Introducing Estimation

Poll results

A new Marquette Law School Poll finds 44 percent of Wisconsin likely voters supporting Democratic candidate Hillary Clinton for president and 37 percent supporting Republican Donald Trump, with Libertarian Gary Johnson at 9 percent and Green Party candidate Jill Stein at 3 percent.

Charles Franklin, Oct. 12, 2016, law.marquette.edu/poll/

Poll results

The full sample of the Oct. 6-9 survey comprises 1,000 registered voters interviewed by cell phone or landline, with a margin of error of +/- 3.7 percentage points. Results for likely voters are based on 878 respondents, with a margin of error of +/- 3.9 percentage points.

Charles Franklin, Oct. 12, 2016, law.marquette.edu/poll/

Using the margin of error

Sampling distribution of a statistic

Distribution of a statistic calculated from different samples of size n drawn from the same population

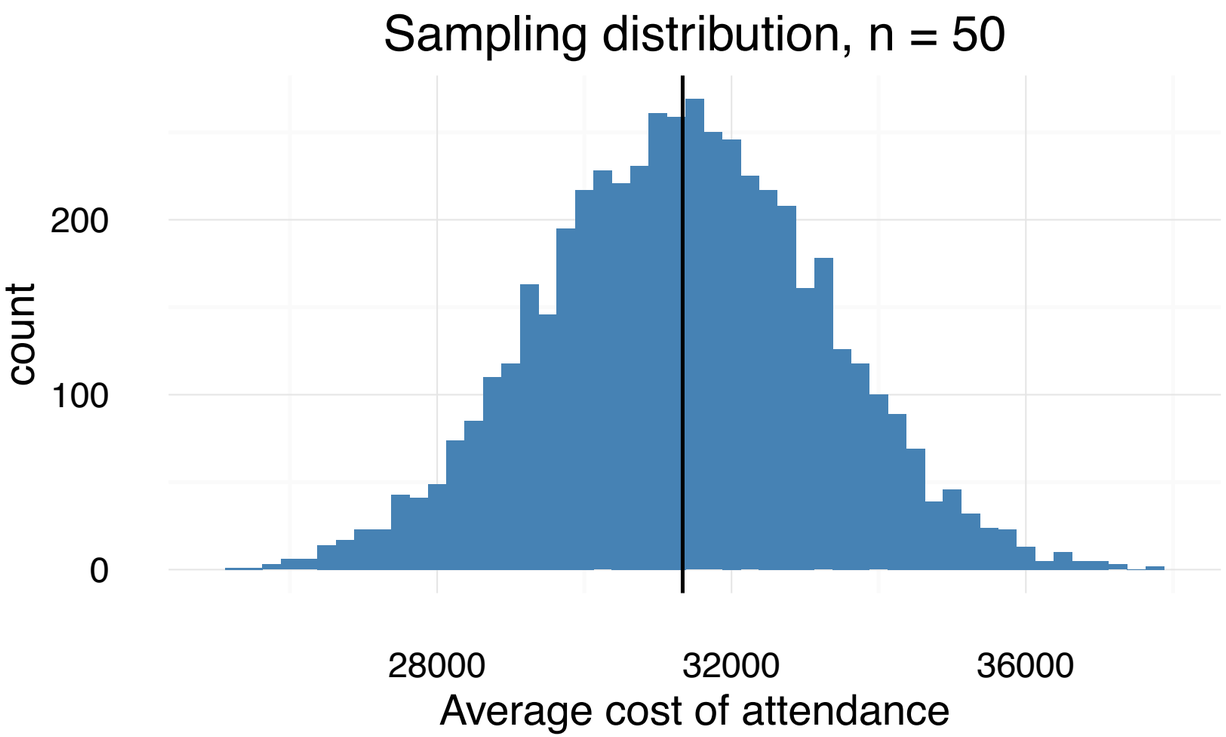
Summarizes the behavior of the statistic calculated from n observations

Example

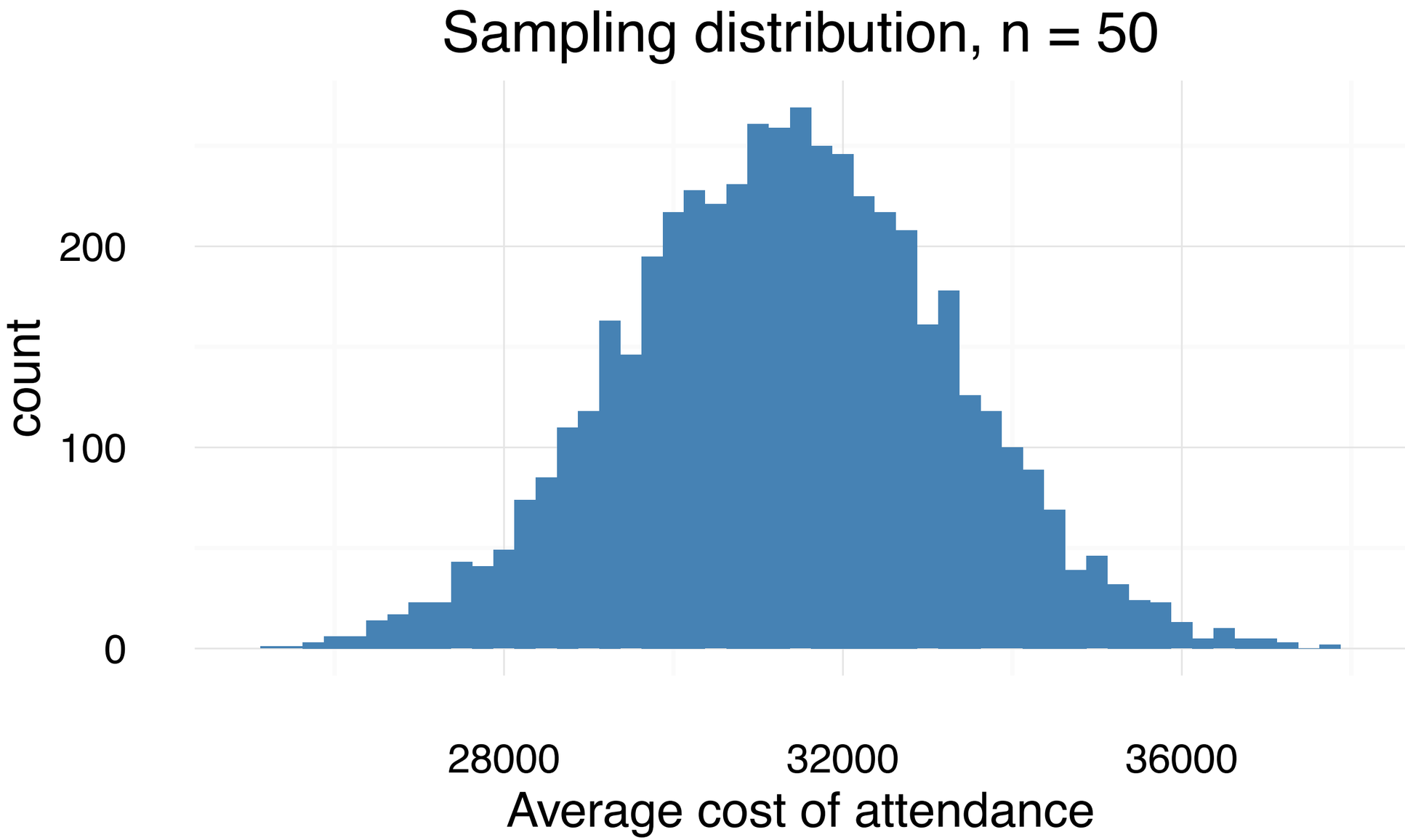
The 2015 college scorecard data set comprised of the 1,776 non-profit colleges/universities in the U.S.

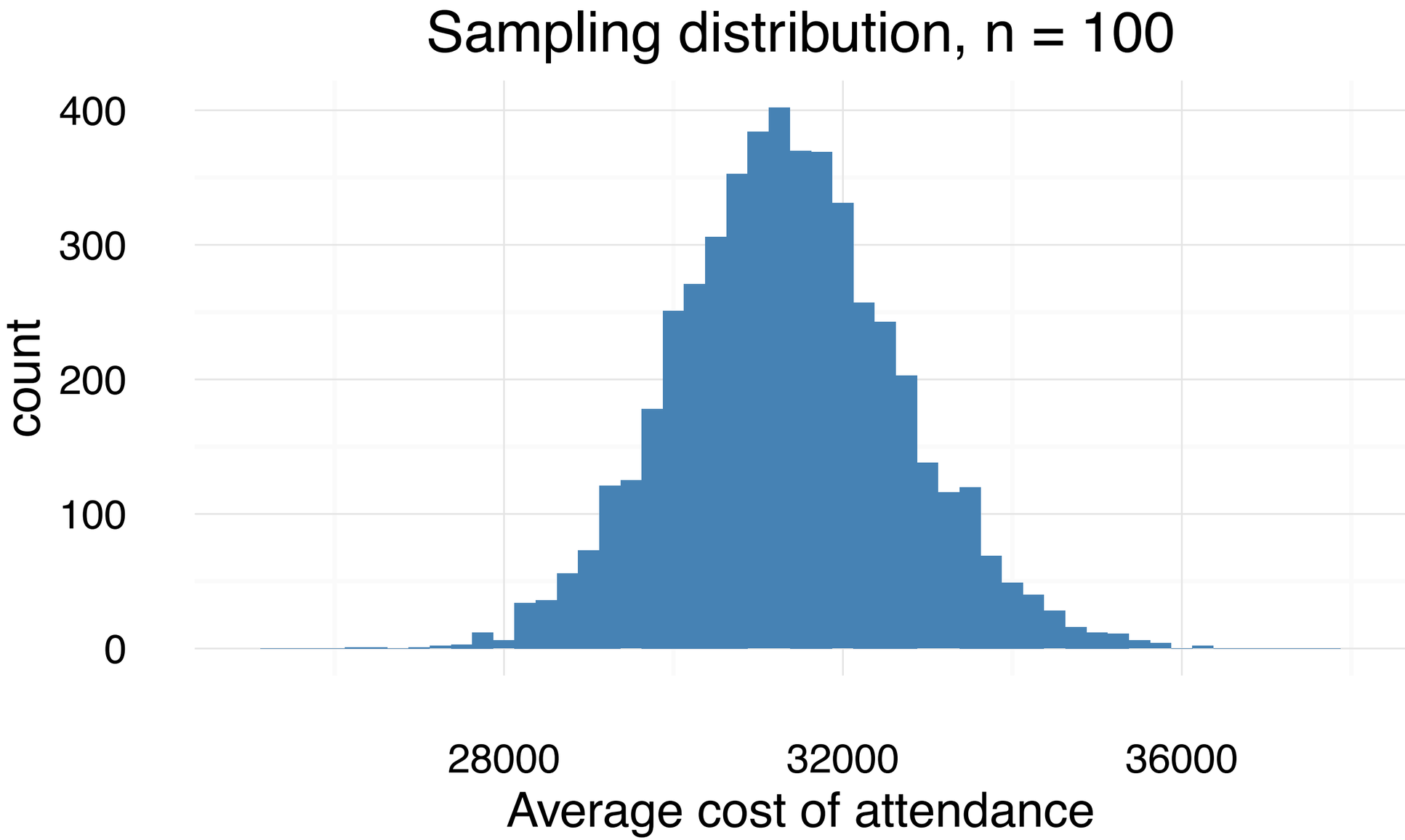
Average cost of attendance = μ = $31,336

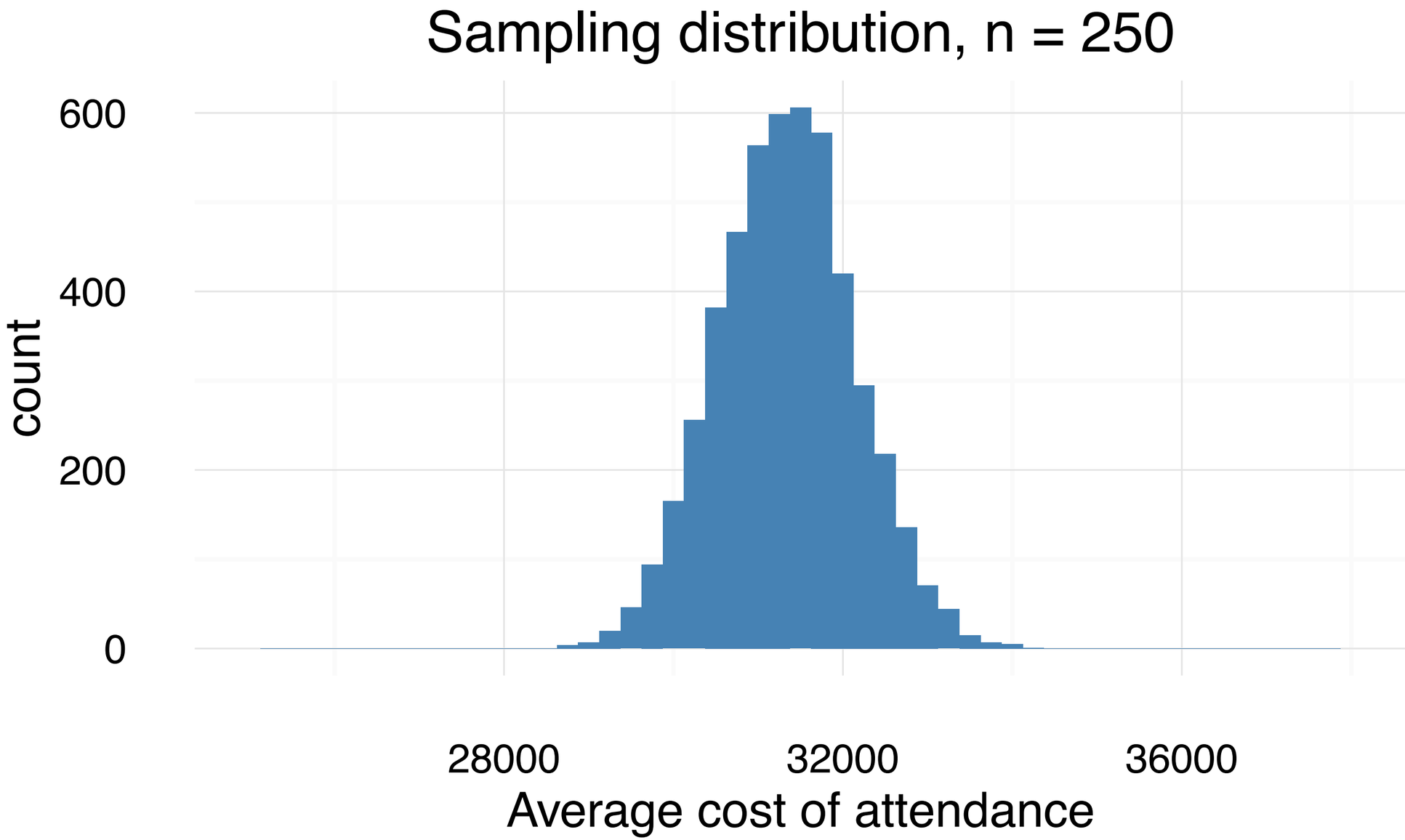
Properties



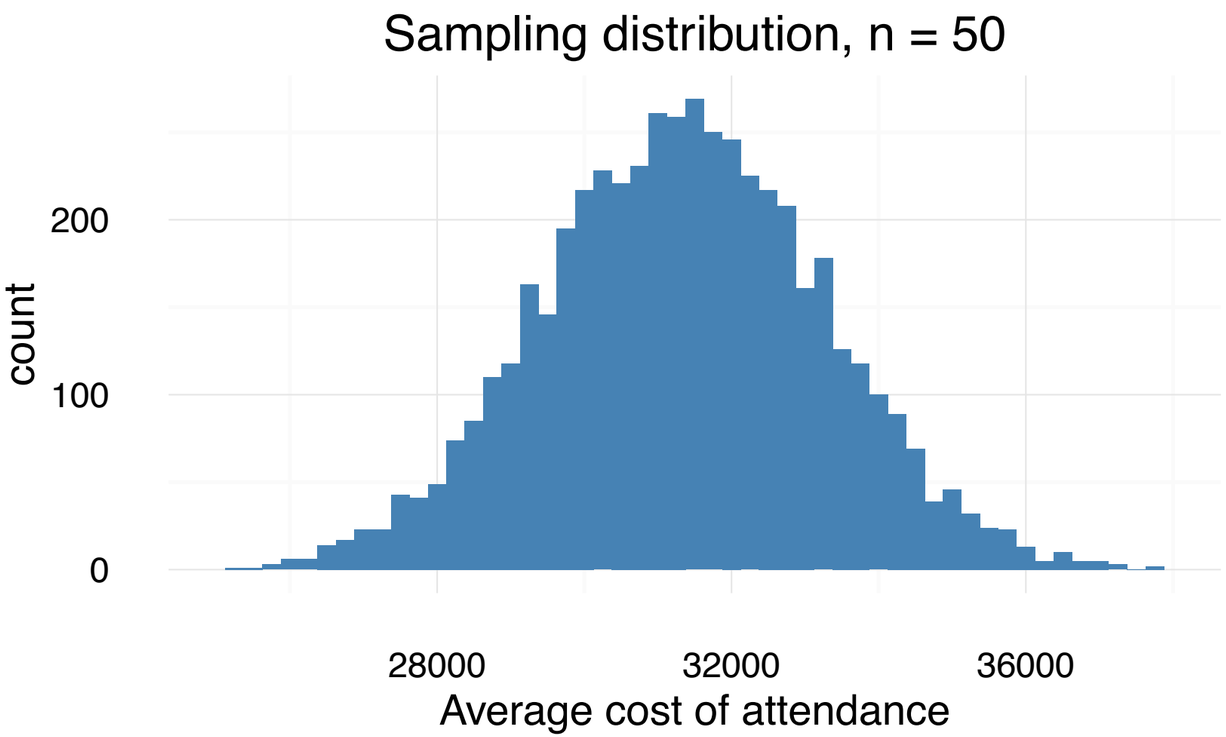
Centered around the true parameter if the sampling scheme is unbiased


Sampling distribution, n = 50
count
200
100
0
28000
32000
36000
Average cost of attendance


Sampling distribution, n = 100
count
400
300
200
100
0
28000
32000
36000
Average cost of attendance


Sampling distribution, n = 250
600
400
200
0
count
28000
32000
36000
Average cost of attendance

Standard error (SE)



The standard deviation of the sampling distribution

Smaller for larger sample sizes

Confidence intervals

For a bell-shaped sampling distribution

ME ≈ 2 · SE for 95% confidence intervals

In our example SE ≈ 1913 for the sample of size n=50

Interpreting confidence intervals

95% of all samples yield intervals that contain the true parameter, so we say that we are "95% confident" or "95% sure" that one interval contains the truth.