

The influence of socio-economic disparities across source populations on the results of trauma center performance evaluations in a Canadian trauma system

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BACKGROUND

- Social and financial burden of injury
- Evaluation of performance to improve the quality and efficiency of health care
- Importance of solid analytical methods

Performance evaluation in trauma

- Performance indicator – risk-adjusted mortality
- Adjustment for patient case mix:
 - anatomical injury severity
 - physiological reaction to injury
 - physiological reserve (age, comorbidities)
- Socio-Economic Status (SES) varies across trauma center source populations
- SES associated with risk of mortality from injury
- Possible source of bias?

Objective

Evaluate whether SES influences trauma center performance evaluations in an inclusive trauma system with free access to medical care

METHODS: Study population

- 59 trauma centers of the inclusive trauma system of Quebec, Canada
- Inclusion criteria: Death, ICU admission, LOS>2 days, transfer
- Exclusion criteria: DOA, isolated hip fracture

Study data

- Quebec Trauma Registry 1999-2006
- Administrative discharge data
- Provincial death file
- SES
 - Ecological indexes of material and social deprivation
 - Based on patients' residential postal code
 - standardized for age and gender

Statistical methods

- Random-intercept hierarchical logistic regression model

$$\text{LOGIT}(\pi_{ij}) = \alpha_j + \beta_1 \text{TRAM}_{ij} + \beta_2 \text{TRANSFER}_{ij} + \beta_3 \text{TRAM} * \text{TRANSFER}_{ij}$$

- Adjusted with the Trauma Risk Adjustment Model (TRAM) risk score

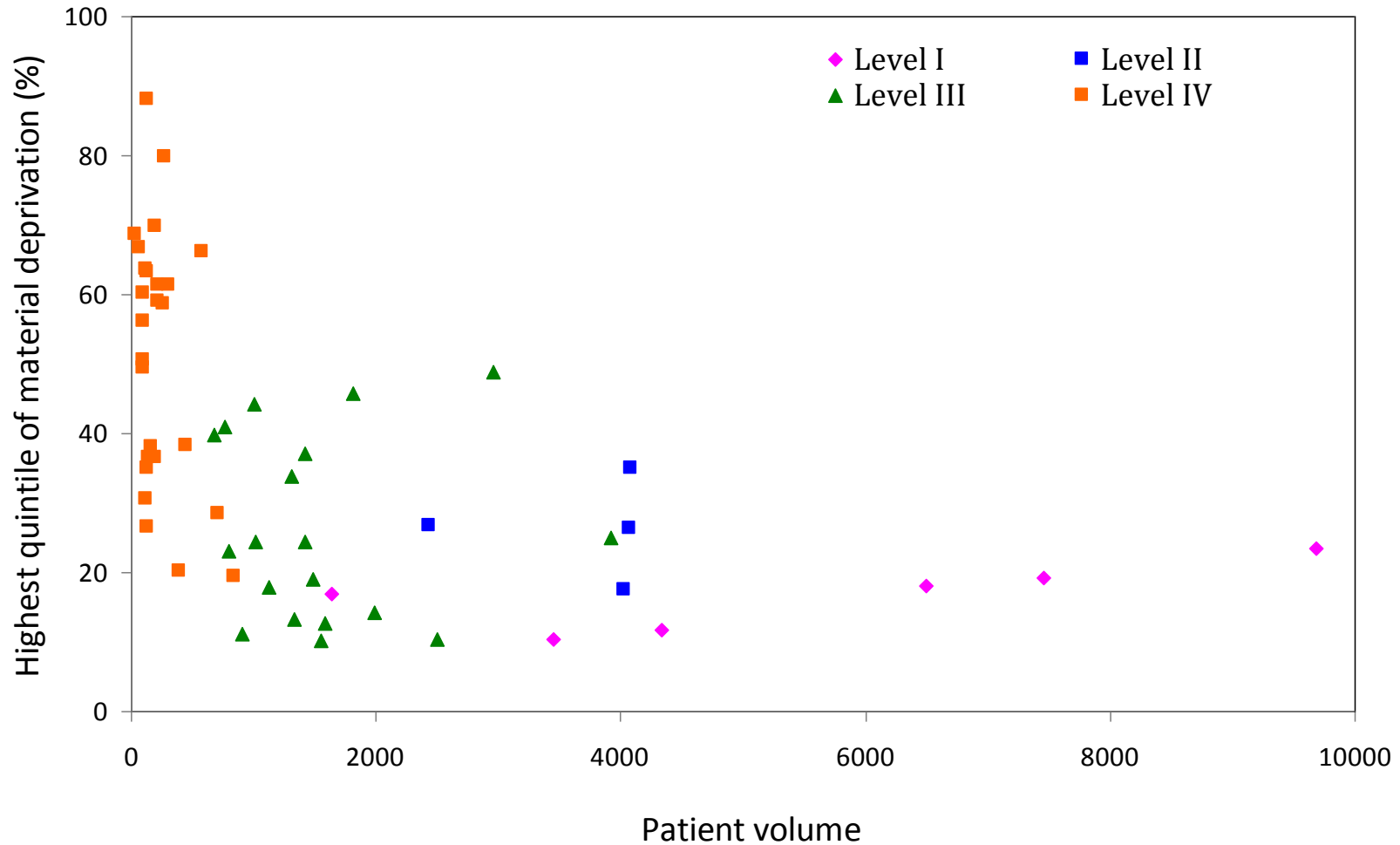
$$\begin{aligned} \text{TRAM} = & \beta_0 + \beta_1 \text{THORAX} + \beta_2 \text{ABDOMEN} + \beta_3 \text{SPINE} + \beta_4 \text{UPPER} + \beta_5 \text{LOWER} \\ & + s(\text{AIS1}) + s(\text{AIS2}) + s(\text{AGE}) + s(\text{GCS}) + s(\text{RR}) + s(\text{SBP}) + s(\text{NCOM}) \end{aligned}$$

- SES: quintiles of material/social deprivation

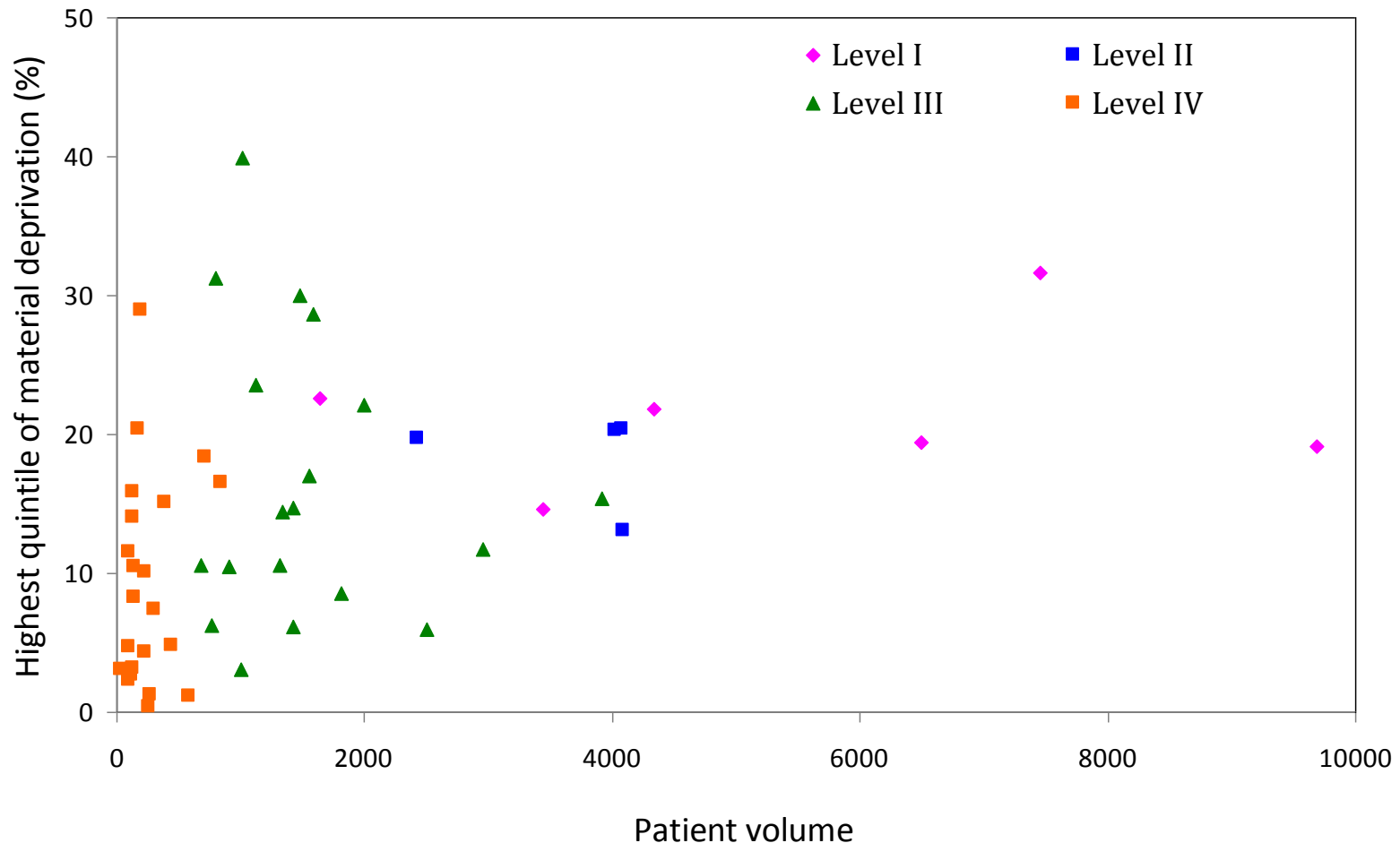
RESULTS

- 97,686 patients from 59 trauma centers
- SES data
 - 86,184 with SES data
 - 2934 (3%) non residents/no postal code
 - 8568 (9%) No SES available for post code
- Crude mortality at 30 days
 - 4065/86,184 (4.7%) for study population
 - 649/11,502 (5.6%) for those with missing SES

Variation of material deprivation by trauma center volume



Variation of social deprivation by trauma center volume



Crude odds ratios of mortality for quintiles of SES

	Material deprivation	Social deprivation
Q1	1.00	1.00
Q2	0.96 (0.86-1.07)	1.02 (0.91-1.13)
Q3	0.95 (0.85-1.06)	1.16 (1.04-1.29)
Q4	0.94 (0.84-1.04)	1.20 (1.08-1.33)
Q5	0.95 (0.85-1.06)	1.19 (1.08-1.33)

N.B SES quintiles standardized for age and gender

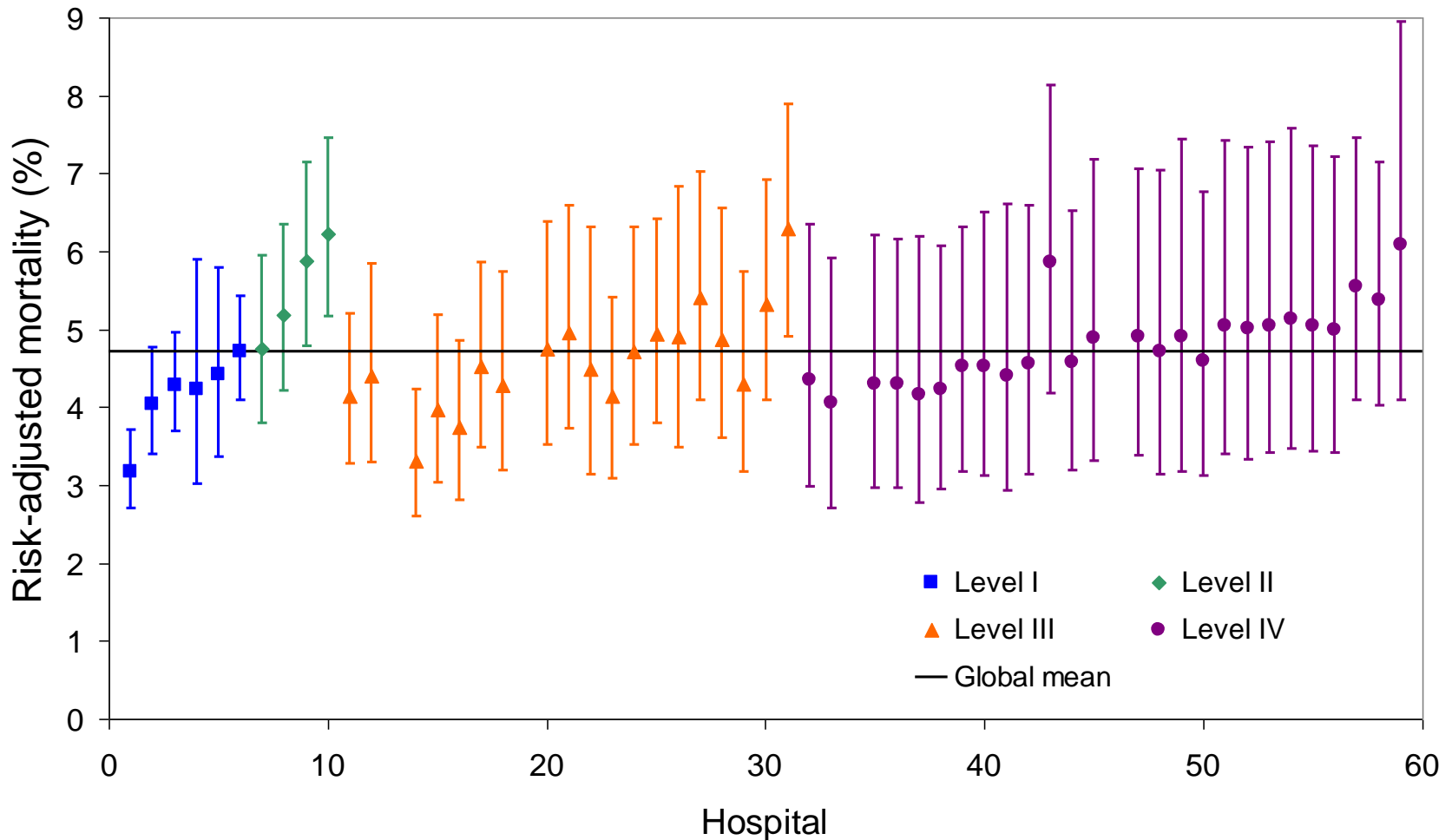
Adjusted* odds ratios odds ratios of mortality for quintiles of SES

	Material deprivation	Social deprivation
Q1	1.00	1.00
Q2	0.95 (0.82-1.09)	0.95 (0.82-1.09)
Q3	0.90 (0.78-1.04)	1.07 (0.93-1.23)
Q4	0.85 (0.73-0.98)	1.01 (0.88-1.16)
Q5	0.87 (0.75-1.00)	0.94 (0.82-1.08)

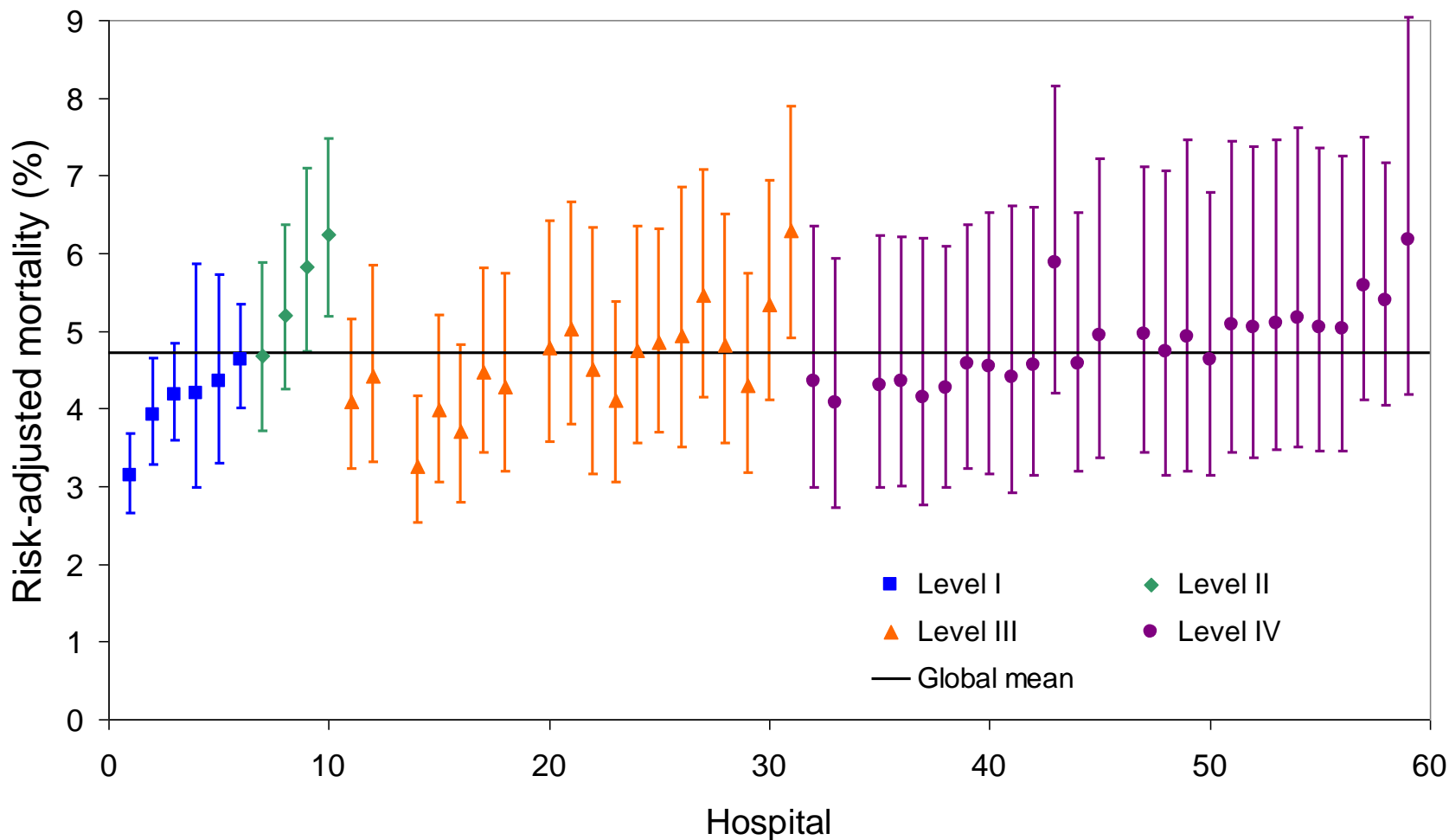
*Adjusted for AIS of two worst injuries, body region of worst injury, GCS, RR, SBP, age, number of comorbidities, transfer status

Risk-adjusted estimates of hospital mortality

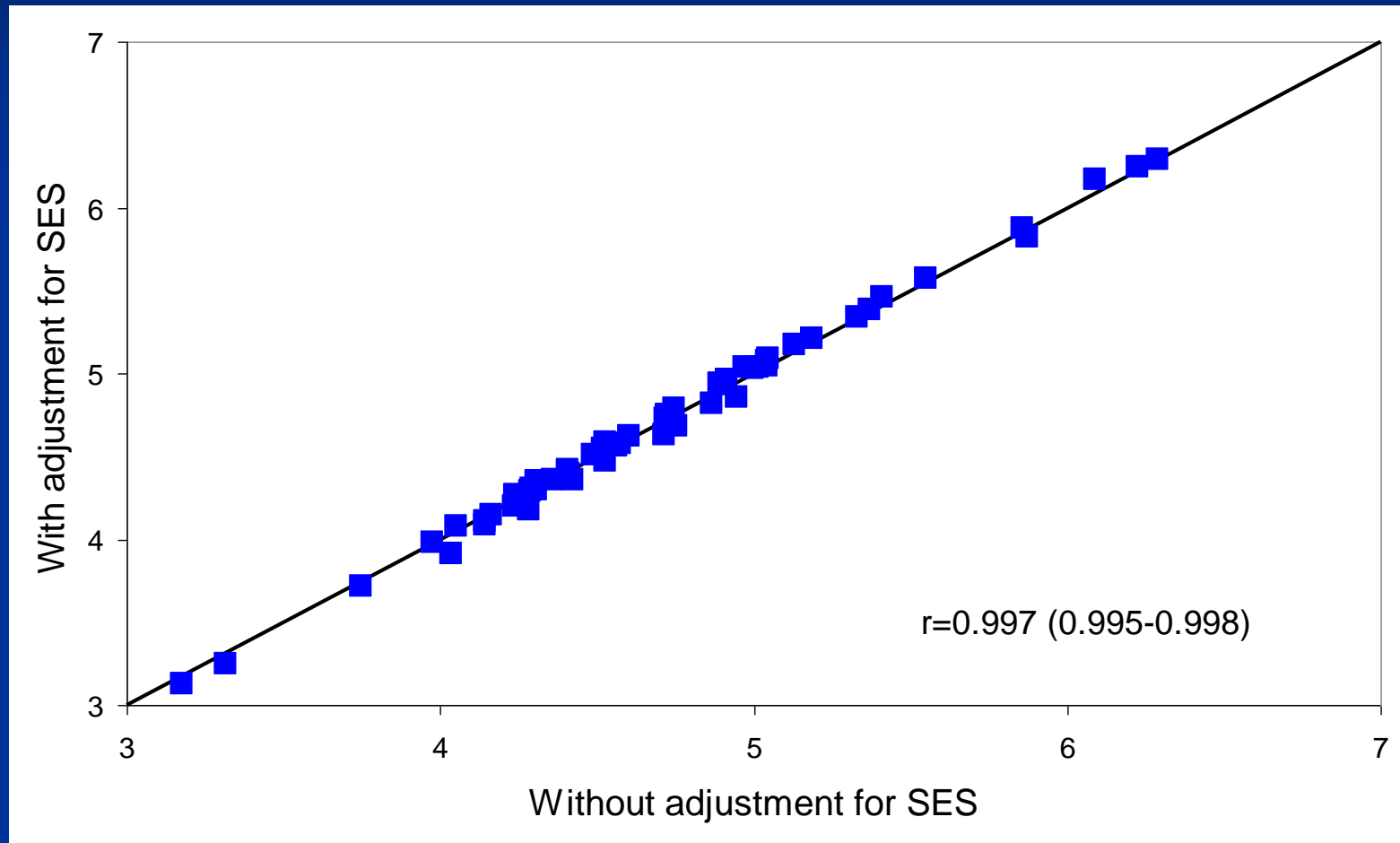
without SES adjustment



Risk-adjusted estimates of hospital mortality *with* SES adjustment



Correlation between mortality estimates

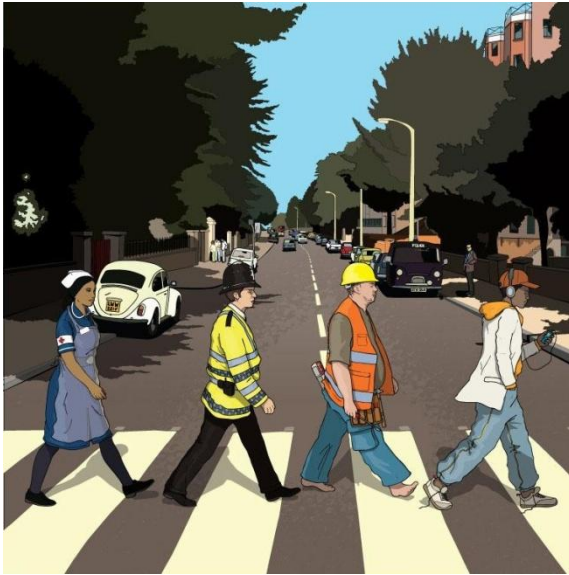


Limitations

- Ecological rather than individual measure of SES
- Quintiles of material deprivation may not discriminate well
- Missing SES data for 12% of patients
- Sample not population-based

CONCLUSIONS

- Disparities in SES across source populations \neq biased trauma centre mortality evaluations
- Need for a rigorous risk adjustment strategy
- Need to confirm with individual SES data



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