**HOW IS A NEW BORN BABY’S BIRTHWEIGHT AFFECTED?**

1. **The Problem**

Nowadays doctors have stressed out the importance of prenatal healthcare, which mainly consists in avoiding bad habits such as smoking and consuming alcohol during pregnancy. Prenatal healthcare is meant to improve well-being of newborns, which can often be measured as birthweight. A birthweight less than 2,500 grams is diagnosed as low birthweight and less than 1,500 is considered very low birthweight.1 The birth weight of the baby can be affected by the mother’s nutrition as well as the genetic factors and external factors such as parents’ age and education, month prenatal care began, total number of prenatal visits.

1. **Methodology**

As public health consultants, our report is meant to analyze which variables can affect birthweight of newborns, understanding useful insights in order to increase newborns’ well-being. Furthermore, a model has been implemented in order to predict birthweight. The report will proceed as follow: first, presenting key insights based on our data explanatory analysis followed by recommendations on what kind of actions should be taken. As we analyzed the data, we had seven missing values and we decided to impute the missing values with using median of each column. After understanding the data, we determined the outliers.

1. **Key Insights**

According to our data, 25% of our babies were born less than 2,900 grams. and 75% of our babies were born less than 3,700 grams.

**3.1 Parents Age**

During our explanatory analysis, we found several interesting insights. In our dataset was provided both mothers’ and fathers’ age, after conducting an accurate research we found out that mothers who are younger than 17 or older than age of 35 are more likely to have a baby with very low birthweight.2 Even fathers’ age is crucial, from the data of more than 40 million births, scientist at Stanford have linked older fathers to health risk for their infants.3 In our given data we try to see the relationship between these two variables (mothers/fathers age) and birthweight. Surprisingly we did not find same patterns but just a weak relationship, that might be either that our sample size data was very small (196 births) or the effect of new healthcare technologies on assisting risky pregnancies. However, when the age is combined (sum of parents age), inevitably we saw a stronger relationship, confirming the effect of parental age.

**3.2 Parent Education**

During the EDA, we analyze how parents’ education effects the birthweight of a newborns. The majority of parents are educated because the data is considered as US population which is highly developed country. As we can see below two graphs, the peak points are around 12 (high school degree) and 16 (collage school degree) for both meduc (mother’s education) and feduc (father’s education). There seem to be the birth rates are higher right after high school degree and college degree for both mother and father.

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* 1. **Smoke and Alcohol Consumption**

Some of the insights that we were able to extract from our dataset after conducting an explanatory data analysis is that the birthweight of the child was strongly affected by alcohol cigarettes consumption meaning that if the more alcohol and cigarettes are consumed, the lower is the birthweight. However, we were questioning the impact of cigarettes consumption because we were expecting to be much higher. We conducted a further research in order to confirm our results, because we believed that smoking was a habit that could have a very high impact on the birthweight. We assumed that cigarettes consumption could be related to the father instead of the mother.

* 1. **Race**

Based on our external research we found out that even race could affect baby birthweight. It has been proven that African American babies are twice as likely to be low birthweight.4 According with these findings we tried to see the same patterns on our dataset, but we did not find any relationship between parents’ race and birthweight.

* 1. **Moth Prenatal Care Began**

According to our analysis, the sooner prenatal care began the better the neonatal health (birthweights). Although there was no significant effect on birthweight during the data exploration, it plays a crucial role for the model accuracy in order to predict birthweight.

1. **Action**
2. **Recommendations**

Based on our explanatory data analysis we built a model that is able to predict infants’ birthweight. The ability to predict the birthweight was tied to number of cigarettes smoked per day and consumption of alcohol. The accuracy of the model was further improved by adding parents ‘age, beginning month of prenatal care and parents’ education.

Such characteristics led to an accuracy of nearly 70%, giving an acceptable prediction of the health of a newborn baby.

To conclude, our model is based on realistic variables that are aligned with our external research, proving that smoking and drinking during pregnancy is highly discouraged, and furthermore parental age effect, beginning month of prenatal care and parents’ education play a crucial role in the health of newborns.