**Chi-Square Test – Anemia and Disabilities**

Lin, Lin, Lin, Hsu, Lob, Yen, Fang, Chien, Tang and Wu (2010) conducted a study to see if there were any relationships between whether or not a child has anemia and whether or not they have an intellectual disability[[1]](#footnote-1). In 2008, physical examinations of 937 children and adolescents with intellectual disabilities were taken. Blood hemoglobin concentration (Hb) was recorded for each individual since this can help determine if an individual has anemia. If an individual has abnormal (low) Hb levels, that would indicate that the individual has anemia. Abnormal Hb levels were defined as having a measure below 13 g/dl in men and 12 g/dl in women.

**Discuss the Following Questions**

1. What would be an appropriate research question for this study?
2. What would be the null and alternative hypothesis statements that would be used to answer the research question?

H0:

Ha:

The table below includes some of the data from the study.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
|  |  | Hemoglobin Concentration | |  |
|  |  | Normal | Abnormal (low) | Totals |
| Disability Level | Mild + Moderate | 482 | 51 | 533 |
| Severe + Profound | 345 | 58 | 403 |
|  | Totals | 827 | 109 | 936 |

* Use the statistical software of your choice (e.g., R, SAS, StatCrunch) to conduct a chi-square test.

1. What conditions need to be met in order to conduct a chi-square test? Are they met?
2. Provide an answer to the research question.

**EXTENSIONS**

1. Did you get the same p-value as Lin et.al. (2010) computed? See page 29 of the article.
2. Can a chi-square test be used to test the following hypothesis? Why or why not?

H0: Average Hb levels are equal for children and adolescents that have mild/moderate disabilities and those that have severe/profound disabilities.

Ha: Average Hb levels are lower for children and adolescents that severe/profound disabilities.

1. If you cannot use a chi-square test to test the hypothesis in the previous question, what type of hypothesis test could you use?
2. Can you generalize these results to all children and adolescents with intellectual disabilities? Why or why not?
3. Can you state that lower Hb levels cause children and adolescents to have anemia? Why or why not?

1. Lin, J., Lin, P., Lin, L., Hus, S., Loh, C., Yen, C., Fang, W., Chien, W., Tang, C., & Wu, C. (2010). Prevalence and associated risk factors of anemia in children and adolescents with intellectual disabilities. *Research in Developmental Disabilities, 31*, pp. 25-32. doi: 10.1016/j.ridd.2009.07.017 [↑](#footnote-ref-1)