

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**: 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)

Getting the Data

```
> library(NCStats)
> setwd("C:/aaaWork/Web/GitHub/NCMTH107/resources/class/H0s")
> 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)
```

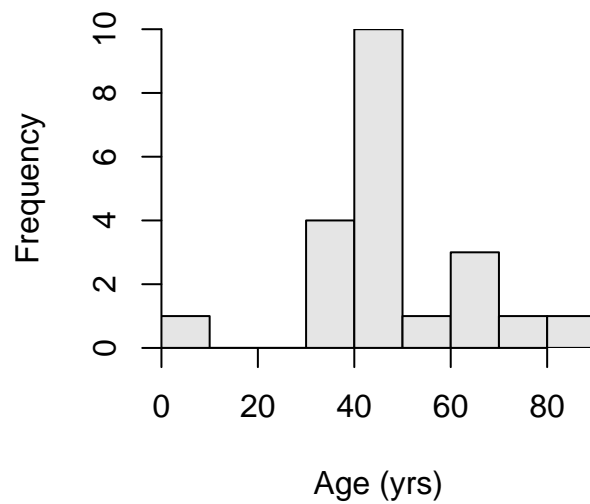
	age	sex	usedrink	usecook	arswater	arsnails
1	44	F	E	E	0.00087	0.119
2	45	F	D	E	0.00021	0.118
3	44	M	E	E	0.00000	0.099
19	42	M	E	E	0.01650	0.275
20	62	M	E	E	0.00012	0.135
21	36	M	E	E	0.00410	0.175

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)")
```

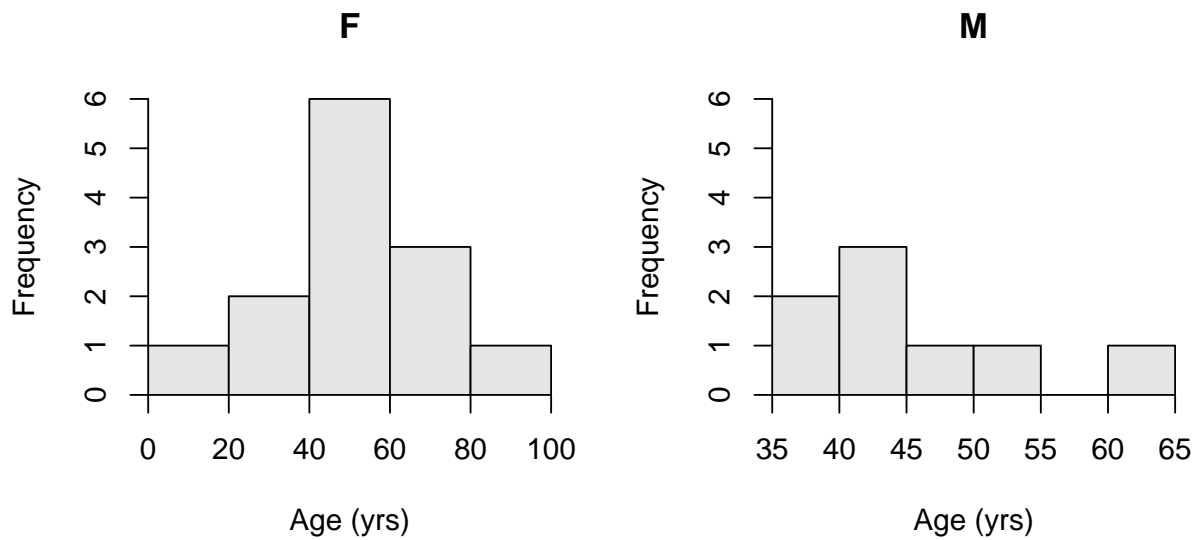


Univariate EDA – Quantitative (Separated by Groups)

```
> 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")
```

