Epi stats case study

CIC Study Group
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Utah Department of
Health & Human
Services

Measles in Texarkana

On November 3, 1970, the CDC received the weekly surveillance data from the Texas State Health Department. The telegram reported **319 cases** of measles in the state **during the previous week.**

In contrast, Texas had reported an average of **26 cases per week during the previous four weeks**.

Is this an outbreak? Why or why not?

Follow up

CDC learned that **295 cases (of 319) of measles had been diagnosed in the city of Texarkana**, including 25 in children reported to have been previously immunized.

At the time, Texarkana was a city of roughly 50,000. Though the city straddles the Texas-Arkansas state line, it is a single town economically and socially. Persons of all ages on both sides of town have frequent contact.

The two sides of Texarkana, however, do have separate public school systems and separate public health departments.

Measles cases by week of onset, Texarkana, Texas and Arkansas, June 28, 1970 - January 29, 1971
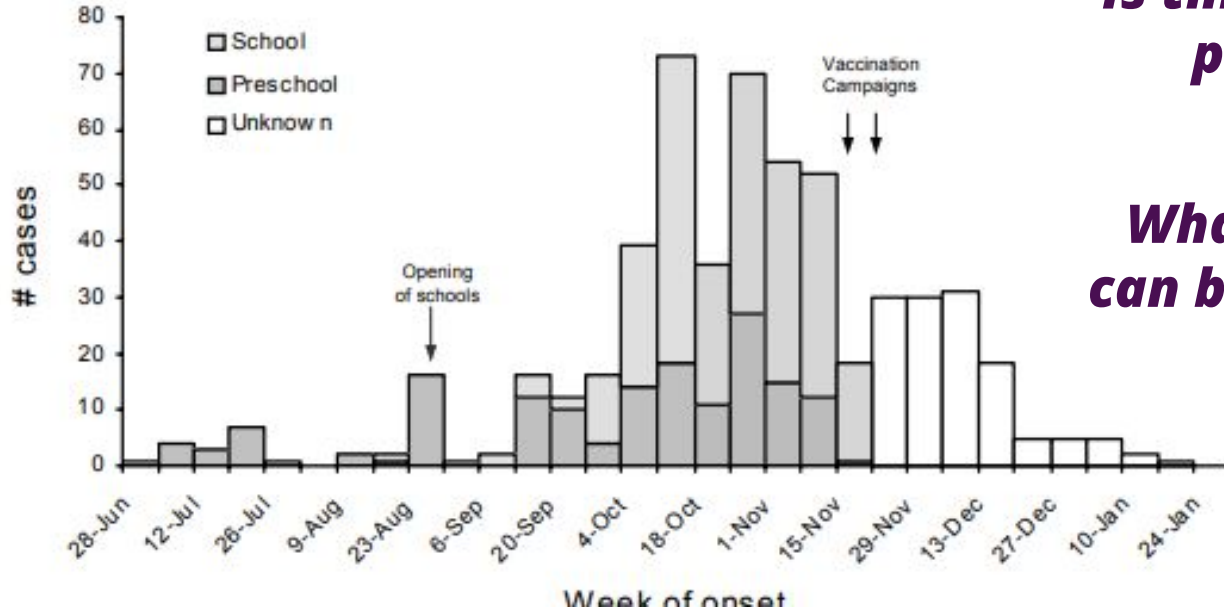
Is this incidence or prevalence?

What observations can be made from the curve?

Between June 1970 and January 1971, <u>633</u> cases of measles were reported in Texarkana.

Case Distribution

The majority of cases occurred in children 1 to 9 years of age and were not evenly distributed across the city.

	Age Group	# Cases	Population	Attack Rate?
Texas (Bowie Co)	1-4	242	4933	**4.9%**
	5-9	251	6252	**4.0%**
Arkansas (Miller Co)	1-4	19	2617	**0.7%**
	5-9	6	3345	**0.2%**

First estimate, then calculate, the <u>attack rate</u> for each population.

What is the value of the attack rate (aka incidence proportion)?

What might be behind the uneven distribution of cases?

What tools do you have to investigate?

>99% of kids (age 1-9) in Texarkana, AR (Miller Co.) were vaccinated for measles

~57% of kids in Texarkana, TX (Bowie Co.) were vaccinated for measles

Determining Vaccine Efficacy (Effectiveness)

	Vaccinated	Unvaccinated	Totals
Measles +	27	466	493
Measles -	6,348	4,344	10,692
Totals	6,375	4,810	**11,185**
Rate (per 1000)	**4.2**	**96.9**	—

Calculate, the <u>rate</u> (per 1,000) for each population

Evaluating Vaccine Efficacy
(Relative risk reduction)

VE = $\dfrac{96.9 - 4.2}{96.9}$ x 100

= **95.7%**

A 95.7% reduction from the number of cases you would expect if they were not vaccinated

$$VE = \frac{ARU - ARV}{ARU} \times 100$$
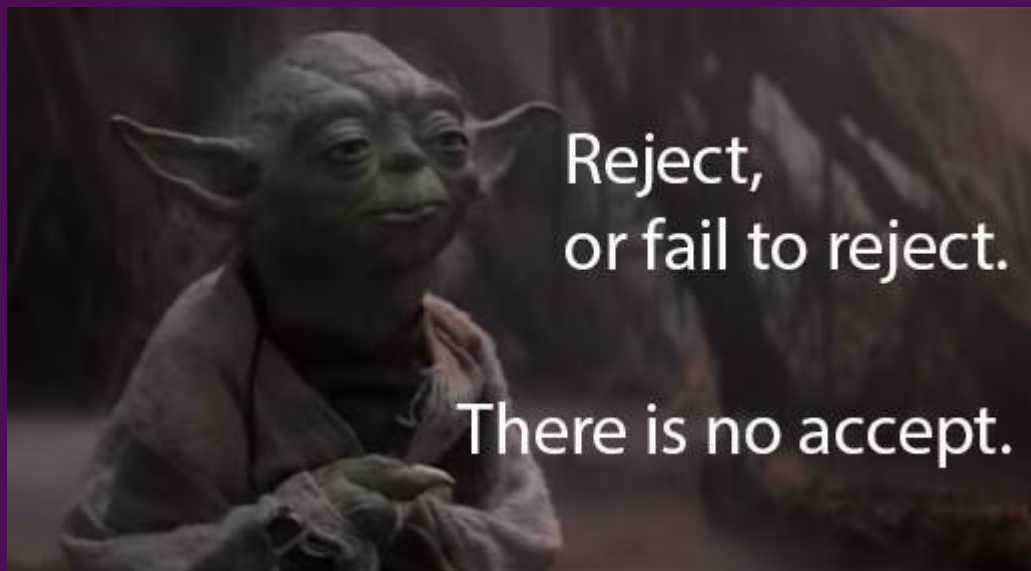
where

VE = vaccine efficacy,

ARU = attack rate in the unvaccinated population; and

ARV = attack rate in the vaccinated population.

- Data are just numbers until you tell a story
  - The story is yours to tell
  - Keep the story simple
- Use the tools you have
- Examine all sides of the story
- Consider alternatives
- Avoid the p-value trap
- Label your units (& axes)
- Don't be afraid of statistics!

Take Home Points

Questions and Discussion

References

https://www.cdc.gov/eis/downloads/xtexark-711-903-student.pdf