Bivariate EDA

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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 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 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 ...
```

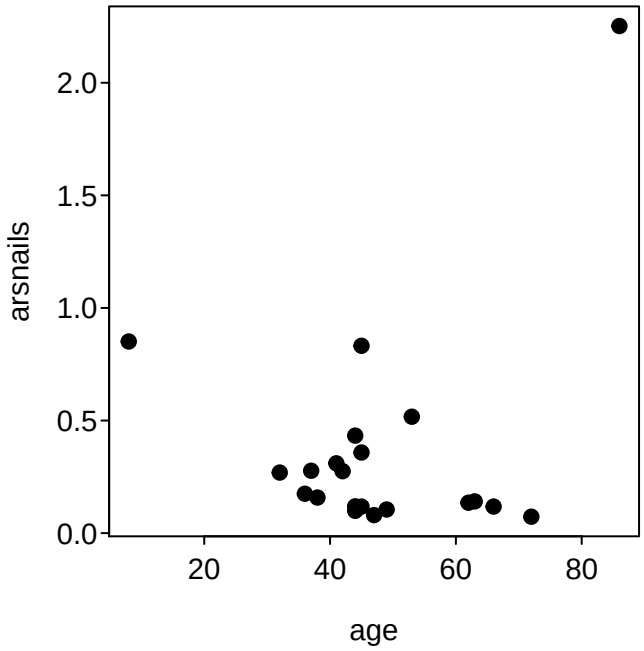
```
> view(Ars)
```

```
   age sex usedrink usecook arswater arsnails
2   45   F        D       E  0.00021    0.118
4   66   F        C       E  0.00115    0.118
```

```
6   45   F        E       E  0.00000    0.358
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
```