

Association of Social Vulnerability Index with Risk-Adjusted Trauma Outcomes

Pooja Neiman, MD
Jonathan Scott, MD



Association of Social Vulnerability Index with Risk-Adjusted Trauma Outcomes

Pooja U. Neiman MD MPA, Melanie M Flaherty BA, Ali Salim MD,
Andrew Ibrahim MD MPH, Zhaohui Fan MD, Naveen Sangji MD MPH, Mark Hemmila MD,
John W. Scott, MD MPH

February 8, 2022

@PoojaNeiman
@DrJohnScott



CENTER FOR HEALTHCARE OUTCOMES &
POLICY

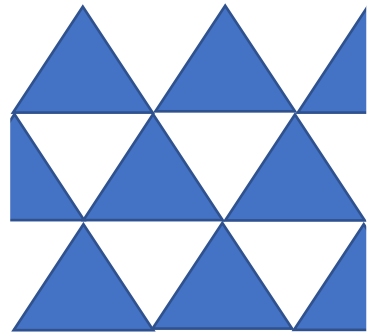


Disclosures

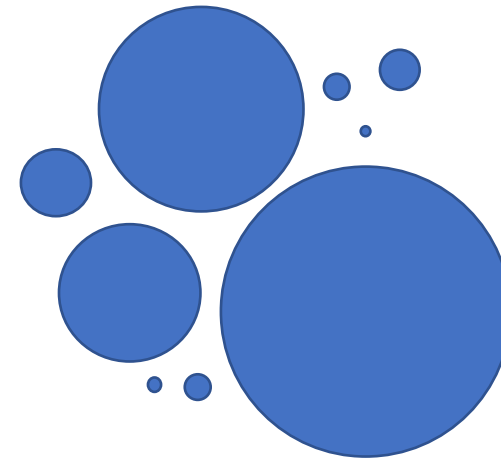
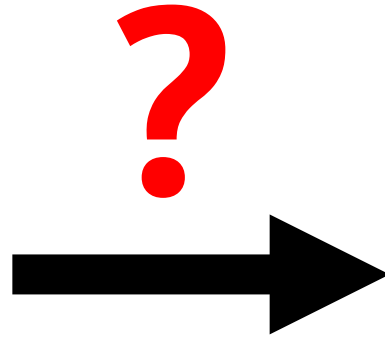
- This work was accepted for publication in the Journal of Trauma and Acute Care Surgery on December 13th, 2021
- A version of this talk was given at AAST (American Association for the Surgery of Trauma) on September 7th, 2021

Little is known regarding the mechanisms that drive disparities in trauma outcomes

- ✓ Insurance status
- ✓ Race
- ✓ Ethnicity
- ✓ Income
- ✓ State/Region
- ✓ Hospital system



**Social &
Economic Traits**



**Inequitable
Outcomes**

- ✓ Inpatient mortality
- ✓ Inpatient morbidity
- ✓ End of life care
- ✓ Access to rehab
- ✓ Return to work

See Haider et al. Arch Surg 2008, Haider et al. J Trauma 2013, Haider et al. JAMA Surg 2015, Haider et al. Ann Surg 2018

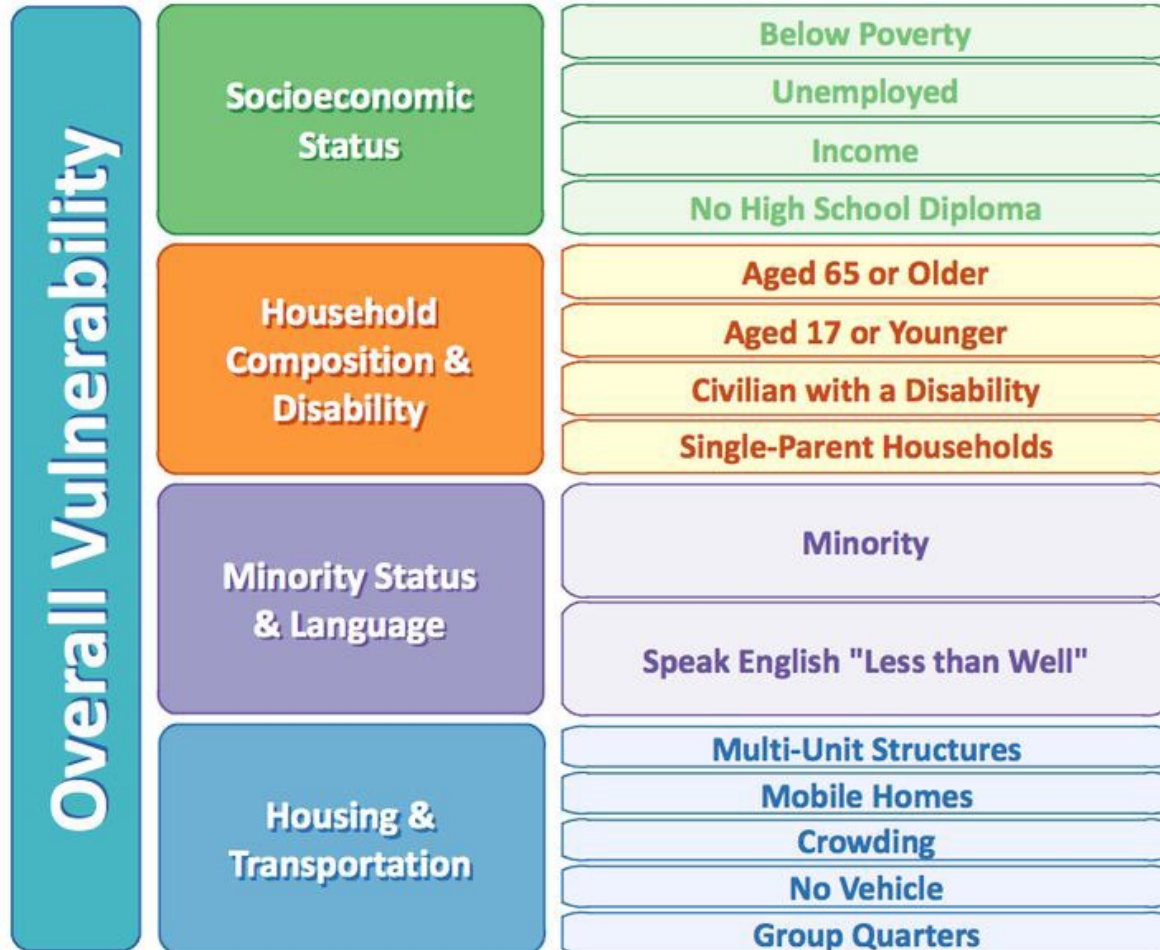
@PoojaNeiman
@DrJohnScott

Social Determinants of Health as a potential driver of disparities in outcomes

- Social determinants of Health (SDOH) are the **conditions in the places where people live, learn, work, and play**
- **Difficult to measure** and thus little understanding of their impact on Trauma Outcomes



The Social Vulnerability Index provides a lens into community resilience and SDOH



- Developed and validated by the **CDC** to guide disaster response
- Census tract level → ZIP codes
- Indexed between 0 and 100
 - **0-20 = least vulnerable**
 - 20-40
 - 40-60
 - 60-80
 - **80-100 = most vulnerable**

Novel application of SVI to Michigan's state-wide trauma collaborative (MTQIP)



CHALLENGE

- Census tract or ZIP code data not available in national trauma registries
- Commercial/federal claims databases may have them, but lack clinical detail

SOLUTION

- The Michigan Trauma Quality Improvement Program's (MTQIP) statewide trauma registry has geographic identifiers, claims-level data, and NTDS clinical detail



Retrospective, observational study to evaluate association between SVI and inpatient outcomes



STUDY COHORT

- Ages 18+
- Admitted 2017-20
- Level 1 or 2 center

PRIMARY PREDICTOR

- **SVI Quintile**
 - 0-20 = least vulnerable
 - 80-100 = most vulnerable

PRIMARY OUTCOME

- **Inpatient mortality**
 - Death or hospice

Three levels of “risk adjustment”

UNADJ. MODEL

CLAIMS MODEL

ROBUST CLINICAL MODEL



@PoojaNeiman
@DrJohnScott



Demographics of study population

	Entire Study	Extremes of SVI Quintiles	
	Cohort	Lowest	Highest
Sample (n)	83,607	10,379	6,874
Age (mean, sd)	63 (\pm 21)	70 (\pm 20)	51 (\pm 22)
Male (%)	53	45	66
Race/Ethnicity			
Non-Hispanic White (%)	83	94	34
Non-Hispanic Black (%)	13	2	59
Hispanic (%)	2	1	5
Non-Hispanic, Other (%)	3	3	3
Insurance Type			
Private (%)	22	21	29
Medicare (%)	50	60	26
Medicaid (%)	10	4	20
Uninsured (%)	4	2	9
Other (%)	15	13	15

@PoojaNeiman
@DrJohnScott

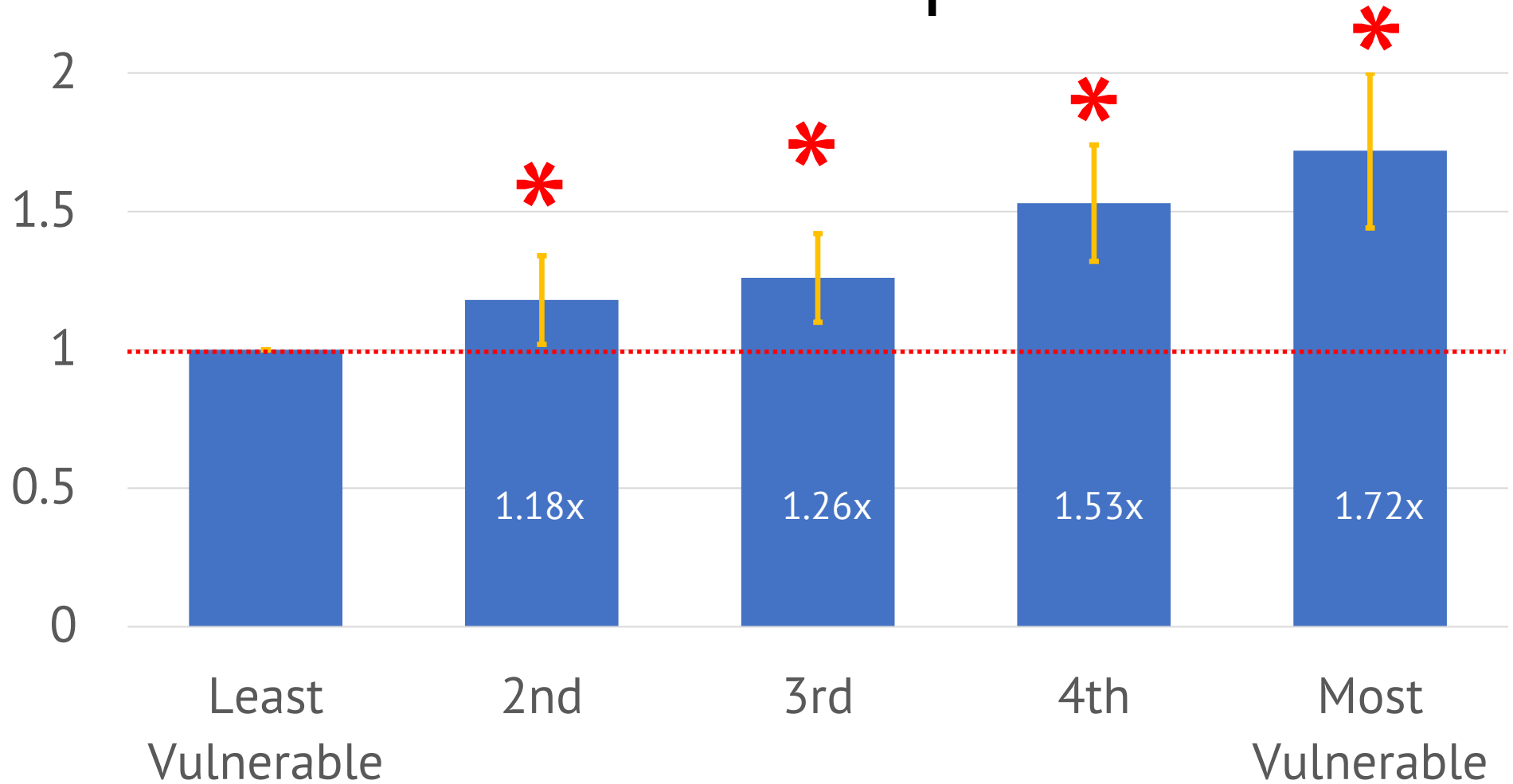
Unadjusted outcomes show “dose-dependent” association between SVI and inpatient mortality

Unadjusted

Claims-based model

MTQIP model

Odds Ratio for Mortality



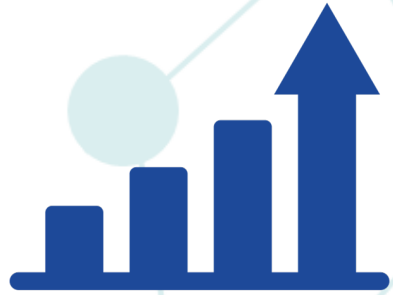
@PoojaNeiman
@DrJohnScott



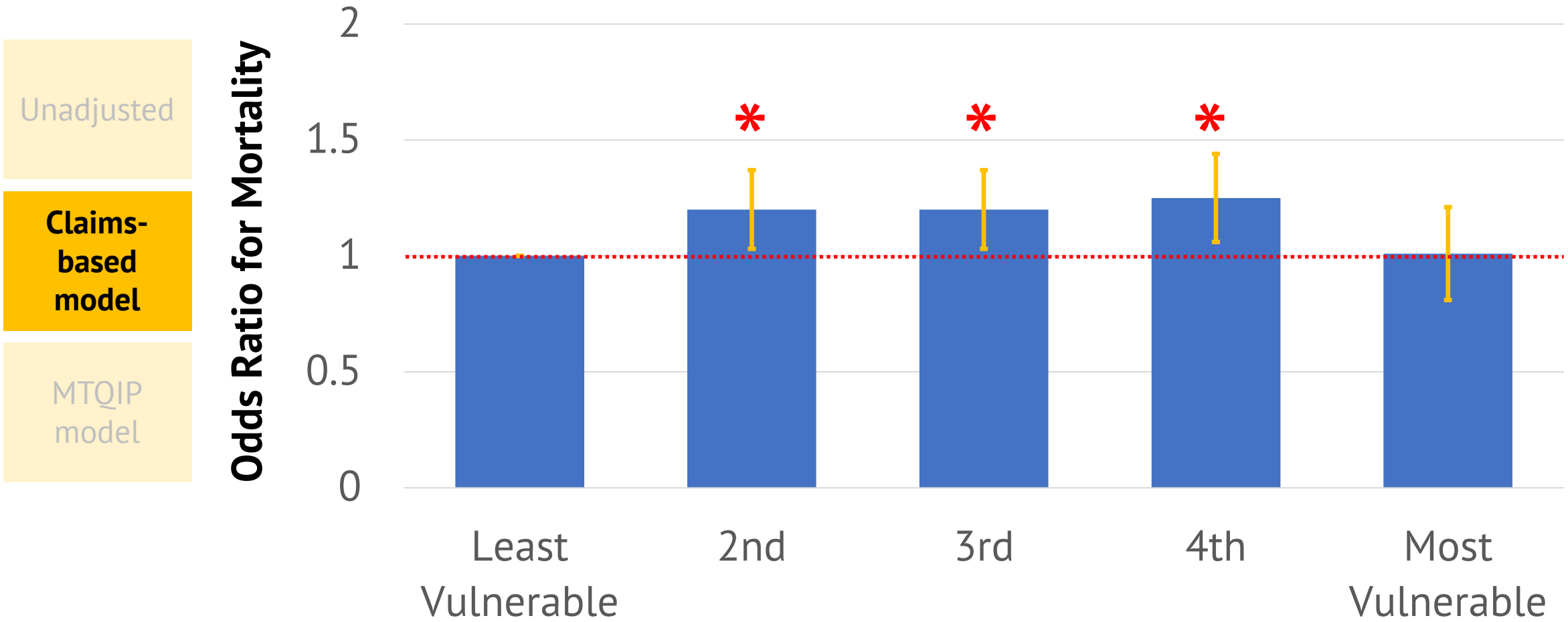
CENTER FOR HEALTHCARE OUTCOMES & POLICY

Key Finding #1

Patients from more vulnerable communities have higher inpatient mortality after trauma admission... in a dose-dependent manner



Dampened association between SVI and mortality after “Claims-based” risk adjustment

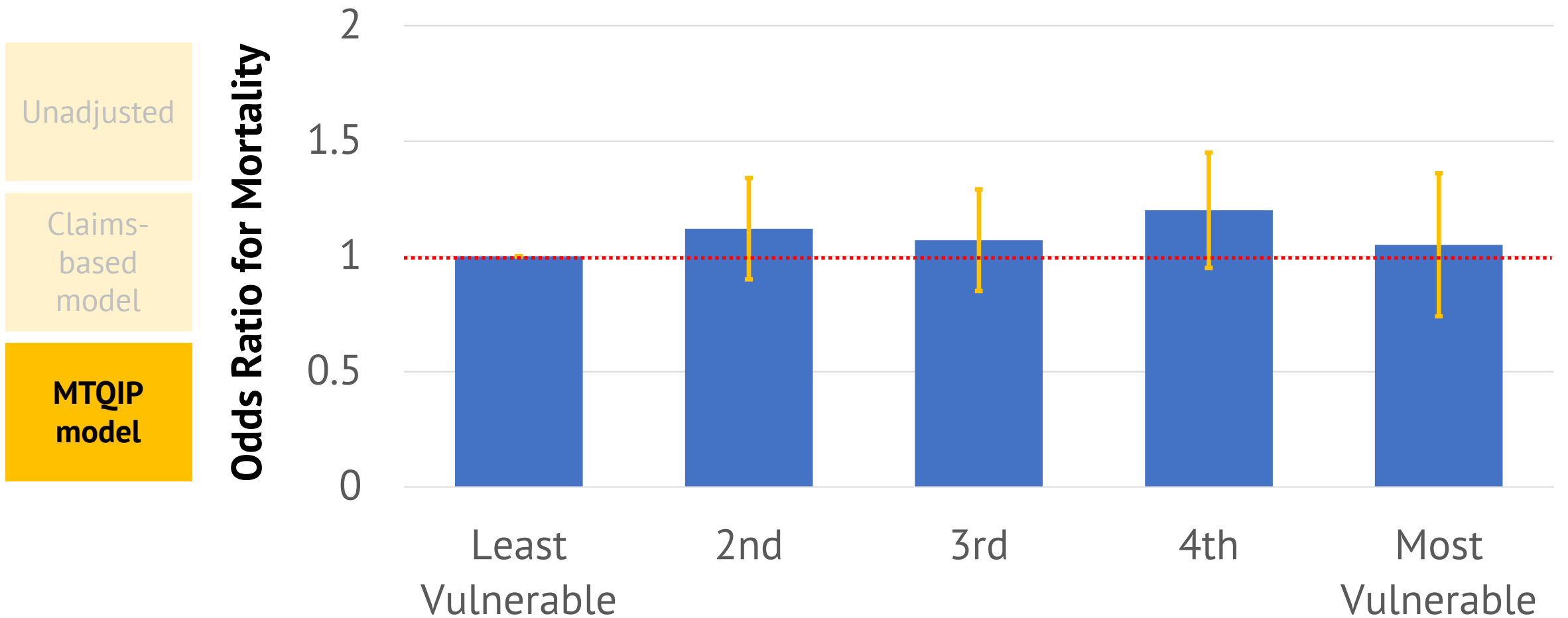


@PoojaNeiman
@DrJohnScott



CENTER FOR HEALTHCARE OUTCOMES & POLICY

No risk-adjusted difference in mortality using the robust clinical model



@PoojaNeiman
@DrJohnScott

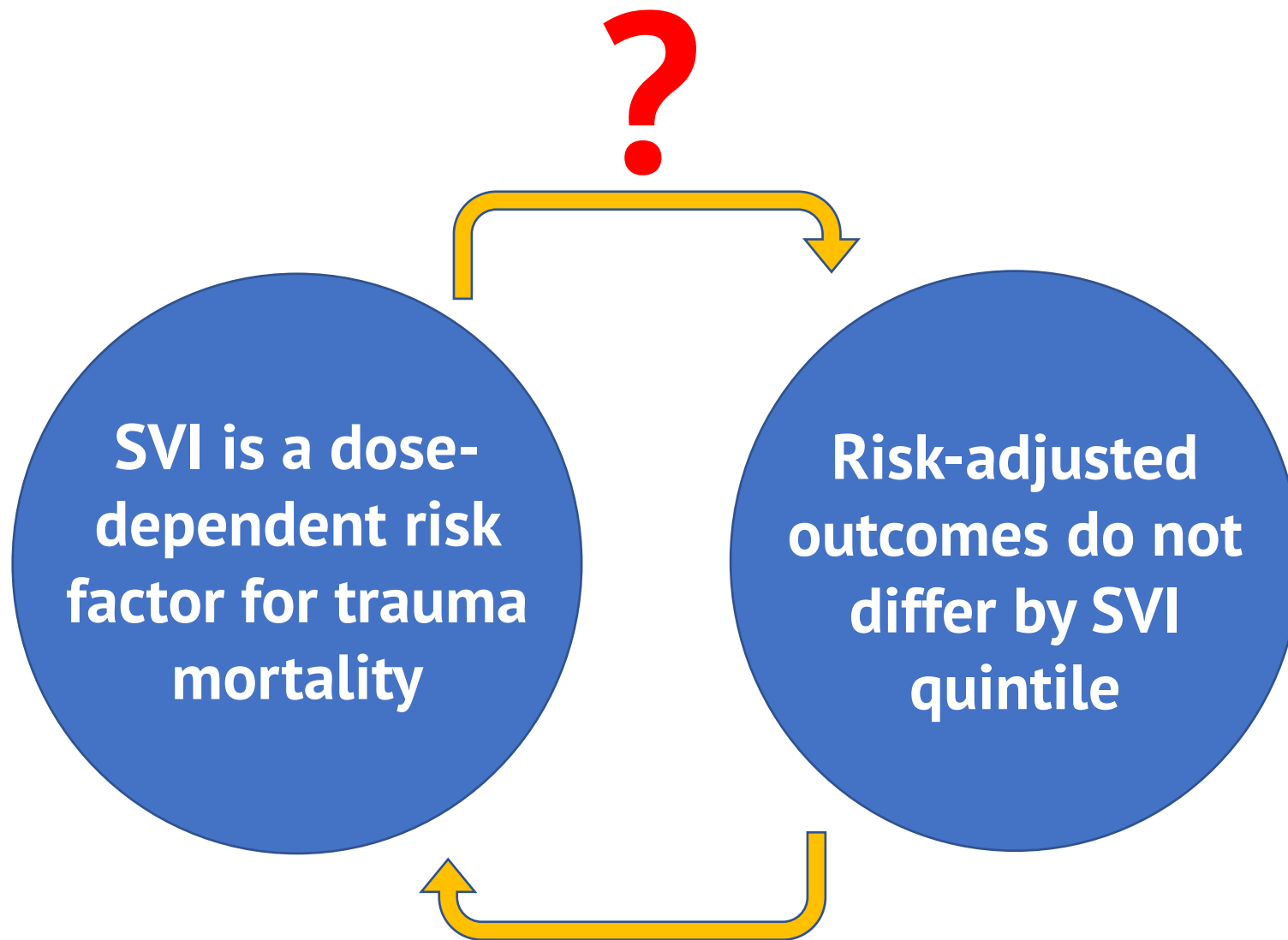


CENTER FOR HEALTHCARE OUTCOMES & POLICY

Key Finding #2

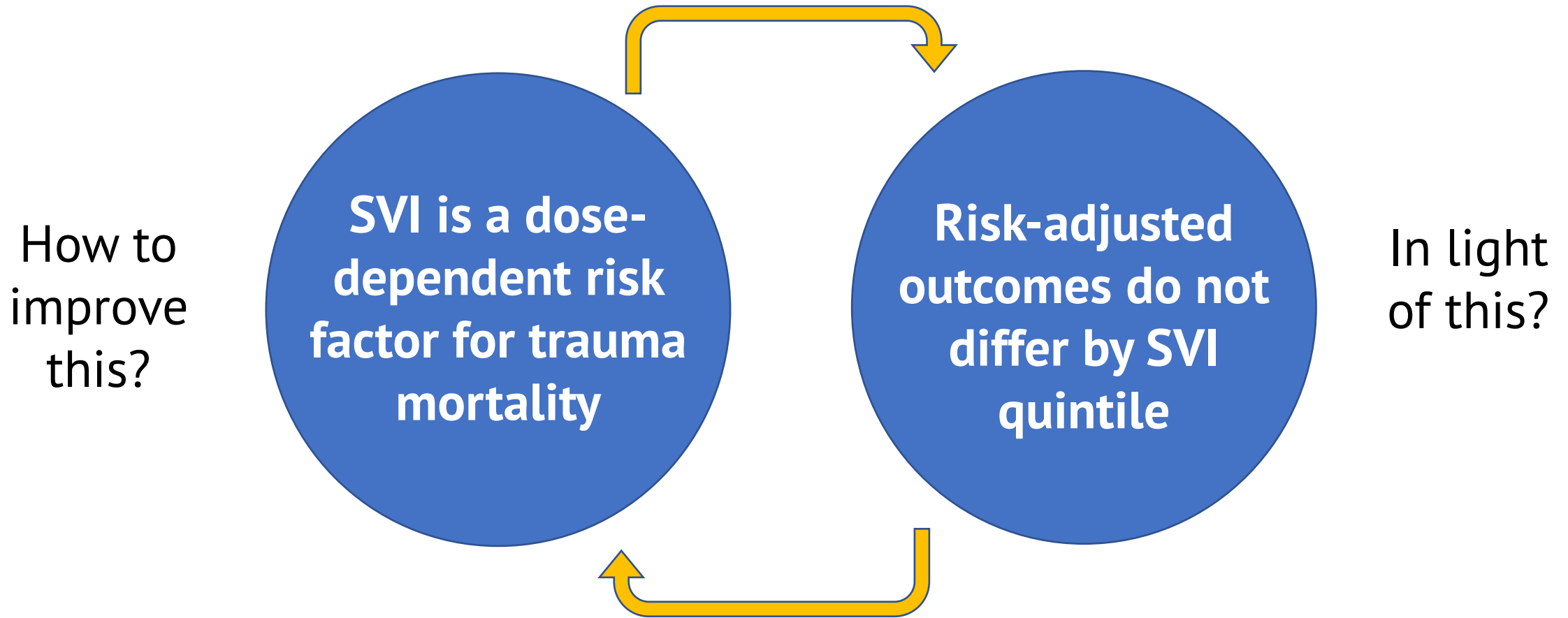


**Compared to lower SVI,
patients from more vulnerable
communities have similar
risk-adjusted inpatient mortality**



@PoojaNeiman
@DrJohnScott

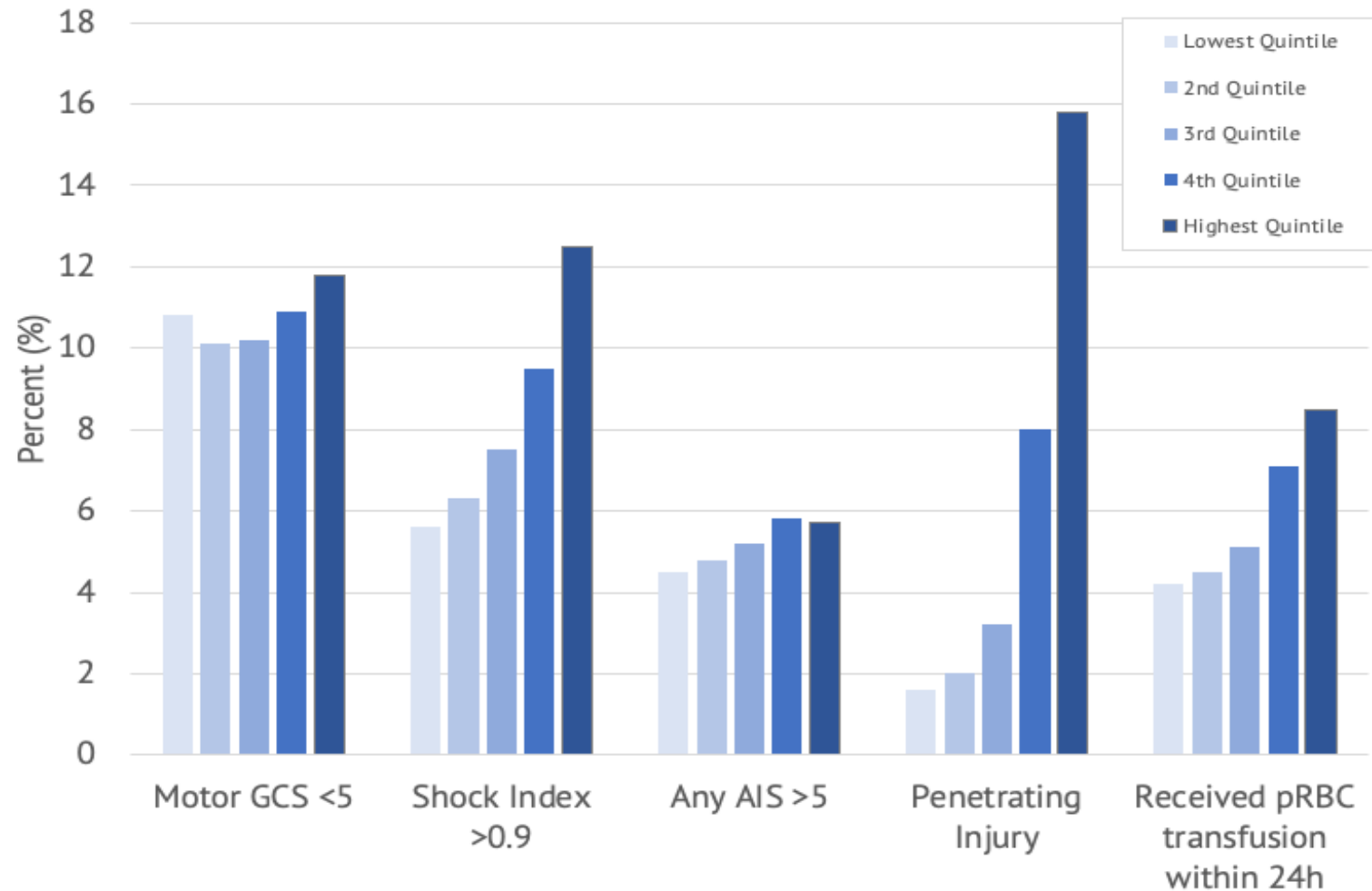
How do we improve outcomes for high SVI patients when risk-adjusted outcomes are the same?



@PoojaNeiman
@DrJohnScott

Injury severity and lethality has a similar dose-dependent association with SVI

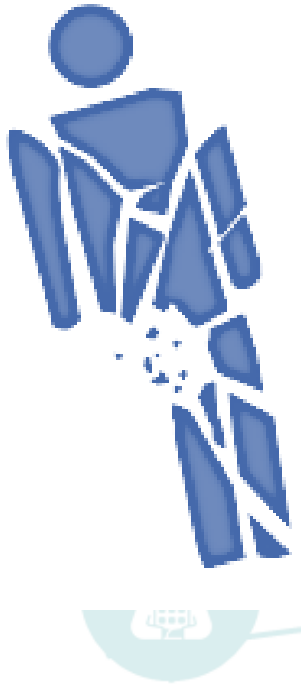
dose-



@PoojaNeiman
@DrJohnScott

Key Implication

Increased mortality among high SVI patients appears to be driven by more lethal injuries, as opposed to worse inpatient care



Improving disparities in outcomes will require investment in communities and injury prevention

ISAVE: Improving Social Determinants to Attenuate Violence



UNITE: Understanding the links between social determinants and firearm violence in California communitiEs



MSHIELD
MICHIGAN SOCIAL HEALTH INTERVENTIONS
to ELIMINATE DISPARITIES

@PoojaNeiman
@DrJohnScott



CENTER FOR HEALTHCARE OUTCOMES & POLICY



Eliminating SDOH-linked disparities requires both excellent inpatient care **AND** investing in communities



SVI associated with “dose-dependent” risk of inpatient mortality



Equivalent “risk-adjusted” outcomes suggests high-quality inpatient care



Must invest “upstream” to reduce community risk of lethal injuries

@PoojaNeiman
@DrJohnScott