

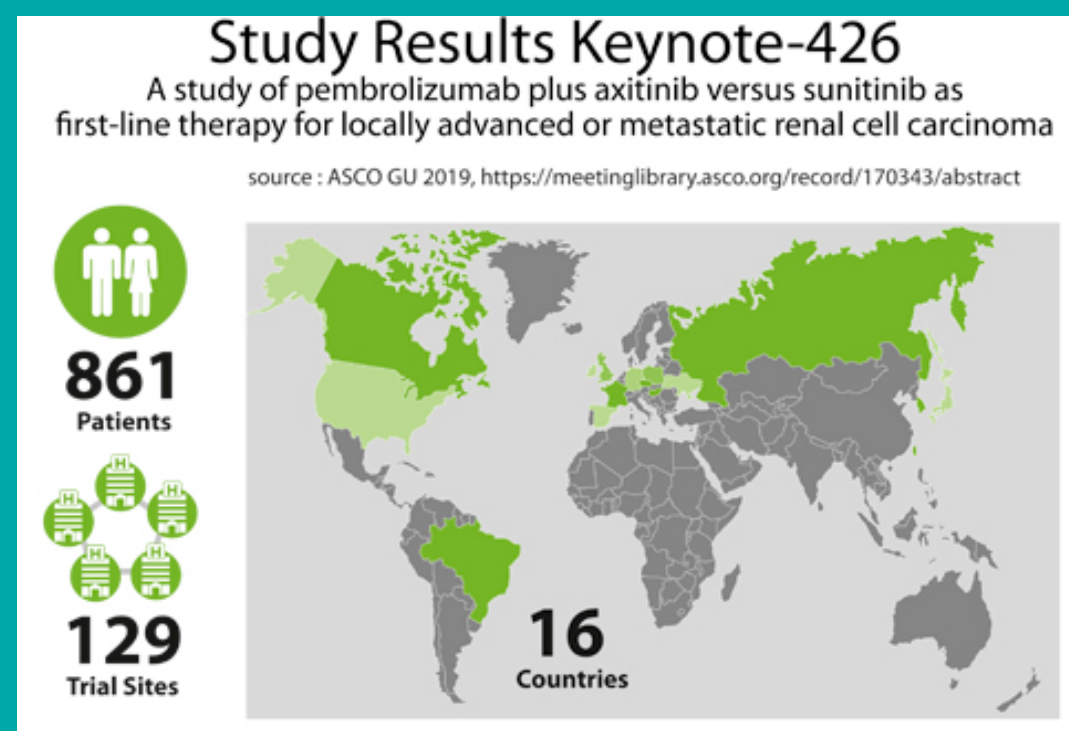
01

INTRODUCTION TO STATISTICS



Statistics are everywhere

Statistics summarize raw facts and figures into meaningful information.



Key Steps in Statistics



Gather Data

From surveys, experiments,
sources.



Analyze

Organize, compute,
and interpret results



Draw Conclusion

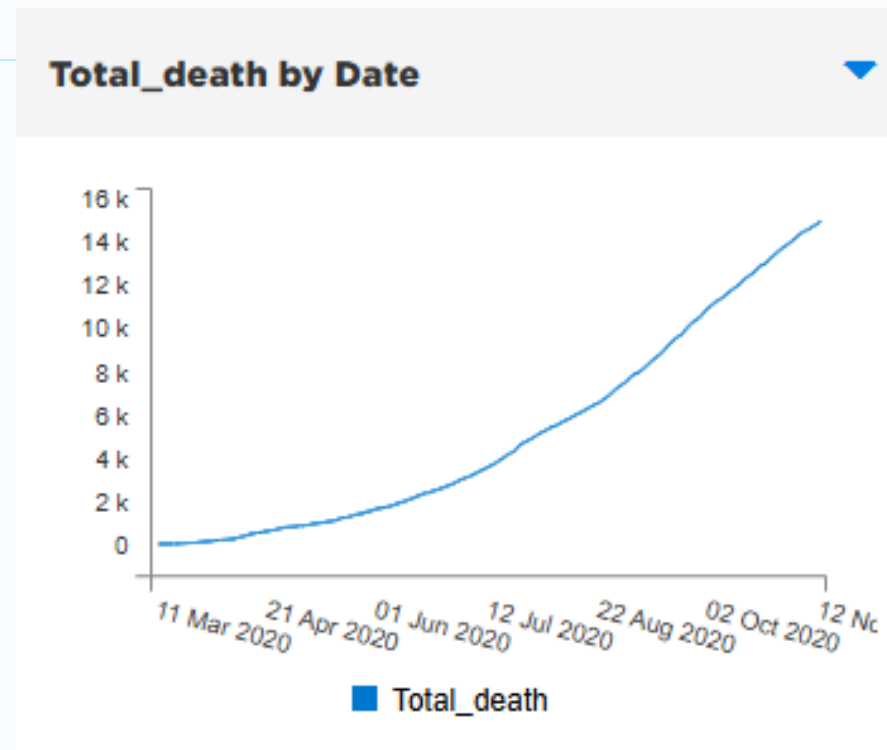
Make predictions and decisions

Key Steps in Statistics



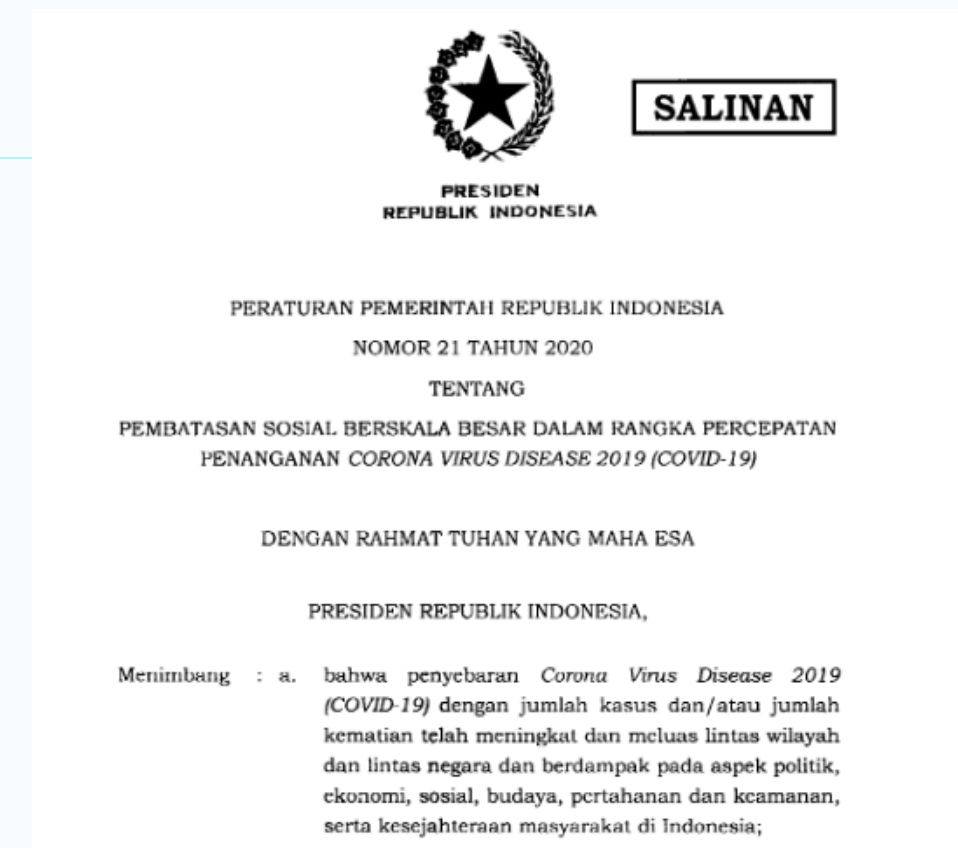
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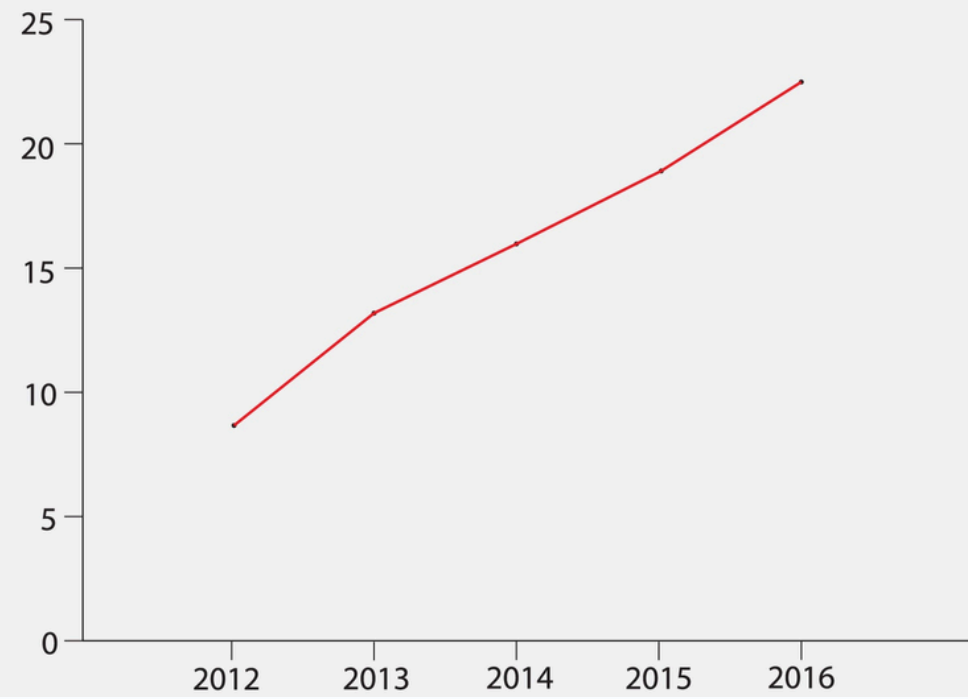
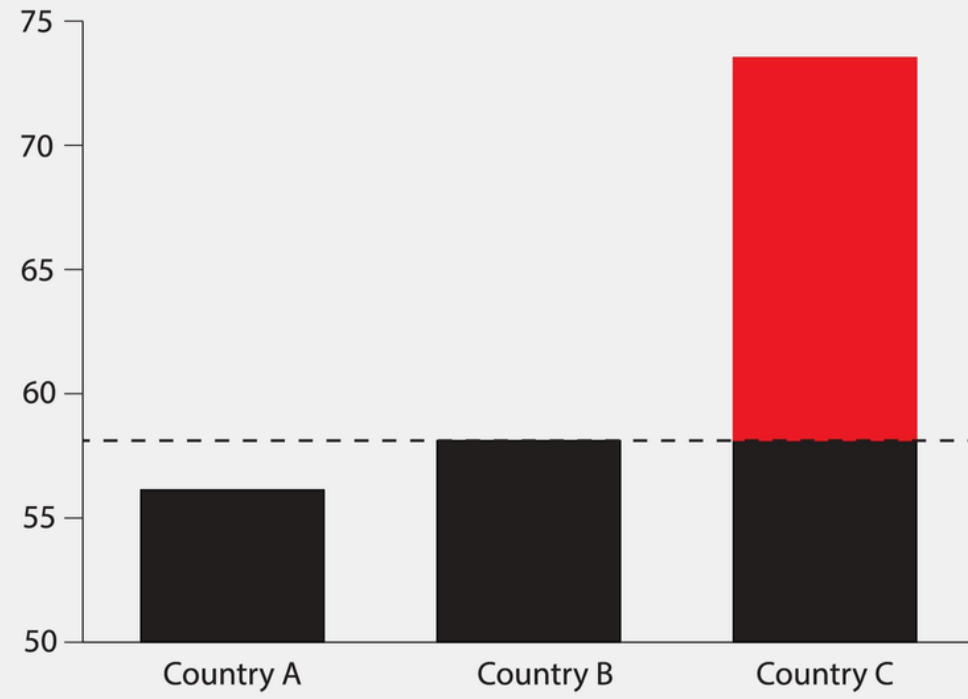
Make predictions and decisions



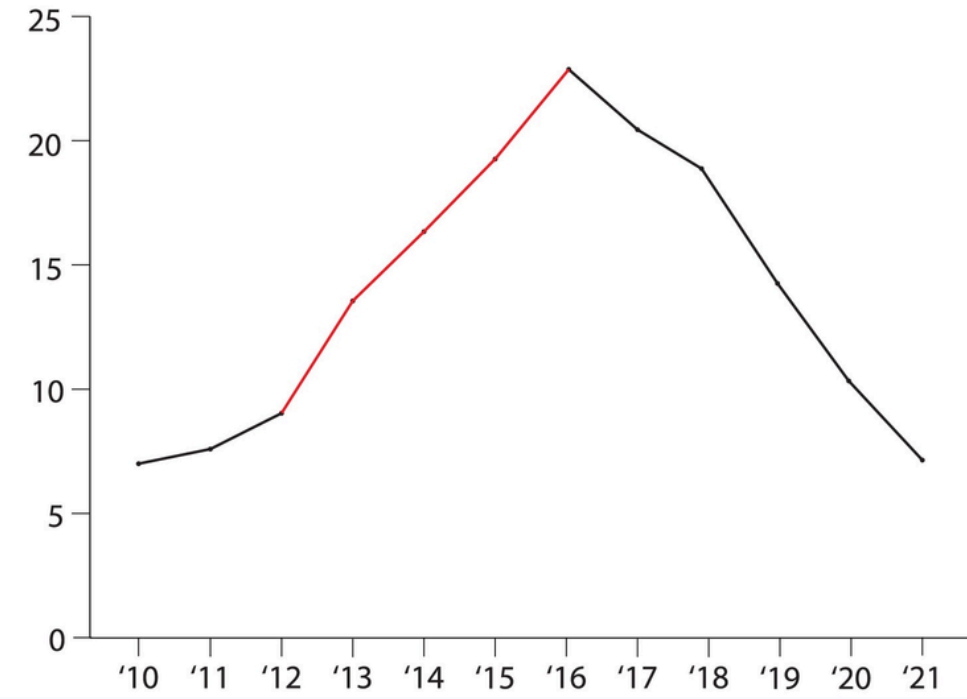
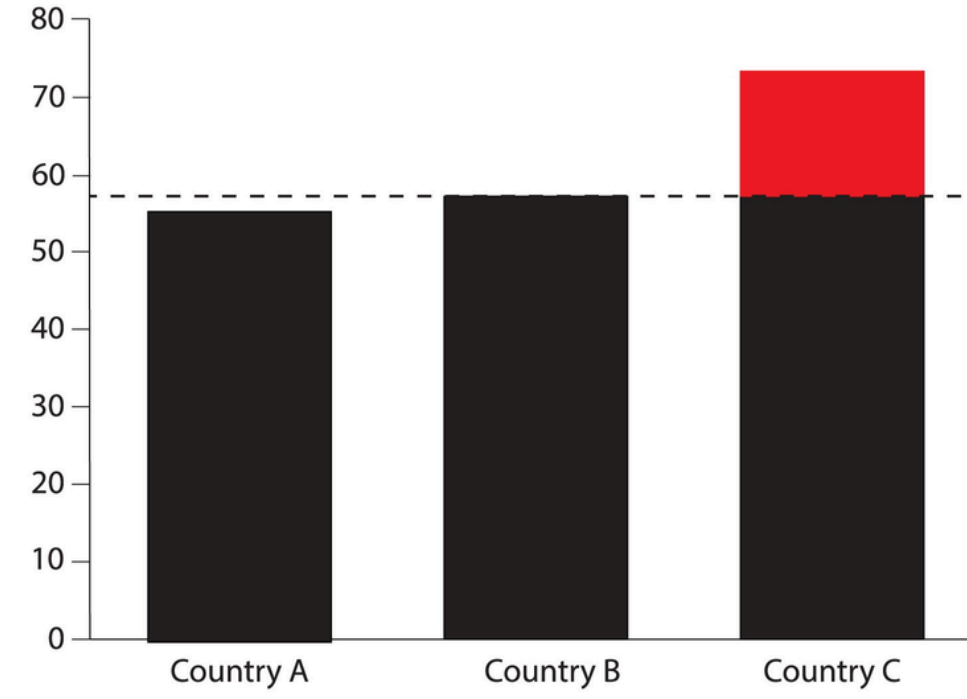
Why Learn Statistics?

- Empowers Decision-Making :
Turns intuition into evidence-based conclusions.
- Detects Misleading Data
Identifies cherry-picking, biased samples, or flawed methodologies.
- Same Data, Different Stories:
Manipulated axes, truncated scales, or selective timeframes.

MISLEADING



ACCURATE





Why Scientists Use Statistics (Not Just Common Sense)

- HUMANS ARE BIASED. WE BELIEVE WHAT WE WANT TO BELIEVE
- COMMON SENSE IS UNRELIABLE FOR ANALYZING COMPLEX DATA.

Example: During COVID-19, many believed "lockdowns don't work" based on personal experience, but statistical analysis showed reduced transmission rates.

Data vs. Information

Try converting the raw data below into information!

- Raw Data: “72, 85, 91, 68, 77” (exam scores).

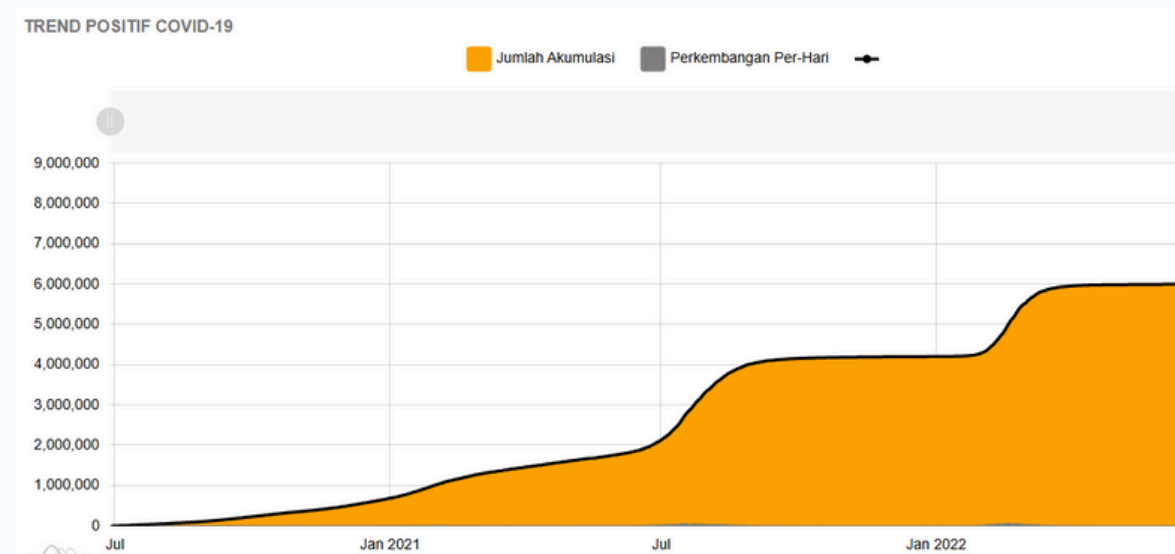


Case Study: COVID-19 Data to Public Health Policies

- Raw Data: Daily case counts (e.g., “March 2020: 100, 200, 500...”).

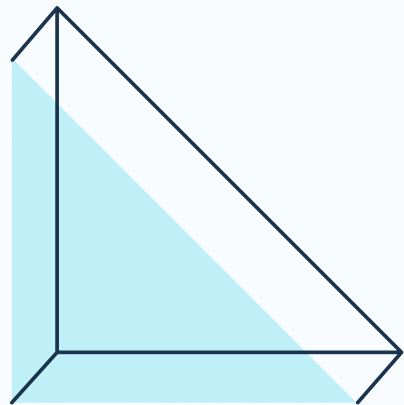
key	AKUMULASI_PLUS_TNP_TGL	AKUMULASI	PERKEMBANGAN	INSIDEN_KUI
2020-06-28	1813	1193	1193	6.8
2020-06-29	2908	2288	1095	10.9
2020-06-30	4195	3575	1287	15.7
2020-07-01	5449	4829	1254	20.4
2020-07-02	7159	6539	1710	26.7
2020-07-03	8517	7897	1358	31.8
2020-07-04	9974	9354	1457	37.3

- Information: “7-day rolling average shows a 50% weekly increase in cases” → Triggers lockdowns.

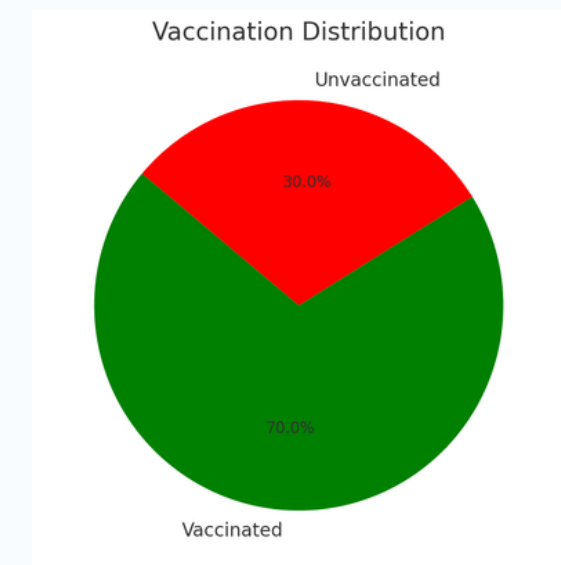
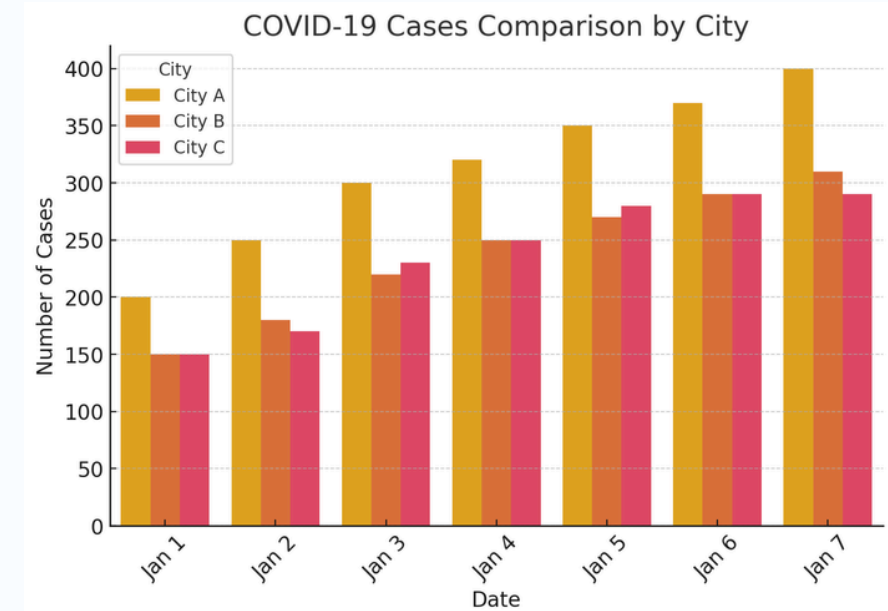
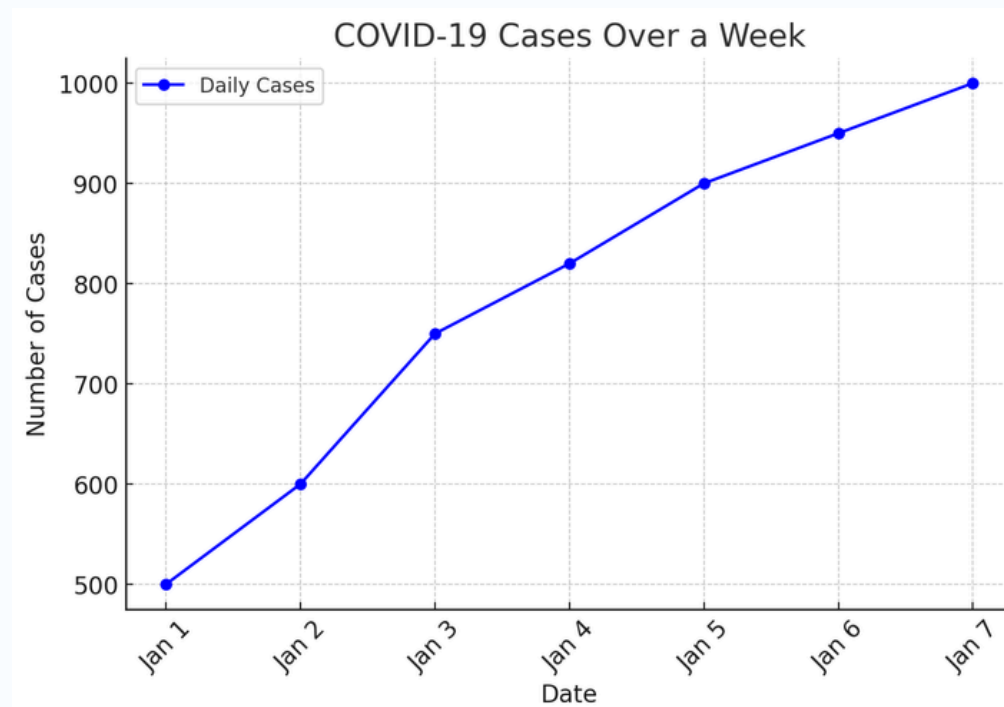


Why Use Charts for Data?

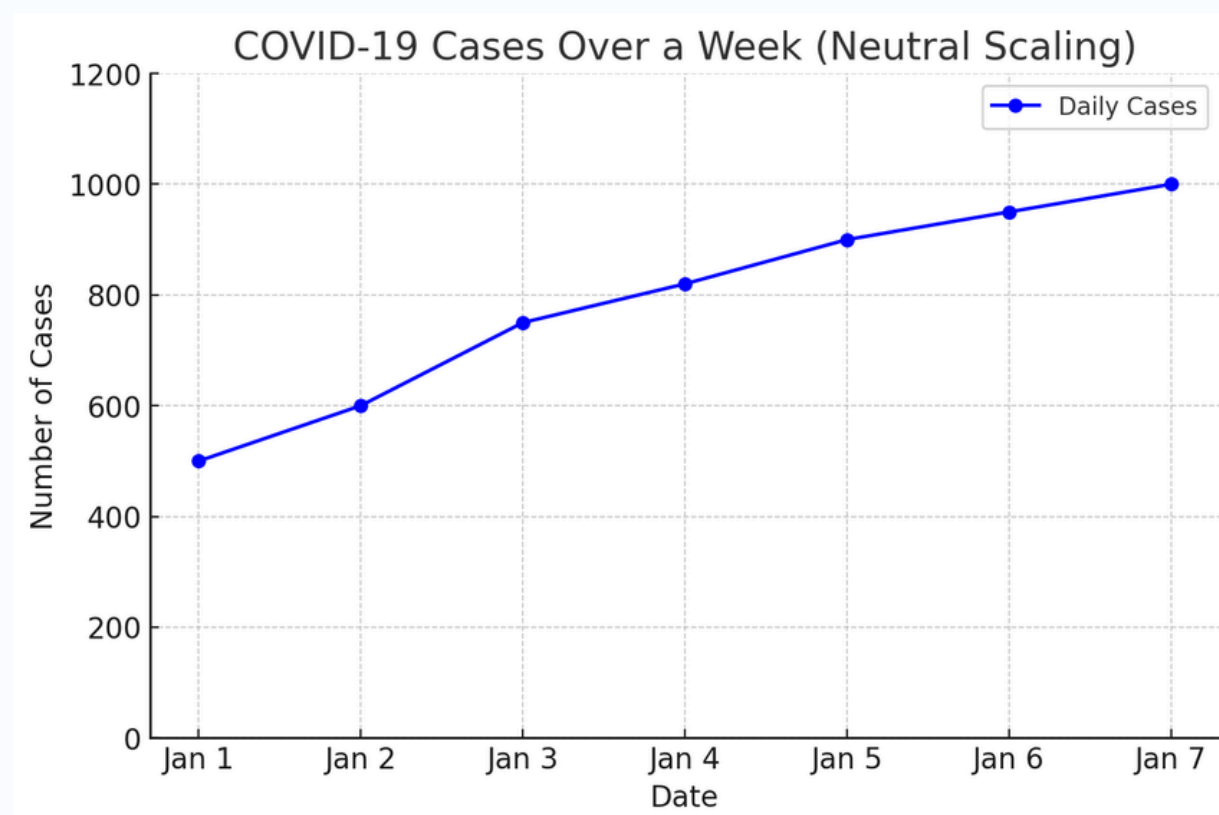
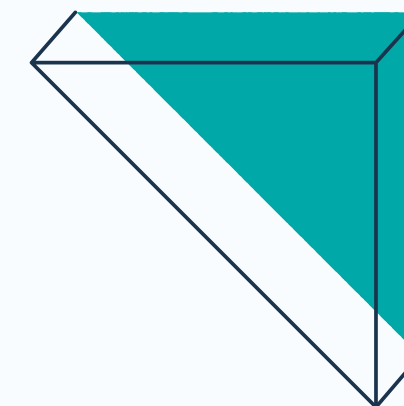
- 📌 Charts help visualize trends and patterns.
- 📌 Raw numbers are hard to interpret.
- 📌 Different charts emphasize different aspects of data.



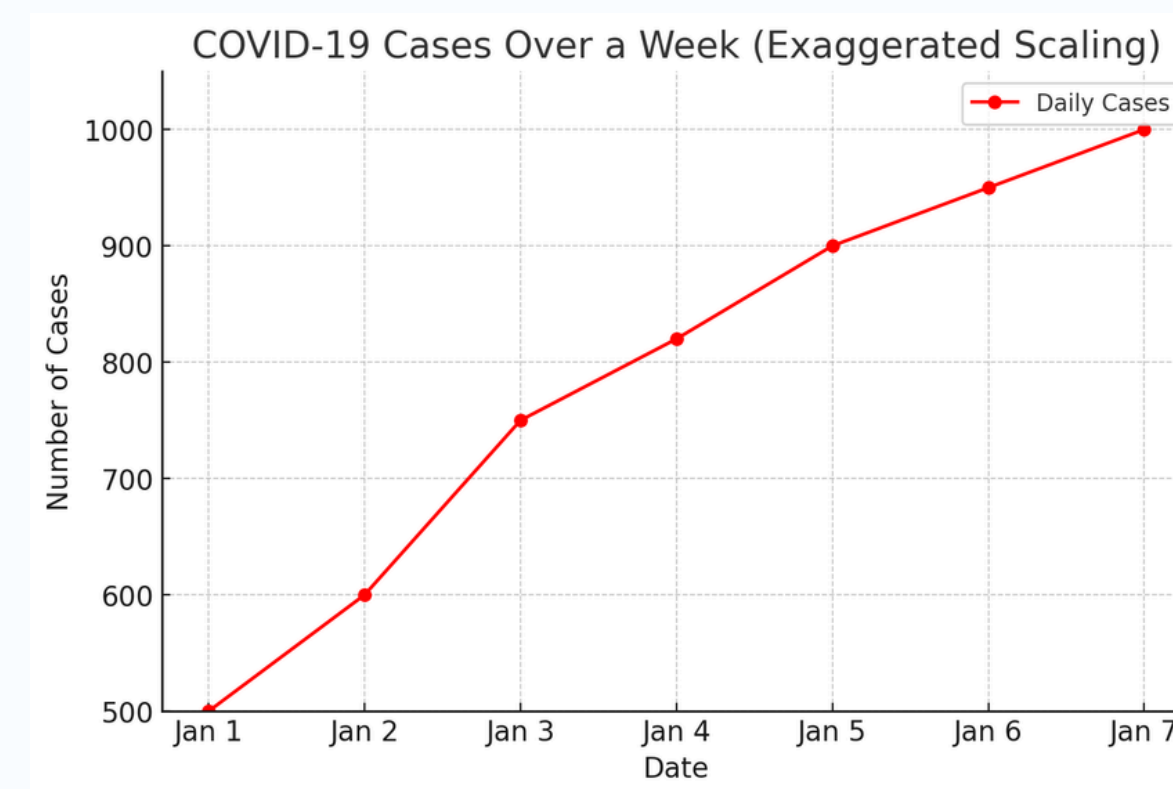
Date	Cases
Jan 1	500
Jan 2	600
Jan 3	750
Jan 4	820
Jan 5	900
Jan 6	950



Misleading Graphs – A Tale of Two Charts



- Y-axis starts from 0, showing a gradual increase in COVID-19 cases over the week.
- The trend looks realistic, helping public health officials make informed decisions.



- Y-axis starts from 500 instead of 0, making the rise in cases appear more dramatic than it actually is.
- This can cause unnecessary panic or be used to push an agenda

Types of Charts & When to Use Them



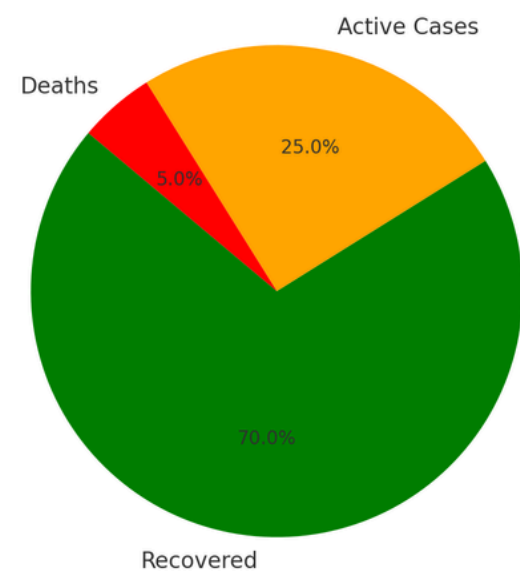
Pie Charts –
Show
proportions.

Bar Charts –
Compare values

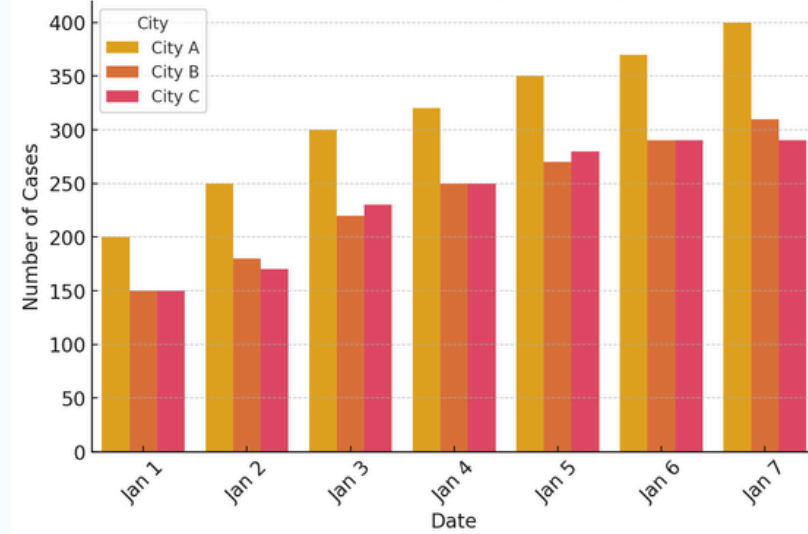
Line Charts –
Show trends
over time

Histograms –
Show
distributions of
numeric data

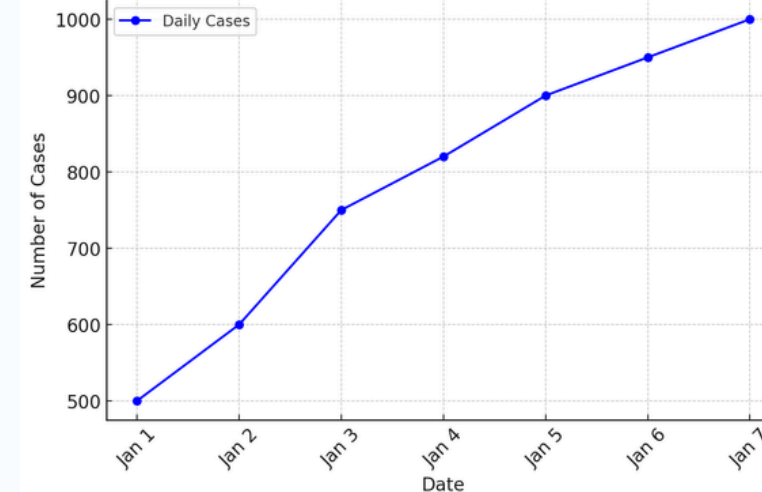
COVID-19 Case Distribution



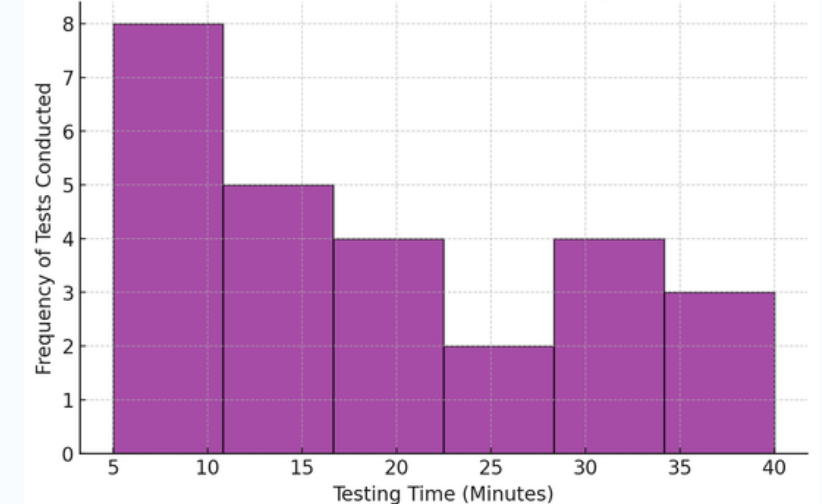
COVID-19 Cases Comparison by City



COVID-19 Cases Over a Week



Distribution of COVID-19 Testing Times



Types of Charts & When to Use Them

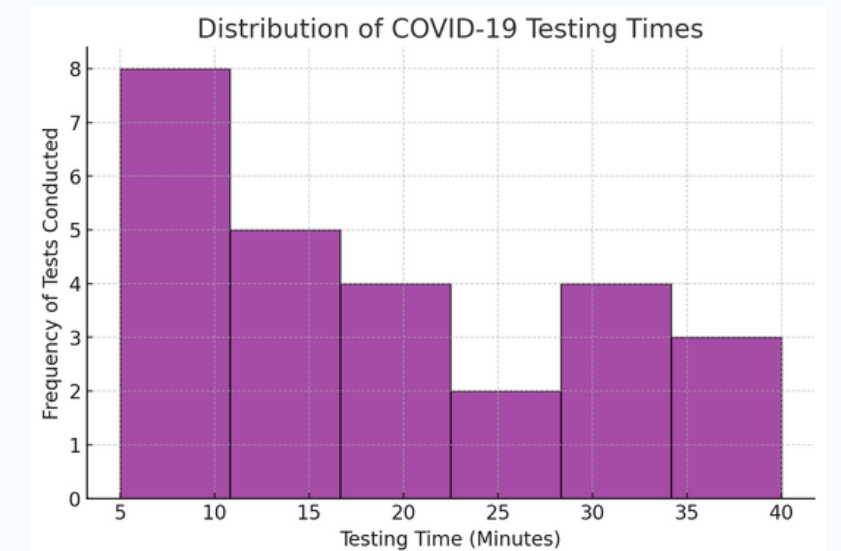
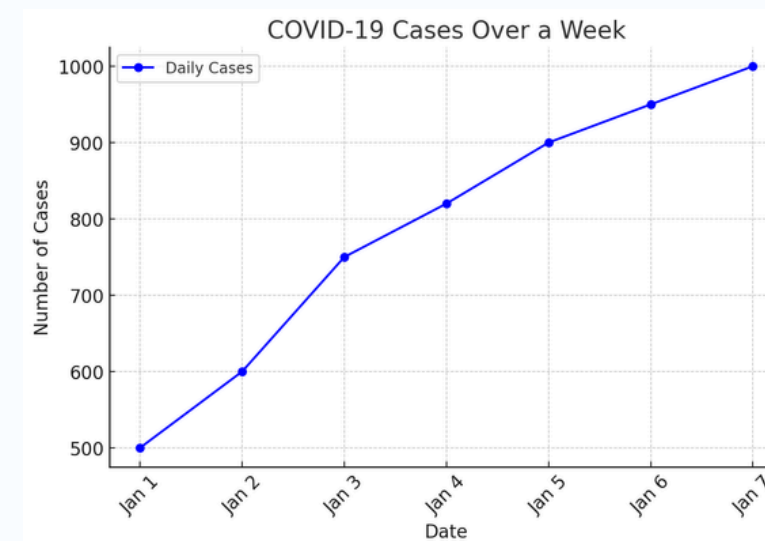
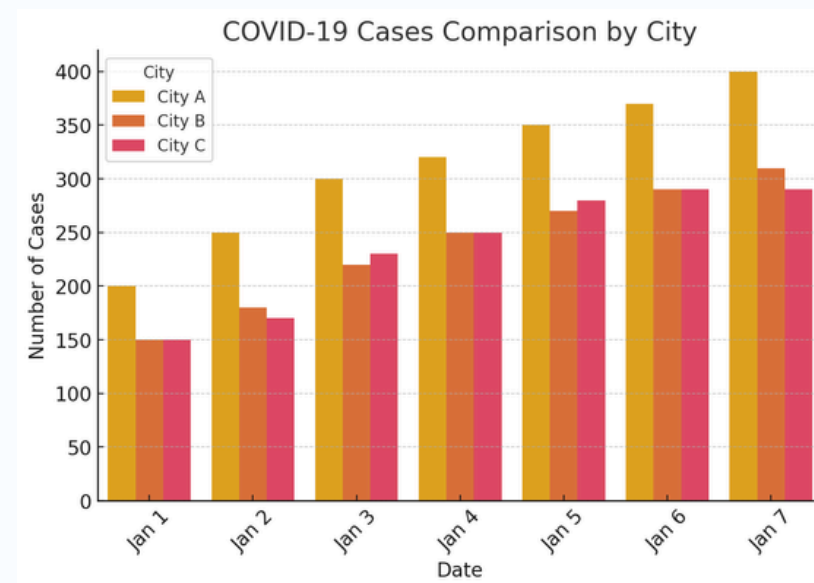
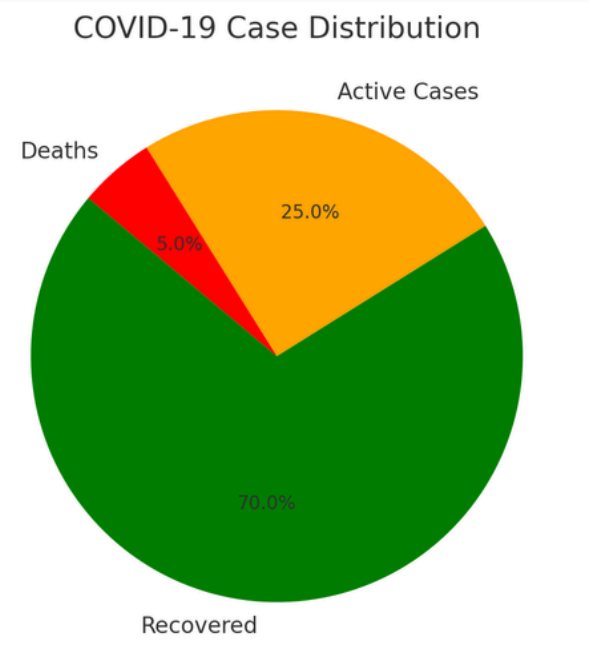


- ✓ Good for: Showing proportions.
- ✗ Bad for: Data with small differences.

- ✓ Easier to compare differences.
- ✗ Not Good for Trends Over Time

- ✓ Time-based data (stock prices, temperature).
- ✗ Not Ideal for Categories

- ✓ Works Well for Large Datasets
- ✗ Only Works for Numeric Data
- ✗ Doesn't Show Individual Data Points



To Sum Up:

- **Statistics make sense of data.**
 - **Charts help visualize patterns.**
 - **Not all charts are accurate—always check for misleading visuals.**
 - **Choosing the right chart matters.**
-





References

Griffiths, D. (2009). *Head first statistics (1st ed.)*. O'Reilly Media.

Foxcroft, D. (2021). [Learning Statistics with Jamovi](#).