

SAMPLING ERROR AND DISTRIBUTION

Sampling error

The difference between statistic and parameter

$$\bar{y} - \mu$$

Sampling distribution

Distribution of our statistic from multiple samples

$$\hat{f}(\bar{y})$$

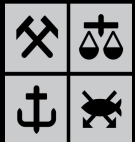
WHAT IS THE MEAN HEIGHT OF AN ADULT IN THE NHANES DATASET?

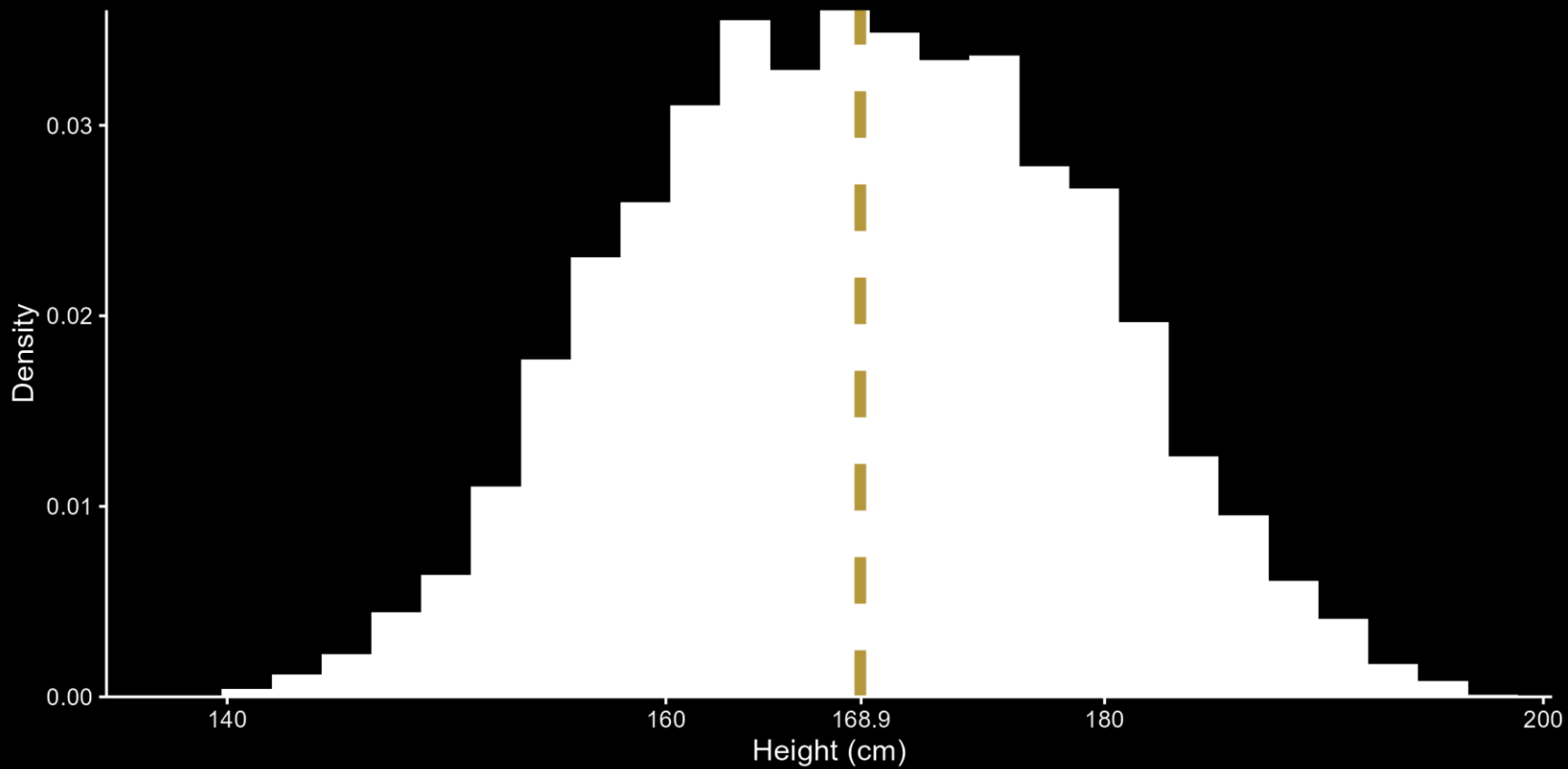
- Population: Adults in the NHANES dataset
- Mean height: $\mu = 168.9$
- Standard deviation: $\sigma = 10.1$

(Assume we do not know this)



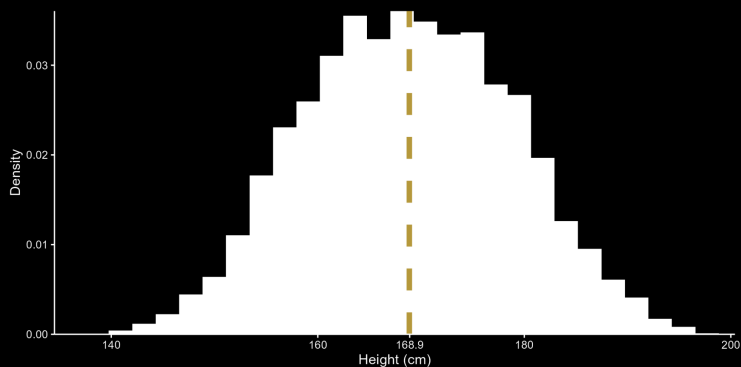
NHH
TECH3





NHH
TECH3





172.9

171.7

172.5

155.1

156.8

180.1

163.9

150.1

166.6

163.6

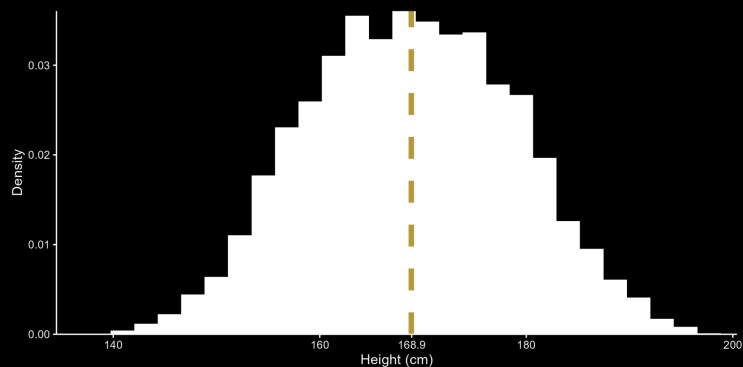
$$\bar{y} = 165.33$$

Sampling error:

$$\bar{y} - \mu = 165.33 - 168.9 = -3.57$$

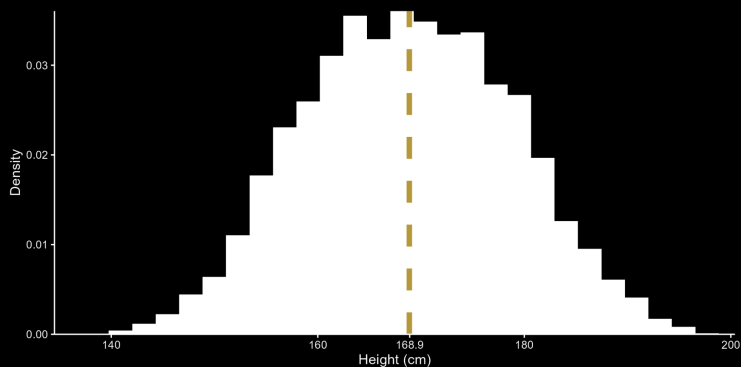
NHH
TECH3





172.9	172.3
171.7	157.1
172.5	176.8
155.1	169.6
156.8	164.6
180.1	174.4
163.9	157.7
150.1	173.0
166.6	158.2
163.6	174.1

$$\bar{y} = 165.33 \quad 167.78$$

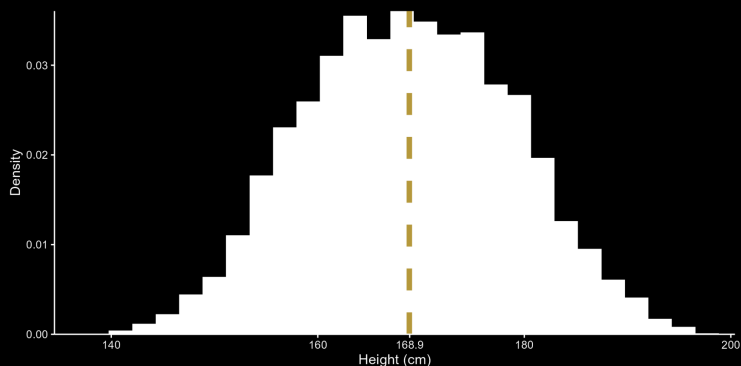


172.9	172.3	152.9
171.7	157.1	174.3
172.5	176.8	174.2
155.1	169.6	168.3
156.8	164.6	168.6
180.1	174.4	164.5
163.9	157.7	188.6
150.1	173.0	157.7
166.6	158.2	173.1
163.6	174.1	148.5

$\bar{y} = 165.33$ 167.78 167.07

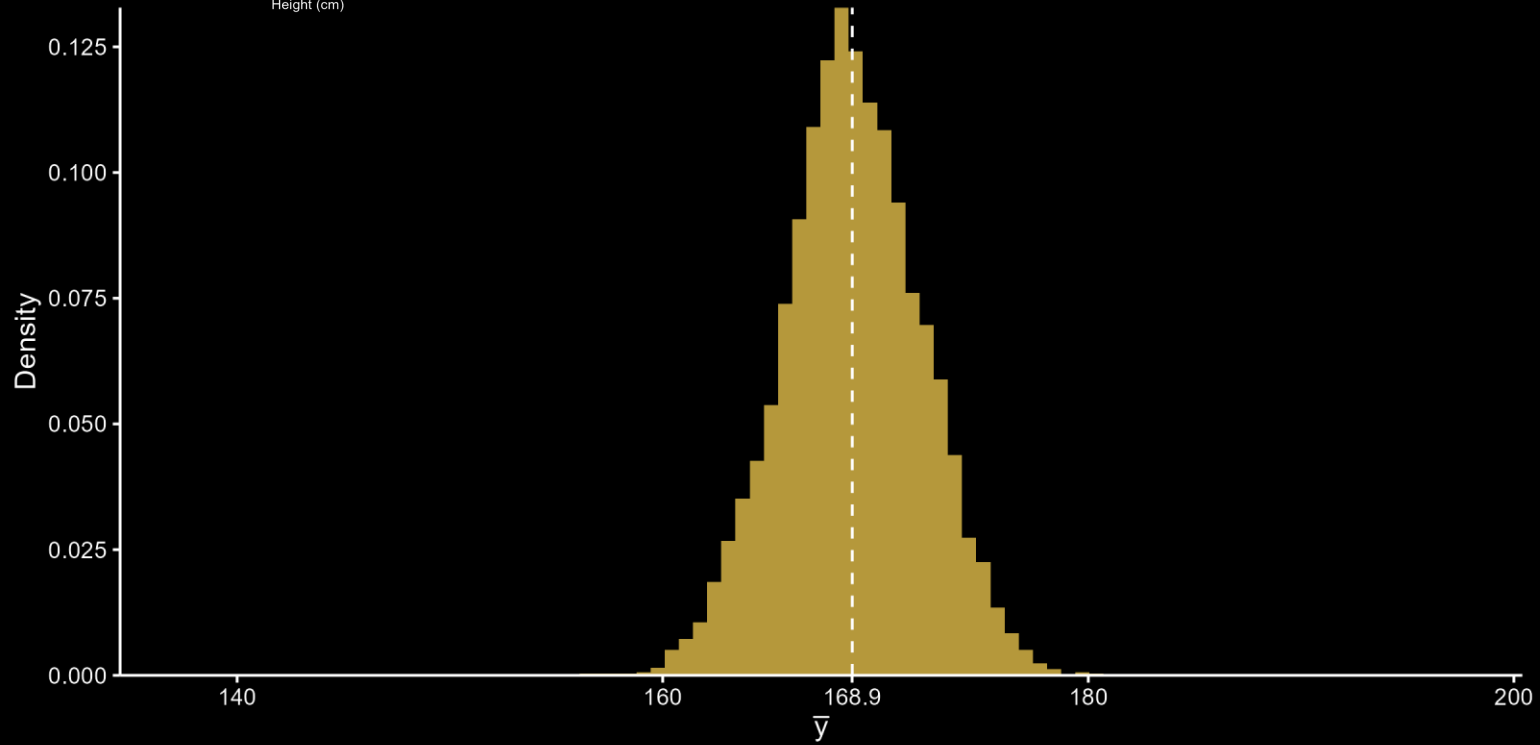
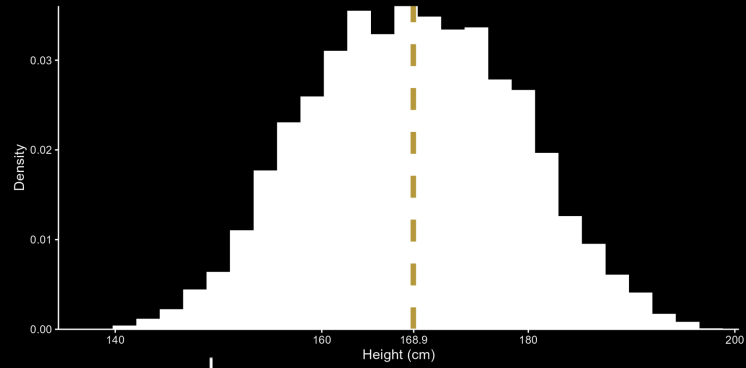
NHH
TECH3



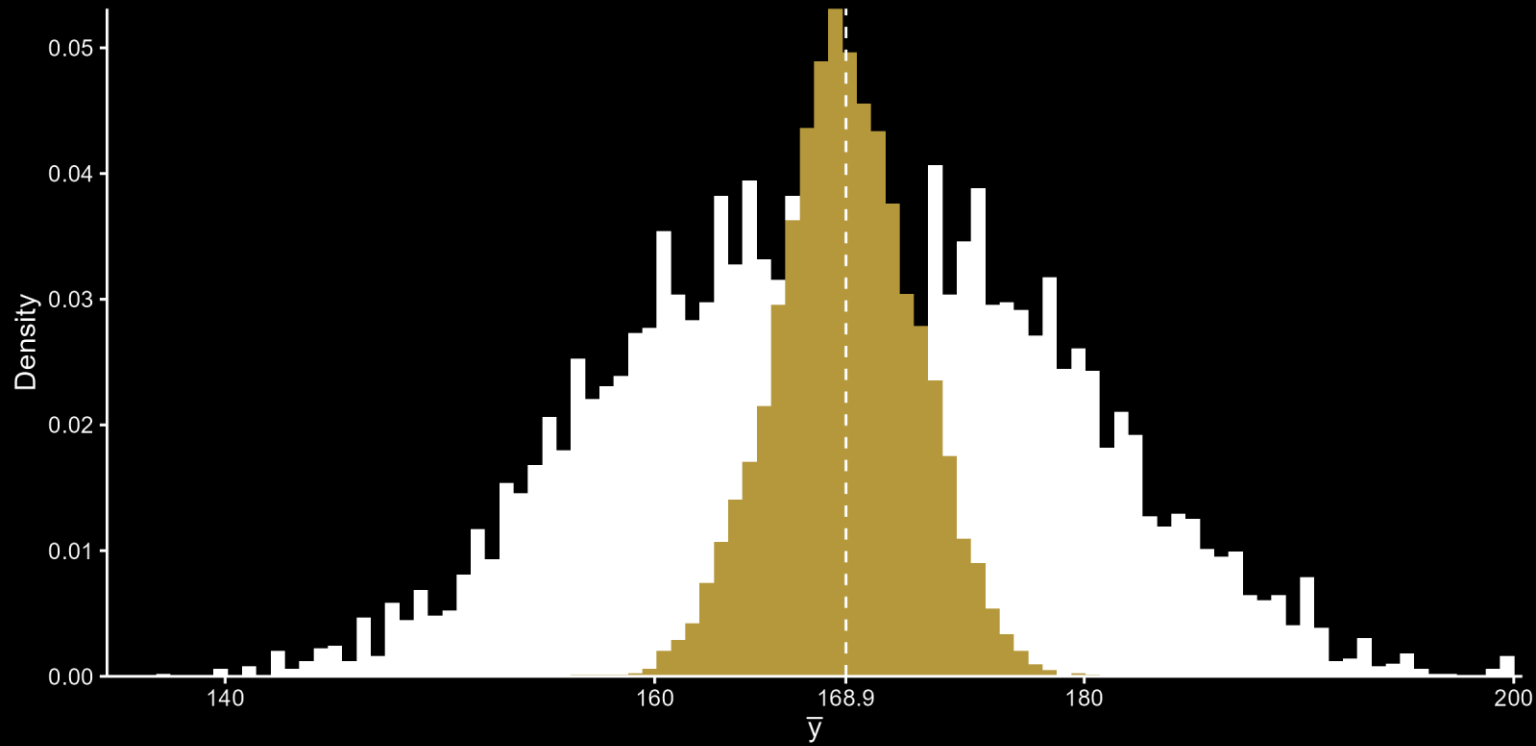


172.9	172.3	152.9	163.6
171.7	157.1	174.3	176.2
172.5	176.8	174.2	166.3
155.1	169.6	168.3	174.8
156.8	164.6	168.6	163.8
180.1	174.4	164.5	182.8
163.9	157.7	188.6	158.2
150.1	173.0	157.7	166.3
166.6	158.2	173.1	168.6
163.6	174.1	148.5	156.4

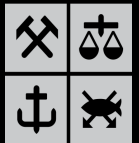
$$\bar{y} = 165.33 \quad 167.78 \quad 167.07$$



Sample size 10

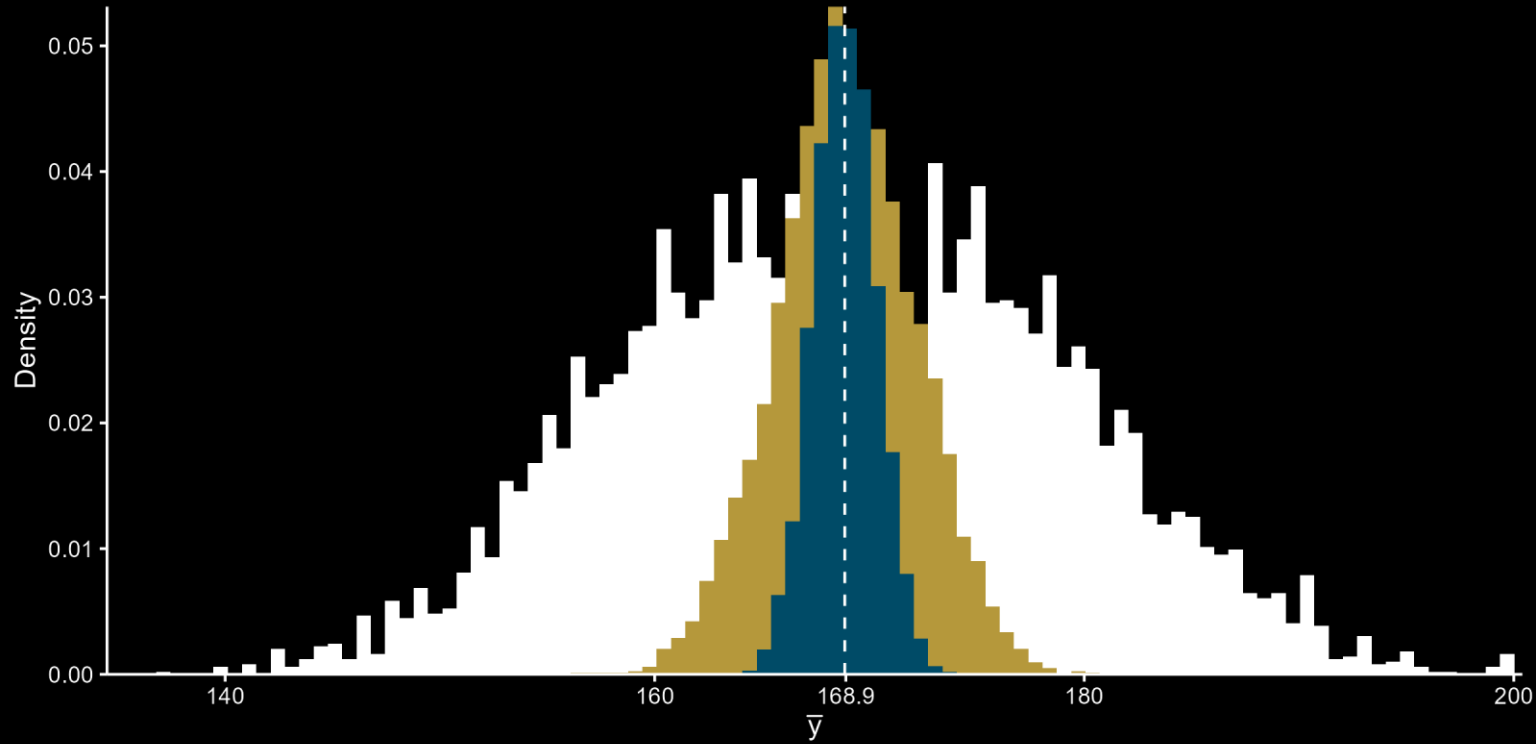


NHH
TECH3

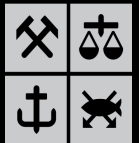


Sample size 10

Sample size 50



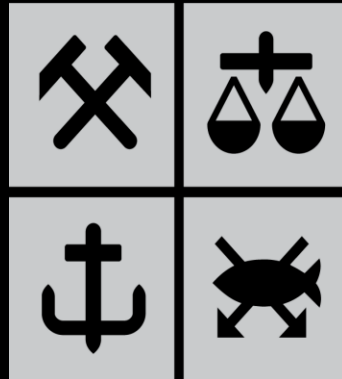
NHH
TECH3



	Mean	Standard deviation
Population	168.9	10.1
\bar{y}_{10}	168.9	3.21
\bar{y}_{50}	168.9	1.45

$$SD(\bar{Y}_n) = \frac{\sigma}{\sqrt{n}}$$

NHH TECH3



Sondre Hølleland
Geir Drage Berentsen