Body Mass index effects on statin prescribtions

Contents

1 introduction

Body Mass Index (BMI) plays an important rule in predicting heart disease risk(Katzmarzyk et al. 2012). Our goal is to compare 90Th quantile regression for BMI in Diabetes and prediabetes population. Quantile regression has many succesfyl application in ecology where different factores interect in a complicated way that produce different variation of one factor for different levels of another variabels(Cade and Noon 2003).

2 Quantile Regression

Quantile regression is an important tool used to regress the dependent variable with high variance over the independent variables. QR is developed to study the relationships between variables that have week or no-relationshipes between their means. Quantile regression is more robust for an outlier than ordinaty least squares regression(OLS). Moreover, QR is . The independent variables are Gender, Age, race, diabetes status, and statin use.

For a random variable X, the cumulative distrubution function (CDF) is

$$F(X) = P(X \leq x)$$

, and the τth quantile of X is defined by

$$F^{-1}(\tau) = \inf\{x : F(x) \geq \tau\}$$

where $0 < \tau < 1$. Let the loss function is defined by

$$\rho_\tau(u) = u(\tau - I_{(u<0)})$$

where I is the indicator function (Koenker 2005). The quantile estimator is the value that manimizes the expected loss function

$E\rho_\tau(X - \hat{x}) = (\tau - 1)\int_{-\infty}^{\hat{x}}(x - \hat{x})dF(x) + \tau\int_{\hat{x}}^{-\infty}(x - \hat{x})dF(x)$. Differentiating with respect to $\hat{x}$, we get

$$0 = (\tau - 1)\int_{-\infty}^{\hat{x}} dF(x) + \tau\int_{\hat{x}}^{-\infty} dF(x) = F(\hat{x}) - \tau.$$

Due to monotnicity of the cumulative distribution function, any solution that satisfies $\{x : F(x) = \tau\}$ is a minimzing for the expected loss function.

Least square method expresses conditional mean of y given x as $\mu(x) = x^T\beta$ and it solves

$$\min_{\beta \in \mathcal{R}^p} \sum_{i=1}^{n} (y_i - x_i^T\beta)^2.$$

Quantile regression expresses conditional quantile function $Q_y(\tau|x) = x^T\beta(\tau)$ and solve

$$\min_{\beta \in \mathcal{R}^p} \sum_{i=1}^{n} \rho_\tau(y_i - x_i^T\beta)^2.$$

This minimization problem can be reformalated to a linear programming problem

$$\min_{\beta \in \mathcal{R}^p}$$

3 methods

prevalence and incidence as a function of age (18 – 84 years in 1-year intervals), race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic, or other), sex, and BMI (underweight, 18.5 kg/m2; normal weight, 18.5 to 25 kg/m2; overweight, 25 to 30 kg/ m2; obese, 30 to 35 kg/m2; and very From the figure we see

4 Data

The data used in this study is National Health and Nutrition Examination Survey data (NHANES)(Disease Control and (CDC) 2018). The data has

Figure 1: A better figure caption

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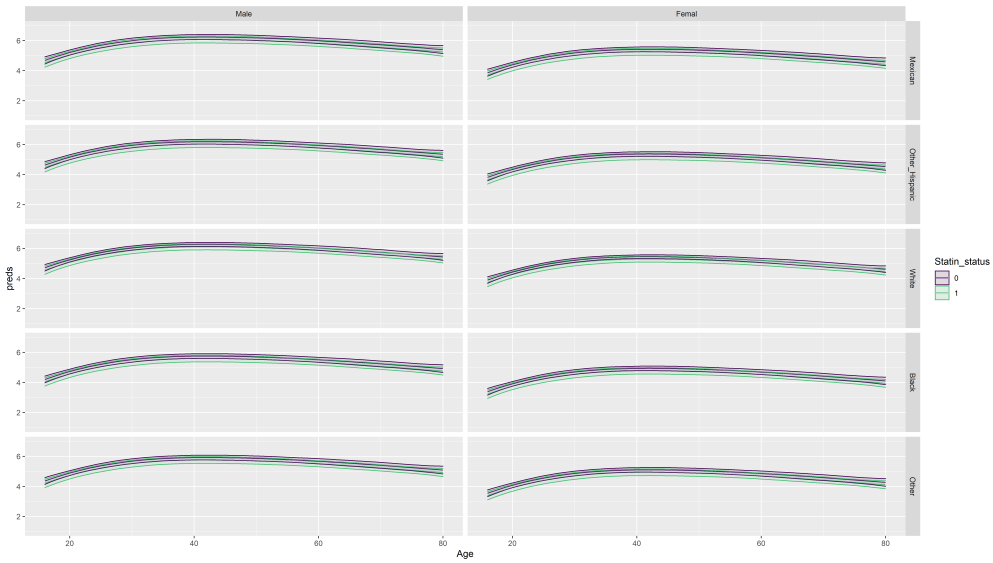

Figure 2: A better figure caption

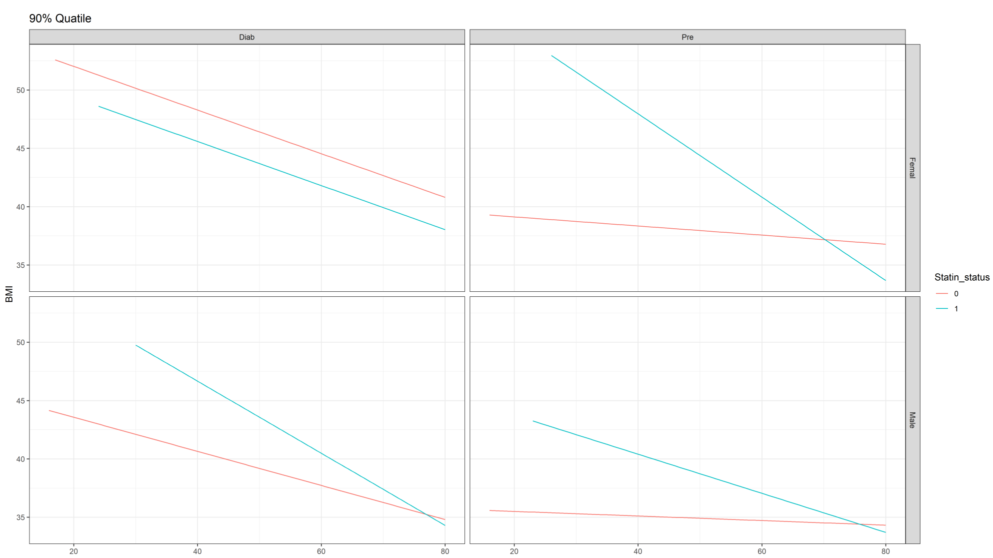

Figure 3: A better figure caption

References

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