Bivariate EDA

Derek H. Ogle

Background

Measurements of the levels of arsenic in the drinking water, cooking water, and toenail samples, as well as related covariates, were measured on 21 individuals with private wells in a New Hampshire community. The variables below were recorded in the https://github.com/droglenc/NCData/blob/master/Arsenic.csv file located on the R Resources web page.

- `age`: Age (yrs) of person
- `sex`: Sex of person
- `usedrink`: Household well used for drinking – A="$< \frac{1}{4}$", B="$\approx \frac{1}{4}$", C="$\approx \frac{1}{2}$", D="$\approx \frac{3}{4}$", E="$> \frac{3}{4}$"
- `usecook`: Household well used for cooking – A="$< \frac{1}{4}$", B="$\approx \frac{1}{4}$", C="$\approx \frac{1}{2}$", D="$\approx \frac{3}{4}$", E="$> \frac{3}{4}$"
- `arswater`: Arsenic in water (ppm)
- `arsnails`: Arsenic in toenails (ppm)

In this handout, we will consider the questions below.

- What type of variable is each variable in the data set?
- Describe the relationship between the level of arsenic in the toenails and the age of the person.
- Describe the relationship between the "amount" that the well is used for drinking and the sex of the person.
- What percentage of females used the well for drinking water more than three-quarters of the time?
- What percentage of all persons in the study were female and used the well for drinking water about one-half of the time?
- What percentage of the sample was female?

Getting The Data

```
> library(NCStats)
> setwd("C:/aaaWork/Web/GitHub/NCMTH107/resources/class/HOs")
> Ars <- read.csv("Arsenic.csv")
> str(Ars)
```

```
'data.frame':   21 obs. of  6 variables:
 $ age     : int  44 45 44 66 37 45 47 38 41 49 ...
 $ sex     : Factor w/ 2 levels "F","M": 1 1 2 1 2 1 2 1 1 1 ...
 $ usedrink: Factor w/ 5 levels "A","B","C","D",..: 5 4 5 3 2 5 5 4 3 4 ...
 $ usecook : Factor w/ 2 levels "B","E": 2 2 2 2 2 2 2 2 2 1 2 ...
 $ arswater: num  0.00087 0.00021 0 0.00115 0 0 0.00013 0.00069 0.00039 0 ...
 $ arsnails: num  0.119 0.118 0.099 0.118 0.277 0.358 0.08 0.158 0.31 0.105 ...
```
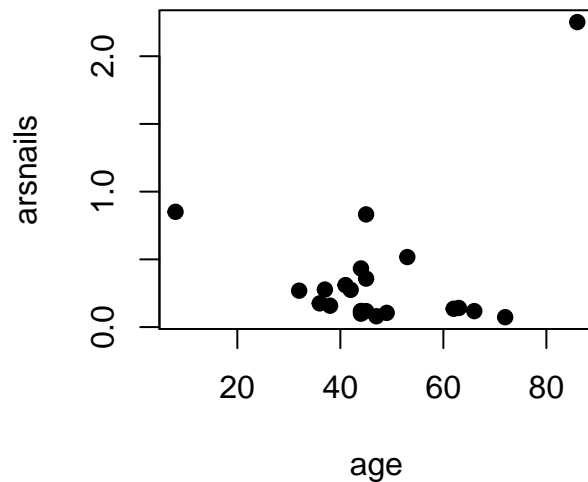
```
> view(Ars)
```

```
  age sex usedrink usecook arswater arsnails
1  44  F        E       E 0.00087    0.119
```

```
2    45    F         D         E    0.00021    0.118
14   86    F         E         E    0.13700    2.252
17   44    M         E         E    0.07640    0.433
18   63    F         E         E    0.00000    0.141
19   42    M         E         E    0.01650    0.275
```

Bivariate EDA – Quantitative

```
> plot(arsnails~age,data=Ars,pch=19)
```



```
> cor(Ars$arsnails,Ars$age)
```

```
[1] 0.2807416
```

Bivariate EDA – Categorical

```
> ( freq.tbl <- xtabs(~sex+usedrink,data=Ars) )
```

```
    usedrink
sex A B C D E
  F 1 0 2 3 7
  M 0 1 0 0 7
```

```
> percTable(freq.tbl,margin=1,digits=1)
```

```
     usedrink
sex    A     B     C     D     E   Sum
  F  7.7   0.0  15.4  23.1  53.8 100.0
  M  0.0  12.5   0.0   0.0  87.5 100.0
```

```
> percTable(freq.tbl,margin=2,digits=1)
```

```
      usedrink
sex     A   B   C   D   E
  F   100   0 100 100  50
  M     0 100   0   0  50
  Sum 100 100 100 100 100
```

```
> percTable(freq.tbl,digits=1)
```

```
      usedrink
sex       A     B     C     D     E   Sum
  F     4.8   0.0   9.5  14.3  33.3  61.9
  M     0.0   4.8   0.0   0.0  33.3  38.1
  Sum   4.8   4.8   9.5  14.3  66.6 100.0
```