



## Introduction

- The latest Census report showed that in 2018 the population of veterans in the US was 18 million, which represents 7% of the US adult population.
- A recent study from Veterans Health Administration (VHA) showed that veteran employees have worse health status than their civilian counterparts.
- Multiple studies have shown that veterans are at higher risk of posttraumatic stress disorder (PTSD) and major depressive disorder (MDD), suicidal ideation or attempts, disabilities, homelessness, severe pain, substance use disorders, and other health related conditions. Does this indicate that the veteran population is less healthy and in need of more emergency or urgent care?
- There are limited evidence-based research findings regarding emergency room utilization in veterans compared to civilian populations.

## Objectives

### The objectives of the study were to:

- Determine if veteran status was associated with higher risk of emergency department (ED) visits.
- Determine if veteran status was associated with higher risk of overnight hospitalization.
- Compare estimations of different statistical methods for non-rare outcomes in this study.

## Methods

### Data source:

- 2019 Nation Health Interview Survey (NHIS)

### Predictor:

- Veteran status

### Outcomes:

- ED visits in the past 12 months.
- Hospital overnight stay in the past 12 months.

### Covariates:

- Age, gender, race, marital status, education, income.

### Statistical methods:

- Poisson regression - ED visit prevalence ratio (PR).
- Logistic regression - odds ratio (OR) of hospital overnight stay.
- Poisson and Cox proportional hazards regression with robust standard error estimate the PR and hazard ratio (HR) of hospital overnight stay.
- R Studio

## Results

- Compared with civilians, veterans had greater prevalence of ED visits (25.8% vs. 21.7%) and hospitalization (15.3% vs. 9.8%), an association that persisted in adjusted analyses: 36% greater prevalence of ED visits (adjusted PR = 1.36 (95% CI: 1.22, 1.50)), and 69% greater odds of hospital overnight stay (Logistic: adjusted OR (AOR) = 1.69 (95% CI: 1.46, 1.97), adjusted HR = 1.62 (95% CI: 1.41, 1.86); Poisson model: adjusted PR = 1.59 (95% CI: 1.37, 1.84)).
- No evidence indicating overestimation of prevalence ratios between logistic, Poisson, and Cox proportional hazard models.

## Results

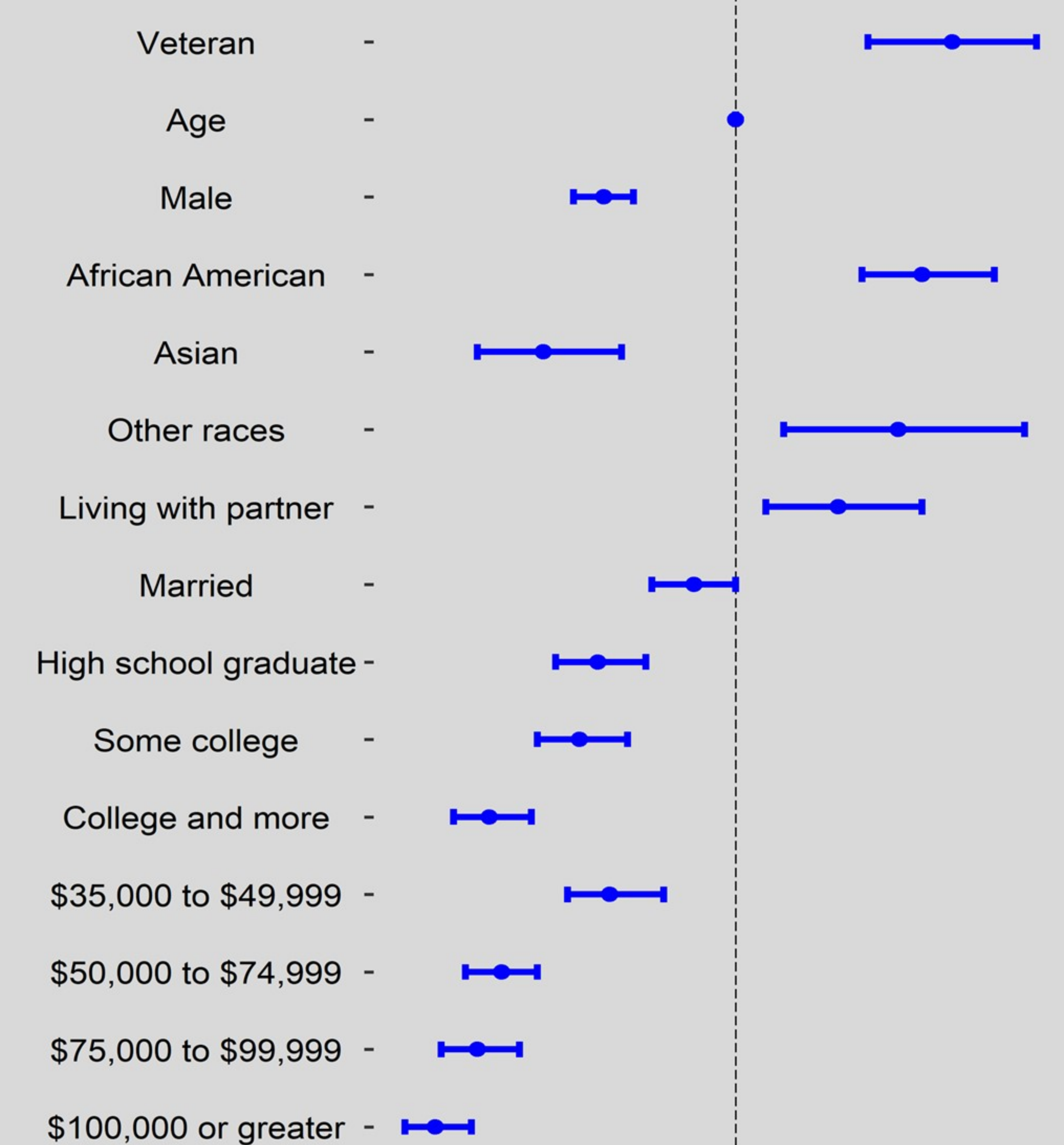


Figure A: ED visits  
Adjusted PR and 95% CI (Poisson)

## Results

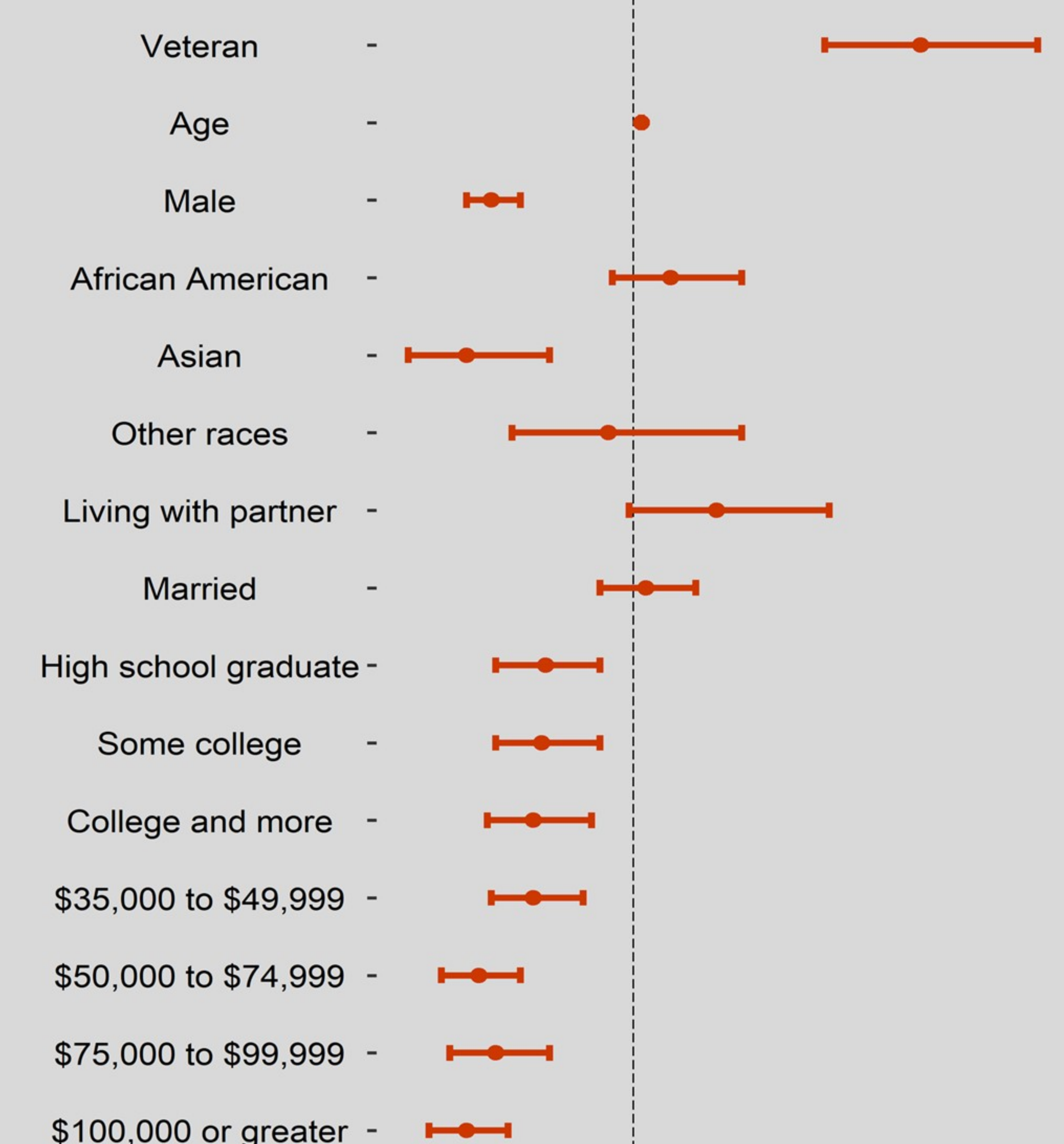


Figure B: Hospital overnight stay  
Adjusted OR and 95% CI (logistic)

## Results

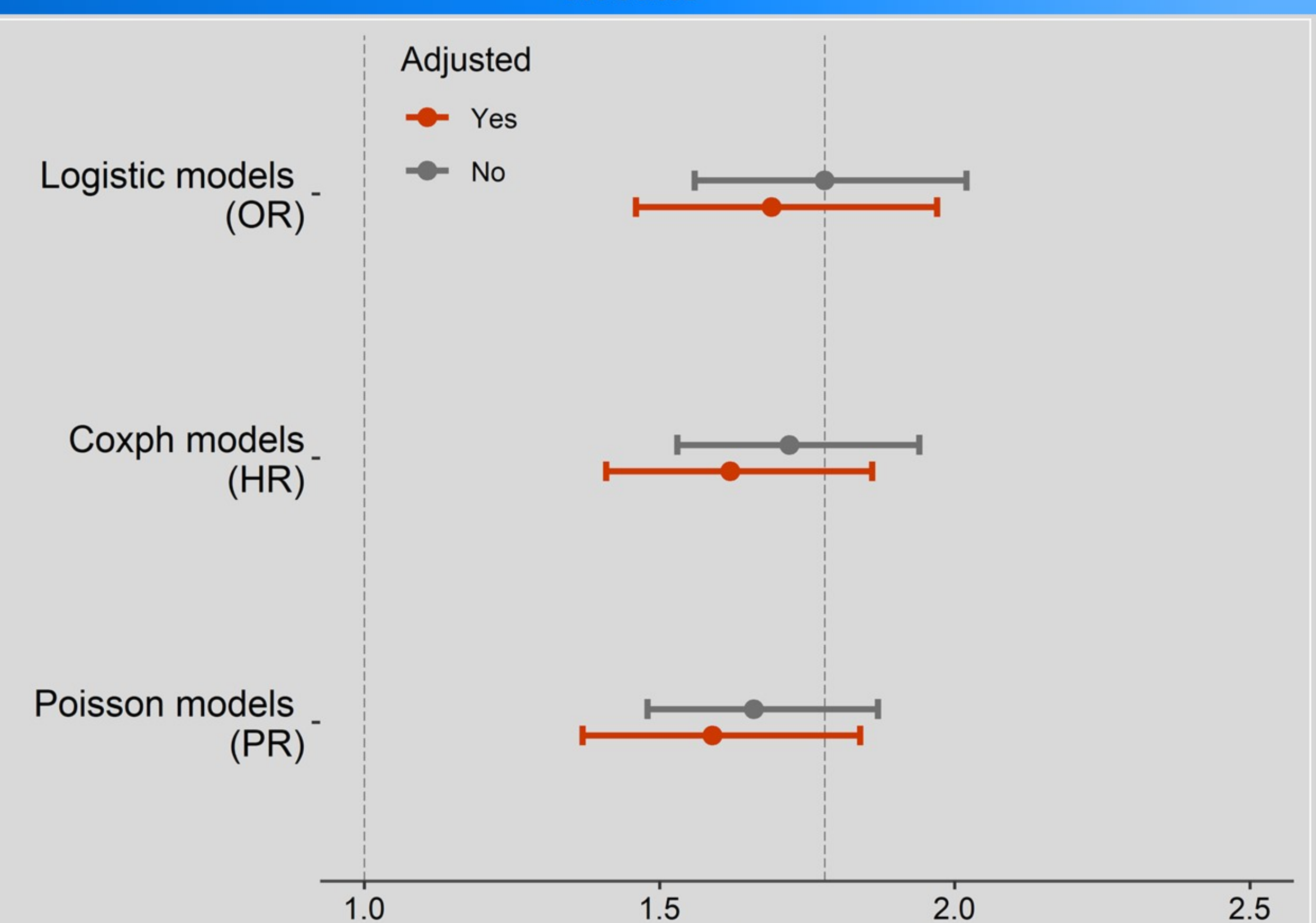


Figure 1: Results of Veteran Vs. Non-veteran ratios in adjusted and unadjusted models for hospital overnight stay

## Discussion/Conclusion

### Discussion:

- In this study, we found that veterans who served on active duty had 36% more ED visits and 1.69 times odds of being hospitalized overnight during the past 12 months compared with their civilian counterparts.
- Our findings are in line with other investigations that have examined on the health risk factors of veterans in comparison with civilian counterparts.
- Other than veteran status, our study also found there were imbalances within race groups, education status and family income. African Americans tend to have higher rate of ED visits and those with higher education and family income tend to have fewer ED visits and less risk of being hospitalized overnight.
- We did not observe major differences in estimation in this study. However, Poisson and Cox regression produced ratio estimations closer to 1 when compared with logistic regression ratios, as expected.
- This study is limited to the cross-sectional design of the survey, we do not draw any causal inferences between veteran status and ED visits and overnight hospitalization.

### Conclusion:

Improving veterans' social determinants of health and innovating primary care outreach interventions may be cost-effective in reducing veterans' ED visits and hospital overnight stay. Even when there is no major difference, statisticians should encourage researchers to use the more conservative models for non-rare outcomes.

## Acknowledgement

I would like to express my special thanks of gratitude to Dr. Carl Rosenberg and Dr. Janet Rosenbaum for their valuable guidance throughout this project.

## Faculty Advisor

Dr. Carl Rosenberg