



TEXAS
Health and Human
Services

Texas Department of State
Health Services

Excel Training

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DSHS Central Office**



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Introductions

- The VPD Team
- And you are?
Name, Agency, and Favorite
Quote

“85%
OF QUOTES
on the internet
are **MADE UP.**”

~ Abraham Lincoln

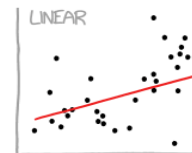


Outline

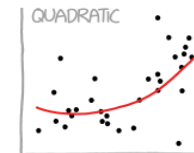
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- Excel Basics
- Statistics
- Mapping
- Situation Report

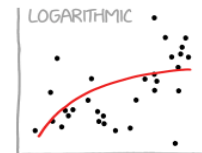
CURVE-FITTING METHODS AND THE MESSAGES THEY SEND



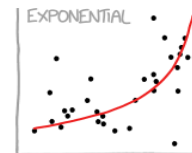
"HEY, I DID A
REGRESSION."



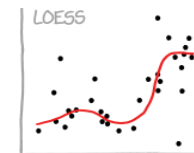
"I WANTED A CURVED
LINE, SO I MADE ONE
WITH MATH."



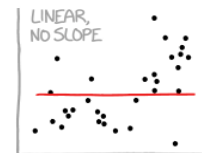
"LOOK, IT'S
TAPERING OFF!"



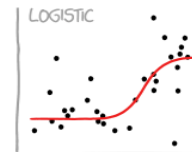
"LOOK, IT'S GROWING
UNCONTROLLABLY!"



"I'M SOPHISTICATED, NOT
LIKE THOSE BUMBLING
POLYNOMIAL PEOPLE."



"I'M MAKING A
SCATTER PLOT BUT
I DON'T WANT TO"



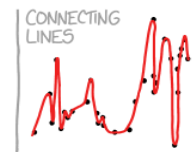
"I NEED TO CONNECT THESE
TWO LINES, BUT MY FIRST IDEA
DIDN'T HAVE ENOUGH MATH."



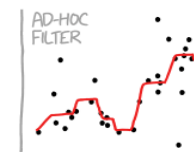
"LISTEN, SCIENCE IS HARD,
BUT I'M A SERIOUS
PERSON DOING MY BEST."



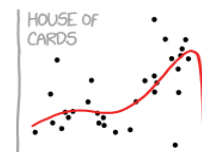
"I HAVE A THEORY,
AND THIS IS THE ONLY
DATA I COULD FIND."



"I CLICKED 'SMOOTH
LINES' IN EXCEL."



"I HAD AN IDEA FOR HOW
TO CLEAN UP THE DATA.
WHAT DO YOU THINK?"



"AS YOU CAN SEE, THIS
MODEL SMOOTHLY FITS
THE- WAIT NO NO DON'T
EXTEND IT AAAAAA!!!"

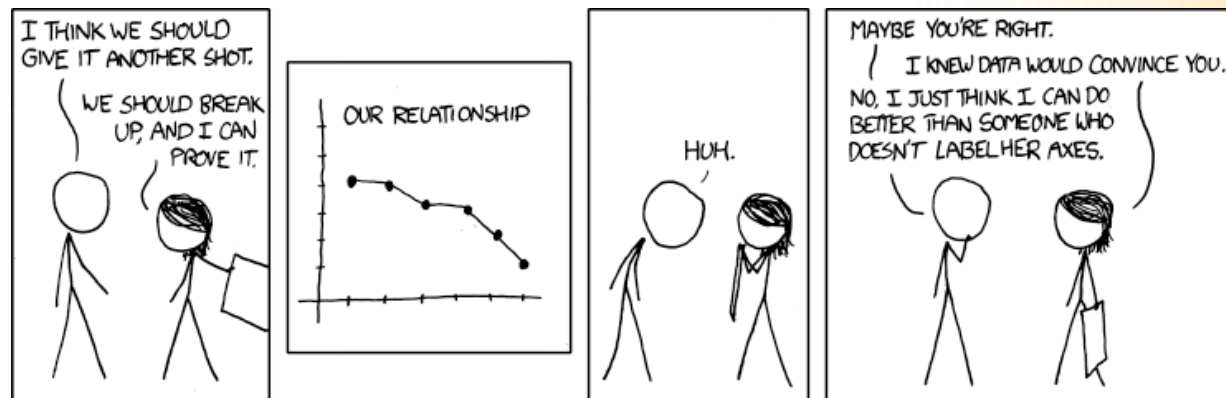
Excel Basics

Basic Functions

- Logic formulae
- VLOOKUP
- Epi Curve
- Descriptive stats



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Setting Up Logic Formulas



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- Why?
 - Case definitions
 - Missing dates for age calculations
 - Yes vs. Yes & Maybe
 - Cases vs. Controls
- IF/THEN in Excel
 - Single
 - Nested
 - COUNTIF
 - COUNTA



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IF/THEN in Excel

- =IF(A2="Yes", 1, "")
 - =If A2 is Yes, then enter 1, else leave blank
- =CountIF(A2:A10,"Yes")
 - =Count of all cells b/t A2 and A10 that have Yes in them
- =CountIFS(A2:A10,"Yes", B2:B10, 1)
 - Count all rows where column A is Yes and column B is 1
- =CountA(A2:A10)
 - Count all cells b/t A2 and A10 are not blank



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Nested IF/THEN

- $=\text{IF}(\text{IF}(J2 = \text{"unk"}, ((I2-N2)/365.25), ((J2-N2)/365.25))) \geq 1, (\text{INT}(\text{IF}(J2 = \text{"unk"}, ((I2-N2)/365.25), ((J2-N2)/365.25))))), \text{IF}(J2 = \text{"unk"}, ((I2-N2)/365.25), ((J2-N2)/365.25))$
- To calculate age based on Onset or Collection (if Onset is unknown)
- Age is reported as an integer if 1 year old or older
- Age is reported as a decimal if less than a year old

Descriptive Summary Table and Graphs

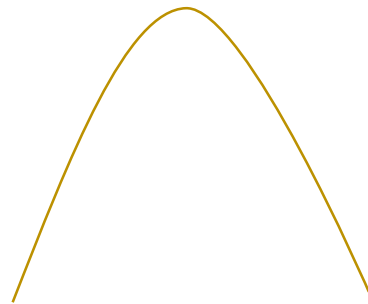


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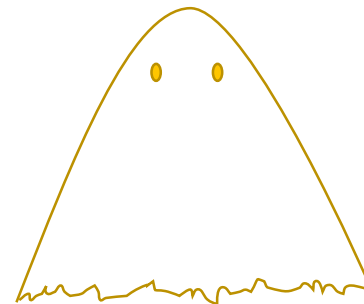
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- Min, Max, Median (Age)
- Age Categories via [VLOOKUP](#)
- Percentage (Gender, Race, Ethnicity)
- Epi Curves (will cover with pivot tables)



Normal Curve



Paranormal Curve



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Summaries in Excel

- =Min(A2:A10)
- =Max(A2:A10)
- =MEDIAN(A2:A10)
- Format for percentage
 - Use the numbers you need (i.e., should you use SUM, COUNT, or COUNTIF(S))
- Pivot Tables to summarize or Create Epi Curves

Statistics

Excel can make your 2X2 table

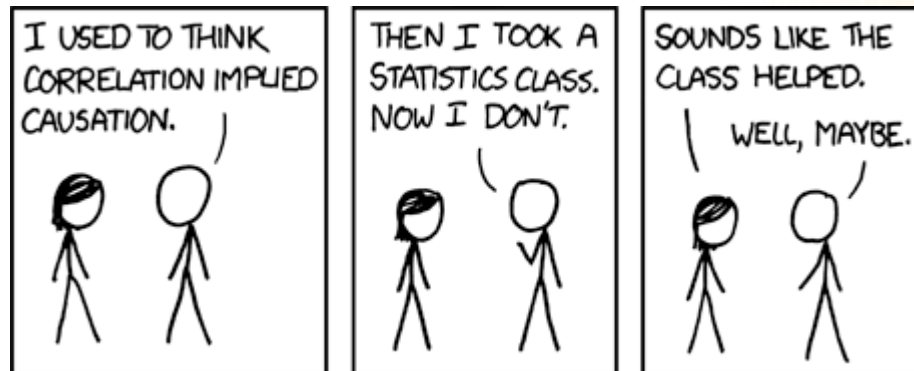
- Odds Ratio (OR)
- Ninety-Five Percent Confidence Interval (95% CI)
- Chi-squared statistic (χ^2)
- P-value



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Odds Ratio (OR)

- Ratio of Yes to No in cases = a/b
- Ratio of Yes to No in "controls" = c/d
- OR = Ratio of the case ratio to "control" ratio, i.e. $\frac{a/b}{c/d}$
- Math time: $\frac{a/b}{c/d} = \frac{a}{b} \times \frac{d}{c} = \frac{ad}{bc}$
- In Excel...

| Exposure | Yes | No | Total |
|------------|-----|-----|---------|
| Cases | a | b | a+b |
| "Controls" | c | d | c+d |
| Total | a+c | b+c | a+b+c+d |



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OR in Excel

- **=(B3*M3)/(F3*L3)**
- **=(Case Yes*Control No) / (Case No*Control Yes)**

95% Confidence Interval (CI)



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- What is a 95% CI?

- $e^x = 1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \dots, -\infty < x < \infty$

- or

e

~2.71828182845904523536028747135266249775724709369995

- $\ln(OR)$

- $\pm 1.96 \sqrt{\frac{1}{a} + \frac{1}{b} + \frac{1}{c} + \frac{1}{d}}$ (plus and minus the product of the SD and SE)

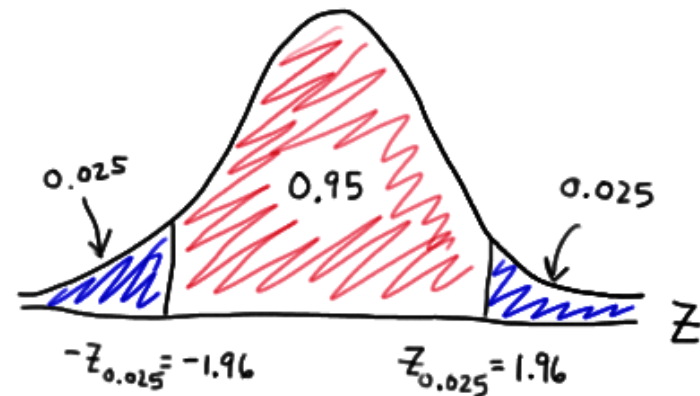
- Plus for the upper bound and minus for the lower bound

- 95% CI = $e^{\ln(OR) \pm 1.96 \sqrt{\frac{1}{a} + \frac{1}{b} + \frac{1}{c} + \frac{1}{d}}}$

- In Excel...

SD = Standard Deviation

SE = Standard Error





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95% CI in Excel

- **=EXP(LN(P3)±(1.96*SQRT((1/B3) + (1/F3)+(1/L3)+(1/M3))))**
- **=e to the ((natural log of the OR) ± (the SD*the SE))**
- The SD = 1.96 for a 95% CI or 2.575 for a 99% CI
- The SE = The square root of (reciprocal of case yes + reciprocal of case no + reciprocal of control yes + reciprocal of control no)



χ^2 statistic

- Needed to calculate the p-value of the OR
- Numerator: The square of $ad-bc$, multiplied by the overall total
- Denominator: The product of each row total and column total
- $$\chi^2 = \frac{(ad-bc)^2 \times (a+b+c+d)}{(a+b)(c+d)(a+c)(b+d)}$$
- In Excel...

| Exposure | Yes | No | Total |
|------------|-----|-----|---------|
| Cases | a | b | a+b |
| "Controls" | c | d | c+d |
| Total | a+c | b+d | a+b+c+d |



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χ^2 in Excel

- =IF(B3>0,(((B3*M3-F3*L3)^2)*(B3+F3+L3+M3))/(D3*N3*(B3+L3)*(F3+M3)),"n/a")
- This calculates the χ^2 statistic if you have case "yes" responses, if you don't it will return "n/a".
- Otherwise you'll have an error for your OR, but still calculate a χ^2

P-value



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- Degrees of freedom (df) = (# columns-1) x (# rows-1)
 - For a 2x2 table, df = 1

| DEGREES OF FREEDOM | PROBABILITY | | | | | | | | | | |
|--------------------|-------------|------|------|------|------|-------|-------|-------|-------|-------|-------|
| | 0.95 | 0.90 | 0.80 | 0.70 | 0.50 | 0.30 | 0.20 | 0.10 | 0.05 | 0.01 | 0.001 |
| 1 | 0.004 | 0.02 | 0.06 | 0.15 | 0.46 | 1.07 | 1.64 | 2.71 | 3.84 | 6.64 | 10.83 |
| 2 | 0.10 | 0.21 | 0.45 | 0.71 | 1.39 | 2.41 | 3.22 | 4.60 | 5.99 | 9.21 | 13.82 |
| 3 | 0.35 | 0.58 | 1.01 | 1.42 | 2.37 | 3.66 | 4.64 | 6.25 | 7.82 | 11.34 | 16.27 |
| 4 | 0.71 | 1.06 | 1.65 | 2.20 | 3.36 | 4.88 | 5.99 | 7.78 | 9.49 | 13.28 | 18.47 |
| 5 | 1.14 | 1.61 | 2.34 | 3.00 | 4.35 | 6.06 | 7.29 | 9.24 | 11.07 | 15.09 | 20.52 |
| 6 | 1.63 | 2.20 | 3.07 | 3.83 | 5.35 | 7.23 | 8.56 | 10.64 | 12.59 | 16.81 | 22.46 |
| 7 | 2.17 | 2.83 | 3.82 | 4.67 | 6.35 | 8.38 | 9.80 | 12.02 | 14.07 | 18.48 | 24.32 |
| 8 | 2.73 | 3.49 | 4.59 | 5.53 | 7.34 | 9.52 | 11.03 | 13.36 | 15.51 | 20.09 | 26.12 |
| 9 | 3.32 | 4.17 | 5.38 | 6.39 | 8.34 | 10.66 | 12.24 | 14.68 | 16.92 | 21.67 | 27.88 |
| 10 | 3.94 | 4.86 | 6.18 | 7.27 | 9.34 | 11.78 | 13.44 | 15.99 | 18.31 | 23.21 | 29.59 |

Nonsignificant

Significant

Source: R. A. Fisher and F. Yates, *Statistical Tables for Biological, Agricultural and Medical Research*, 6th ed., Table IV, Oliver & Boyd, Ltd., Edinburgh, 1963, by permission of the authors and publishers.

- In Excel...



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P-value in Excel

- =IF(V3="n/a","n/a",CHIDIST(V3,1))
- =IF the χ^2 statistic reports "n/a", then this cell should also report "n/a"
- =CHIDIST(χ^2 statistic, df) will give you the p-value
- Conditional formatting, if <0.05 then make red



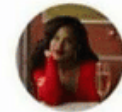
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The data

- What is needed
 - Address
 - Non-PHI identifier
 - Onset date
 - Anything else?



CHLO

@chlothegod

Y'all pronounce it data or data?



RJ

@itsrjhill

I'm mad that I read these words in two different ways... but you're trippin if you think it's data and not data



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Situation Report

Updating others

- Use a template
- What to include
- When to update
- Who to update



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| <u>P-VALUE</u> | <u>INTERPRETATION</u> |
|----------------|--|
| 0.001 | HIGHLY SIGNIFICANT |
| 0.01 | |
| 0.02 | |
| 0.03 | |
| 0.04 | SIGNIFICANT |
| 0.049 | |
| 0.050 | OH CRAP. REDO CALCULATIONS. |
| 0.051 | ON THE EDGE OF SIGNIFICANCE |
| 0.06 | |
| 0.07 | HIGHLY SUGGESTIVE, SIGNIFICANT AT THE P<0.10 LEVEL |
| 0.08 | |
| 0.09 | |
| 0.099 | HEY, LOOK AT THIS INTERESTING SUBGROUP ANALYSIS |
| ≥0.1 | |



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Situation Report: Why?

- Nice summary of an outbreak
- Ready to deploy when asked for by the powers that be

Situation Report: Components



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- 1. Context/Background
 - Population affected
 - Location
 - Geography of outbreaks (in general)
 - Etiology

Situation Report: Components



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- 2. Initiation of Investigation
 - Date of notification
 - Date investigation started

Situation Report: Components



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- 3. Investigation Methods
 - Initial activity
 - Data collection methods
 - Analysis methods
 - Case definitions

Situation Report: Components



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- 4. Investigation Results
 - Numbers (lab confirmed and epi-linked)
 - Numbers (know onset dates, range of dates)
 - Epi Curves
 - Numbers (hospitalizations and deaths)
 - More Numbers (demographics and geography)
 - Even more numbers (relevant exposure data)

Situation Report: Components



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- 5. Discussions and/or Conclusions
 - So... whattaya think about this outbreak?

Situation Report: Components



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- 6. Recommendations for Controlling Disease...
 - So... whattaya goin' do now?

Situation Report: Components



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- 7. Key investigators and/or Report Authors
 - Give credit where credit is due

Situation Report: Components



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- 8. Resources
 - Did you beg, borrow or steal any additional info?
 - Give them credit here



Summary

- Excel can do more
- Mapping, who knew?
- SitReps are important

Questions?



"Mr. Osborne, may I be excused?
My brain is full."



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Thank you

Your contact information here
