

Disparity of the Disparities

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

BST 5230 Bayesian Statistics Presentation

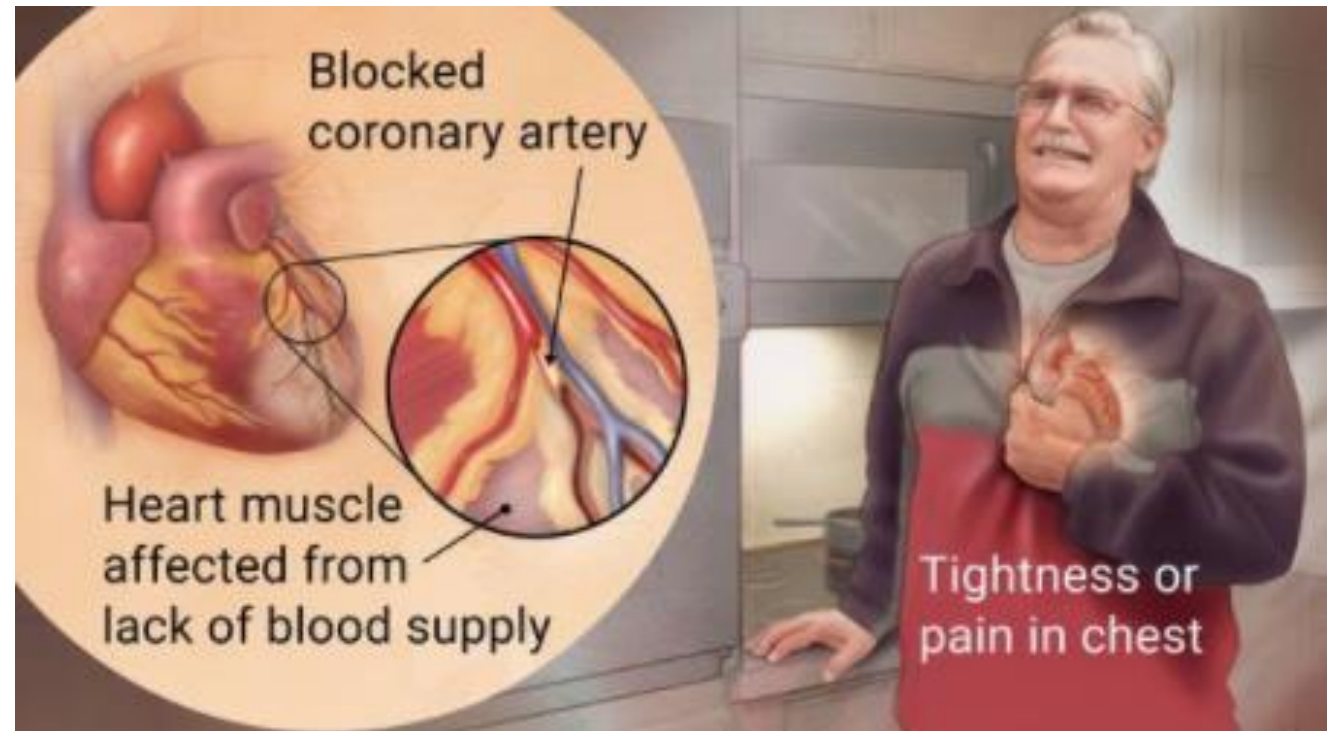
May 3, 2018

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‡*

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}

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U.S.

ORIGINAL ARTICLE

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

Bradford E. Jackson, PhD;¹ David B. Coultas, MD;² Sumihiro Suzuki, PhD;³ Karan P. Singh, PhD;¹ & Sejong Bae, PhD¹

¹ Division of Preventive Medicine, Department of Medicine, University of Alabama at Birmingham, Birmingham, Alabama

² Department of Medicine, University of Texas Health Science Center at Tyler, Tyler, Texas

³ Department of Biostatistics, School of Public Health, University of North Texas Health Science Center, Fort Worth, Texas

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 $\rightarrow 32199 + 32199$

4. Statistical models

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

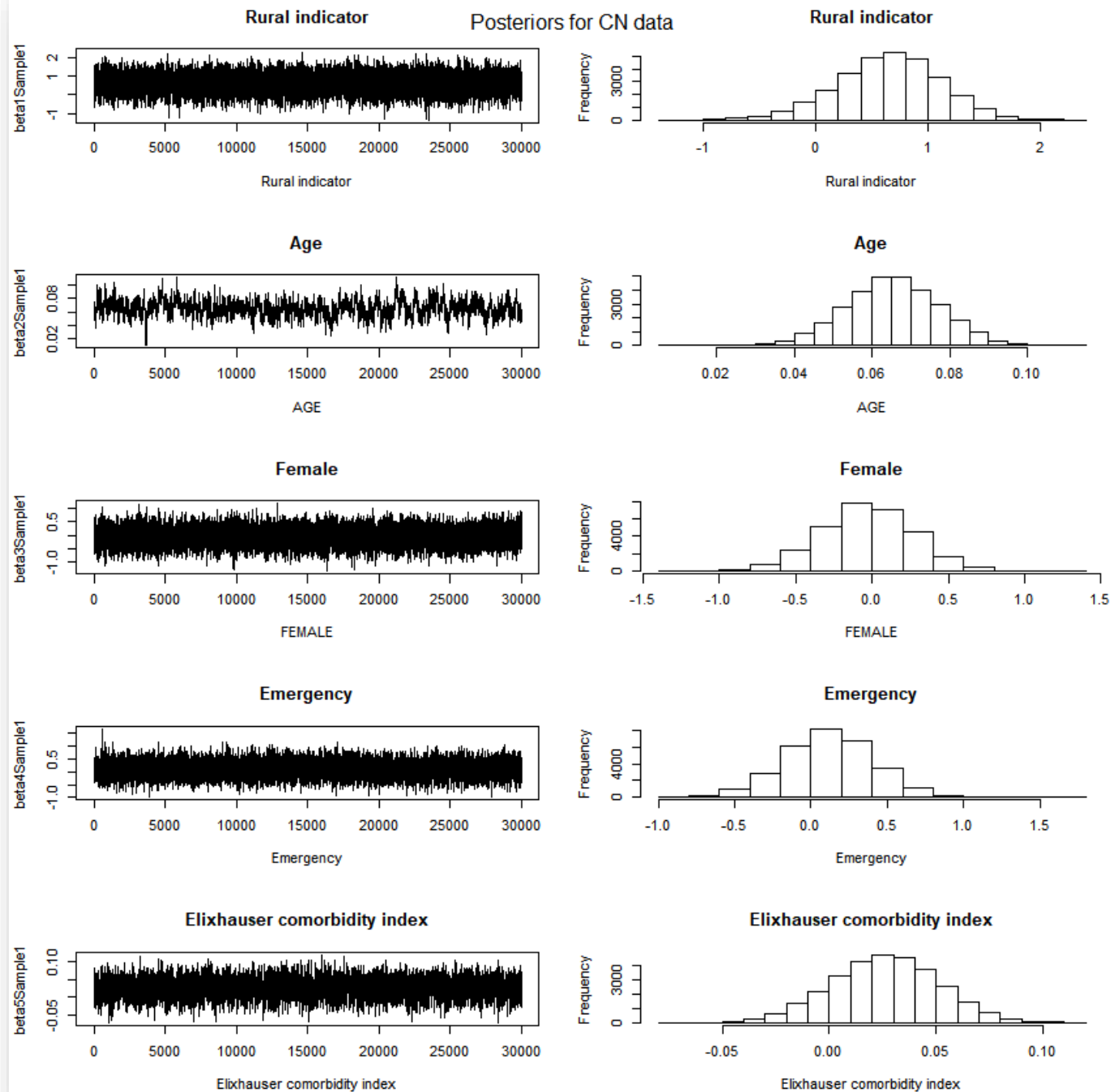
JAGS model

- # Likelihood
- for (i in 1:n)
- {
 - $\text{DIED}[i] \sim \text{dbern}(\text{ilogit}(b0 + \text{b1} * \text{Rural}[i] + b3 * \text{AGE}[i] + b3 * \text{FEMALE}[i] + b4 * \text{Emergency}[i] + b5 * \text{ELIX}[i]))$
- }
- # Priors
- $b0 \sim \text{dnorm}(0, 0.0001)$
- $b1 \sim \text{dnorm}(0, 0.0001)$
- $b2 \sim \text{dnorm}(0, 0.0001)$
- ...}

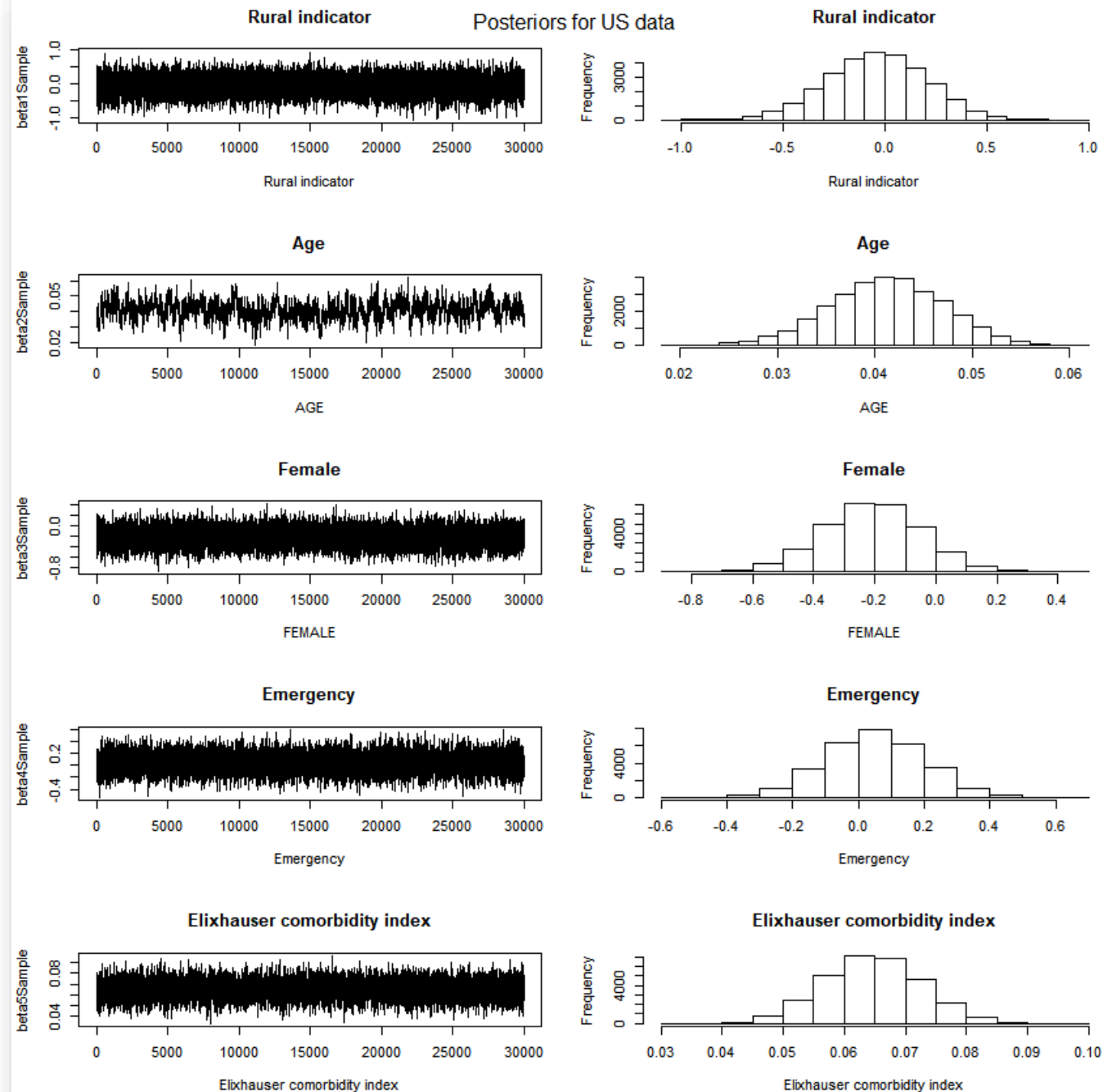
Parameters

- `adaptSteps = 1000`
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- `nChains = 3`
- `numSavedSteps=30000`
- `thinSteps=1`

Posteriors for CN

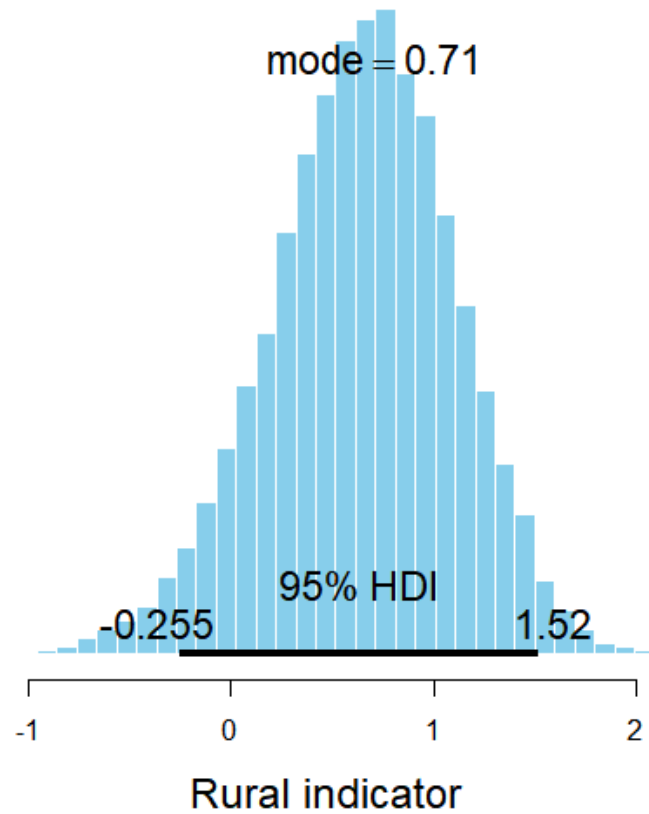


Posteriors for US

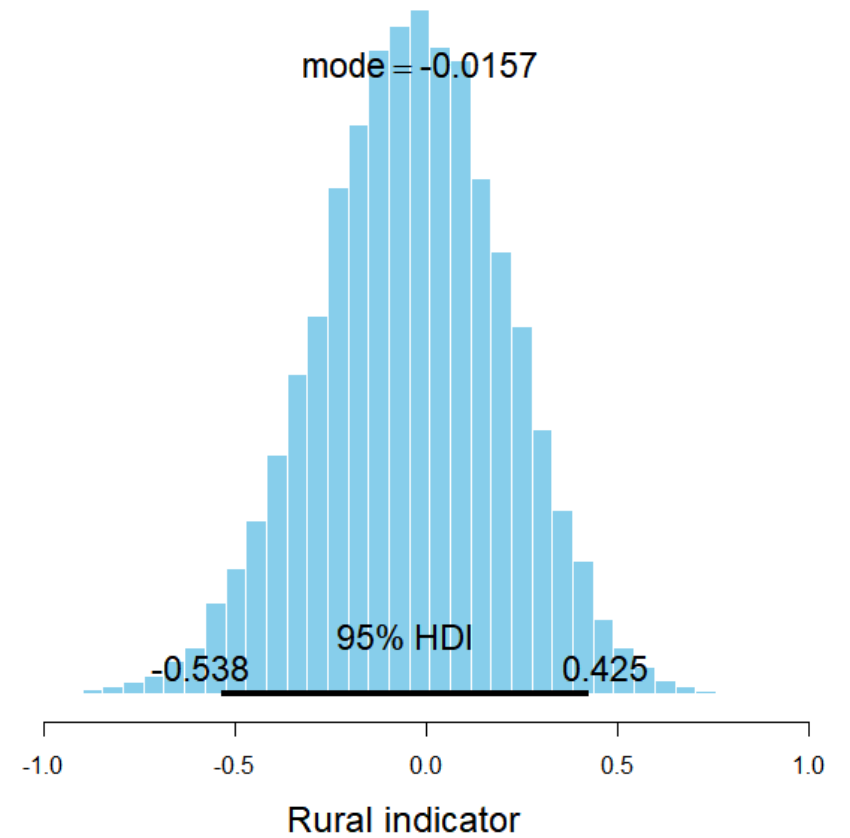


95% Credible intervals

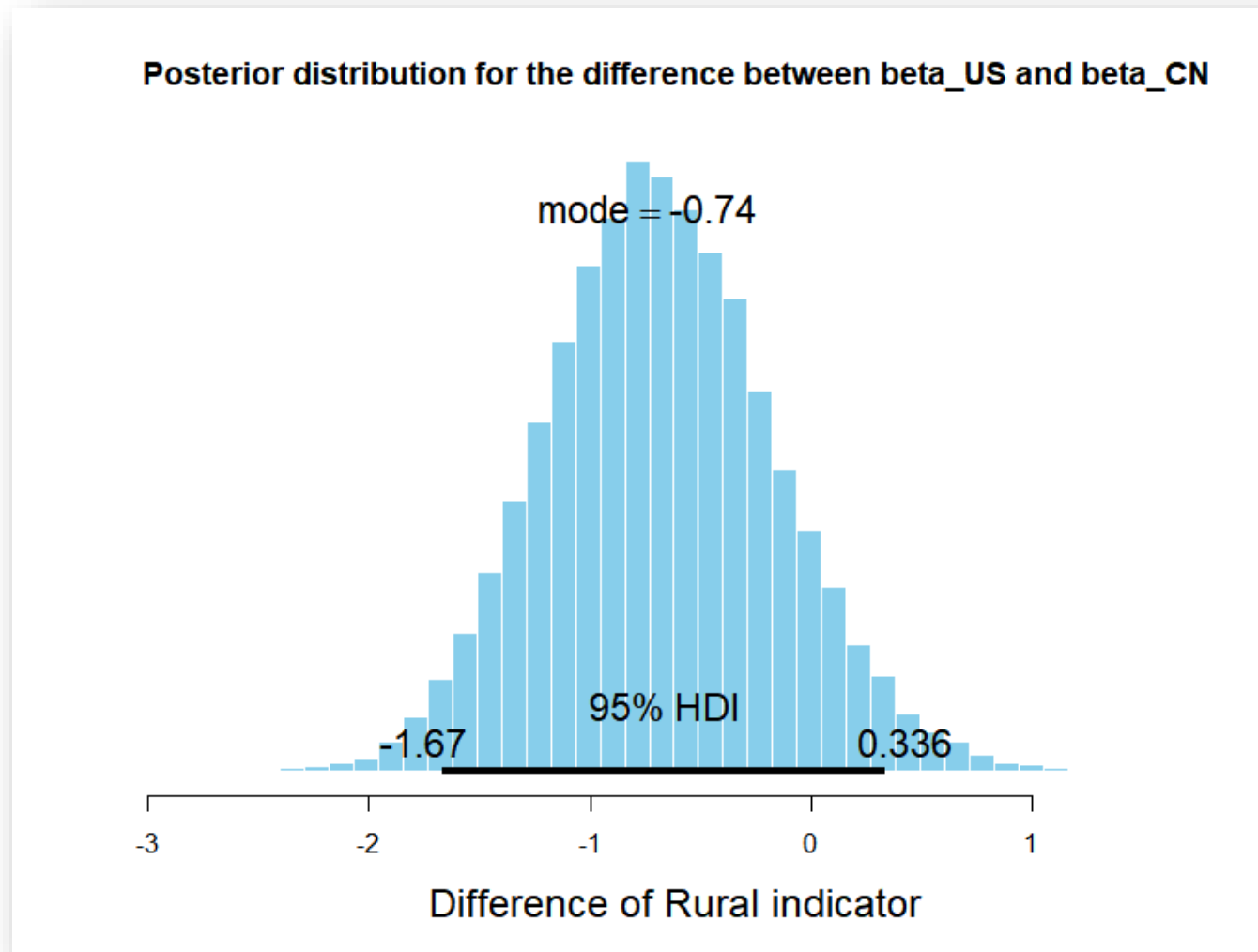
Posterior distribution for CN data



Posterior distribution for US data



Posterior distribution of the difference



Q & A