14. Final Comments

The goal of the case study was to develop a model that allows us to estimate the joint and separate effects of some maternal and paternal characteristics on an infant's birth weight. The following nine independent variables were considered: gestation time (GESTWKS), maternal smoking (MNOCIG), mother's age (MAGE), and height (MHEIGHT), pre-pregnancy weight (MPPWT), paternal smoking (FNOCIG), father's age (FAGE), and height (FHEIGHT), and father's education (FEDYRS). We examined the relationship between infant birth weight (BWT) and the nine independent variables with the following multiple regression model:

$$BWT = \beta_0 + \beta_1 * GESTWKS + \beta_2 * MNOCIG + \beta_3 * MAGE + \beta_4 * MHEIGHT +$$
$$\beta_5 * MPPWT + \beta_6 * FNOCIG + \beta_7 * FAGE + \beta_8 * FHEIGHT + \beta_9 * FEDYRS + ERROR.$$

We found that over 26 % of the variation in infant birth weights is explained by these nine predictors. The value of the determination coefficient (0.26) indicates that the model can be improved by adding new significant variables. In order to develop a better model, it is necessary to identify the variables and to include them into the multiple linear regression model.

The above model showed a very strong effect of gestation time on infant birth weight after accounting for the effect of maternal and paternal variables. Maternal smoking (MNOCIG), maternal pre-pregnancy weight (MPPWT), paternal height (FHEIGHT), and maternal height (MHEIGHT) are the next four most important contributors. However, the remaining four variables: maternal age (MAGE), paternal age (FAGE), paternal smoking (FNOCIG), and paternal education (FEDYRS) were found to be nonsignificant contributors.

We also compared the relative influence on birth weight from maternal variables compared to the paternal variables. We found considerably stronger influence of the maternal variables on an infant's birth weight.