

## 7.1 Sampling Designs

A parameter is a number that describes a characteristic about a population.

Ex:  $\mu, \sigma, p \rightarrow$  population proportion

A statistic is a number that describes a characteristic about a sample.

Ex:  $\bar{x}, s, \hat{p} \rightarrow$  sample proportion

Ex: I identify population, parameter, sample, and the statistic.

A CNN poll asked 1,102 12 to 17 year olds in the U.S. if they have a cell phone. Of the respondents, 71% said yes.

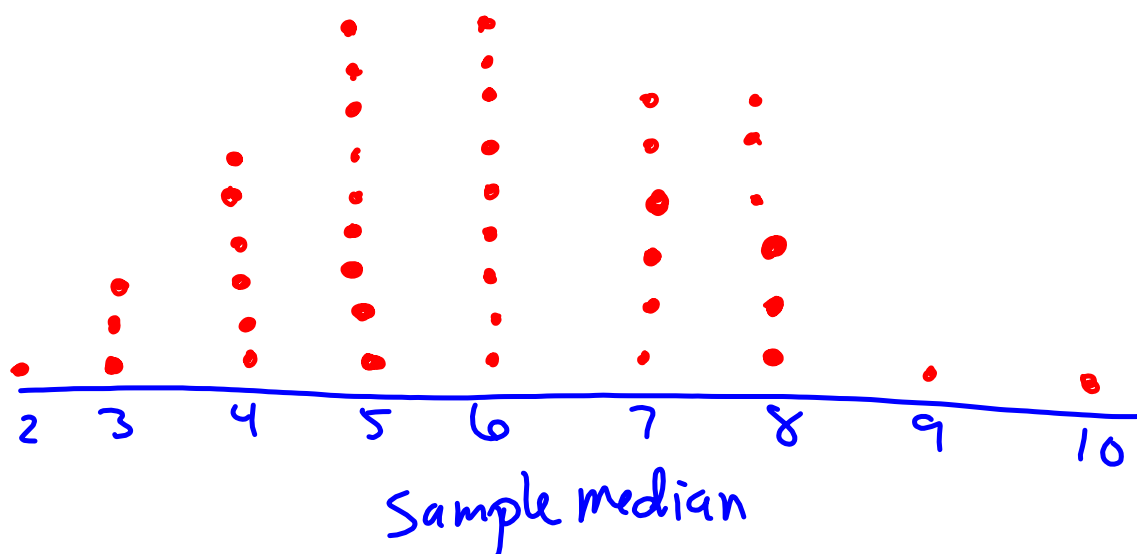
Pop: All 12 to 17 year olds in the US

Parameter: The % of all 12 to 17 year olds in the US who have a cell phone.

Sample: 1102 12 to 17 year olds in the US who responded to the poll.

Statistic: 71% of 12 to 17 year olds in the sample who have cell phones

Sampling Variability: the value of a statistic in repeated random sampling varies.

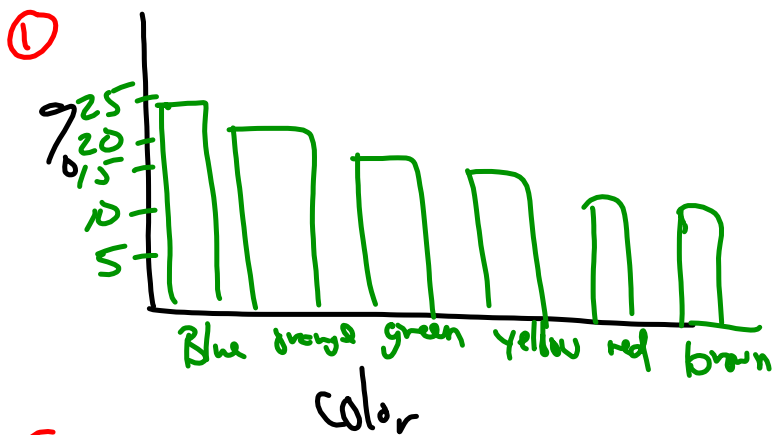


## Sampling Distribution of a statistic

is the distribution of values taken on by a statistic in all possible samples of the same size from the same population.

Distribution of a sample: individual trials  
Sampling Distribution: All trials together

check your understanding p. 428



$$\hat{p} = \frac{12}{50} = 24\%$$

③  $p$  = proportion of orange = 20%

$\hat{p}$  = Sample proportion of orange  $\approx 20\%$

## Describe a Sampling Distribution

### Center: Bias

A statistic used to estimate a parameter is an unbiased estimator if the mean of its sampling distribution is equal to the value of the parameter being estimated.

### Spread: Variability

The variability of a statistic is described by the spread of the sampling distribution. Spread is determined by the size of the sample. Larger samples give lower variability (but not lower bias). It will not depend on the size of the population as long as the 10% condition is met.

