

We will conduct a chi-square test to determine if the difference in these sample proportions is large enough that we can attribute it to a genuine difference between the groups rather than to random chance.

(e) State the null and alternative hypotheses, in symbols and in words.

(f) What proportion of the mothers (for the two groups combined) had HIV+ babies?

(g) Use this proportion to determine the expected counts of HIV+ babies in the two groups.

(h) Determine the expected counts of HIV- babies in the two groups.

Note that we could also have found these expected counts by: $E = \frac{(\text{row total}) \times (\text{column total})}{\text{grand total}}$.

(i) Calculate the chi-square statistic in the usual way: $\chi_s^2 = \sum \frac{(O - E)^2}{E}$.

When analyzing a 2×2 table, use 1 degree of freedom for the chi-square distribution.

(j) Determine the P -value from Table 9. [Remember to divide the tail area in half because this test is directional.]

(k) What conclusion would you draw from this test?

(l) Can you draw a cause-and-effect conclusion between AZT and the baby's HIV status? [*Hint*: Was this an observational study or a controlled experiment?]

(m) What would you say to a woman who was in the control group and had an HIV+ baby, who feels wronged that AZT was available and would have helped her baby's chances, but it was not given to her?

Example: Violence begetting violence

To study the notion that victims of violence exhibit more violent behavior toward others, a researcher searched court records to find 908 individuals who had been victims of abuse as children. She then found a control group of 667 individuals who had not been victims of violence as children. The researcher then searched through subsequent years of court records to determine which of these individuals went on to commit a violent crime. She found that 102 of the 908 individuals who had been abused as children went on to commit a violent crime as an adult and that 53 of the 667 individuals in the control group committed a violent crime as an adult.

(a) Is this an observational study or a controlled experiment? Explain.

(b) Identify the explanatory and the response variable in this study.

(c) Create a 2×2 table to present these data.

(d) Conduct a chi-square test of the researcher's hypothesis. Report the hypotheses, test statistic, and P -value. What conclusion would you draw at the $\alpha = .05$ significance level?

(e) Does the design of this study enable you to draw a cause-and-effect conclusion? Explain.

Create an example:

Suppose that you are testing whether men and women have different survival rates from a certain disease over a certain period of time.

a) Fill in the following table in such a way that there is absolutely no difference in the survival proportions of men and women:

	Men	Women	Total
Survived			400
Died			100
Total	200	300	500

b) What would the value of the chi-square test statistic be for this table? Explain.