



IHP 525 Article Review Sample Biostatistics Final Project Article Review

Overview: This document provides an example of what information is being asked for and how the information for each journal submission can be gathered for easy review. Information is provided for each module where a journal submission is due.

Please Note: Article 2 is *not* featured in this sample review.

For this example, the information on one journal article will be provided. You will be comparing two articles for your article review project. For this example, we will use an article about tea and fluoride:

Silva Linhares, D. P., Ventura Garcia, P., Amaral, L., Ferreira, T., & dos Santos Rodrigues, A. (2017). [Safety evaluation of fluoride content in tea infusions consumed in the Azores—a volcanic region with water springs naturally enriched in fluoride.](#) *Biological Trace Element Research*, 179(1), 158–164.

First, let's look at what information is provided and where in a research article.

The **Introduction** informs us of why this study was done. It summarizes what is currently known about the topic and sometimes what still needs to be discovered. For our example, the introduction explains that this study was conducted to gain further information on the topic of fluoride in tea, specifically when brewed with naturally fluorinated water. Too much fluoride can lead to fluorosis, a cosmetic condition that affects the teeth. Each specific research question (RQ) that the study hoped to answer should be made clear.

In the **Methods** section, the study design and statistical methods used to analyze the data are revealed. It should be made clear who was studied, how they were selected, what interventions were used, if any, and how, when, and what measurements were taken. Then what statistical methods were used to answer each research question should be clearly addressed.

In the **Results** section, the answer to each RQ is provided. Tables, graphs, and figures are used to visually present the answer to the research questions and to describe the sample that was studied. This section has descriptive statistics, test results, and corresponding p-values.

In the **Discussion** section, the authors describe their results in more detail and try to explain why these results occurred and what they mean. This section should also include any limitations of the study and ideas for future research based on experiences from this study.

A short **Conclusion** should be drawn at the end of the article. It is usually free of any statistics and only made up of two to three sentences. It is the message that the authors want their readers to walk away with.

A list of **References** is provided at the end. These are past studies that were mentioned in the introduction or discussion sections.

Module Two	
I.	Background: Use this section to provide a brief context for the health problem, issue, or trend you are researching. Specifically, you should answer the following: <ul style="list-style-type: none">A. What topic or health question did you research, and why is it relevant to public health, nursing, or the health science professions? Give real-world examples to support your answer.B. How can biostatistics help inform decision making around your topic? Support your answer with specific examples.
II.	Article Selection: In this section, discuss how and why you selected your two articles. Be sure to address the following: <ul style="list-style-type: none">A. Explain why you selected these specific articles to examine over the other choices.B. Assess each article's importance to health decision making in your field. Give real-world examples to illustrate your answer.

Background: The topic of fluoride was chosen because fluoride is important for healthy teeth and has been a public health topic for decades. Communities started adding fluoride to their public water systems about 70 years ago as a way to reduce tooth decay and cavities in a large number of people. Fluoride can also occur naturally in the water. Around the same time, fluoride was added to toothpaste as well. However, many communities have stopped adding fluoride to their water as they are worried about people consuming too much.

Biostatistics can be used to prove the effect of adding fluoride to water systems and to toothpaste. We can look at the amount of tooth decay and caries in a population before and after fluoride was introduced in the water or toothpaste. We could also look at if people lose fewer teeth. Smaller studies could be done where we measure variables on a sample of people's teeth and then have them use toothpaste with fluoride or fluoride drops or drink fluorinated water and then measure these same variables again. We call these response variables or outcome variables. We are looking to see if the use of fluoride changes any of these variables (caries, staining on teeth, fluorosis, loss of teeth, etc.).

Article Selection: I picked this article specifically because I drink a lot of tea, and I know that the health of your teeth affects your whole body. I have a bad bite and have been told my teeth may become loose as a result, so getting enough fluoride is important, but it is also important not to get too much. Fluoride is released during tea infusion, so tea drinkers could be at risk of too much fluoride, especially if the water they use is naturally high in fluoride. The use of fluoride is simple way for us to affect the health of an entire population, so it is an important public health

program. The more we can learn about the sources of fluoride, the more effectively we can provide public health programs to ensure everyone gets enough fluoride but not too much fluoride.

	Article 1	Article 2
Full APA citation	Silva Linhares, D. P., Ventura Garcia, P., Amaral, L., Ferreira, T., & dos Santos Rodrigues, A. (2017). Safety evaluation of fluoride content in tea infusions consumed in the Azores—a volcanic region with water springs naturally enriched in fluoride. <i>Biological Trace Element Research</i> , 179(1), 158–164. doi: http://dx.doi.org/10.1007/s12011-017-0947-9	
Purpose of study	To estimate the exposure to fluoride in the Azores through drinking tea prepared with water from different volcanic locations	
Research questions (or RQs—specifically what will be tested or compared)	Does the amount of fluoride in tea vary by origin (location) of water? Does the amount of fluoride in tea vary by commercial brand of tea? Does the amount of fluoride in tea vary by brewing time?	

Module Five	
III.	<p>Findings: This section should highlight the major findings of each of the articles you selected. Specifically address the following:</p> <ul style="list-style-type: none"> A. What are the findings of each article, and what implications do they have individually and collectively for solving the health problem in question? Support your answer with specific examples from your field. B. Explain how key biostatistical calculations and methods support the conclusions in each article. Cite relevant information from the articles that support your answer.

Your long-form response to this table will go in this section. Please remember the table below is to be used to gather your thoughts before responding.

	Article 1	Article 2
Statistical Methods (see table below for description of each possible test)	All RQs deal with comparing the mean of fluoride between groups so the one-way ANOVA with Tukey post hoc tests is appropriate. In the article, they only computed the ANOVA to test for a variation in fluoride across locations. PH in the water was also compared across locations, but the Kruskal–Wallis test was used. It is a nonparametric test used when the outcome variable is severely skewed. It parallels the ANOVA. So the distribution of PH is compared across groups, but without using means. In addition, Pearson correlation statistics were used to assess the linear association between fluoride concentration and amount of PH in the water for different tea subgroups. Line graphs were used to assess the effect of brewing time on fluoride.	
Results (present for each RQ)	Note: RQ Results (answers) can be found in Table 1 and Figure 1 of the article. Review to help your understanding, and review your own journal article(s) for similar information of what that study found.	
Does the amount of fluoride in the tea vary by origin (location) of water? This is the primary RQ of interest.	P-values in Table 1 answer this RQ. The amount of fluoride varies significantly between the three locations ($p < .001$), regardless of type or brand of tea. Looking at the means, we see the SC location has the highest fluoride and PF has the smallest. Mean difference ranges between 0.2 and 0.8 ppm. You should present these means along with the standard deviations for each group. You could also go on and present the means and SEs for various scenarios as they do in the Results section of the article.	
Does the amount of fluoride in the tea vary by commercial brand of tea?	We can answer this looking at the means in Table 1, but no p-value is provided in the table to answer this RQ. The highest fluoride was always in Azorean tea and the lowest amount in International B. We can also see higher mean fluoride levels in black tea than in green tea.	
Does the amount of fluoride vary by brewing time?	See Figure 1. As one might expect, the longer you brew tea, the higher the level of fluoride regardless of brand or type. Depending on the brand of tea, the PH level can increase by 0.5 to almost 2 ppm when going from a brew time of 1 minute to 10 minutes.	
Additional findings	In Table 2 we see that there is a strong, negative statistically significant correlation between PH and fluoride regardless of whether we look at green or black tea or brand or location. The smallest correlation is -0.741 and the largest is -0.999!	

Module Six	
IV.	<p>Methods: Use this section to compare and contrast the methods used in the articles you selected with an eye to assessing the quality and limitations of the findings and informing future research. Specifically, you should address the following:</p> <ul style="list-style-type: none"> A. Explain why the authors of each article selected the methods they did. How appropriate were the methods to the overall purpose of the paper? Justify your response. B. Analyze a difference and similarity in the methods chosen with respect to the health question being addressed in the selected articles. Explain your answer using evidence from the articles selected and information you have learned in the course. C. Assess a strength and limitation of the different approaches used in the articles you selected. Explain your answer using evidence from the articles you selected and information you have learned in the course.

Your long-form response to this table will go in this section. Please remember the table below is to be used to gather your thoughts before responding.

	Article 1	Article 2
Why specific statistical tests were used	The why for each test done is included in the information above for Module Five. Specifically, an ANOVA was the appropriate statistical test to use because mean levels of fluoride were compared between independent groups (defined by the water source and other characteristics of the tea brewing process). Pearson correlation statistics were used appropriately, as PH and fluoride are both continuous variables, and it is of interest to see if they are linearly associated (as PH increases, does fluoride increase or decrease at a continuous rate?).	
Similar methods between articles	Mention which statistical tests and graphs were used in both studies. Why might this be? Did the two studies have similar outcome variables or similar RQs? Did each article present many test results, or did one use less testing?	
Difference in methods	Identify which tests are used in one article but not the other. Was this because outcome variables differed? Because distribution of the data differed? Did each article present many test results, or did one use less testing? Was one clearer than the other?	
Strengths	The study considered the type and brand of tea and brewing time rather than just considering the location and fluoride. Thus this study proved that the association between water location and fluoride held true regardless of the type and brand of tea and brewing time. The results were consistent with other published studies. Correct statistical methodology was used.	
Limitations	Not sure where the water samples were taken from, or whether the time of year and proximity to shore would impact fluoride amounts. Results seem constrained to a specific population.	

Module Seven

Conclusions. What does your evaluation of the strengths and weaknesses of the articles you selected suggest for future research in this field? Be sure to provide specific suggestions for potential next steps based on evidence from your analysis, and explain how these suggestions would help improve decision making.

Your long-form response to this table will go in this section. Please remember the table below is to be used to gather your thoughts before responding.

Conclusion	<p>Tea consumption may lead to too much fluoride in one's diet for people living near water sources with naturally high fluoride concentrations. In such areas it is important to carefully choose the type and amount of tea that is consumed.</p> <p>This article laid out and described the results of this study very clearly, and the study appears to be well done. However, the population of people that this study refers to is very narrow. How do we apply these results to people living in New England, for example? A study that looked at the amount of fluoride in water supplies that are not near volcanic sources would be necessary to help public health professionals apply such results to their populations. Also, it would help to study a larger variety of tea brands. In addition, it would be helpful to study how much tea consumption is necessary to bring on fluorosis and other negative side effects of consuming too much fluoride. Such a study would involve an observational study that followed a cohort of subjects for a long period of time.</p>
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Description of Statistical Tests Covered in IHP 525 and in the Journal Articles Used in Final Project Article Review

Every **parametric test** assumes that the data follow a given distribution and most assume the normal distribution, thus means and standard deviations are used in their computations. For every parametric test, there is a corresponding nonparametric test. **Nonparametric tests** are tests that do not require any assumptions about the distribution of your data. Below is a list each of the parametric tests mentioned in this course along with the corresponding nonparametric test. It is always best to use the parametric test when you can, as they are more powerful and thus result in smaller p-values.

Module	Parametric Test	Nonparametric test	When to Use
Four, Five	*One sample z-test (use with large n or when σ known), *One sample t-test (use S rather than σ)	Kolmogorov–Smirnov test (K–S)	With the z-test and t-test, you assume the data follow the normal distribution and compare the mean of a sample to a specified value. Use K–S when you want to compare the distribution of a continuous variable to a specified known distribution.

Module	Parametric Test	Nonparametric test	When to Use
Six	*Paired t-test (or repeated measures when measures taken multiple times)	Signed rank test, Freidman's test for repeated measures (McNemar test when outcome is categorical with just two categories)	Use to compare the values of a continuous variable within pairs (or between time points or conditions on same person) and test for a difference. Example: Does ocular pressure vary between a person's left eye and right eye? McNemar used if variable is dichotomous (like yes/no). Example: Compare if an eye has cataracts between left and right eyes or between time points.
Six, Seven	*Independent t-test, *ANOVA and *post-hoc tests	Wilcoxon rank sum test or Kruskal–Wallis test or Mann–Whitney U test or Kolmogorov–Smirnov test	When want to compare whether the values of a continuous variable vary between independent groups. Independent t-test and ANOVA compare means between independent groups. Nonparametric tests compare the median values or the ranks of the values between independent groups.
Seven	*Z-test of proportions	*Fisher's exact test, chi-square test	Compare proportions between independent groups (i.e., test the association between two categorical variables). Example: Does the proportion of people with diabetes vary between Americans and Europeans?
Nine	*Pearson Correlation; *linear regression	Spearman Correlation	Use to measure the strength and direction of a linear association (parametric version) or monotonic association (nonparametric) between two continuous variables.

Note: Asterisk (*) indicates tests covered in IHP 525.