

10.5: Report Conclusions in Non-statistical Language

The hypothesis test has been conducted and we have reached a decision. We must now communicate these conclusions so they are complete, accurate, and understood by the targeted audience. How a conclusion is written is open to subjective analysis, but here are a few suggestions.

Be consistent with the results of the Hypothesis Test

Rejecting H_o requires a **strong statement** in support of H_a , while failing to reject H_o does NOT support H_o , but requires a **weak statement** of insufficient evidence to support H_a .

Example



A researcher wants to support the claim that, on average, students send more than 1000 text messages per month, and the research hypotheses are $H_o : \mu = 1000$ vs. $H_a : \mu > 1000$

Conclusion if H_o is rejected: The mean number of text messages sent by students exceeds 1000.

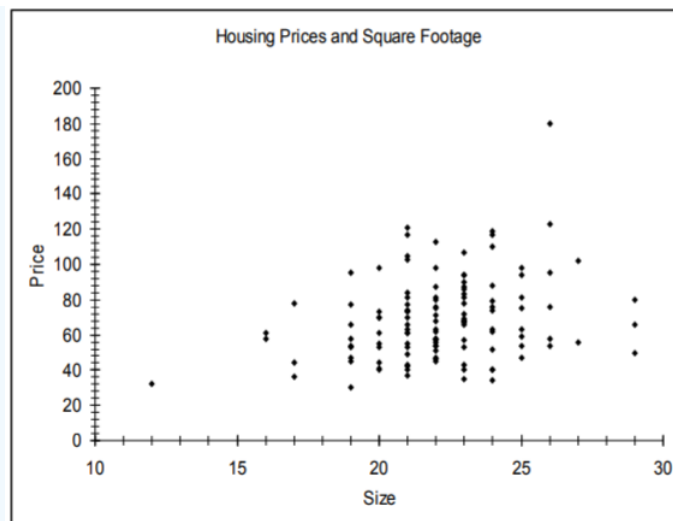
Conclusion if H_o is not rejected: There is insufficient evidence to support the claim that the mean number of text messages sent by students exceeds 1000.

Use language that is clearly understood in the context of the problem

Do not use technical language or jargon, but instead refer back to the language of the original general question or research hypotheses. Saying less is better than saying more.

Example

A test supported the Alternative Hypothesis that housing prices and size of homes in square feet were positively correlated. Compare these two conclusions and decide which is clearer:



Solution

Conclusion 1: By rejecting the Null Hypothesis we are inferring that the Alternative Hypothesis is supported and that there exists a significant correlation between the independent and dependent variables in the original problem comparing home prices to square footage.

Conclusion 2: Homes with more square footage generally have higher prices.

Limit the inference to the population that was sampled

Care must be taken to describe the population being sampled and understand that the any claim is limited to this sampled population. If a survey was taken of a subgroup of a population, then the inference applies only to the subgroup.

For example, studies by pharmaceutical companies will only test adult patients, making it difficult to determine effective dosage and side effects for children. “In the absence of data, doctors use their medical judgment to decide on a particular drug and dose for children. ‘Some doctors stay away from drugs, which could deny needed treatment,’ Blumer says. ‘Generally, we take our best guess based on what’s been done before.’ The antibiotic chloramphenicol was widely used in adults to treat infections resistant to penicillin. But many newborn babies died after receiving the drug because their immature livers couldn’t break down the antibiotic.”⁷³ We can see in this example that applying inference of the drug testing results on adults to the un-sampled children led to tragic results.

Report sampling methods that could question the integrity of the random sample assumption

In practice it is nearly impossible to choose a random sample, and scientific sampling techniques that attempt to simulate a random sample need to be checked for bias caused by under-sampling.

Telephone polling was found to under-sample young people during the 2008 presidential campaign because of the increase in cell phone only households. Since young people were more likely to favor Obama, this caused bias in the polling numbers. Additionally, caller ID has dramatically reduced the percentage of successful connections to people being surveyed. The pollster Jay Leve of SurveyUSA said telephone polling was “doomed” and said his company was already developing new methods for polling.⁷⁴

Sampling that didn’t occur over the weekend may exclude many full time workers while self-selected and unverified polls (such as ratemyprofessors.com) could contain immeasurable bias.

Conclusions should address the potential or necessity of further research, sending the process back to the first procedure

Answers often lead to new questions. If changes are recommended in a researcher’s conclusion, then further research is usually needed to analyze the impact and effectiveness of the implemented changes. There may have been limitations in the original research project (such as funding resources, sampling techniques, unavailability of data) that warrant more comprehensive studies.

For example, a math department modifies its curriculum based on the improved student success rates of an experimental course. The department would want to do further study of student outcomes to assess the effectiveness of the new program.

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