Perspectives on Computational Research

Problem Set: Data (NCHS' Vital Statistics Natality Birth Data)

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Method

Data

In this research, the data are utilized from '*NCHS' Vital Statistics Natality Birth Data*' collected by the *National Vital Statistics System* of the *National Center for Health Statistics*. *NCHS' Vital Statistics Natality Birth Data* are aggregated based on a sample of birth certificates from the United States between 1968 and 2015. The data are composed of demographic data, health data, and geographic data. For the purpose of this research the demographic data in 2015 are extracted and analyzed.

NCHS' Vital Statistics Natality Birth Data are extensively used for health and medical research. Utilizing the data, smoking during pregnancy (Mathews, 2001), preterm births (Martin et al., 2010), teenage birth (Mathews et al., 2010), and out-of-hospital births (MacDorman et al., 2010) were studied. This validates the data and presents wide range of medical

issues that the data can be utilized. The data are curated and stored at the website of *Centers for Disease Control and Prevention* (https://www.cdc.gov/nchs/data_access/vitalstatsonline.htm#Births). Alternatively, the data are accessible at the website of the *National Bureau of Economic Research* (http://www.nber.org/data/vital-statistics-natality-data.html).

The demographics show that the average age of mother is 28.51 with the standard deviation of 5.86 and the average age of father is 31.35 with the standard deviation of 6.79 (Table 1).

Table 1. Demographics of NCHS' Vital Statistics Natality Birth Data

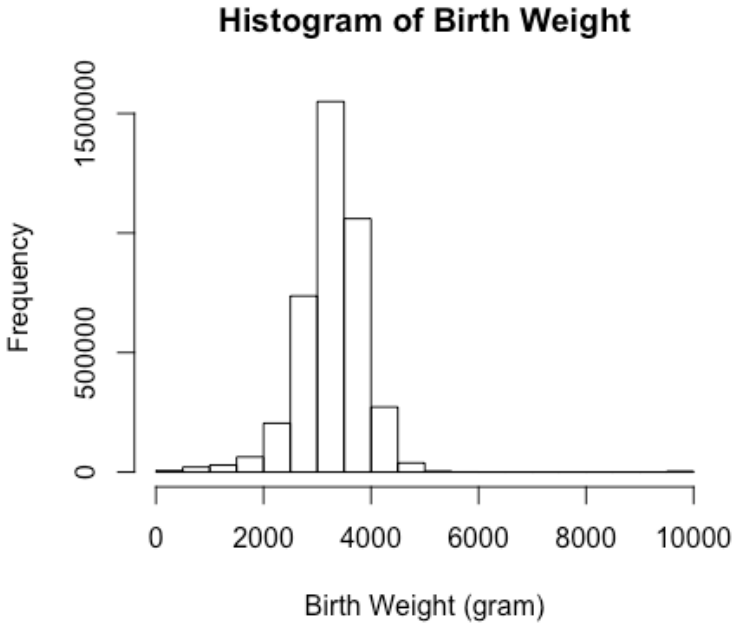
	Mother's Age	Father's Age
Obs	3,988,733	3,988,733
Mean	28.51	31.35
Std. Dev.	5.86	6.79
Min	12	13
Max	50	98

The summary statistics showed that the average mother's height is 64.53 inches and the average BMI is 29.02. The average pre-pregnancy weight is 81.50kg (179.68lb) and the average delivery weight is 92.48kg (203.88lb). The mean of birth weight is 3.28kg and the average number of prenatal visits is 13.85 (Table 2).

Table 2. Summary Statistics of NCHS' Vital Statistics Natality Birth Data

	Mother's Height (inch)	Mother's Body Mass Index	Pre-Pregnancy Weight (pound)	Delivery Weight (pound)	Birth Weight (gram)	Number of Prenatal Visits
Obs	3,919,668	3,919,668	3,919,668	3,919,668	3,988,733	3,919,668
Mean	64.53	29.02	179.68	203.88	3276.29	13.85
Std. Dev.	4.58	14.42	143.95	124.94	625.53	15.46
Min	30	13	75	100	227	0
Max	99	99.9	99	999	9999	99

The histogram of birth weight reveals that the distribution is left-skewed. It also shows that most of the cases are located between 2kg and 4.5kg. This may present a standard of deciding a preterm infant by measuring its birth weight.



To check if higher mother's body mass index than the average has an effect on pre-pregnancy weight, delivery weight, and birth weight, conditional analysis was conducted. The summary statistics show that the mean pre-pregnancy weight (274.79lb) is higher than the mean delivery weight (262.69lb) for the subjects with higher BMI. This is an opposite result from the pattern from the all subjects. It needs further research if higher BMI subjects lose their weights as they approach to deliver a baby. The average birth weight (3318g) was slightly higher in the higher BMI group.

Table 3. Summary Statistics of subjects with higher BMI

	Pre-Pregnancy Weight (pound)	Delivery Weight (pound)	Birth Weight (gram)
Obs	1,221,860	1,221,860	1,221,860
Mean	274.79	262.69	3318
Std. Dev.	228.85	168.45	696.67
Min	75	100	227
Max	999	999	9999

Reference

Mathews, T. J., Sutton, P. D., Hamilton, B. E., & Ventura, S. J. (2010). State disparities in teenage birth rates in the United States. NCHS data brief, (46), 1-8.

MacDorman, M. F., Menacker, F., & Declercq, E. (2010). Trends and characteristics of home and other out-of-hospital births in the United States, 1990-2006. National vital statistics reports: from the Centers for Disease Control and Prevention, National Center for Health Statistics, National Vital Statistics System, 58(11), 1-14.

Martin, J. A., Osterman, M. J., & Sutton, P. D. (2010). Are preterm births on the decline in the United States? Recent data from the National Vital Statistics System. NCHS data brief, (39), 1-8.

Mathews, T. J. (2001). Smoking during pregnancy in the 1990s. Natl Vital Stat Rep, 49(7), 1-14.