Maternal Smoking and Infant Health

Epidemiological studies indicate that smoking is responsible for a 150 to 250 gram reduction in birth weight and that smoking mothers are about twice as likely as non-smoking mothers to have a low-birth-weight baby (under 2500 grams). Birth weight is a measure of the baby's maturity. Another measure of maturity is the baby's gestational age, or the time spent in the womb. Typically, smaller babies and babies born early have lower survival rates than larger babies who are born at term. For example in the Child Health and Development Studies (CHDS) group, the rate at which babies died within the first 28 days after birth was 150 per thousand births for infants weighing under 2500 grams, as compared to 5 per thousand for babies weighing more than 2500 grams.

However, smokers may differ from non-smokers in some essential ways that may affect the birth weight of the baby, whether or not the mother smoked. The 1989 Surgeon General's Report addresses this problem:

…cigarette smoking seems to be a more significant determinant of birth weight than the mother's pre-pregnancy height, weight, parity, payment status, or history of previous pregnancy outcome, or the infant's sex. The reduction in birth weight associated with maternal tobacco use seems to be a direct effect of smoking on fetal growth. Mothers who smoke also have increased rates of premature delivery. The newborns are also smaller at every gestational age.

The data comes from a larger study – the CHDS. The entire CHDS database includes all pregnancies that occurred between 1960 and 1967 among women in the Kaiser Foundation Health Plan in Oakland, California. The Kaiser Health Plan is a prepaid medical care program. The women in the study were all those enrolled in the Kaiser Plan who obtained prenatal care in the San Francisco-East Bay area and who delivered at any of the Kaiser hospitals in Northern California.

At birth, measurements on the baby were recorded. They included the baby's length, weight and head circumference. Those babies recorded for use in this analysis are baby boys born during one year of the study who lived at least 28 days and who were single births. We have information about whether or not the mother smoked during pregnancy, the baby's birth weight, gestation (duration of pregnancy in days, calculated from the first day of the last normal menstrual period), parity (an indicator of whether the baby was the first born or not), mother's age at time of conception (in years), mother's height (in inches) and mother's pre-pregnancy weight (in pounds),

Prepare a statistical analysis plan that assesses the effect of a mother smoking or not (and other factors) on the birth weight of babies.