

# 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

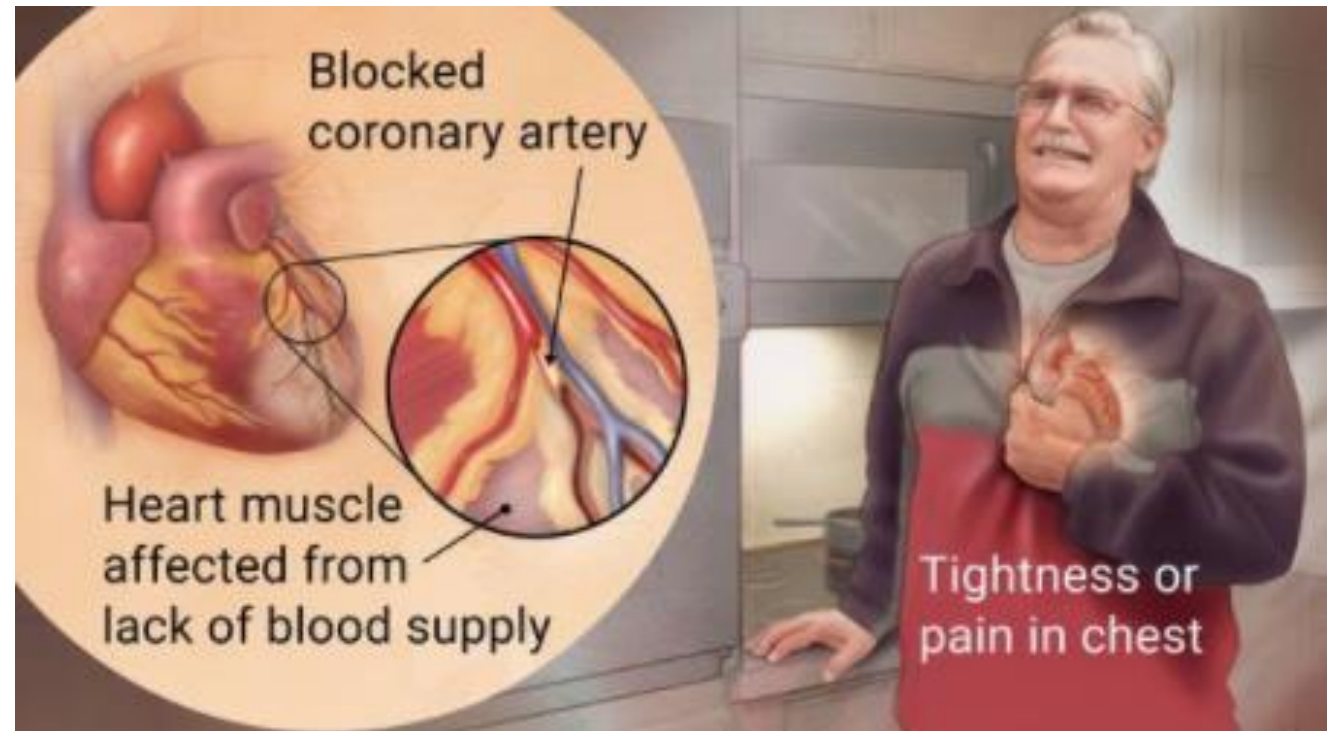
May 3, 2018

Miao Cai

# 1. Background

Acute myocardial infarction = Heart attack

- Very common
- Emergency
- High mortality



China

ORIGINAL ARTICLE

## Explaining Urban-Rural Health Disparities in China

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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,<sup>a,b</sup> Xin Yuan, MD, PhD,<sup>c,d</sup> Keqin Rao, MD, PhD,<sup>e</sup> Zhe Zheng, MD, PhD,<sup>c,d</sup> and Shengshou Hu, MD, PhD<sup>c,d</sup>

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U.S.

ORIGINAL ARTICLE

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

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

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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  $\rightarrow 32199 + 32199$

## 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

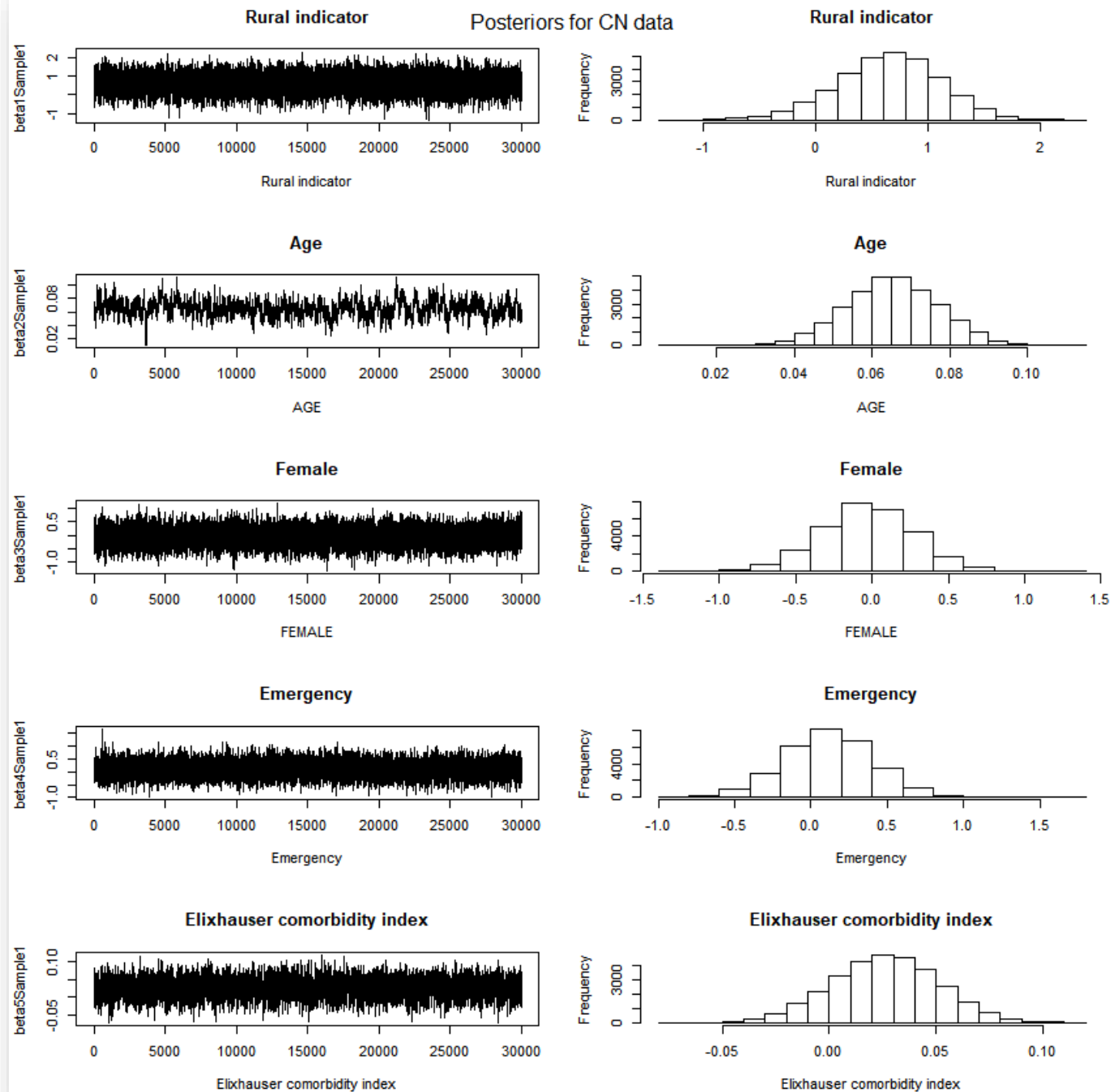
- # Likelihood
- for (i in 1:n)
- {
  - $\text{DIED}[i] \sim \text{dbern}(\text{ilogit}(b0 + \textcolor{red}{b1} * \textcolor{red}{\text{Rural}}[i] + b2 * \text{age\_45\_59}[i] + b3 * \text{age\_60\_69}[i] + b4 * \text{age\_70\_79}[i] + b5 * \text{age\_80p}[i] + b6 * \text{FEMALE}[i] + b7 * \text{Emergency}[i] + b8 * \text{ELIX}[i]))$
- }
- # Priors
- $b0 \sim \text{dnorm}(0, 0.0001)$
- $b1 \sim \text{dnorm}(0, 0.0001)$
- $b2 \sim \text{dnorm}(0, 0.0001)$
- ...}

# Parameters

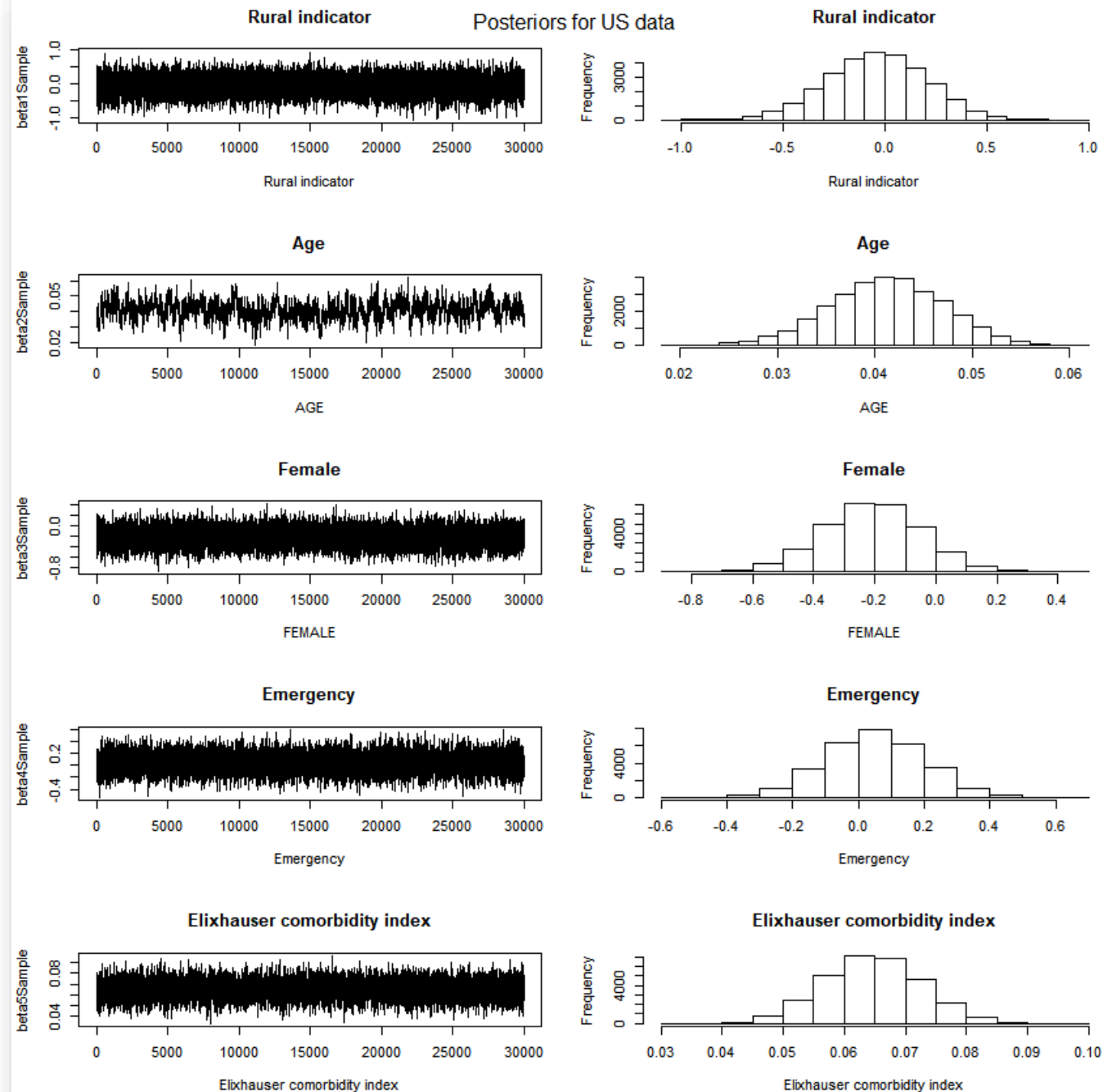
- `adaptSteps = 1000`
- `burnInSteps = 10000`
- `nChains = 3`
- `numSavedSteps=30000`
- `thinSteps=1`



# Posteriors for CN

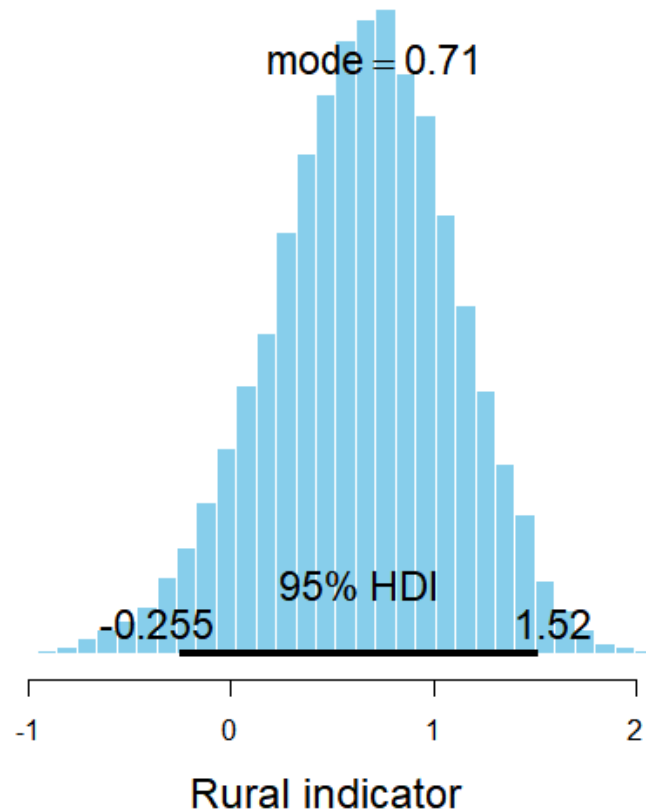


# Posteriors for US

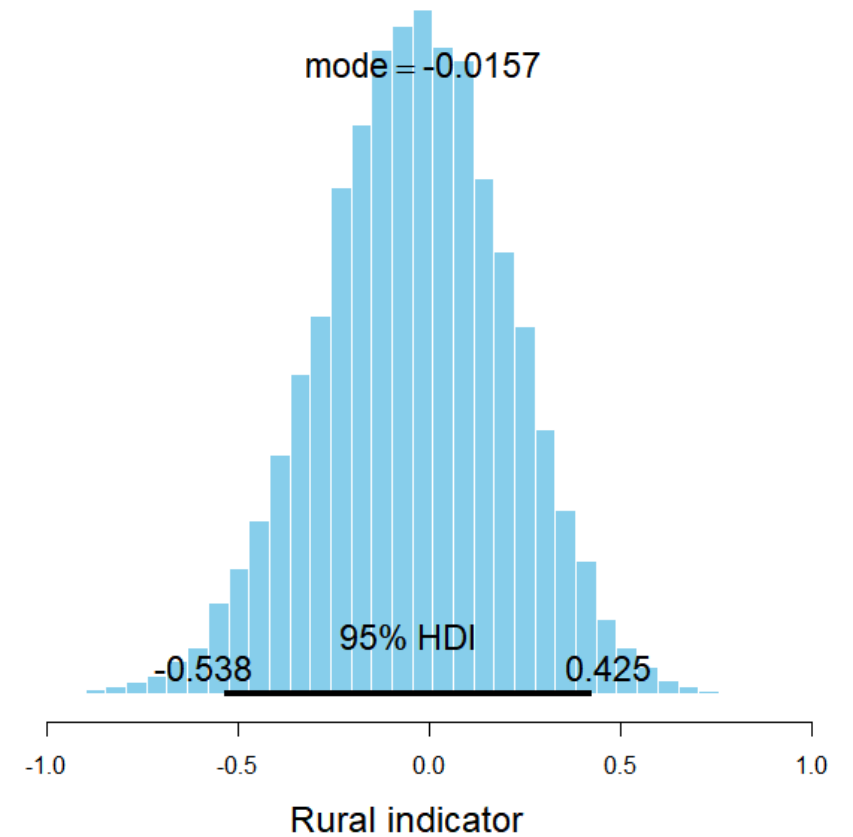


# 95% Credible intervals

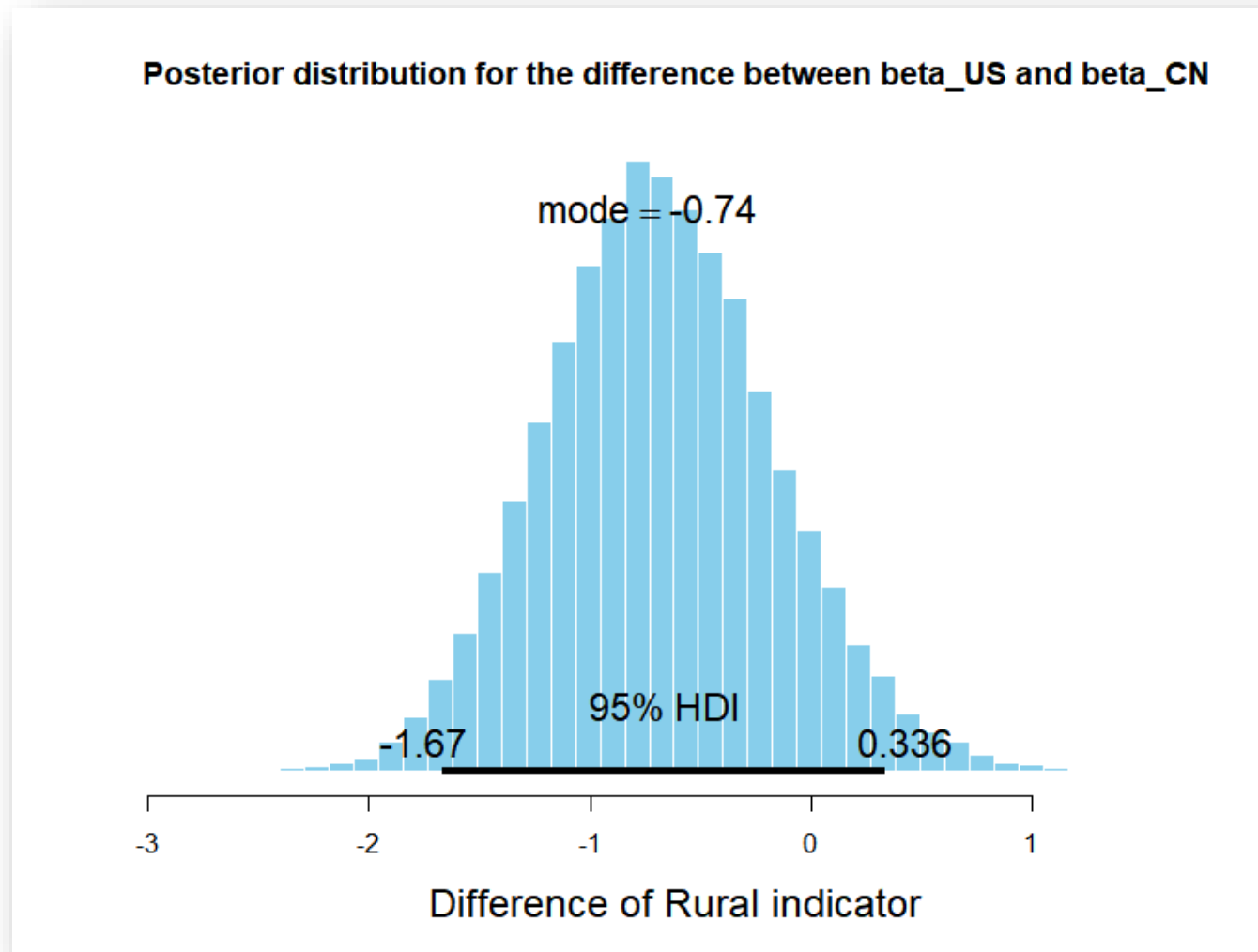
Posterior distribution for CN data



Posterior distribution for US data



# Posterior distribution of the difference



Q & A