AMERICAN SOCIETY FOR MICROBIOLOGY

ABRCMS Online

"Data Preparation and Presentation"

August 2019

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Questions?

Type questions for the speaker(s) in the Q&A box.

We will address questions throughout the webinar.

Important Dates

Student Travel Award Deadline: *August 20*

Abstract Submission Deadline: *September 6*

Learning goals

- Explore the differences between qualitative and quantitative data
- Discover techniques for presenting, describing, and analyzing data
- Interpret different examples of data presentation in scientific conference presentations

Disclaimer: The views presented here are based on opinion and does not represent the publication policy of any specific conference. The graphs included in this presentation have not been cited deliberately to avoid any specific criticisms of a publication. These are presented *only* as examples.

Data Analysis and Interpretation

Analysis

Describing data with tables, graphs, or narrative; transforming data into information.

Interpretation

Adding meaning to information by making connections and comparisons and by exploring causes and consequences.

Analyzing Data

- Is the acquired data **sufficient to demonstrate an effect**?
- Is the **presentation** of the data clear?
- Are there any **outliers**?
- Is it clear what I am **modifying** (variables) and what I am **measuring** (outcomes)?
- Is it clear **how** the outcome is being measured?

Interpreting Data

- Does the **outcome indicator** meet the **target**?
- What is the **relevance** of the finding?
- What are the **potential reasons** for the finding?
- How does it **compare**? (trends, group differences)
- What **other data** should be reviewed to understand the finding (triangulation)?
- Is there a need to conduct **further analysis**?

Qualitative vs. Quantitative

- What is the **unit of analysis**?
- Are you relying on **universal theory** (generalizable) or **local knowledge** (not generalizable)?
- Will **theory or data come first** (hypothesis-testing vs. hypothesis-generating)?
- Will your study be **cross-sectional or longitudinal**?
- Will you **verify or falsify a theory**? Remember, you cannot conclusively prove any theory; the best that you can do is find nothing that disproves it.

Quantitative Approaches

- Attempts to **explain phenomena** by collecting and analyzing numerical data
- Tells you **if** there is a "difference" but not necessarily **why**
- Data collected are always **numerical** and analyzed using **statistical methods**
- Variables are **controlled** as much as possible to eliminate **interference** and measure the **effect** of any change

Quantitative Approaches

Is my **sample size** big enough?

Have I used the correct **statistical test**?

Have I reduced the likelihood of making **false inferences** (Type I vs. Type II errors)

Are my results **generalizable**?

Are my results/methods/results **reproducible**?

Am I measuring things the **right way**?

Qualitative Approaches

- Any research that **doesn't involve numerical data**
- Tends to start with a **broad question** rather than a specific hypothesis
- **Develop theory** rather than start with one—*inductive rather than deductive*

Qualitative Approaches

Have I **coded** my data correctly?

Have I managed to capture the situation in a **realistic manner**?

Have I **described the context** in sufficient detail?

Have I managed to see the world **through the eyes of my subjects**?

Is my approach **flexible** and **able to change**?

Graphical Excellence

- Well-designed presentation of interesting data – a matter of **substance, statistics, and design**
- Consists of complex ideas communicated with **clarity, precision, and efficiency**

Tufte, Edward R. *The Visual Display of Quantitative Information;* Graphics Press: Cheshire, CT, 1983; pp 1-197.

Graphical Excellence

Scientific graphics should communicate ideas with:

Clarity

- Lack of ambiguity and confusion

Precision

- Truthful results
- Distortion-free presentation

Efficiency

- Minimal “chartjunk”

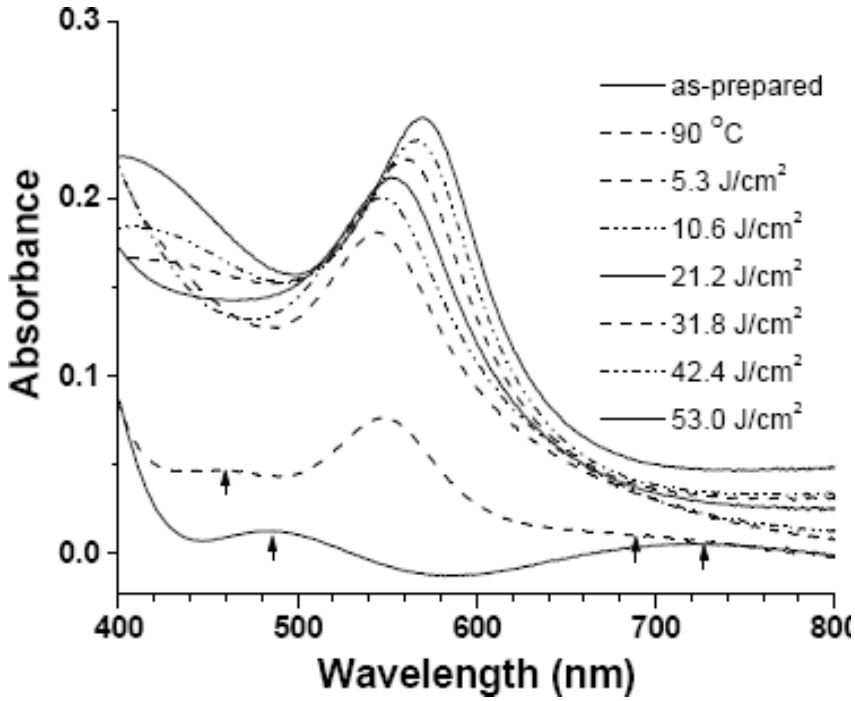
Tufte, Edward R. *The Visual Display of Quantitative Information;* Graphics Press: Cheshire, CT, 1983; pp 1-197.

Graphical Excellence

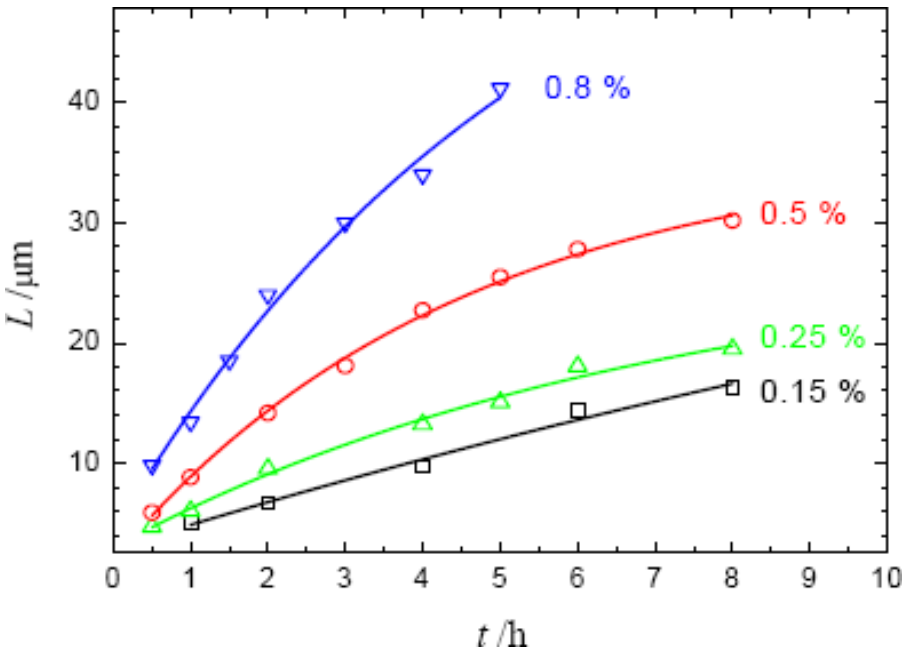
- Provide **comparison** and **reference**
- Provide **causality (or correlation)**
- Capture **multivariate complexity**
- Motivation of display – **quality** of the data
- **Convey change** over time **within the eye span**
- **Maximize information content** per unit area

Be Concise

Can you distinguish these curves?



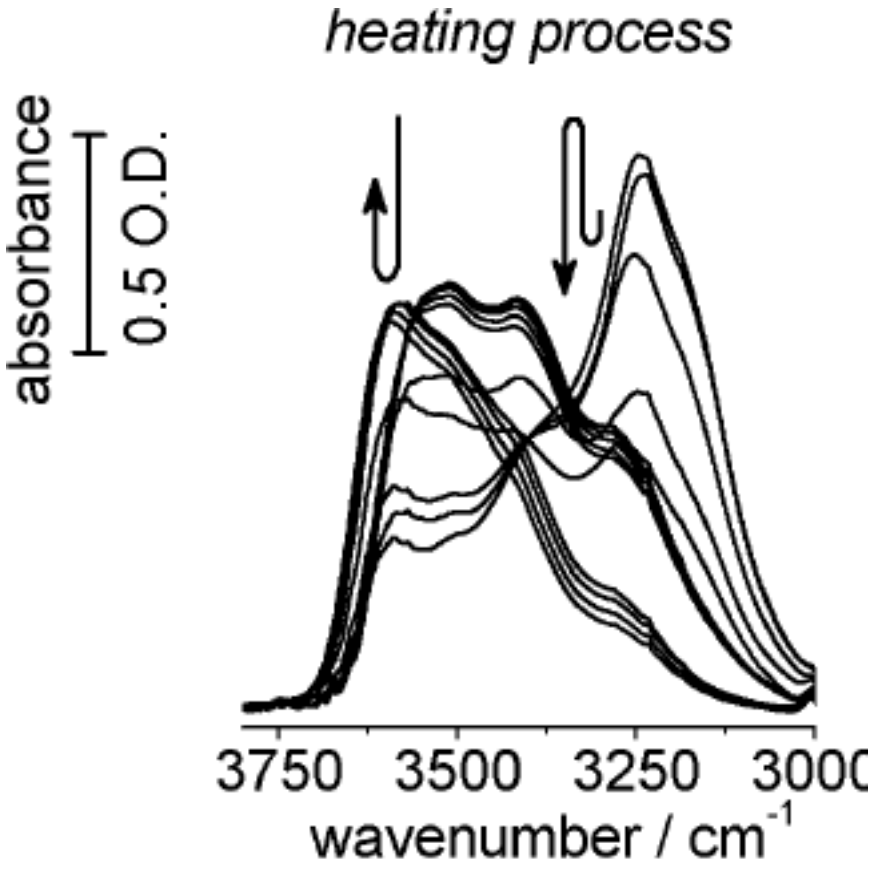
Clear, concise, easy to read



Enhancing a Graphic

Can you distinguish the individual spectra?

Proper use of color would have improved the readability.



Identify Everything

To what are these normalized?

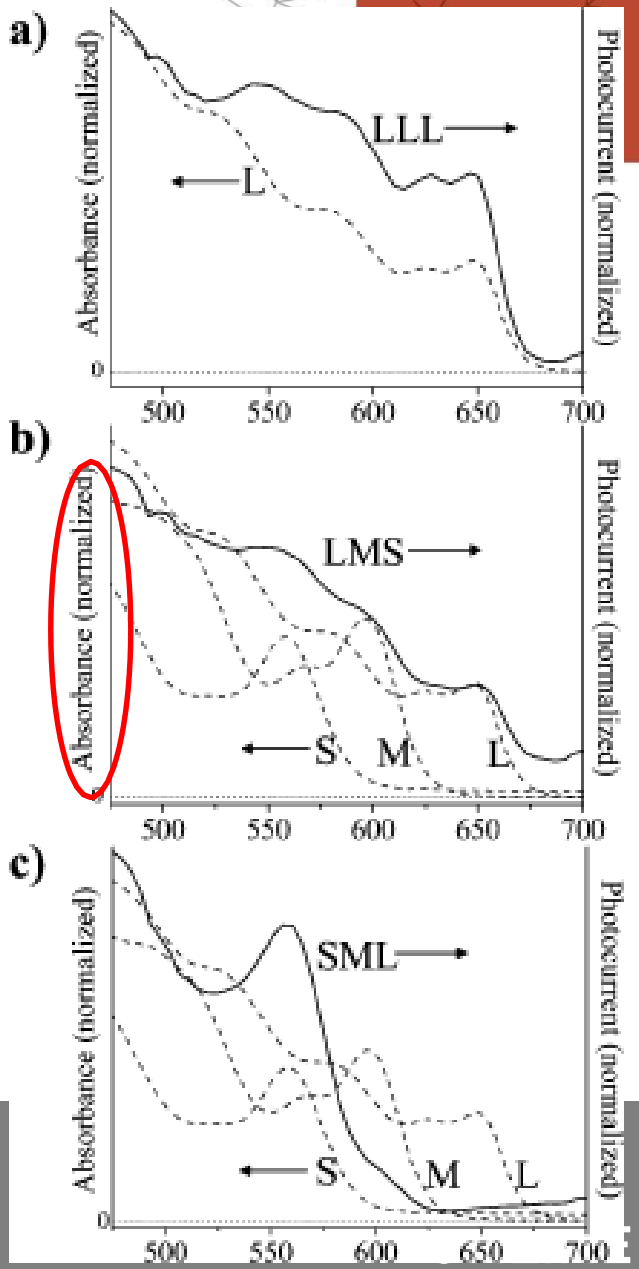


Figure 6. Photocurrent action (PCA) spectra (normalized photocurrent as a function of excitation wavelength, solid lines, right axes) for the junctions ITO/PEDOT:PSS/**X**/ EGaIn, **X** = LLL (a), LMS (b), and SML (c). The tunable excitation source for these spectra was a 450 W Hg–Xe arc lamp in combination with a monochromator (intensity = 38 μW/cm^2). Also shown with each PCA spectrum are the ground-state absorbance spectra for films of the S, M, and L QDs on glass (dashed lines, left axes).

Identify Everything

Don't forget to check the footnotes

Table 2 Effects of annealing in N_2 on the dispersion, cluster size, activity and selectivity of RuO_2(9.5wt%)/CNT catalyst.

Annealing temperature	d_{RuO2} [b]	Dispersion [c]	Conversion rate [a]	Turnover rate ODH [d]	E^{obs}_{ODH} [e]	S_{CO2}	S_{FA}	S_{MF}	S_{DMM}
°C	nm	%	mol_{MeOH} (mol $Ru_{total})^{-1}$ h^{-1}	mol_{ODH} (mol $Ru_{surface})^{-1}$ h^{-1}	kJ/mol	%	%	%	%
100	1.4±0.5	39.8	158	232	48.0±0.9	0	17	34	49
200	1.5±0.5	41.5	100	147	-	0	22	41	37
300	1.6±0.4	45.4	124	171	60.9±3.7	0	25	52	22
400	1.5±0.5	35.7	79	141	-	0	27	66	6

a Reaction conditions: 120 °C, 7 kPa methanol, 20 kPa O_2, conversion in 13~25%.

b By TEM.

c By CO chemisorption.

d The formation of every molecular of MF and DMM need a single ODH event.

?

Identify Everything

Axis not labeled

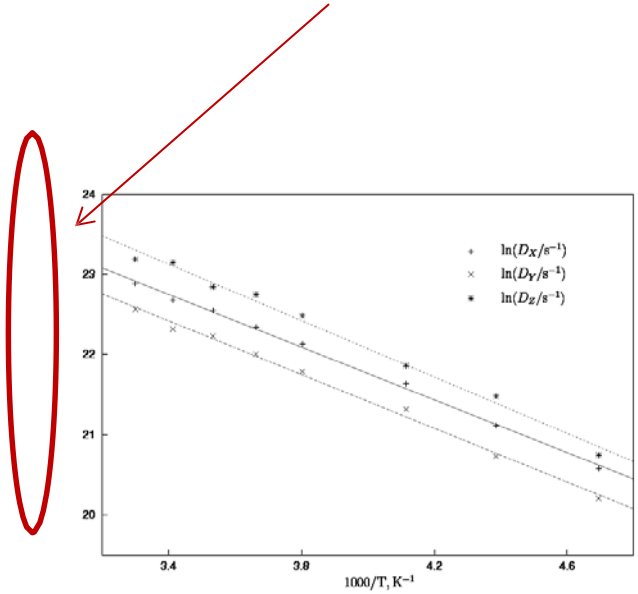
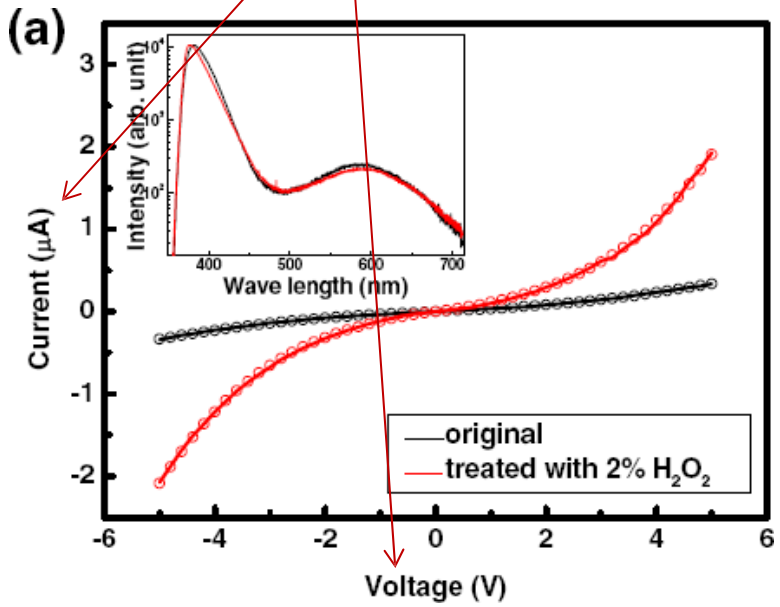


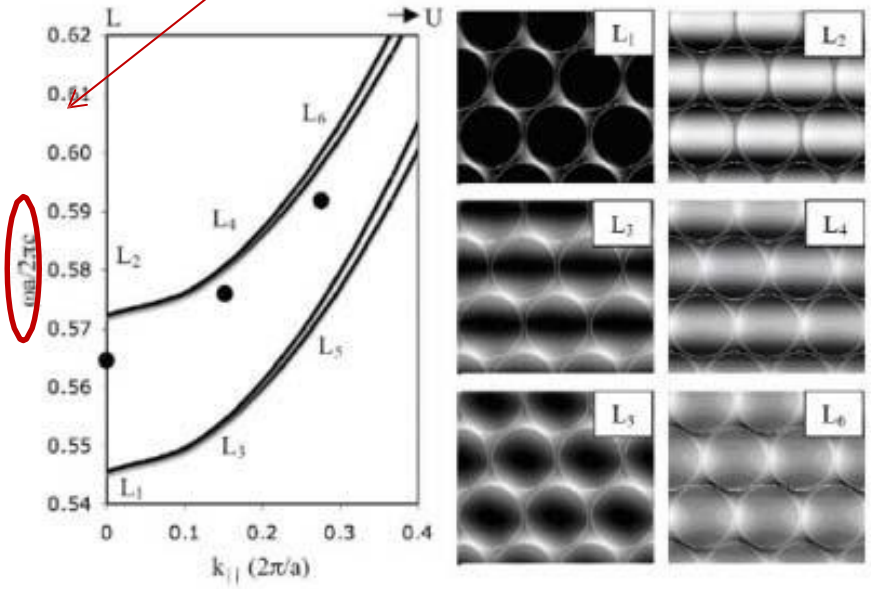
Figure 2: Arrhenius plot for components of the RDT of DMAN. The activation energies extracted from the slopes of these lines are 13.7 ± 0.3, 13.9 ± 0.4 and 14.6 ± 0.6 kJ/mol for tumbling about X, Y and Z axes, respectively.

Axes clearly labeled

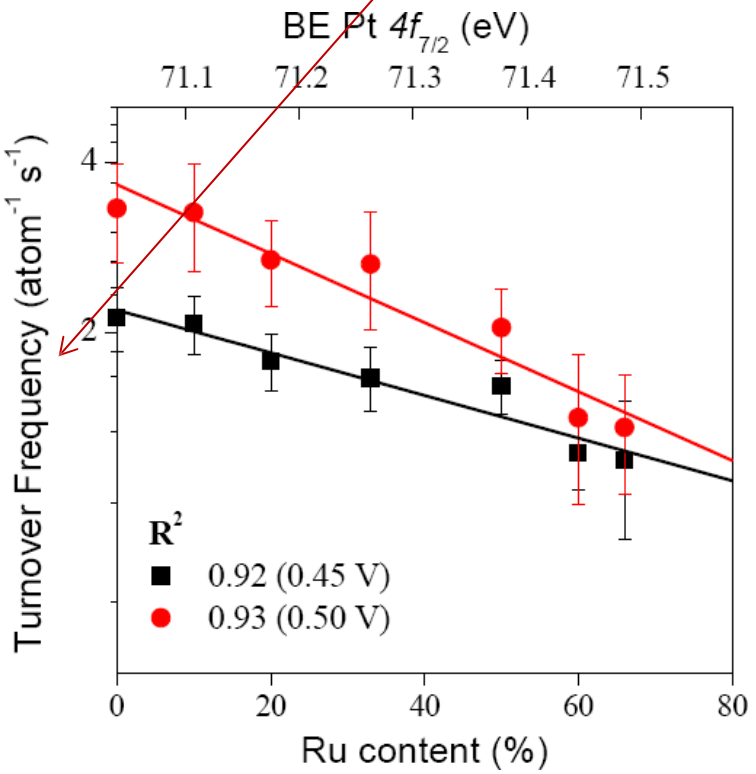


Identify Everything

No description



Variable is described



Data Analysis Exercise

Social and Behavioral Sciences/Public Health

Question:

- Are clinics in a certain geographical area reaching their treatment targets for HIV patients?

Data Source:

- Routine health information

Data Source

Code	Variables
1.	New clients
2.	Group pre-test counseled
3.	Individual pre-test counseled
4.	Accepted HIV test
5A.	HIV test result - Positive
5B.	HIV test result – Negative
5C.	HIV test result - Indeterminate
6A.	Post-test counseled - Positive
6B.	Post-test counseled – Negative
8A.	Therapy ordered
9.	Therapy round 1
10.	Therapy round 2

- Which of these variables are relevant to answer your question?
- Which elements will be included in your numerator and which in your denominator?

Data Source

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- Which of these variables are relevant to answer your question?
- Which elements will be included in your numerator and which in your denominator?

Answers:

1) New clients, Therapy round 1 and 2

2) New ANC clients = Denominator,

Therapy round 1 and 2 = Numerator

Presenting the Data

Number of clients receiving therapy

Code	Variables	Facility 1	Facility 2	Facility 3	Facility 4	Facility 5
9.	**IPTp-1**	536	1435	39	969	862
10.	**IPTp-2**	372	542	38	452	780

Question:

Among the five facilities, which one performed **better**?

Presenting the Data

Number of clients receiving therapy

Code	Variables	Facility 1	Facility 2	Facility 3	Facility 4	Facility 5
9.	**IPTp-1**	536	1435	39	969	862
10.	**IPTp-2**	372	542	38	452	780

Question:

Among the five facilities, which one performed **better**?

Answer:

Cannot tell because we don't know the denominators

Presenting the Data

Number of clients receiving therapy

Code	Variables	Facility 1	Facility 2	Facility 3	Facility 4	Facility 5
1	New ANC Clients	744	2708	105	1077	908
9.	IPTp-1	536	1435	39	969	862
10.	IPTp-2	372	542	38	452	780

Question: Now, you have the **denominators**, which of these facility performed better?

Presenting the Data

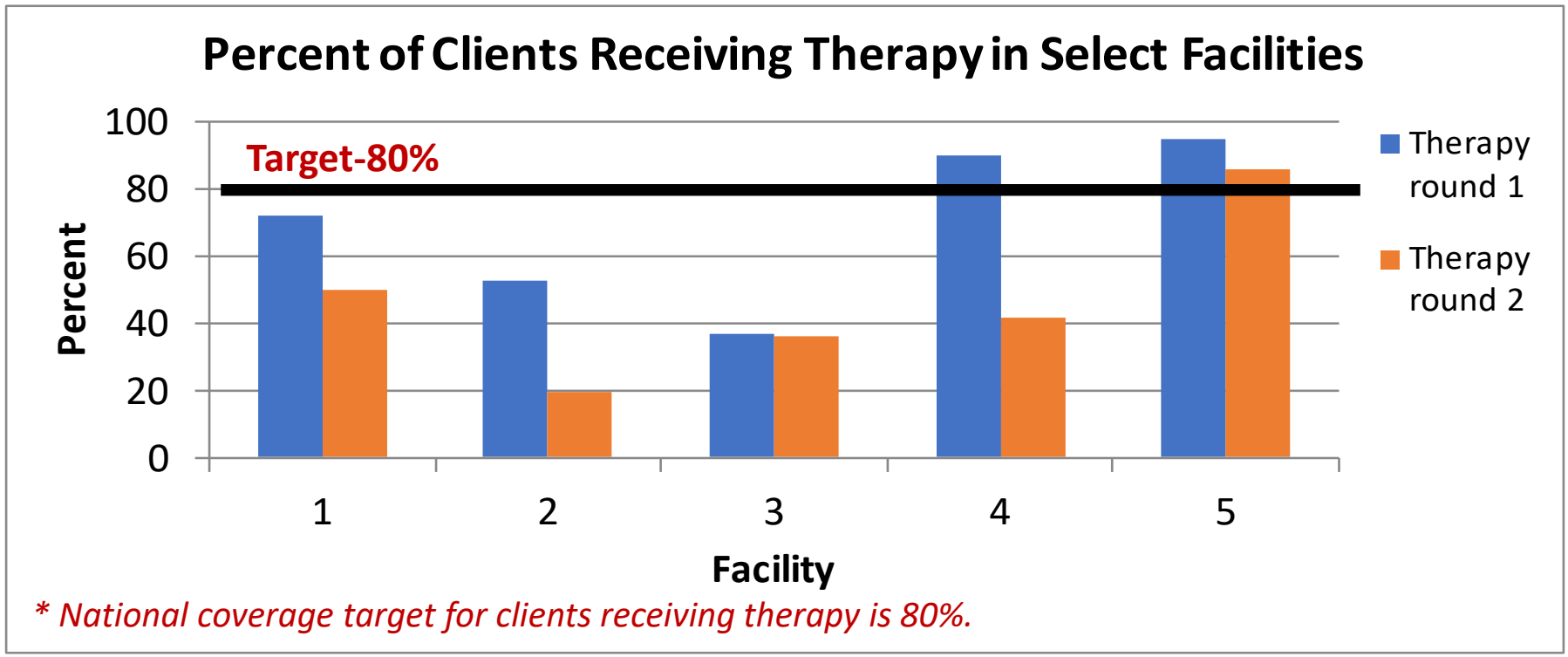
Number of clients receiving therapy

Code	Variables	Facility 1	Facility 2	Facility 3	Facility 4	Facility 5
1	New ANC Clients	744	2708	105	1077	908
9.	IPTp-1	536	1435	39	969	862
10.	IPTp-2	372	542	38	452	780

Indicator	Facility 1	Facility 2	Facility 3	Facility 4	Facility 5
% of new ANC clients who receive IPTp-1 in the past year	72%	53%	37%	90%	**95%**
% of new ANC clients who receive IPTp-2 in the past year	50%	20%	36%	42%	**86%**

Response: Facility 5

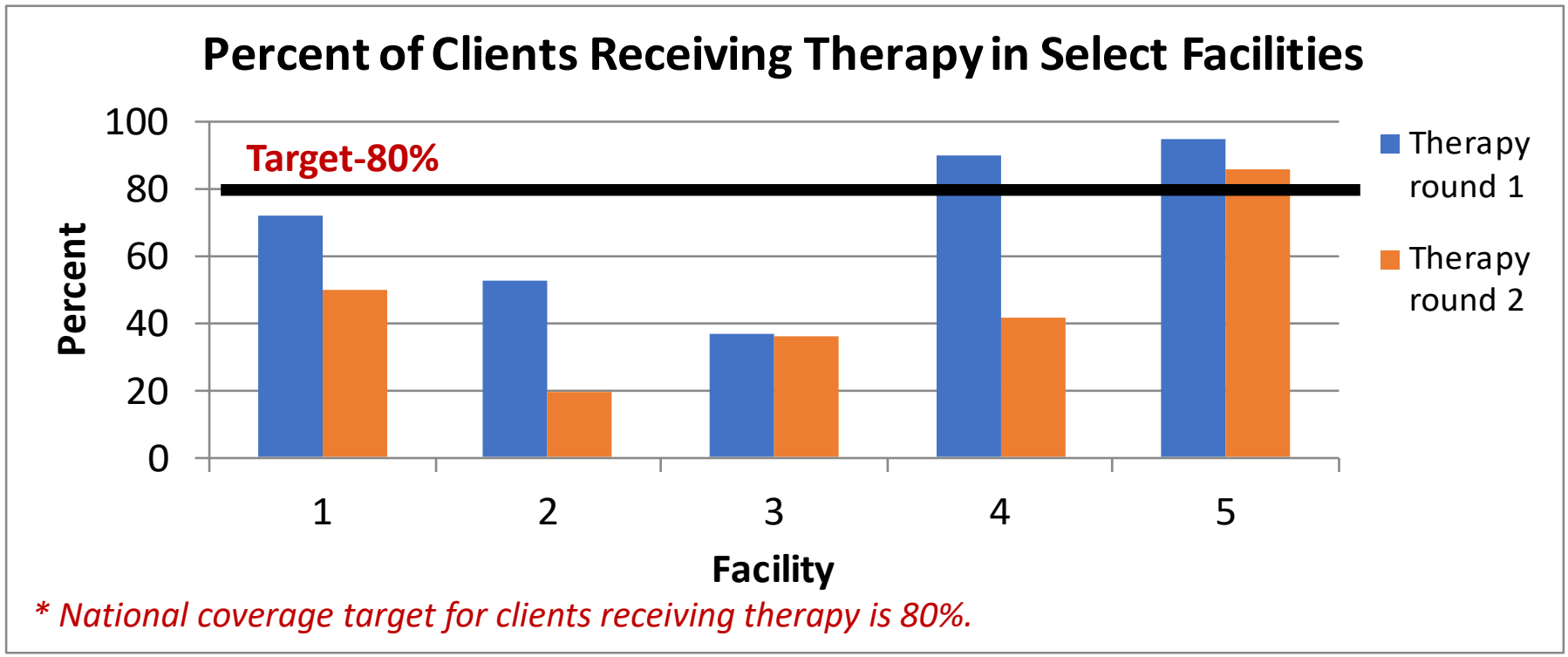
Presenting the Data



** National coverage target for clients receiving therapy is 80%.*

Question 1: Are the facilities reaching the **coverage target**?

Presenting the Data



** National coverage target for clients receiving therapy is 80%.*

Question 2: What else can we **interpret** from this information?

Some Additional Questions

- Which **facility** is performing better/worse than **expected**?
- What is the **trend over time** for these facilities?
- How would you **assess** each facility's performance based on the data?
- What **other data or information** should you consider in providing recommendations or guidance to the facilities?

Questions?

Type questions for the speaker(s) in the Q&A box.

We will address any additional questions at this time.

Thank You!

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