Maternal Smoking and Infant Health

National Institutes of Health

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Outline

Introduction to National Institutes of Health

1. Part of the U.S. Department of Health and Human Services
2. Nation's medical research agency
3. Make important discoveries that improve health and save lives
4. Thanks to NIH-funded medical research, Americans today are living longer and healthier

Problem that concerns the baby birth weight

1. One of the U.S. Surgeon Generals health warnings "Smoking by pregnant women may result in fetal injury, premature birth, and low birth weight."
2. Epidemiological studies show that smoking is responsible for a 150 to 250 gram reduction in birth weight
3. Epidemiological studies also indicate that smoking mothers are about twice as likely as nonsmoking mothers to have a low-birth-weight baby (under 2500 grams)

NIH-Sponsored Project

1. To compare the birth weights of babies born to smokers and nonsmokers
2. To assess the impact of maternal smoking status on baby birth weight
3. To determine what other variables influence the baby birth weight
4. To predict the birth weight given the values of variables considered

From Team to Sponsor

The following outputs are expected from this project:

1. A report regarding whether maternal smoking status has an impact on baby birth weight
2. A software that produces the prediction interval of baby birth weight given the values of the predictors as the input

From Sponsor to Team

In order for my project to be of successful one, I will need:

1. Access to the datasets of Child Health and Development Studies where the data regarding birth weight, maternal smoking status, maternal height, weight and age are provided
2. Computing resources
3. Timely responses to inquiries
4. Symposium attendance travel expenses

Collection of Data

The data was collected in the following ways:

1. Place: Kaiser Foundation Health Plan in the San FranciscoEast Bayarea
2. Time: Between 1960 and 1967
3. Variable: Baby birth weight; Maternal smoking status; Maternal height; Maternal weight; Maternal age

Clean the Data

1. Delete the data with missing values
2. Delete the detected outliers

Methods

1. Software: R
2. Two sample hypothesis test to determine the difference in the birth weights of babies born to smoking mothers and babies born to nonsmoking mothers
3. Multiple covariates regression analysis for birth weight (response) against other variables including maternal smoking status, maternal height, weight, age as predictors to measure the relationship among those variables
4. Ordinary least squres method to find the coefficients
5. Test the model
6. Refine the model

MLR Model for baby birth weight

Original Model:

$$\begin{aligned} Birth\ Weight = \ & \beta_0 + \beta_1(Maternal\ Smoking\ Status) + \beta_2(Maternal\ Height) \\ & + \beta_3(Maternal\ Weight) + \beta_4(Maternal\ Age) + \epsilon(error\ term) \end{aligned}$$

Work to Be Done

1. Assess residual assumptions
2. Examine the multicollinearity and overfitting
3. Test and refine the model

For Future Related Research

1. Take into consideration more variables like the diet of mothers before they labored
2. Use future data to further test the model

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