

Documentation for fetal growth dataset

Early identification of fetuses that are at increased risk for being growth restricted at birth or being born before they are fully mature is important to reduce infant morbidity and mortality. The fetal growth data for this project were collected from a cohort study of prenatal influences on pregnancy outcomes. We will consider a subset of 537 women from this cohort who had multiple ultrasounds during pregnancy, and determine if information collected from the ultrasounds are associated with poor pregnancy outcomes.

The study cohort consists of women who were actively recruited from the local community and were interested in being a part of a research study. Women had to be identified on or before their 12th week of pregnancy so that they could be enrolled, informed consent obtained, and the early ultrasounds scheduled. The dataset consists of all singleton, live-born pregnancies who had complete data on their ultrasound, birth weight, gestational age, and other covariate information.

Ultrasound measures of intrauterine fetal growth and blood flow:

To identify growth restriction during pregnancy, many different ultrasound measurements of fetal size and blood flow may be useful. In particular, the head circumference (HC), abdominal circumference (AC), or femur length (FL) can be used individually to estimate fetal size during the first and second trimester. Some researcher will consider a fetus to be “growth restricted” when one of these ultrasound measurements falls below a specific gestational age threshold, although where to choose the exact cutoff for a threshold is not clear. Other researchers have proposed simply averaging the three measures as an overall effect of size, which has its own sets of problems.

Additionally, when a fetus does not receive enough oxygen or nutrients during pregnancy, growth may be limited. Blood flow resistance can be measured using multiple Doppler ultrasound measurements on different arteries (uterine and umbilical), at different locations (left and right), and at multiple times during the pregnancy. Blood flow restriction can be measured using the ratio of systolic pressure to diastolic pressure (S/D ratio), where a high S/D ratio is indicative of higher resistance to blood flow. As with the measures of fetal size, there are similar questions about (1) if the multiple measures of restriction should be combined or treated separately, and (2) if they are combined, how best to do the aggregating.

Question to be addressed:

All analyses should be conducted to address the central scientific question

- Are ultrasound measurements of fetal size and/or blood flow restriction associated with increased risk of poor pregnancy outcomes?

For your report, you may choose to focus on either birth weight or gestational age as your outcome of interest. You may also choose to consider birth weight/gestational age as a continuous variable or dichotomize into commonly-used outcomes in reproductive health

- Low birth weight (< 2500 g), or
- Pre-term brith (< 37 weeks)

Regardless of your choice of outcome, your analysis should focus on addressing the scientific question while considering possible confounding by measured and unmeasured covariates. Black race/ethnicity and parity are two factors that are known to have a strong association with both birth weight and gestational age. Height and BMI are also provided for your consideration.

Available data:

The following variables are available:

- *patid* = Participant identification number
- *uterine15left* = S/D ratio in the left uterine artery at 15 weeks
- *uterine15right* = S/D ratio in the right uterine artery at 15 weeks gestation
- *head15* = Head circumference at 15 weeks
- *abd15* = Abdominal circumference at 15 weeks
- *femur15* = Femur length at 15 weeks
- *daysto15us* = Days from conception to the 15 week ultrasound
- *uterine24left* = S/D ratio in the left uterine artery at 24 weeks
- *uterine24right* = S/D ratio in the right uterine artery at 24 weeks
- *umbilical24* = S/D ratio in the umbilical artery at 24 weeks
- *head24* = Head circumference at 24 weeks
- *abd24* = Abdominal circumference at 24 weeks
- *femur24* = Femur length at 24 weeks
- *daysto24us* = Days from conception to the 24 week ultrasound
- *gestage* = Gestational age at delivery (days)
- *bwt* = Birth weight at delivery (grams)
- *black* = Indicator for black race/ethnicity (1=black, 0=other)
- *multip* = Parity indicator (0=first pregnancy, 1=not first)
- *height* = Height
- *bmi* = Body mass index (weight / height²)