Sampling Distribution Worksheet Name: Key

Epilepsy is a medical condition that produces seizures affecting a variety of mental and physical functions. Its also called a seizure disorder. When a person has two or more unprovoked seizures, they are considered to have epilepsy. The Epilepsy Foundation reports that active epilepsy (history of the disorder plus a seizure or use of antiepileptic medicine within the past 5 years) is prevalent in 0.9% of Americans.

Questions

1. What is the parameter of interest, p? and what is its value?
   The proportion of all Americans who have active epilepsy. It's value is 0.9%.

2. What is the smallest sample size, n, we could use and still have the np condition satisfied? (remember to use p as a proportion and not a percentage in this formula.)

$$\begin{aligned} np &> 10 \\ n(0.009) &> 10 \\ n &> \frac{10}{0.009} \\ n &> 1,111.1 \\ \text{So } n &= 1,112 \end{aligned}$$

$$\begin{aligned} n(1-p) &> 10 \\ n(0.991) &> 10 \\ n &> \frac{10}{0.991} \\ n &> 10.1 \\ \text{So } n &= 11 \end{aligned}$$

   So $n = 1,112$ is the smallest sample size that satisfies the condition.

3. Is the 10% condition satisfied with the sample size you calculated in problem 2?
   $n = 1,112$ is less than 10% of the Unites States population (350 million people)

4. What is the Sampling Distribution?

$$\begin{aligned} \mu(\hat{p}) = p &= 0.009 \\ \sigma(\hat{p}) = \sqrt{\frac{p(1-p)}{n}} &= \sqrt{\frac{0.009(1-0.009)}{1,112}} = 0.0028 \end{aligned}$$

   Therefore, $\hat{p}$ is N(0.009, 0.0028)

5. Use the 68-95-99.7 Rule to find an interval in which 95% of $\hat{p}$ values will be contained.
   95% of the observations will be within 2 standard deviations of the mean (p). So

$$\begin{aligned} p &\pm 2(\sigma(\hat{p})) \\ 0.009 &\pm 2(0.0028) \\ 0.009 &\pm 0.0056 \end{aligned}$$

   And the interval is $(0.0034, 0.0146)$