R Training

Session 2

February 12, 2026

Today

- Learn how to:
    - Create a scatter plot, density plot, and bar chart using the `ggplot2` package
    - Create flexible and easy-to-read tables of any dataset using the `gt` package
    - Create simple academic-standard regression output tables using the `stargazer` package
- Practice the above!

Data Visualization — Descriptive Statistics — Plots

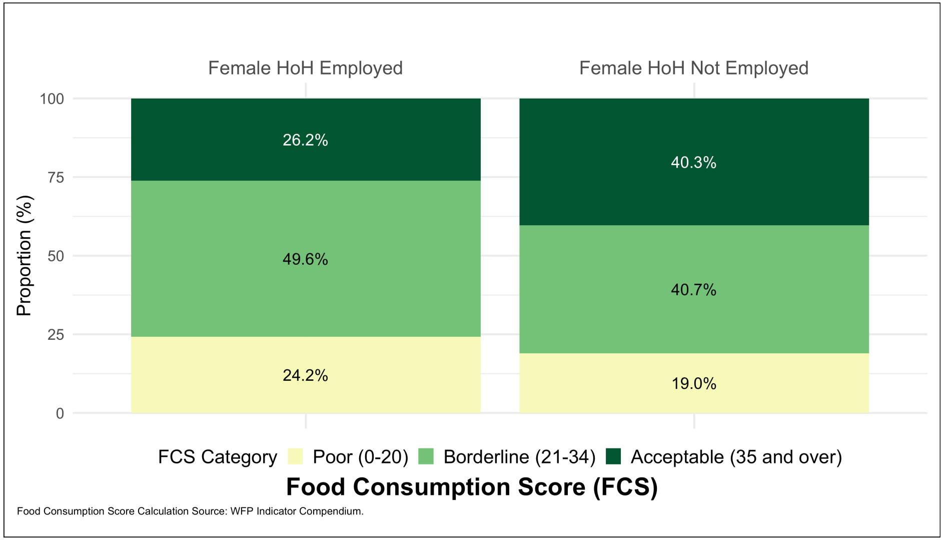
Descriptive Stats Plots

`ggplot2` is the gold standard in data visualization in data work. It's one of the main reasons that people use R over other programming languages.

Very simple syntax and allows you to add elements very easily.

You can use `ggplot2` to create any type of plot you can think of.

I've included a lot of links at the end of these slides to explore the possibilities of `ggplot2` further. Strongly recommend you use them or at least save them somewhere.



The Magic of `ggplot2`

Using `ggplot2` to create plots is great because the **structure** it sets up makes plot creation intuitive.

```
ggplot(data = <DATA>) +
  <GEOM_FUNCTION>(
     mapping = aes(<MAPPINGS>),
     stat = <STAT>,
     position = <POSITION>
  ) +
  <SCALE_FUNCTION> +
  <FACET_FUNCTION> +
  <THEME_FUNCTION>
```

1. `Data`: The data that you want to visualize
2. `Layers`: geom_ and stat_ → The geometric shapes and statistical summaries representing the data
3. `Aesthetics`: aes() → Aesthetic mappings of the geometric and statistical objects
4. `Scales`: scale_ → Maps between the data and the aesthetic dimensions
5. `Facets`: facet_ → The arrangement of the data into a grid of plots
6. `Visual themes`: theme() and theme_ → The overall visual defaults of a plot

Scatter Plot — Step-by-Step

Dataset Convert to Plot Add Something

Start with a dataset you want to visualize

```
head(mtcars)
```

```
##                    mpg cyl disp  hp drat    wt  qsec vs am gear carb
## Mazda RX4         21.0   6  160 110 3.90 2.620 16.46  0  1    4    4
## Mazda RX4 Wag     21.0   6  160 110 3.90 2.875 17.02  0  1    4    4
## Datsun 710        22.8   4  108  93 3.85 2.320 18.61  1  1    4    1
## Hornet 4 Drive    21.4   6  258 110 3.08 3.215 19.44  1  0    3    1
## Hornet Sportabout 18.7   8  360 175 3.15 3.440 17.02  0  0    3    2
## Valiant           18.1   6  225 105 2.76 3.460 20.22  1  0    3    1
```

Scatter Plot — Step-by-Step

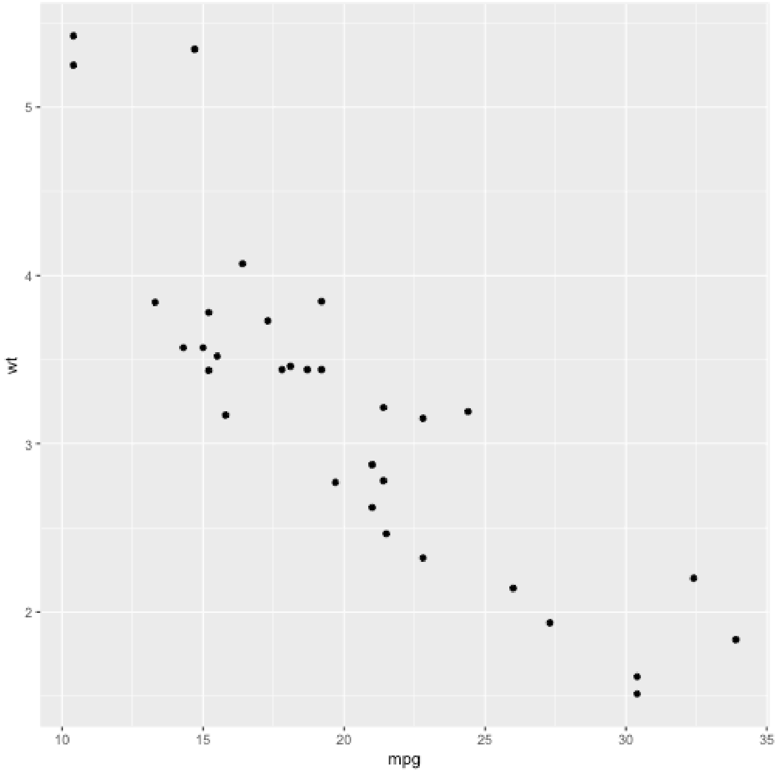
Dataset Convert to Plot Add Something

```
ggplot(mtcars)
```

Scatter Plot — Step-by-Step

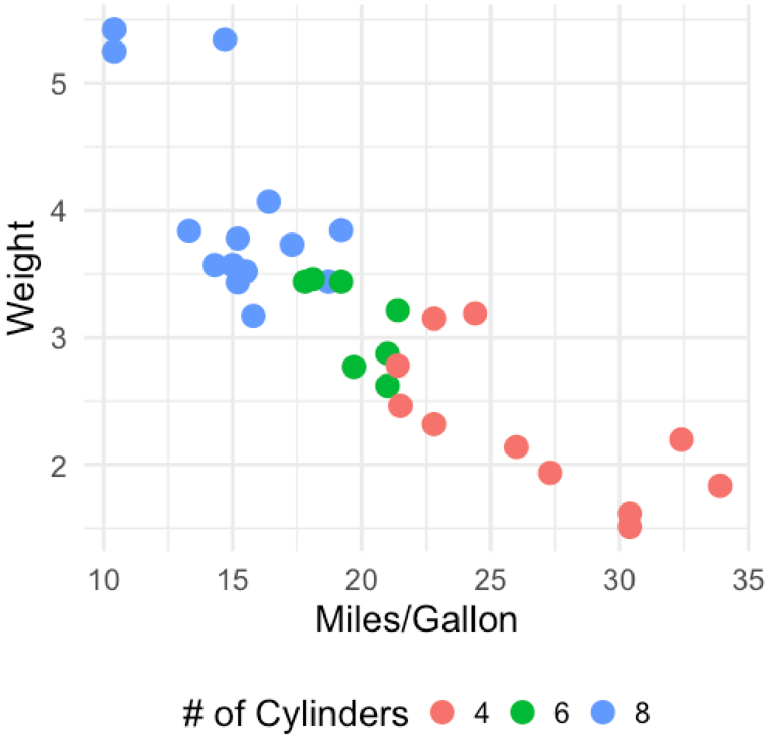
Dataset Convert to Plot **Add Something**

```
ggplot(mtcars) +
  geom_point(
    aes(x = mpg, y = wt)
  )
```



Scatter Plot — Make It Better

```
ggplot(mtcars) +
  geom_point(
    aes(
      x = mpg, y = wt,
      color = factor(cyl)
    ),
    size = 6
  ) +
  xlab("Miles/Gallon") +
  ylab("Weight") +
  scale_color_discrete(
    name = "# of Cylinders"
  ) +
  theme_minimal(base_size = 24) +
  theme(
    legend.position = "bottom"
  )
```



Bar Plot — Step-by-Step

Dataset   Convert to Plot   Add Something   Fix Class Issue

Start with a dataset you want to visualize

```
mtcars_summary
```

```
## # A tibble: 3 × 2
##     cyl   mpg
##   <dbl> <dbl>
## 1     4  26.7
## 2     6  19.7
## 3     8  15.1
```

Bar Plot — Step-by-Step

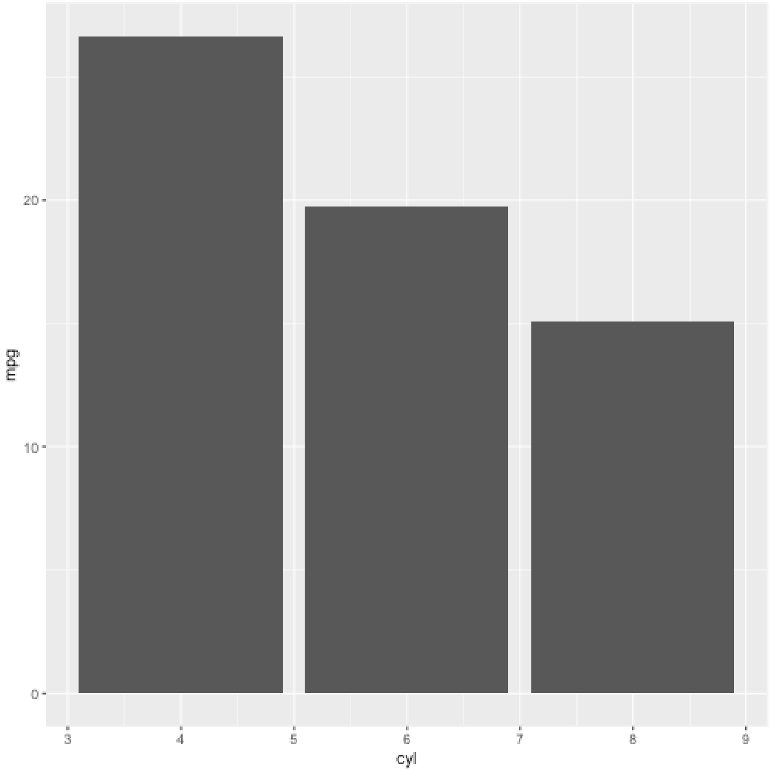
Dataset | Convert to Plot | Add Something | Fix Class Issue

```
ggplot(mtcars_summary)
```

Bar Plot — Step-by-Step

Dataset Convert to Plot **Add Something** Fix Class Issue

```
ggplot(mtcars_summary) +
  geom_col(
    aes(
      x = cyl,
      y = mpg
    )
  )
```

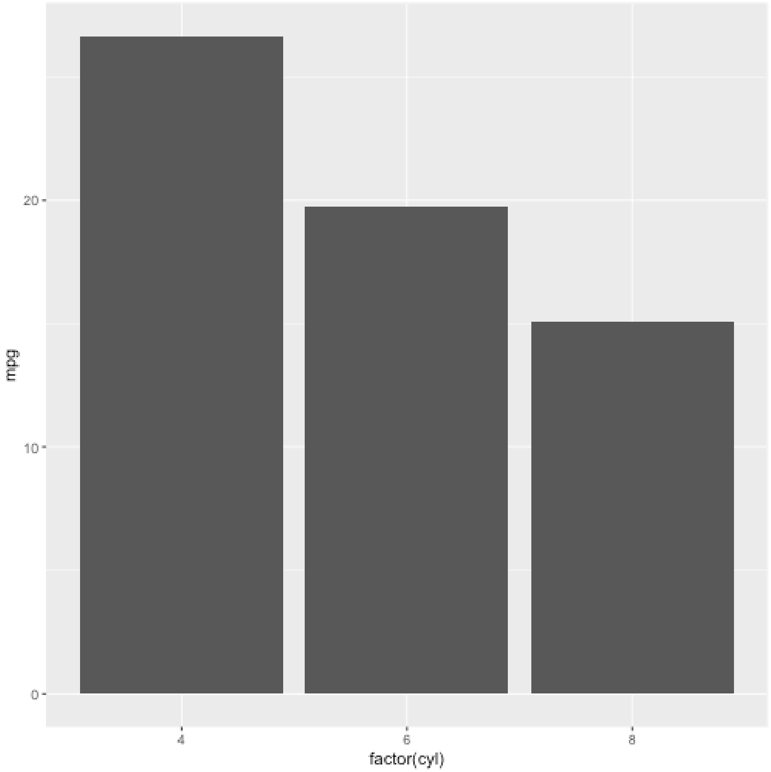


Bar Plot — Step-by-Step

Dataset Convert to Plot Add Something **Fix Class Issue**

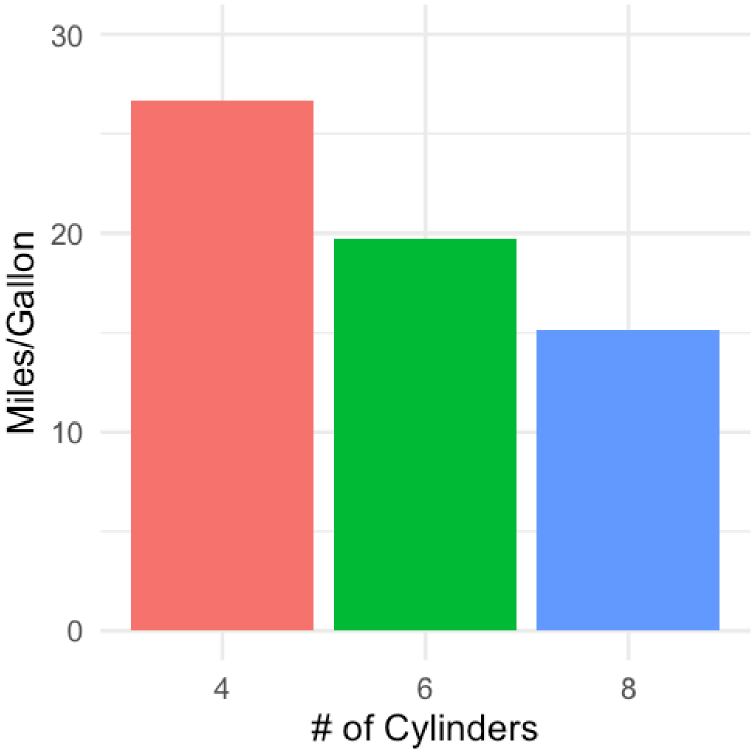
```
ggplot(mtcars_summary) +
  geom_col(
    aes(
      x = factor(cyl),
      y = mpg
    )
  )
```

`cyl` categorizes cars by number of cylinders. Although the values are numbers, it is a **categorical** variable. We communicate this to `ggplot()` using the `factor()` function.



Bar Plot — Make It Better

```
ggplot(mtcars_summary) +
  geom_col(
    aes(
      x    = factor(cyl),
      y    = mpg,
      fill = factor(cyl)
    )
  ) +
  xlab("# of Cylinders") +
  ylab("Miles/Gallon") +
  scale_y_continuous(
      limits = c(0, 30)
  ) +
  theme_minimal(base_size = 24) +
  theme(
    legend.position = "none"
  )
```



Plot Standards

1. Your plot should be **properly labeled**:

    - The plot should have a title describing its content
    - Axes should be labeled
    - Legend (if any) should have a title and labels

2. Your plot should be **properly formatted**:

    - Axis dimensions should be appropriate. What is appropriate varies depending on context, but usually you should aim to fill the plot space with data
    - Text size should be large enough for text to be legible

3. Your plot should be **self contained**. People should be able to understand your plot and its data without any other context or explanatory text. That means:

    - A caption note that includes data source and any important data construction notes
    - Title and subtitle that deliver the plot's *message*

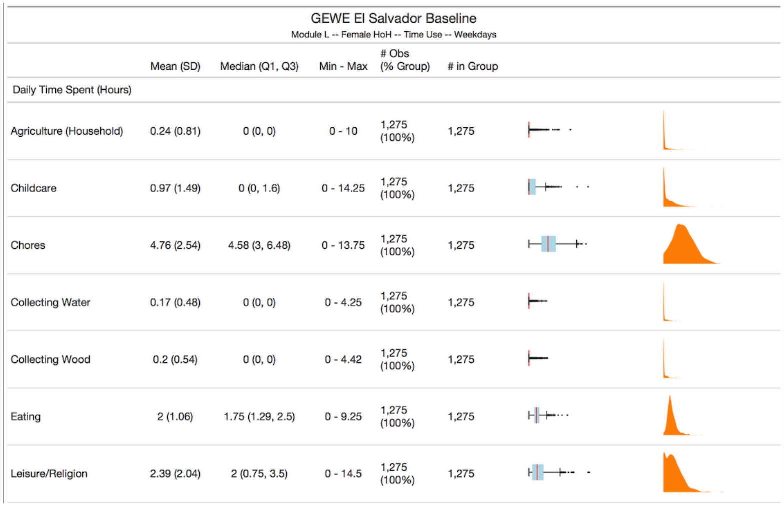
Data Visualization — Descriptive Statistics — Tables

Descriptive Statistics Tables

Sometimes, you just want to share a small table or data frame, and make it look presentable to a colleague or PI.

There are countless R packages to help do this. Today, we're looking at the `gt` package. It's simple to use and it's very easy to create good-looking tables using it.

`gt` exports into .png, .pdf, or .html. You can add interactive elements, plots within columns.



GEWE El Salvador Baseline

Module L -- Female HoH -- Time Use -- Weekdays

	Mean (SD)	Median (Q1, Q3)	Min - Max	# Obs (% Group)	# in Group
Daily Time Spent (Hours)					
Agriculture (Household)	0.24 (0.81)	0 (0, 0)	0 - 10	1,275 (100%)	1,275
Childcare	0.97 (1.49)	0 (0, 1.6)	0 - 14.25	1,275 (100%)	1,275
Chores	4.76 (2.54)	4.58 (3, 6.48)	0 - 13.75	1,275 (100%)	1,275
Collecting Water	0.17 (0.48)	0 (0, 0)	0 - 4.25	1,275 (100%)	1,275
Collecting Wood	0.2 (0.54)	0 (0, 0)	0 - 4.42	1,275 (100%)	1,275
Eating	2 (1.06)	1.75 (1.29, 2.5)	0 - 9.25	1,275 (100%)	1,275
Leisure/Religion	2.39 (2.04)	2 (0.75, 3.5)	0 - 14.5	1,275 (100%)	1,275

Descriptive Statistics Table — Step-by-Step

We will mainly use the example in the script for this. To summarize, the steps are:

- Create a dataset you want to export
- Run the dataset through the `gt()` function to create a gt object
- Customize the table using functions from the `gt` package (see online for further things you can do). Examples of what you can do include:
    - Modify column names — `cols_label()`
    - Modify borders — `tab_style()`, `cell_borders()`
    - Add colors conditional on cell value — `data_color()`
    - Add title/subtitle — `tab_header()`
- Export the table using `gtsave()`

Data Visualization — Simple Regression Table

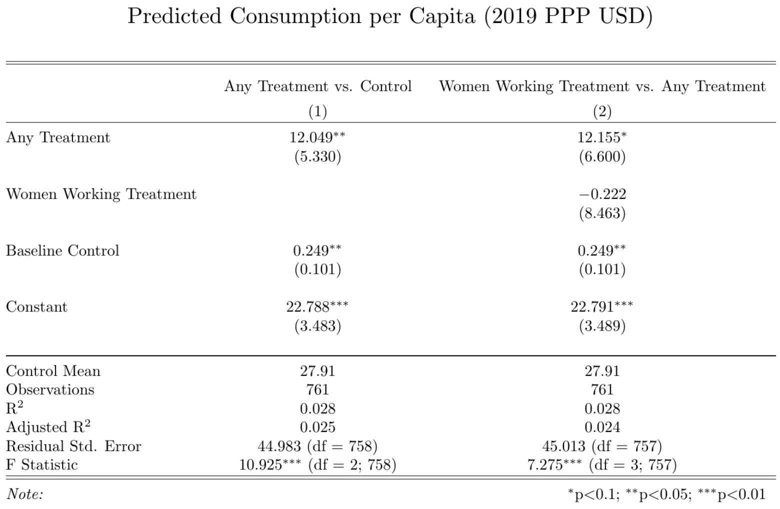
Regression Tables

Regression tables are very common in economic/policy analysis.

They're very simple to create using R and a software called **LateX** (pronounced latek).

Unless you're getting into academic research, you don't need to know how to properly use LateX. Just enough to:

- Export the LateX script from R
- Copy/paste it into a LateX-reading software, e.g. Overleaf
- Export the pdf or png to share



Predicted Consumption per Capita (2019 PPP USD)

	Any Treatment vs. Control	Women Working Treatment vs. Any Treatment
	(1)	(2)
Any Treatment	12.049**	12.155*
	(5.330)	(6.600)
Women Working Treatment		−0.222
		(8.463)
Baseline Control	0.249**	0.249**
	(0.101)	(0.101)
Constant	22.788***	22.791***
	(3.483)	(3.489)
Control Mean	27.91	27.91
Observations	761	761
R^2	0.028	0.028
Adjusted R^2	0.025	0.024
Residual Std. Error	44.983 (df = 758)	45.013 (df = 757)
F Statistic	10.925*** (df = 2; 758)	7.275*** (df = 3; 757)
Note:		*p<0.1; **p<0.05; ***p<0.01

Regression Table — Step by Step

Run Regression in R

Convert to Exportable Table

```
# Simplest regression format in R

reg_example <- lm(
    outcome_variable ~ independent_variable + control_variables,
    data = dataset
)

# Observe results

summary(reg_example)
```

Regression Table — Step by Step

Run Regression in R

Convert to Exportable Table

Simply do one of these!

```
reg_example_sg <- stargazer::stargazer(reg_example)
# Many options to make prettier
```

OR

```
reg_example_ht <- huxtable::huxreg(reg_example)
```

Regression Table — Step by Step

Export Stargazer Table

Export Huxtable Table

```r
# You can export a LateX script using the 'writeLines' function

writeLines(
    reg_example_sg,
    "filepath/filepath/filepath/reg_example_sg.tex"
)
```

To visualize your table, the easiest solution is to:

- Create a free Overleaf account on overleaf.com
- Open a new document
- Copy/paste your .tex output in between the `begin{document}` and `end{document}` lines
- Click compile and then save!

You can also install the `tinytex` package and use `pdftolatex` to save a PDF file.

Regression Table — Step by Step

Export Stargazer Table

Export Huxtable Table

Some simple options for the Huxtable table:

```
huxtable::quick_latex(
    reg_example_ht,
    file = "filepath/filepath/filepath/reg_example_ht.tex"
)

huxtable::quick_pdf
    reg_example_ht,
    file = "filepath/filepath/filepath/reg_example_ht.pdf"
)

huxtable::quick_html(
    reg_example_ht,
    file = "filepath/filepath/filepath/reg_example_ht.html"
)
```

Practical Exercise

Using the World Values Survey Dataset

The World Values Survey

> *"The survey, which started in 1981, seeks to use the most rigorous, high-quality research designs in each country. The WVS consists of nationally representative surveys conducted in almost 100 countries which contain almost 90 percent of the world's population, using a common questionnaire. […] WVS seeks to help scientists and policy makers understand changes in the beliefs, values and motivations of people throughout the world."*

- Social values, attitudes & stereotypes
- Societal well-being
- Social capital, trust and organizational membership
- Economic values
- Corruption
- Migration
- Post-materialist index
- Science & technology
- Religious values
- Security
- Ethical values & norms
- Political interest and political participation
- Political culture and political regimes
- Demography

Today's practical component

1. Download the required data for this session from this Dropbox folder

2. Open your project in RStudio, either by (1) opening RStudio using your .rproj file or (2) clicking on "File", "Open Project", and then navigating to your .rproj file within Rstudio

3. Successfully run the code in the `session_2.R` script

4. Attempt the challenges at the bottom of the script!

Links

Tables

Marek Hlavac, “stargazer: beautiful LATEX, HTML and ASCII tables from R statistical output”

Thomas Mock, “gt - a (G)rammar of (T)ables”

Plots

Alicia Horsch, “A quick introduction to ggplot2”

RStudio, RStudio Cheatsheets