

Sampling Plan

The central purpose of this analysis is to determine the mean trip length to campus for the university community. We desire enough samples to estimate the mean trip length within 1 miles at 95% confidence.

Trip length frequency distributions are not distributed normally, but we can simplify this analysis by asserting a normal distribution for the number of necessary samples,

$$N = \frac{\sigma^2 z^2}{\epsilon^2},$$

where σ is the standard deviation, z is the z score of the desired confidence level—which is 1.96 for 95% confidence on a two-sided test—and ϵ is the desired margin of error.

The standard deviation of trip lengths is a difficult parameter to estimate for a new population, particularly given the geographic and land use constraints that enter the equation. Though we have no local data to base this estimate on, we obtained information on university trips from the Reno, Nevada travel demand model (home of the University of Nevada, Reno). The distribution of these trips is presented in Figure 1. The weighted standard deviation of these trips is 10.2 miles.

Given the desired accuracy and confidence alongside the transferred standard deviation from Reno, the analysis requires 400 survey responses in each group. Using an assumed response rate of 20%, we plan distribute the survey to 2000 graduate and undergraduate students.

We have obtained permission to distribute the survey in the Civil and Construction Engineering department email, which goes out to 916 students, and the BYU sustainability email, which goes out to about 600 students. We can also potentially distribute the survey in the BYU First-Generation Student newsletter, which goes out to 179 students.

With these emails we are able to send the survey to 1695 students. With the assumed response rate of 20%, we expect 339 responses. This is less than our required number, and so we also plan to take a convenience sample of students on campus. We plan to set up a booth in the student center for a week, and ideally we will be able to obtain the remaining 61 required responses. This convenience sample, though not perfect, will additionally help us weight our results, as the current email channels we plan to utilize for distribution are not particularly representative of campus.

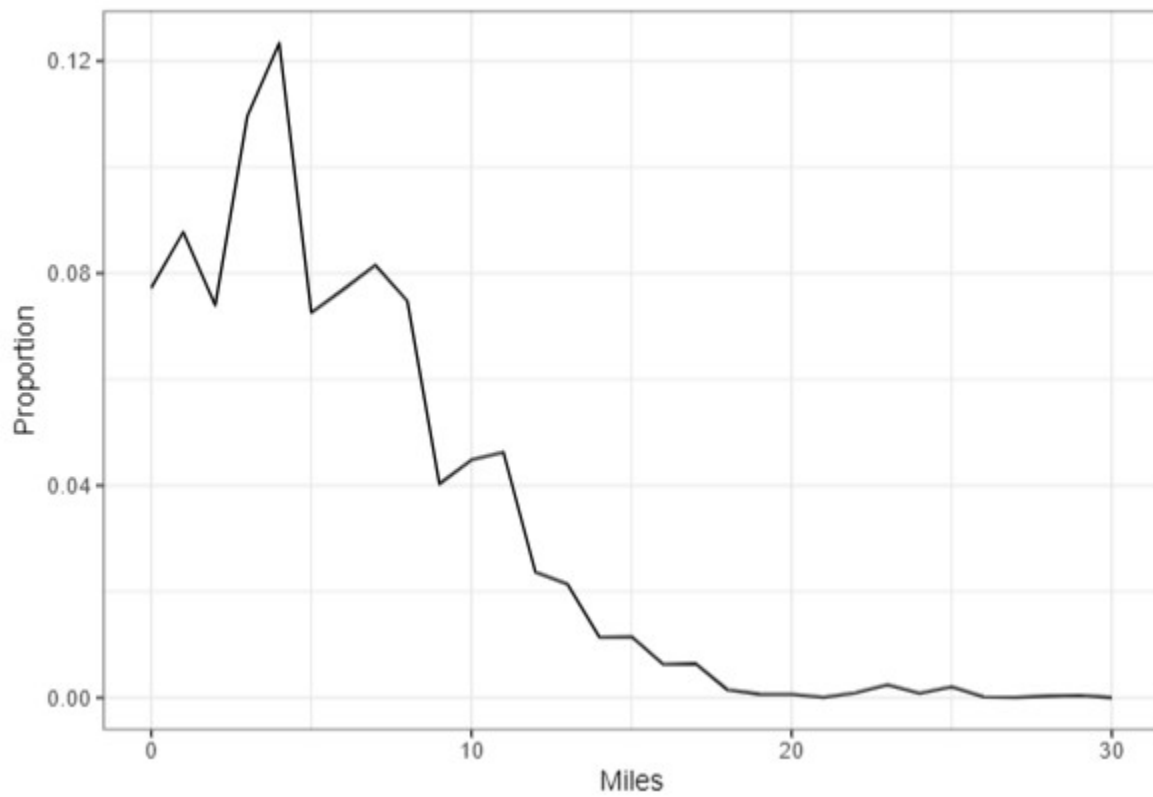


Figure 1: University trip length frequency distribution for Reno, NV.
Data from Reno/Washoe County travel demand model.