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](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="", B="", C="", D="", E=""
* usecook: Household well used for cooking -- A="", B="", C="", D="", E=""
* 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)

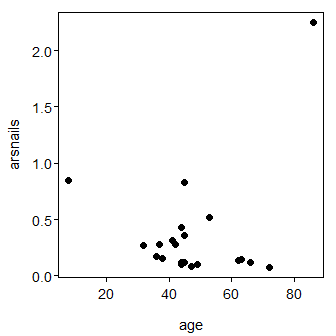
'data.frame': 21 obs. of 6 variables:  
 $ age : int 44 45 44 66 37 45 47 38 41 49 ...  
 $ sex : Factor w/ 2 levels "F","M": 1 1 2 1 2 1 2 1 1 1 ...  
 $ usedrink: Factor w/ 5 levels "A","B","C","D",..: 5 4 5 3 2 5 5 4 3 4 ...  
 $ usecook : Factor w/ 2 levels "B","E": 2 2 2 2 2 2 2 2 1 2 ...  
 $ arswater: 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  
7 47 M E E 0.00013 0.080  
9 41 F C B 0.00039 0.310  
14 86 F E E 0.13700 2.252

## 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