

# asp vipers

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asp vipers, BPA, chap 01

reference:

- Kéry and Schaub, 2012, Bayesian Populaton Analysis Using WinBUGS, Academic Press
- asp viper, Wikipedia
- photos of asp vipers, Google search

```
library(ggplot2)
```

## asp vipers

### data

```
mu <- 65      # average length in cm
sigma <- 5    # population sd
```

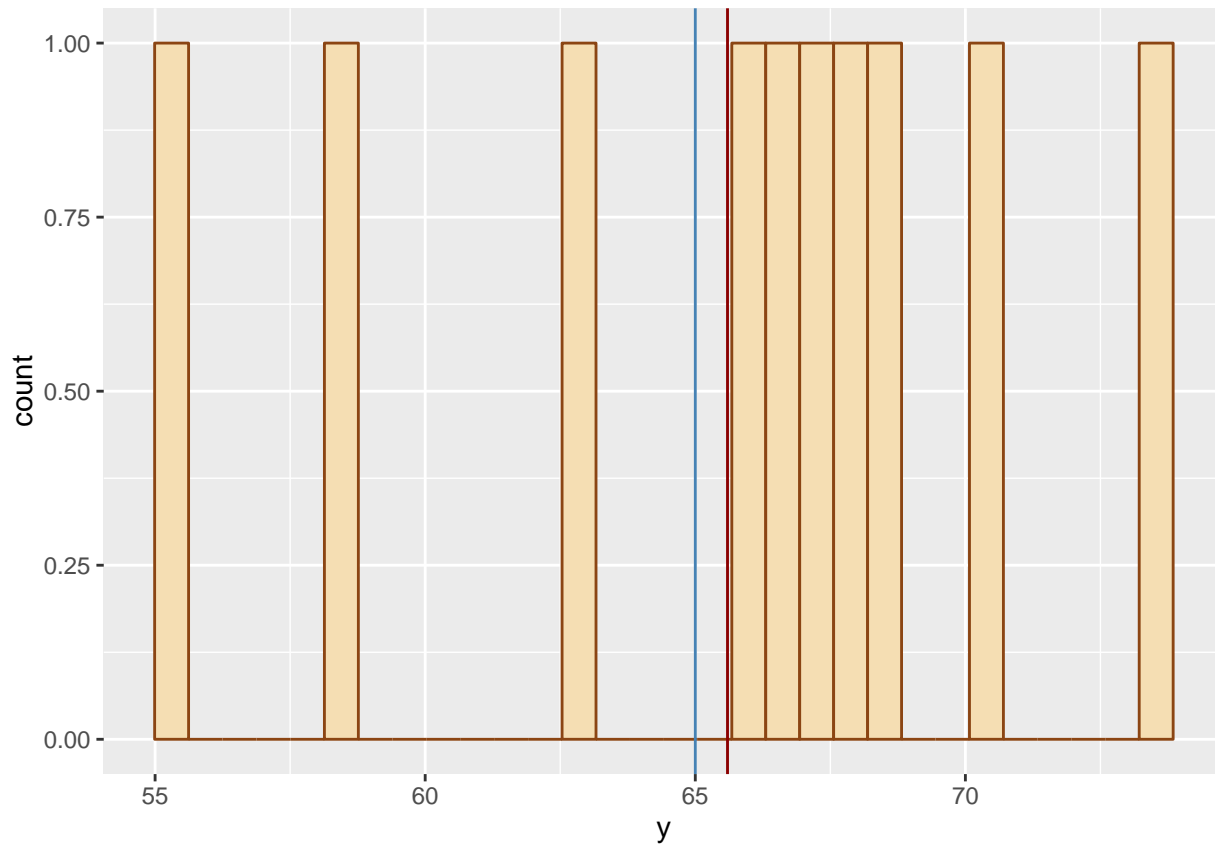
### one sample of 10 asp viper lengths

```
samp <- rnorm(10, mean=mu, sd=sigma)
```

### illustration

dark red = average length of this sample of 10 asp vipers  
steelblue = average length of asp vipers in this population

```
data <- data.frame(y = samp)
ggplot(data, aes(y)) +
  geom_histogram(color = "saddlebrown", fill = "wheat") +
  geom_vline(xintercept = mean(samp), color = "darkred") +
  geom_vline(xintercept = mu, color = "steelblue")
```



### many sample means

```

reps <- 1e6
sample.means <- rep(NA, reps)
for (i in 1:reps){
  sample.means[i] <- mean(rnorm(10, mean=mu, sd=sigma))
}

```

### histogram of many sample means

mean is an unbiased estimator of the population mean

```

data <- data.frame(y = sample.means)
ggplot(data, aes(y)) +
  geom_histogram(color = "saddlebrown", fill = "wheat") +
  geom_vline(xintercept = mu, color = "steelblue")

```

