Univariate EDA

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Background

Karagas et al. (1996) conducted a pilot study to assess the utility of arsenic concentrations in the toenail as an indicator of ingestion of arsenic-containing water. They interviewed 21 individuals whose household drinking water supply was provided by a private (unregulated) well, including 10 individuals who lived in areas of New Hampshire where elevated water levels of arsenic had been reported previously. Each participant also provided a sample of water and toenail clippings.

The data are recorded in Arsenic.csv. Descriptions of the variables are below.

- `age`: Age (yrs) of person
- `sex`: Sex of person
- `usedrink`: How much (fraction of time) the well is 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`: How much (fraction of time) the well is 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)

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 ...
```

```
> headtail(ars)
```

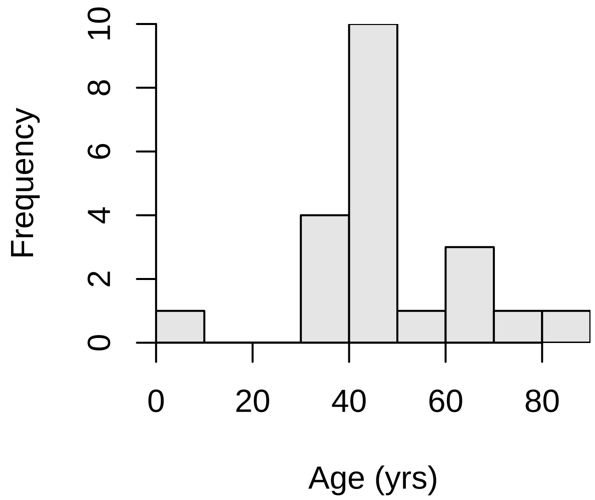
```
   age sex usedrink usecook arswater arsnails
1   44   F        E       E  0.00087    0.119
2   45   F        D       E  0.00021    0.118
3   44   M        E       E  0.00000    0.099
19  42   M        E       E  0.01650    0.275
20  62   M        E       E  0.00012    0.135
21  36   M        E       E  0.00410    0.175
```

Univariate EDA – Quantitative

```
> Summarize(~age,data=ars,digits=2)
```

```
       n   nvalid     mean       sd      min       Q1   median       Q3      max percZero
   21.00    21.00    47.57    16.08     8.00    41.00    45.00    53.00    86.00     0.00
```

```
> hist(~age,data=ars,main="",xlab="Age (yrs)")
```

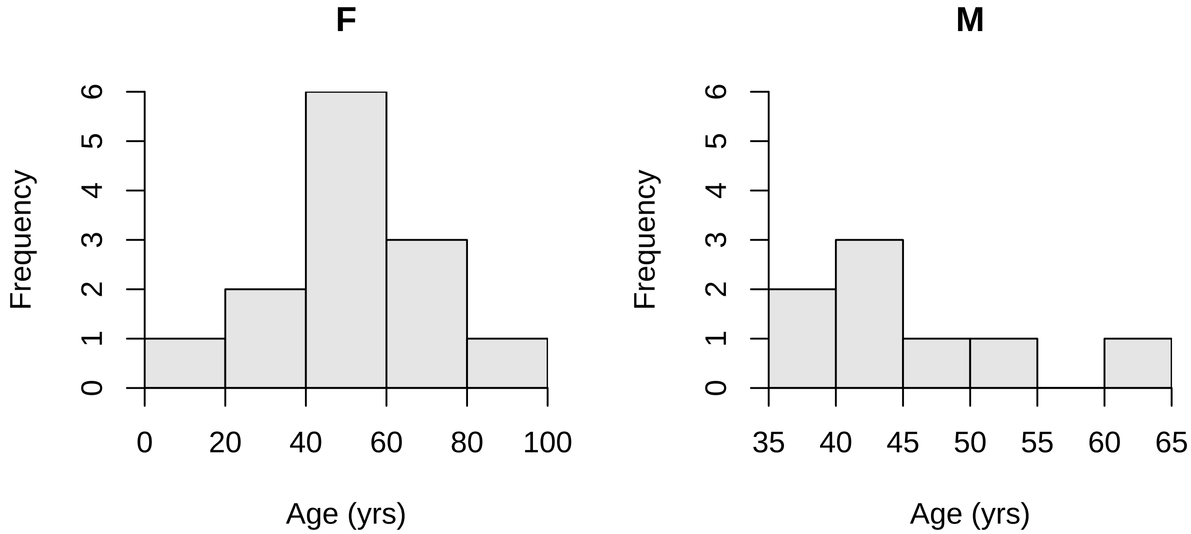


Univariate EDA – Quantitative (Separated by Groups)

```
> Summarize(age~sex,data=ars,digits=2)
```

```
  sex  n nvalid  mean    sd min    Q1 median   Q3 max percZero
1   F 13     13 48.77 19.60   8 41.00     45 63.0  86        0
2   M  8      8 45.62  8.53  36 40.75     44 48.5  62        0
```

```
> hist(age~sex,data=ars,xlab="Age (yrs)",col="gray90")
```



Univariate EDA – Categorical

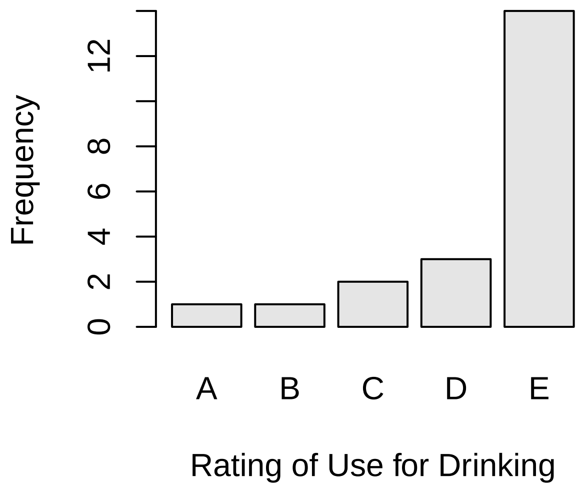
```
> ( tbl.drink <- xtabs(~usedrink,data=ars) )
```

```
usedrink
 A  B  C  D  E 
 1  1  2  3 14 
```

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

```
usedrink
    A     B     C     D     E   Sum 
  4.8   4.8   9.5  14.3  66.7 100.1 
```

```
> barplot(tbl.drink,xlab="Rating of Use for Drinking",ylab="Frequency",col="gray90")
```


Frequency
0
2
4
6
8
12
A
B
C
D
E
Rating of Use for Drinking