

VOE 2021 Schield MathFest Slides 1

Statistical Literacy: The Diabolical Denominator

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Consultant: Univ. New Mexico
Fellow: American Statistical Association
Elected Member: International Statistical Institute
US Rep: International Statistical Literacy Project
President: National Numeracy Network

MathFest Aug 4, 2021

Paper: www.StatLit.org/pdf/2021-Schild-MathFest.pdf
Slides: www.StatLit.org/pdf/2021-Schild-MathFest-Slides.pdf

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Choice of Denominator (per what?):

Choice of the denominator can cause a:

1. change in a direction over time
2. change in direction between group rates
3. difference between group prevalences

The choice of a denominator is the user's choice.
 That choice can be *diabolical*: evil, wicked or cruel
 Denominator choices have statistical consequences

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#1: Denominator Choice Causes Change in Rates Over Time

Microwave (\$/year)	1980	1987	Change
per Household (HH)	\$14	\$20	43%
Percentage reporting	2.9%	8.0%	176%
per HH Reporting	\$483	\$250	-48%

www.bls.gov/opub/mlr/1992/05/art3full.pdf

Baby sitting (\$/year)	1980	1987	Change
per Household (HH)	\$76	\$75	-1%
Percentage reporting	6.8%	6.4%	-6%
per HH Reporting	\$1,118	\$1,172	5%

www.bls.gov/opub/mlr/1992/05/art3full.pdf

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#2A: Denominator Choice Causes Change in Rate-Compare Direction

The 1996 auto-death rate was

- 7 times as high in HI (35) as in AK (7) *per mile of road*.
- twice as high in AK (38) as in HI (19) *per vehicle*.

HI: Hawaii
 AK: Arkansas

Table 1029. 1996 USAA

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#2B: Denominator Choice Causes Change in Rate-Compare Direction

Mich. has a *higher* death rate than R.I. *per case*.

Mich. Deaths	Compare Covid Death Rates by Level	R.I. Deaths
25	DEATHS	20
	HOSPITALIZED	
	per 1,000 confirmed CASES	
	per Million POPULATION	
1,662	2,399	

www.worldometers.info/coronavirus/country/us/ as of 5/1/2021

Mich. has a *lower* death rate than R. I. *per capita*.

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#2B: Diabolical Denominator. Which Denominator is Right?

Michigan has a *higher* death rate than Rhode Island *per case*.

Michigan has a *lower* death rate than Rhode Island *per capita*.

Which denominator is right?
 Is it 'per case' or 'per capita'?

Maybe neither one!

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#2B: Diabolical Denominator. Which Denominator is Right?

Q. Per what? A. Infections?

Mich. Deaths	Compare Covid Death Rates by Level	R.I. Deaths
25	DEATHS	20
??	HOSPITALIZED	??
1,662	per 1,000 confirmed CASES	2,399
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#3: Denominator Choice Shows Difference in Group Prevalences

Guys are 9 times as prevalent among prisoners as gals.
Guys are 93% of prisoners (49% of population).

Male%	Compare Percentages between Levels	Black%
93%	PRISON	38%
73%	ARRESTS	26%
??	CRIMES (reported)	??
49%	POPULATION	13%

Prison (2019): www.bop.gov/about/statistics/statistics_inmate_gender.jsp
Arrest M+F (2019): www.ojjdp.gov/ojstatbl/crime/ucr.asp?table_in=1

Blacks are 38% of prisoners (13% of the population)

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#3: Denominator Choice Shows Difference in Group Prevalences

Compare with their percentage among committed crimes
Males are 73% of arrests (75% of victimizations)

Male%	Compare Percentages between Levels	Black%
93%	PRISON	38%
73%	ARRESTS	26%
??	CRIMES (reported)	??
75%	CRIMES Committed	25%
49%	POPULATION	13%

2019: https://bjs.ojp.gov/library/publications/list?series_filter=Criminal%20Victimization

Blacks are 26% of arrests (25% of victimizations)

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Statistical Educators Should Offer a Course that:

- asserts that *Association is Not Causation*
- asserts that *Disparity is Not Discrimination*
- focuses on the *Story Behind the Statistics*
- emphasizes how a *crude association* may conceal the real story!
- shows students these things without computers

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University of New Mexico is offering such a course!

Offering 4 sections fall 2021



Statistical Literacy UNIVERSITY CATALOG

MATH 1300 (3)
Participants will study the social statistics encountered by consumers. Investigate the story behind the statistics. Study the influences on social statistics. Study the techniques used to control these influences. Strong focus on confounding.

Meets New Mexico General Education Curriculum Area 2: Mathematics and Statistics.

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Why Don't You Teach Statistical Literacy?

To learn more about Statistical Literacy:

Read papers at
www.StatLit.org/Schield-Pubs.htm

Most recent papers:
Statistical Literacy: Teaching Confounding
www.StatLit.org/pdf/2021-Schield-USCOTS.pdf

University of New Mexico Offers a New Confounder-Based Statistical Literacy Course
www.StatLit.org/pdf/2021-Schield-ASA.pdf

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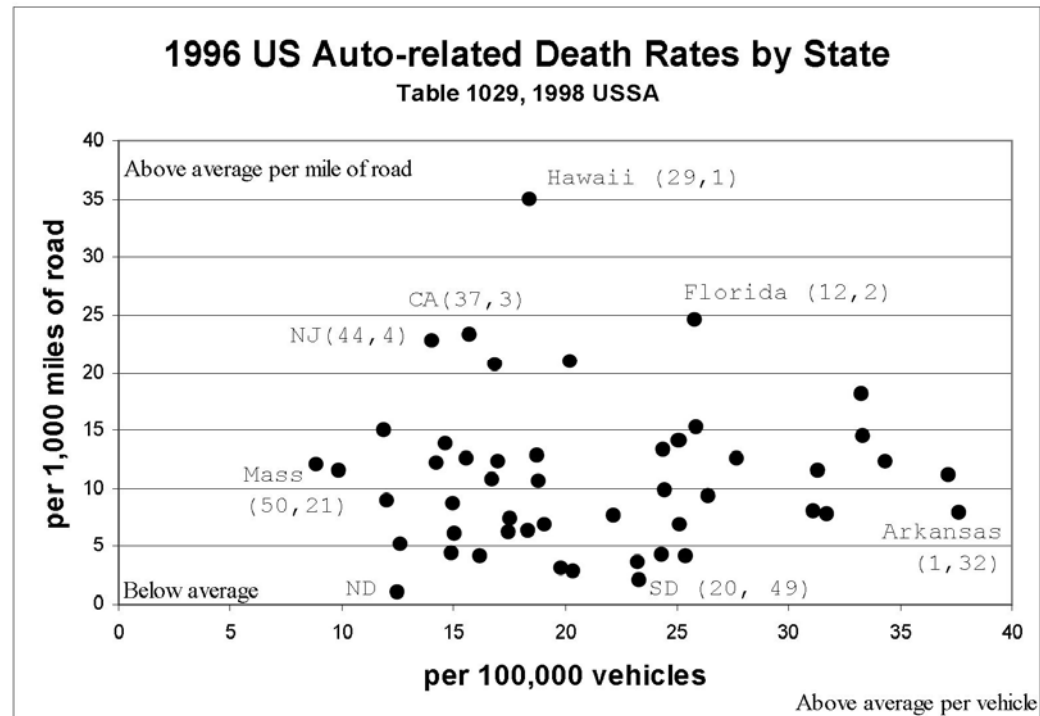
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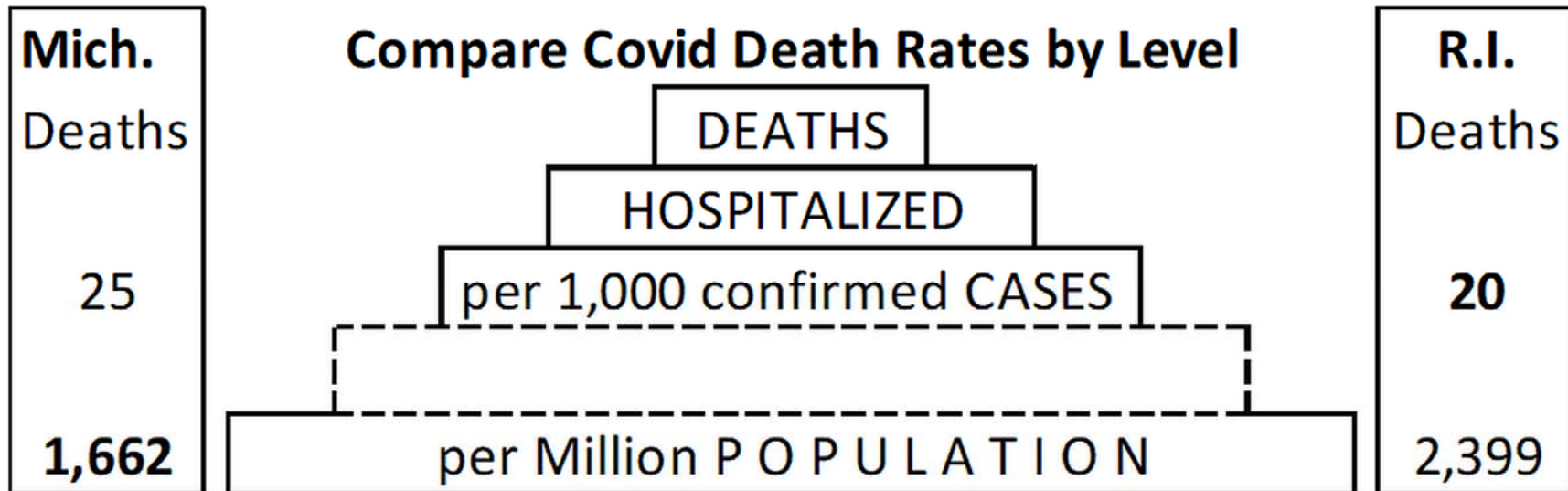
HI: Hawaii

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#2B: Denominator Choice Causes Change in Rate-Compare Direction

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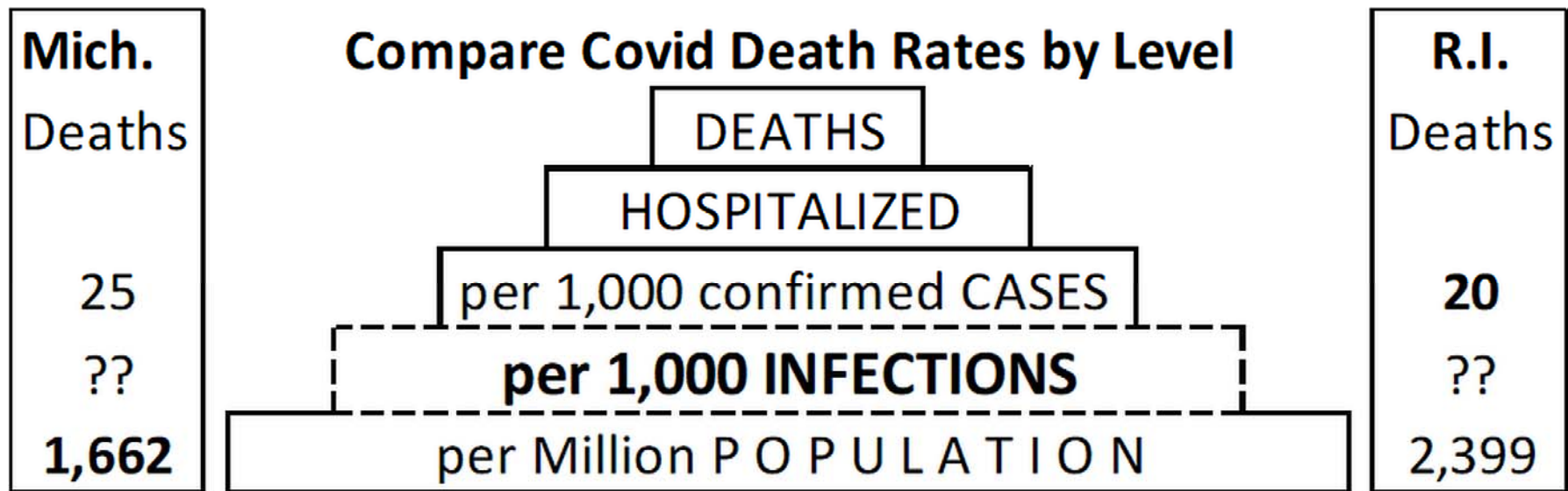
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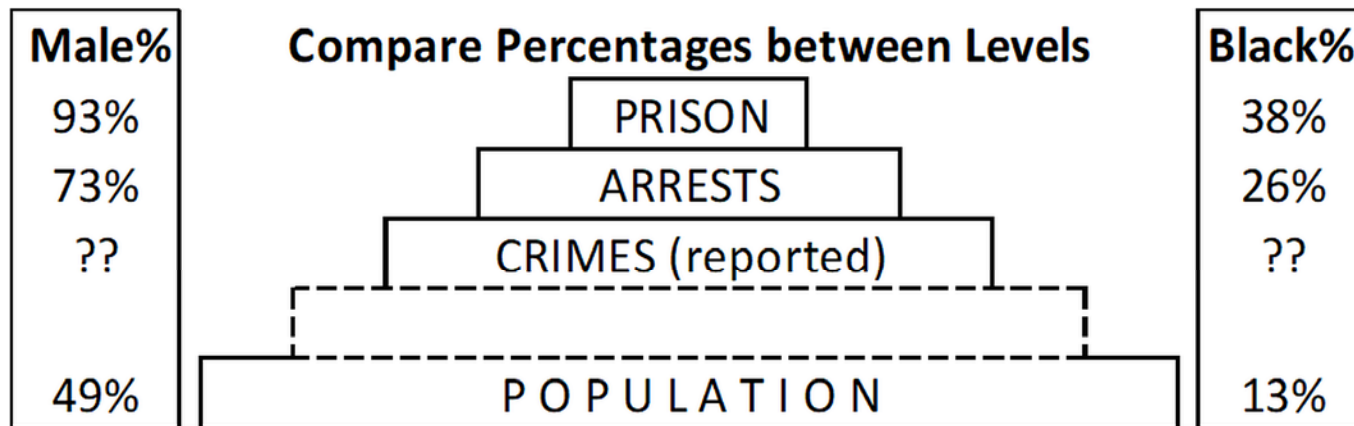
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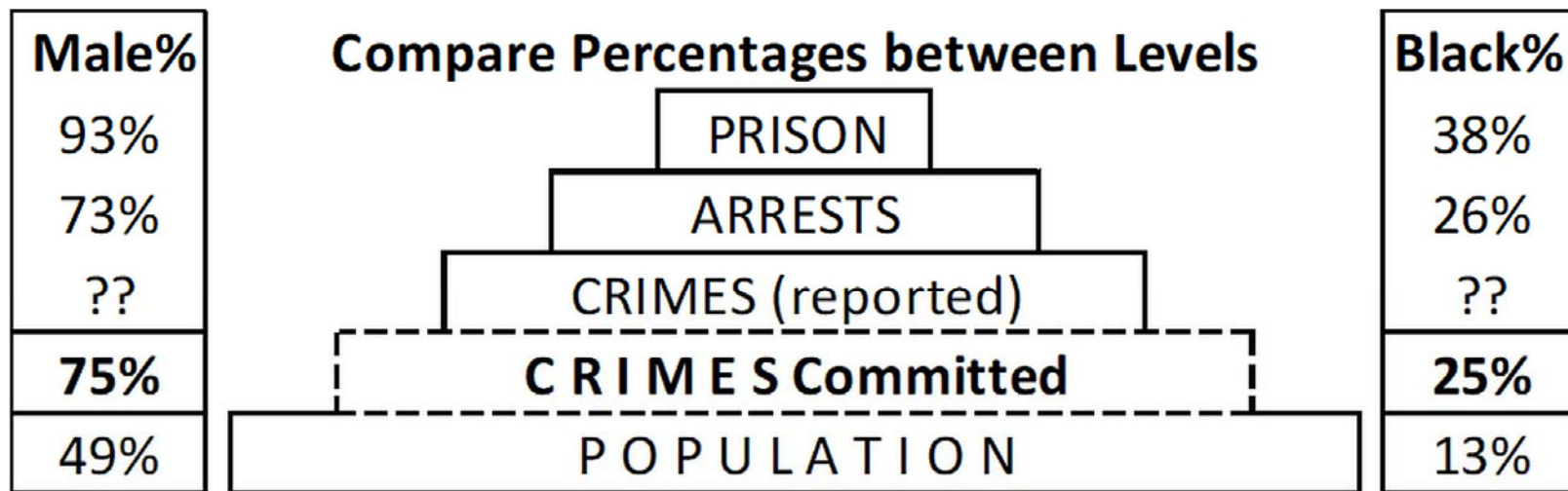
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