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Average treatment effect of cholesterol-lowering medication and average systolic blood pressure (SBP), mm Hg.

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Summary: We investigate the average treatment effect among the treated (ATT) of cholesterol-lowering medication on the mean systolic blood pressure (mm Hg). Using data from the National Health and Nutrition Examination Survey (NHANES), we fit a propensity score model to estimate the ATT among adults living in the United States of America.

Key words: cholesterol-lowering medicationsystolic blood pressureblood pressure control.

This paper has been submitted for consideration for publication in *Biometrics*

1. Introduction

Controlling blood pressure (BP) reduces the risk for cardiovascular disease. However, the prevalence of BP control (i.e., systolic BP < 140 and diastolic BP < 90) among US adults with hypertension has decreased since 2013. We invite teams to analyze publicly available data from US adults to help identify potential causes or correlates of worsening BP control among US adults with hypertension over the past decade, as this may allow for development of effective interventions to help control BP and prevent cardiovascular disease.

2. Materials and methods

2.1 *Data*

The National Health and Nutrition Examination Survey (NHANES) combines interviews and physical examinations to assess the health and nutritional status of adults and children in the United States of America. The program started in the early 1960s and has been conducted every two years since 1999. The survey samples from a nationally representative 5,000 persons each year. The participants are located in counties across the country, 15 of which are visited each year. The interview asks questions about demographic, socioeconomic, dietary, and health-related questions. The examination consists of medical, dental, physiological measurements, and laboratory tests.

The NHANES dataset we are using can be downloaded from **cite** . The dataset contains information from the survey from 1999 to 2020 with a sample of 59,799 rows and 111 chosen columns. Each row is a noninstitutionalized US adults participated in the survey between 1999 and 2020. The columns contain information about demographics, blood pressure levels, hypertension status, antihypertensive medication usage, and co-morbidities.

For this analysis, **missing data**

2.2 *Statistical methods*

We fit a propensity score model on

2.2.1 *Exploratory data analysis.*

2.2.2 *Modeling.*

3. Results {$results}

3.1 *Study population*

3.2 *Propensity score model*

Diagnostics.

3.3 *Average treatment effect among the treated*

4. Discussion

5. Supplementary information

The data can be downloaded from GitHub or accessed via the cardioStatsUSA R package. For both the file and information about the R package, see `https://github.com/jhs-hwg/cardioStatsUSA`.

All code for the analysis can be accessed at **link github**

6. Acknowledgement

7. Section title

Text with citations by Heagerty et al. (2000), (Pepe, 2003).

7.1 *Subsection title*

as required (Hoerl and Kennard, 1970; Zou and Hastie, 2005). Don't forget to give each section and subsection a unique label (see Sect. 7).

Paragraph headings. Use paragraph headings as needed.

7.2 *Equations*

Here is an equation:

$$f_X(x) = \left(\frac{\alpha}{\beta}\right)\left(\frac{x}{\beta}\right)^{\alpha-1} e^{-\left(\frac{x}{\beta}\right)^{\alpha}}; \alpha, \beta, x > 0$$

Here is another:

$$a^2 + b^2 = c^2 \tag{1}$$

Inline equations: $\sum_{i=2}^{\infty}\{\alpha_i^{\beta}\}$

8. Figures and tables

8.1 *Figures coming from R*

Normal figure embedded in text.

```
## Warning in plot.formula(runif(25) ~ runif(25)): the formula 'runif(25) ~
## runif(25)' is treated as 'runif(25) ~ 1'
```

[Figure 1 about here.]

8.2 *Tables coming from R*

```
print(xtable::xtable(head(mtcars)[,1:4],
caption = "Caption centered under table", label = "tab1"),
comment = FALSE, timestamp = FALSE, caption.placement = "top")
```

[Table 1 about here.]

Table 1 shows these numbers. Some of those numbers are plotted in Figure **??**.

```
head(mtcars[,1:4])
```

```
##                   mpg cyl disp  hp
## Mazda RX4         21.0   6  160 110
## Mazda RX4 Wag     21.0   6  160 110
## Datsun 710        22.8   4  108  93
## Hornet 4 Drive    21.4   6  258 110
## Hornet Sportabout 18.7   8  360 175
## Valiant           18.1   6  225 105
```

References

Heagerty, P. J., Lumley, T., and Pepe, M. S. (2000). Time-dependent roc curves for censored survival data and a diagnostic marker. *Biometrics* **56,** 337–344.

Hoerl, A. E. and Kennard, R. W. (1970). Ridge regression: Biased estimation for nonorthogonal problems. *Technometrics* **12,** 55–67.

Pepe, M. S. (2003). *The statistical evaluation of medical tests for classification and prediction.* Oxford University Press.

Zou, H. and Hastie, T. (2005). Regularization and variable selection via the elastic net. *Journal of the Royal Statistical Society: Series B (Statistical Methodology)* **67,** 301–320.

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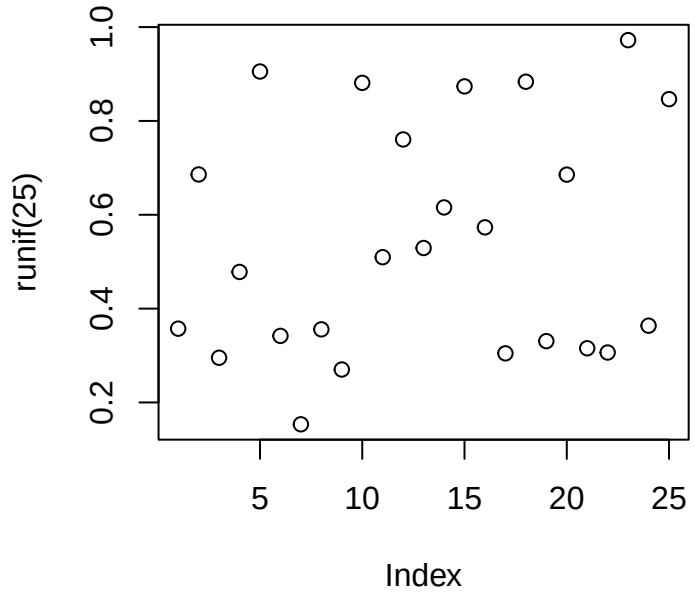

Figure 1. Output from `pdf()`

Table 1
Caption centered under table

	mpg	cyl	disp	hp
Mazda RX4	21.00	6.00	160.00	110.00
Mazda RX4 Wag	21.00	6.00	160.00	110.00
Datsun 710	22.80	4.00	108.00	93.00
Hornet 4 Drive	21.40	6.00	258.00	110.00
Hornet Sportabout	18.70	8.00	360.00	175.00
Valiant	18.10	6.00	225.00	105.00