Data Interpretation and Impact

December 2, 2020

Welcome!

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Today's Outline

- Basic statistics and definitions

- Data analysis and interpretation

- Visualizing data

- Results dissemination
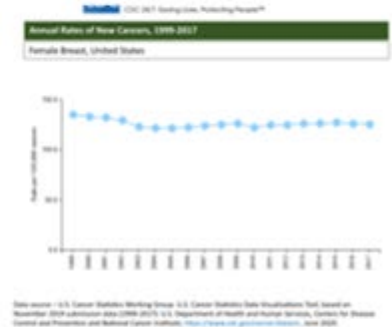
- Homework assignment

Four Basic Statistics

Counts

6 : 9

Ratios

By 2020,
60%
of people in the world had never received
a phone call in their life.
SOURCE: NOT a real stat

Proportions

Rates

1. Basic Statistics: Counts

John Snow – Cholera cases in the Golden Square area of London, August-September. 1854

Counts

"Counts" – The most basic statistical measure

- Referred to as **"frequency"** or **"number of events"**
- Answers the question "how many people have this disease?"
- Expressed as integers (1, 2, 3…)

Definition 1: Numerator and Denominator

$$\frac{100}{5{,}000}$$

← Numerator: Upper number of a fraction

← Denominator: Lower number of a fraction

6
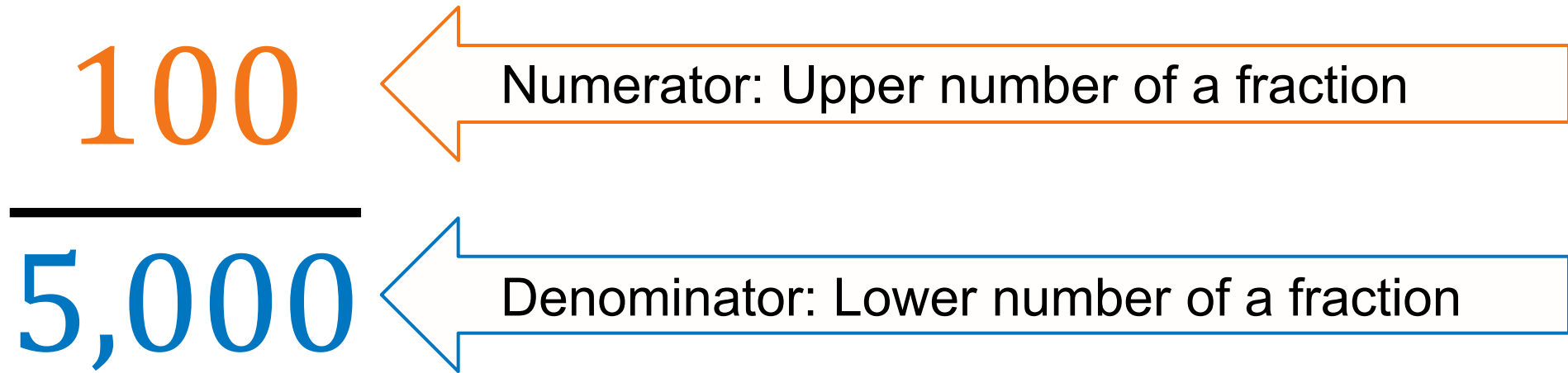
2. Basic Statistics: Ratios

"Ratios" – One number *(x)* divided by another *(y)* or $\frac{Female}{Male}$

- *(x)* referred to as numerator *(female)*
- *(y)* referred to as denominator *(male)*
- *(x)* and *(y)* maybe related or completely independent:
  - Different categories of the *same variable*: number of males and number of females
  - Numerator and denominator are completely *different variables*: number of hospitals in a city and the size of the population living in that city

6 : 9

Ratios

3. Basic Statistics: Proportions

By 2020,

60%

of people in the world had never received a phone call in their life.

SOURCE: NOT a real stat

Proportions

"Proportions" – The number (numerator) is included in the denominator

- Example: Among people in the world, what proportion has never received a phone call in their lives?

- $\frac{60}{100}$ = .60 or 60%

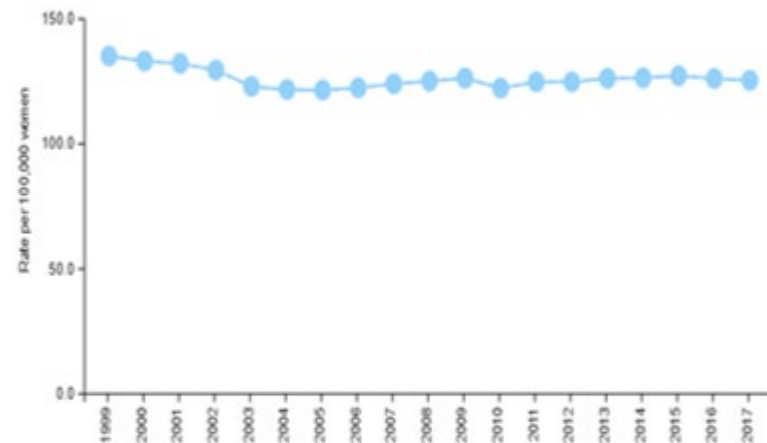- Often expressed as percentage (%)

4. Basic Statistics: Rates

Annual Rates of New Cancers, 1999-2017
Female Breast, United States

Data source – U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on November 2019 submission data (1999-2017): U.S. Department of Health and Human Services, Centers for Disease

Rates

"Rates" – The number (frequency) of events over population at risk

- Unlike proportions, rate *includes an element of time*
- Rate means how fast something is happening or going.
- Example: 250,520 female new breast cancer cases per 100,000 women reported in U.S. in 2017

Polling Questions

Indicate where it is a ratio, a proportion, a rate or none of the three.

A. Ratio

B. Proportion

C. Rate

D. None of the above

Q1: Number of women in Alaska who died from **heart disease** in 2019

  Number of women in Alaska who died from **cancer** in 2019

Q2: Number of women in Hawaii who died from **heart disease** in 2019

  Number of women living in Hawaii on July 1, 2019
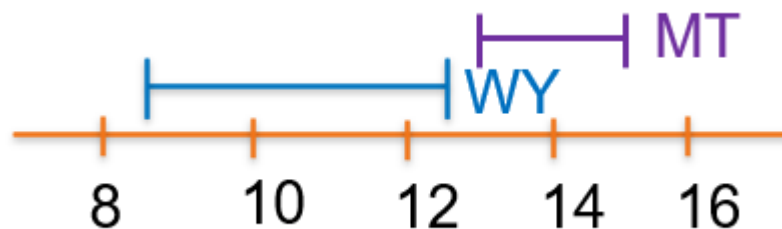
Definition 2: 95% Confidence Interval

13.9% (11.8-16.0) women smokers in Montana vs.
10.3% (8.2-12.4) women smokers in Wyoming
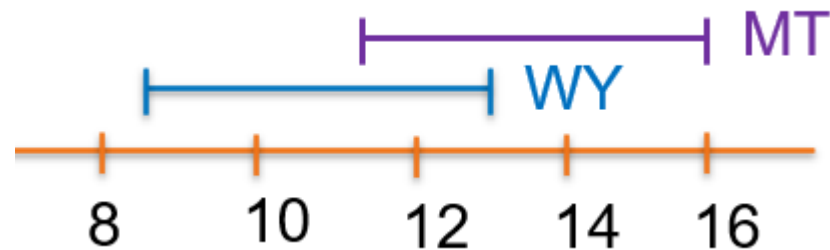
Are these significantly different?

Not Significant

13.9% (12.8-15.0) women smokers in Montana vs.
10.3% (9.2-11.4) women smokers in Wyoming

Significant

Data Source: Fake data

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Data Analysis and Interpretation

Data Analysis:

1. Sorting the data for it to make sense

2. Descriptive statistics: quantitative descriptive of data such as simple summaries, counts, rates, proportions

3. Exploratory data analysis: "*Puts emphasis of learning from the data, which appears plausible in the light of the evidence*"

   – Makes extensive use of analytical graphics along with numerical summaries

Data Analysis and Interpretation

"…...exploratory data analysis, is an approach to statistics which emphasizes that a researcher should begin his or her analysis by looking at the data, on grounds that the more familiar one is with one's data, the more effective they can be used to develop, test and refine theory.

Econometricians are often accused of never actually looking at their data.

Exploratory data analysts believe in the inter-ocular trauma test:

keep looking at the data until the answer hits you between the eyes!"

- Peter Kennedy (1992: 284)

A Guide to Econometrics, Oxford: Blackwell.

Data Analysis and Interpretation

1

Involve your data personnel from the beginning of your project.

2

Do not be afraid to look and share preliminary data.

3

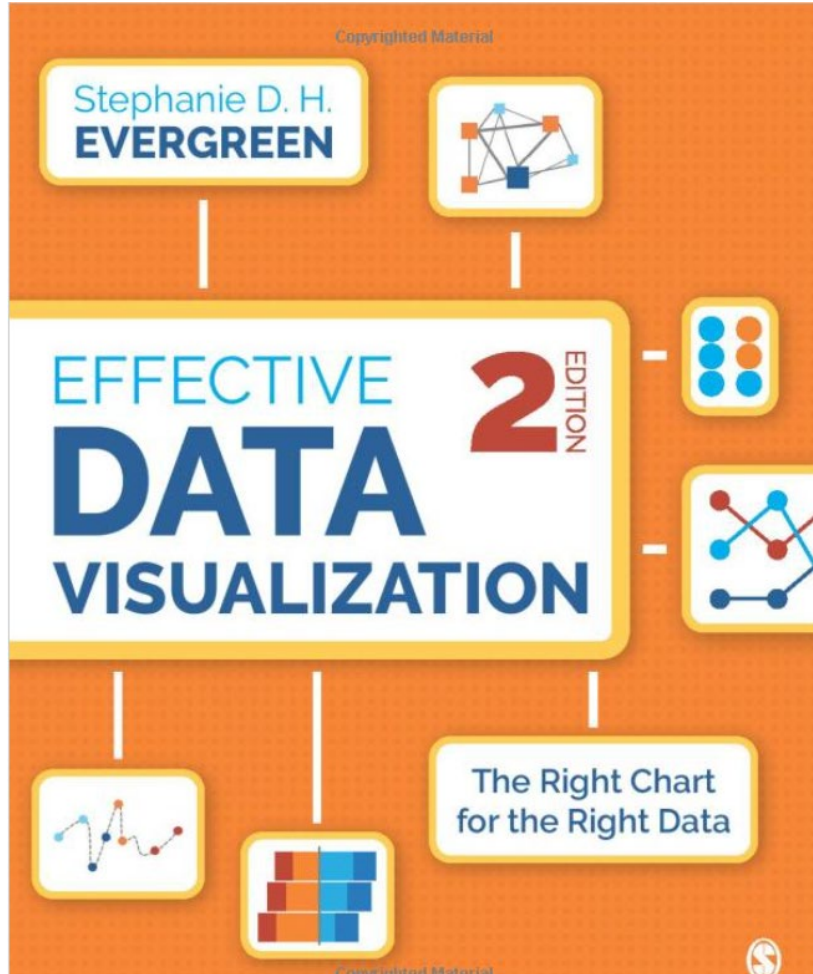Document your data source, limitations, inclusions and exclusions.

Polling Question:

Q1. Do you have a dedicated data person at your workplace?

A. Yes

B. No

C. Don't need one

Q2. How comfortable do you feel analyzing data?

A. I am a pro, and I love data.

B. I don't like it, but I still do it.

C. Someone else does it for me.

Visualizing Data: Tell a Story with Data

Source: *Effective Data Visualization, The Right Chart of the Right Data, 2nd Edition by Stephanie D.H Evergreen*

Visualizing Data: Tell a Story with Data

EVERGREEN DATA 4 STEP VISUALIZATION PROCESS
© STEPHANIE EVERGREEN

1. **WHAT'S THE POINT?** Write it here on a new line.

Look at the data to see which facility met the benchmark

3. **WHAT IS THE BEST CHART TYPE?** Sketch it below.

Combo chart

2. **WHO IS THE AUDIENCE & HOW WILL THIS BE DELIVERED TO THEM?** Describe their data needs & literacy. List the software & platforms.

Audience: Present it at a director's board meeting
**Software:** Get data from EHR and summarize in Excel

4. **HOW CAN YOU SHARPEN THE POINT?** Add emphasis above.

Tip: Highlight a point you learned about the data. No facility met its benchmark.

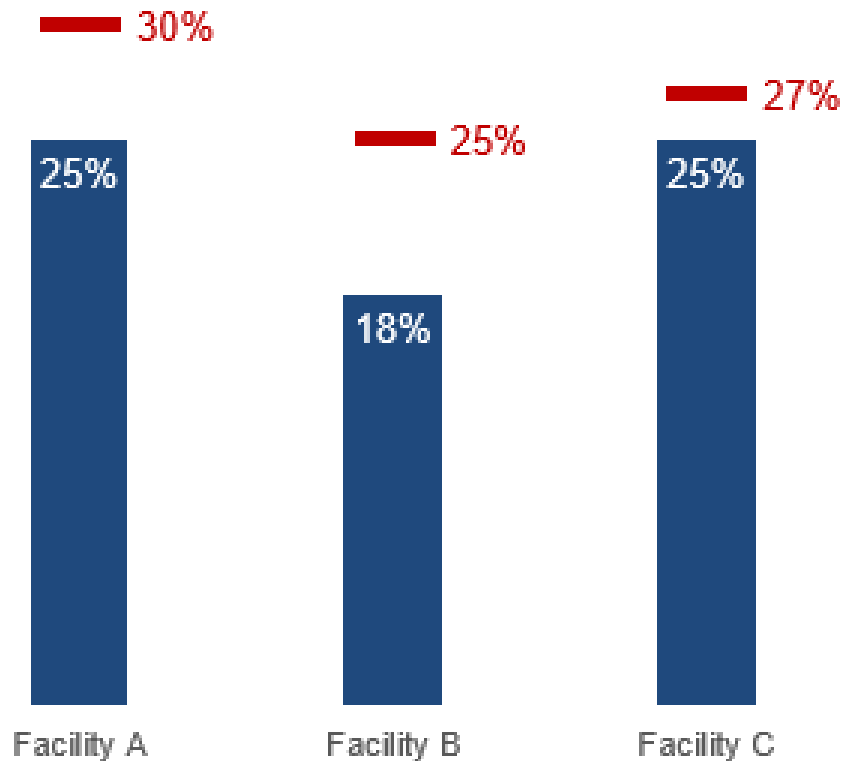| Facility Name	% of residents aged 60 years and older who received shingles vaccine in 2019	Benchmark
Facility A	25.0	30.0%
Facility B	18.2	25.0%
Facility C	25.1	27.0%
Data Source: Fake data		

Visualizing Data: Tell a Story with Data

None of the three facilities met performance benchmarks of vaccinating their patients for shingles this year.
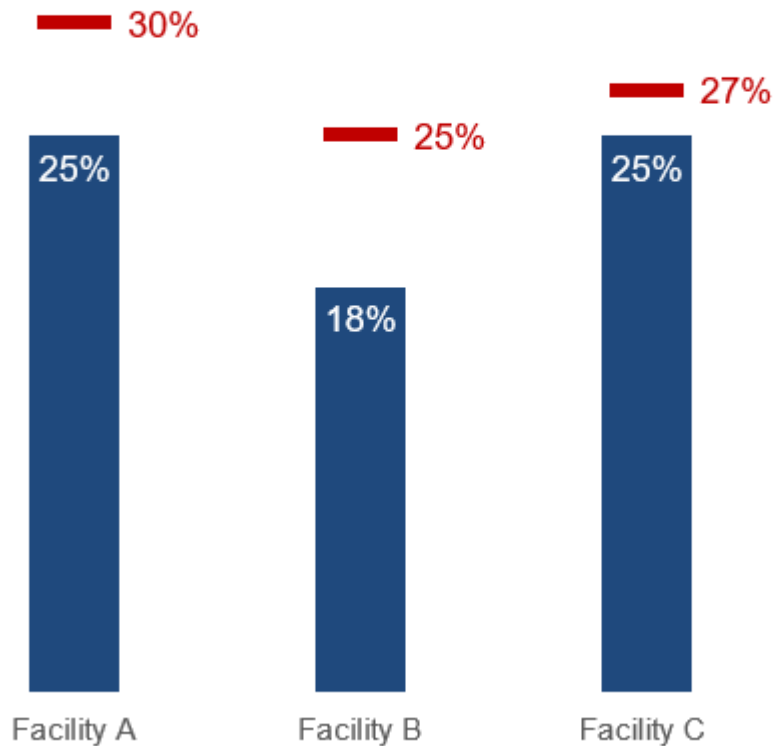
Facility Name	% of residents aged 60 years and older with shingles vaccine in 2019	Benchmark
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Facility C	25.1	27.0%
Data Source: Fake data		

Visualizing Data: Tell a Story with Data

None of the three facilities met performance benchmarks of vaccinating their patients for shingles this year.

- Facility A: 25% (benchmark 30%)
- Facility B: 18% (benchmark 25%)
- Facility C: 25% (benchmark 27%)

What conclusion can you make about the data illustrated in this chart?

In 2019, among facilities included in our study who offered shingle vaccination to their patients aged 60 year and older [Fig.]:
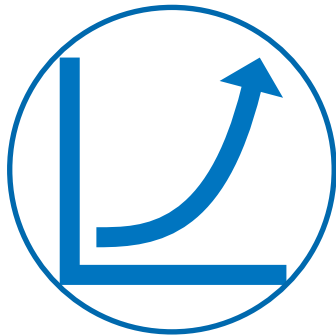
- None of the three facilities met their performance benchmark.
- **Facility B** was the furthest away from meeting their benchmark.
- **Facility C** was the closest to meeting their benchmark.

Result Dissemination:
Sharing Your Data with Others

Communication
About the project
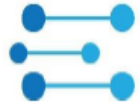and results

Dissemination
About the results only

Homework for next session: Wednesday, December 9

Inpatient costs per member per month for Valley Community Medical Center for 2019												
Services	**Jan.**	**Feb.**	**Mar.**	**Apr.**	**May**	**Jun.**	**Jul.**	**Aug.**	**Sep.**	**Oct.**	**Nov.**	**Dec.**
Mental health	$5	$5	$5	$4	$4	$4	$3	$3	$3	$3	$3	$3
Surgical	$19	$19	$19	$20	$20	$20	$21	$21	$21	$22	$22	$22
Physician	$12	$12	$13	$13	$12	$13	$12	$12	$13	$12	$13	$12
Pharmacy	$6	$6	$6	$6	$6	$6	$10	$10	$10	$10	$10	$10
Data Source: Fake data												

EVERGREEN DATA 4 STEP VISUALIZATION PROCESS
© STEPHANIE EVERGREEN

1. **WHAT'S THE POINT?** Write it here on a new line.

3. **WHAT IS THE BEST CHART TYPE?** Sketch it below.

Tip: Refence slide 16 for chart type

2. **WHO IS THE AUDIENCE & HOW WILL THIS BE DELIVERED TO THEM?** Describe their data needs & literacy. List the software & platforms.

4. **HOW CAN YOU SHARPEN THE POINT?** Add emphasis above.

5. What conclusion can you make about the data illustrated in this chart?

Source: Effective Data Visualization, The Right Chart of the Right Data, 2nd Edition by Stephanie D.H Evergreen

Session Evaluation

Fill out evaluation questions now.

Next Sessions

Session 6: Dec. 9, 2020 – Hands on with Data

- Break out session
- Report from breakout rooms
- Resources: Data templates, links to data sources

Questions?

Thank you for your time!