Disparity of the Disparities

A Comparison of Rural-Urban Disparity of Mortalities among Acute Myocardial Infarction Inpatients between China and US, 2013-2015

BST 5025 Theory of Biostatistics II
Presentation

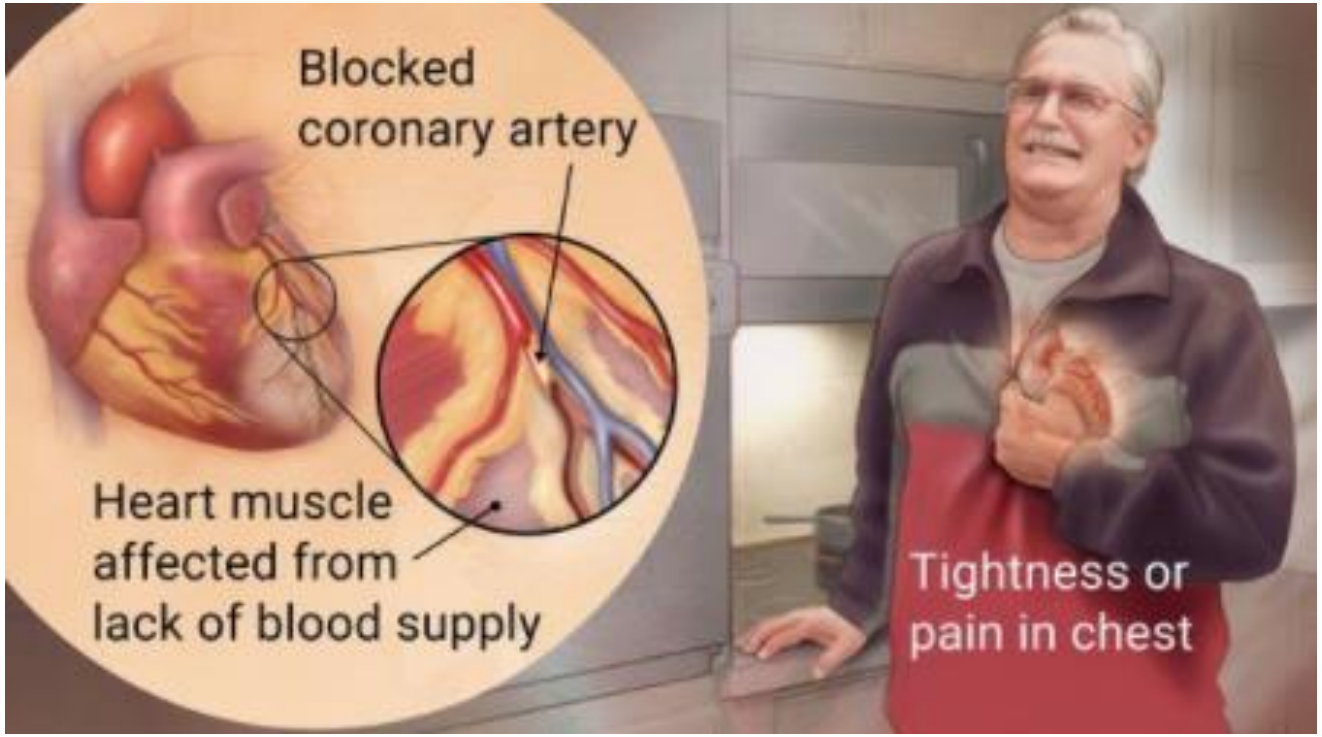
May 3, 2018

Miao Cai

1. Background

Acute myocardial infarction = Heart attack

- Very common
- Emergency
- High mortality



China

ORIGINAL ARTICLE

Explaining Urban-Rural Health Disparities in China

Hai Fang, PhD, MPH, Jie Chen, PhD,† and John A. Rizzo, PhD‡*

Asia-Pacific Journal Of Public Health
Volume 20 Number 2
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Urban–Rural Disparity of Overweight, Hypertension, Undiagnosed Hypertension, and Untreated Hypertension in China

Xiaohui Hou, PhD, MHPA

National trend in congenital heart disease mortality in China during 2003 to 2010: A population-based study

Zhan Hu, MD, PhD,[a,b] Xin Yuan, MD, PhD,[c,d] Keqin Rao, MD, PhD,[e] Zhe Zheng, MD, PhD,[c,d] and Shengshou Hu, MD, PhD[c,d]

U.S.

ORIGINAL ARTICLE

Rural-Urban Disparities in Quality of Life Among Patients With COPD

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Urban-Rural Differences in Coronary Heart Disease Mortality in the United States: 1999–2009

Widening Rural–Urban Disparities in All-Cause Mortality and Mortality from Major Causes of Death in the USA, 1969–2009

2. Hypothesis

- H_0: $\beta_{CN} = \beta_{US}$
- H_1: $\beta_{CN} \neq \beta_{US}$

3. Data source

- US: National Inpatient Sample (NIS), by AHRQ
- CN: Statewide inpatient records in Shanxi Province

AMI patients:

- US: 367,981 in 2013 ~ 2015
- CN: 36,464 in 2013 ~ 2015

- Propensity score matching → 32199 + 32199

4. Statistical models

- Outcome: mortality → binary 0 or 1
- $Y_i \sim BIN(1, p_i)$
- $\text{logit}\left(\frac{p_i}{1-p_i}\right) = \beta_1 X_1 + \ \ldots + \beta_n X_n$
- Two models separately for China and US

Table 1: Logistic regression results for China and US

	Dependent variable:	
	DIED	
	China	United States
	(1)	(2)
Rural	0.063	0.248***
	(0.154)	(0.066)
Age: 45-59	0.453	0.386***
	(0.314)	(0.137)
Age: 60-69	1.172***	0.819***
	(0.306)	(0.136)
Age: 70-79	2.111***	1.193***
	(0.300)	(0.139)
Age: >80	2.700***	1.689***
	(0.304)	(0.139)
Female	0.046	0.069
	(0.092)	(0.047)
Emergency	0.328***	0.046
	(0.087)	(0.045)
Elixhauser Comorbidity Index	0.005	0.060***
	(0.008)	(0.002)
Payer: Public Insurance	0.163	−0.318***
	(0.169)	(0.113)
Payer: Private Insurance	−1.375*	−0.359***
	(0.728)	(0.118)
Payer: No Charge	0.378	0.412
	(0.300)	(0.321)
Payer: Other	0.264	0.018
	(0.291)	(0.163)
Constant	−5.899***	−3.836***
	(0.336)	(0.157)
Observations	32,199	32,199
Log Likelihood	-2,620.025	-7,639.565
Akaike Inf. Crit.	5,266.049	15,305.130
Note:	*p<0.1; **p<0.05; ***p<0.01	

Hypothesis testing (1)

- Model CN: $\hat{\beta}_{CN} \sim N(b_{CN}, se_{CN}^2)$
- Model US: $\hat{\beta}_{US} \sim N(b_{US}, se_{US}^2)$

- Combined: $\hat{\beta}_{CN} - \hat{\beta}_{US} \sim N(b_{CN} - b_{US},\ \ se_{CN}^2 + se_{US}^2)$

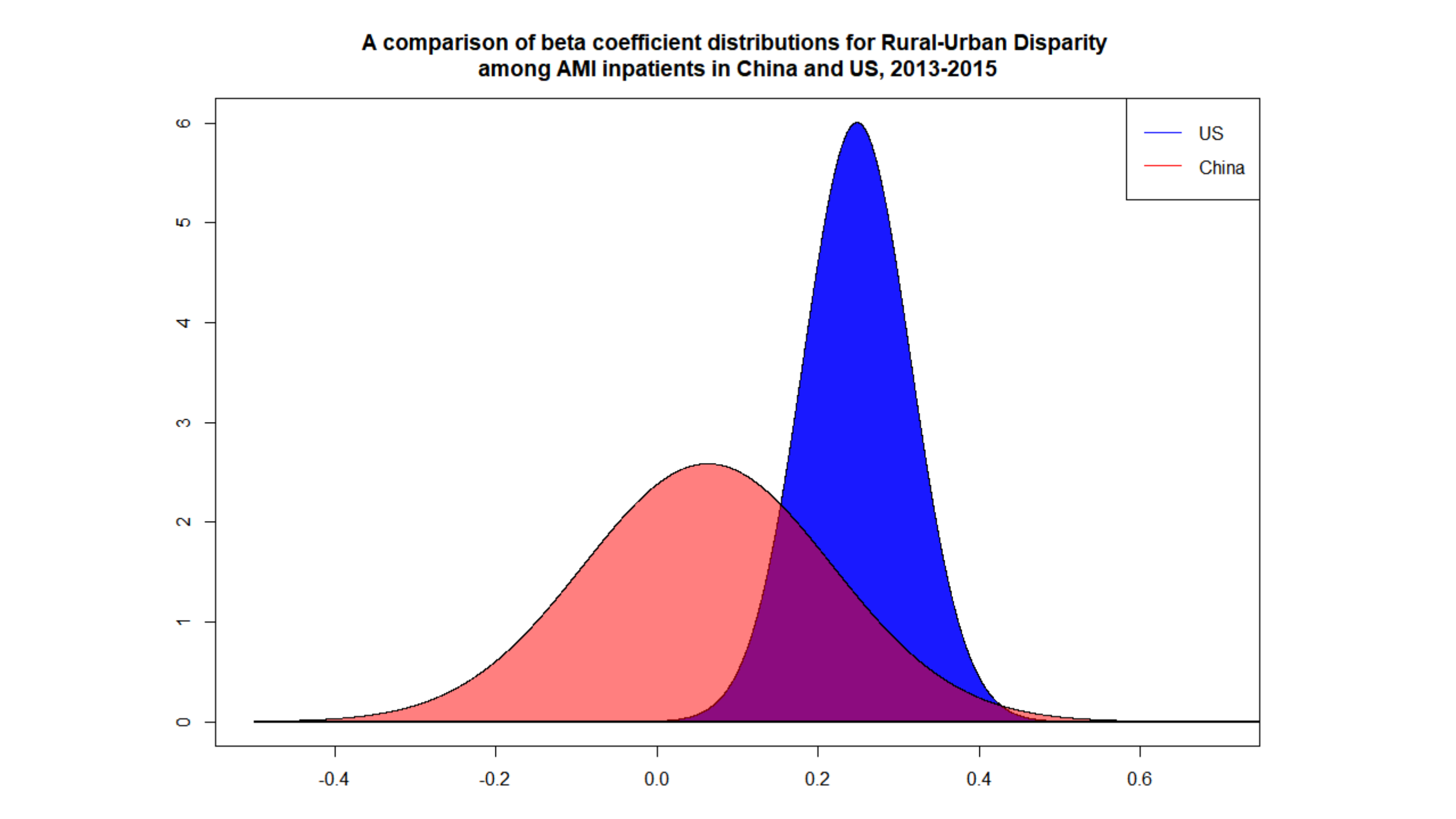
- H_0: $\beta_{CN} = \beta_{US}$ ➔ $\beta_{CN} - \beta_{US} = 0$

Hypothesis testing (2)

- Test statistics:

- $z = \frac{\hat{\beta}_{CN} - \hat{\beta}_{US} - (\beta_{CN} - \beta_{US})}{\sqrt{se_{CN}^2 + se_{US}^2}} \sim N(0,1)$

- $z = \frac{0.063 - 0.248 - (0 - 0)}{\sqrt{0.154^2 + 0.066^2}}$ = -1.104 ➔ no evidence to reject H_0


A comparison of beta coefficient distributions for Rural-Urban Disparity
among AMI inpatients in China and US, 2013-2015
US
China
0
1
2
3
4
5
6
-0.4
-0.2
0.0
0.2
0.4
0.6

Q & A