

SAMPLING

MPA 630: Data Science for Public Management

November 1, 2018

*Fill out your reading report
on Learning Suite*

PLAN FOR TODAY

Exam 2

Sampling vocabulary

Sampling in real life

Sampling with computers

EXAM 2

SAMPLING VOCABULARY

DEFINING THE POPULATION

Population

A collection of things
in the world

Population parameter

Something we want to
know about the population

COUNTING THE POPULATION

Census

Count every single thing in
the whole population

Sampling

Select parts of the
population and count those

MEASURE THE SAMPLE

Sample statistic or point estimate

The population parameter,
but for the sample

Uses the hat sign; p-hat

p

\hat{p}

IS THE SAMPLE GOOD?

Representativeness

Does the sample look like the population?

Bias and randomness

Does every part of the population have
the same chance of being sampled?

Generalizability

Is \hat{p} a good guess of p ?

WHY EVEN DO THIS?

Censuses are expensive
and often impossible

If a sample is taken at random...

...it will be unbiased and representative...

...and the sample estimates can
generalize to the whole population
(within a confidence interval)

WHAT IF *YOU* AREN'T COUNTED?

**Sampling gets us accurate estimates
of population parameter—even if
samples seem small!**

Statistical power

SAMPLING IN REAL LIFE

M & M SAMPLING

Define the population

What thing are we counting?

What parameter are we measuring?

Count the population

Census or sample?

Measure the sample

What is our p-hat?

Is the sample good?

Is the sample representative?

Is the sample biased?

Is p-hat a good guess?



THE TRUE *p*

Plant	City	Blue	Brown	Green	Orange	Red	Yellow
CLV	Cleveland, OH	20.7%	12.4%	19.8%	20.5%	13.1%	13.5%
HKP	Hackettstown, NJ	25.0%	12.5%	12.5%	25.0%	12.5%	12.5%

“Our color blends were selected by conducting consumer preference tests, which indicate the assortment of colors that pleased the greatest number of people and created the most attractive overall effect.”

“Each large production batch is blended to those ratios and mixed thoroughly. However, since the individual packages are filled by weight on high-speed equipment, and not by count, it is possible to have an unusual color distribution”

IMPROVING \hat{p}

**What can we do to get a better estimate
of the whole population of M&Ms?**

More samples?

Bigger samples?

Bigger sample size = better sampling

SAMPLING WITH COMPUTERS