Model Fitting:

1. Fit the entire dataset from ages 0 to 20 with the QR model

$$Q_\tau(BMI) = G_\tau(age)$$

2. Fit with cubic spline with $Knots = (0.1, 0.25, 0.5, 1.0, 1.5, 2.0, 4.0, 5.0, 8.0, 10.0, 12.0, 14.0, 16.0)$

3. Again, choose quantiles $\tau = (0.03, 0.1, 0.25, 0.5, 0.75, 0.9, 0.97)$

4. The resulting quantile curves are displayed separately in two age frame: ages 0-2.5 and ages 2-18. (See Figure 1-4) Boys and Girls are fitted separately.

A quick access of GOODNESS OF FIT: (See Figures 5 and 6)

1. Partition the entire age range into small intervals. Partition are indicated by dotted gray lines in Figures 5 and 6

2. In each interval, calculate the proportion of observations that lower than the fitted τth quantile. (The red lines in Figure 5 and 6). If model fits the data well, we expect this proportion to be close to its nominal level τ.

3. In Figures 5 and 6, the red lines are fairly close to the black horizontal lines, which are the true quantile levels. That suggests the model fitting is reasonably good.
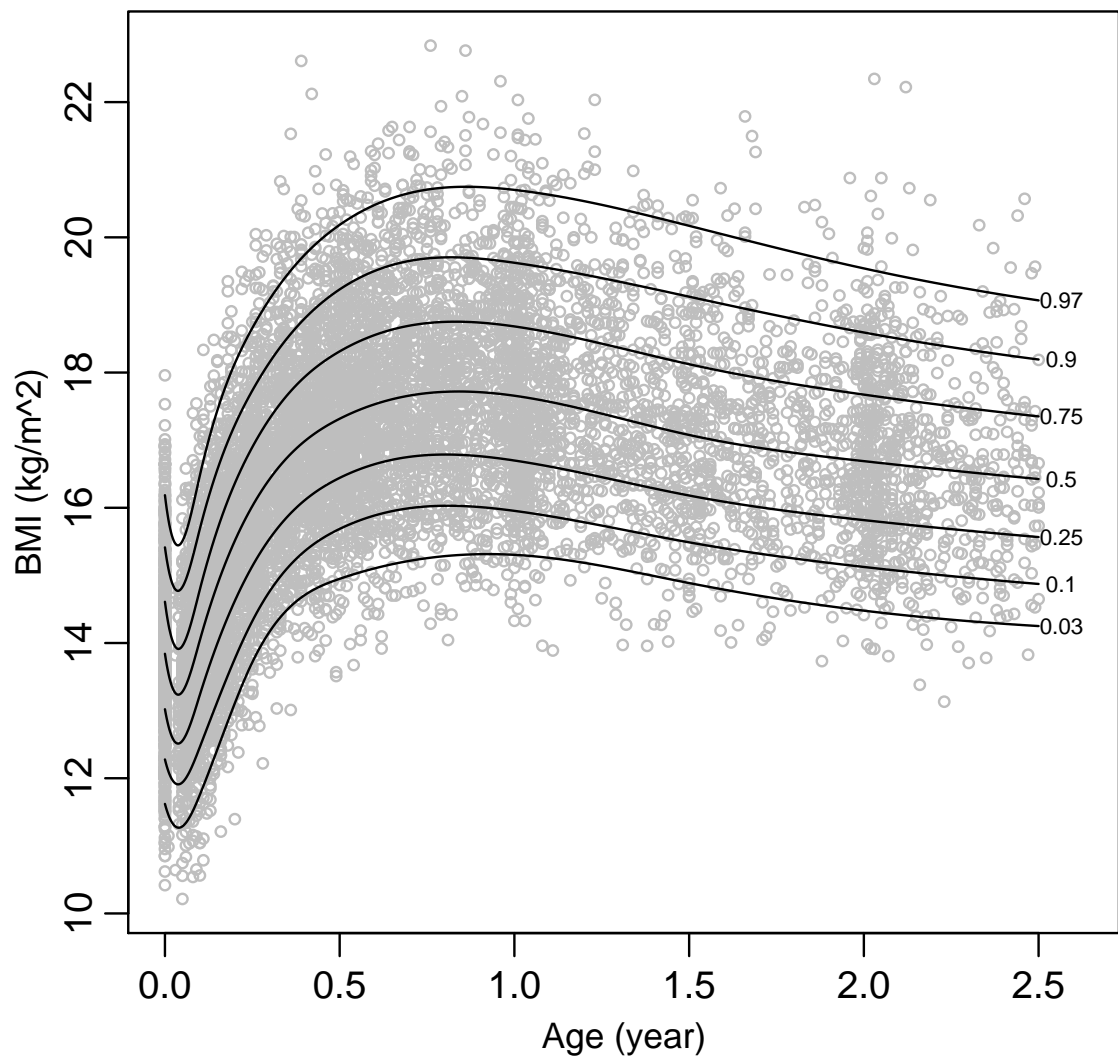
Fitted quantile curves, age 0 – 2.5 , boy, BMI
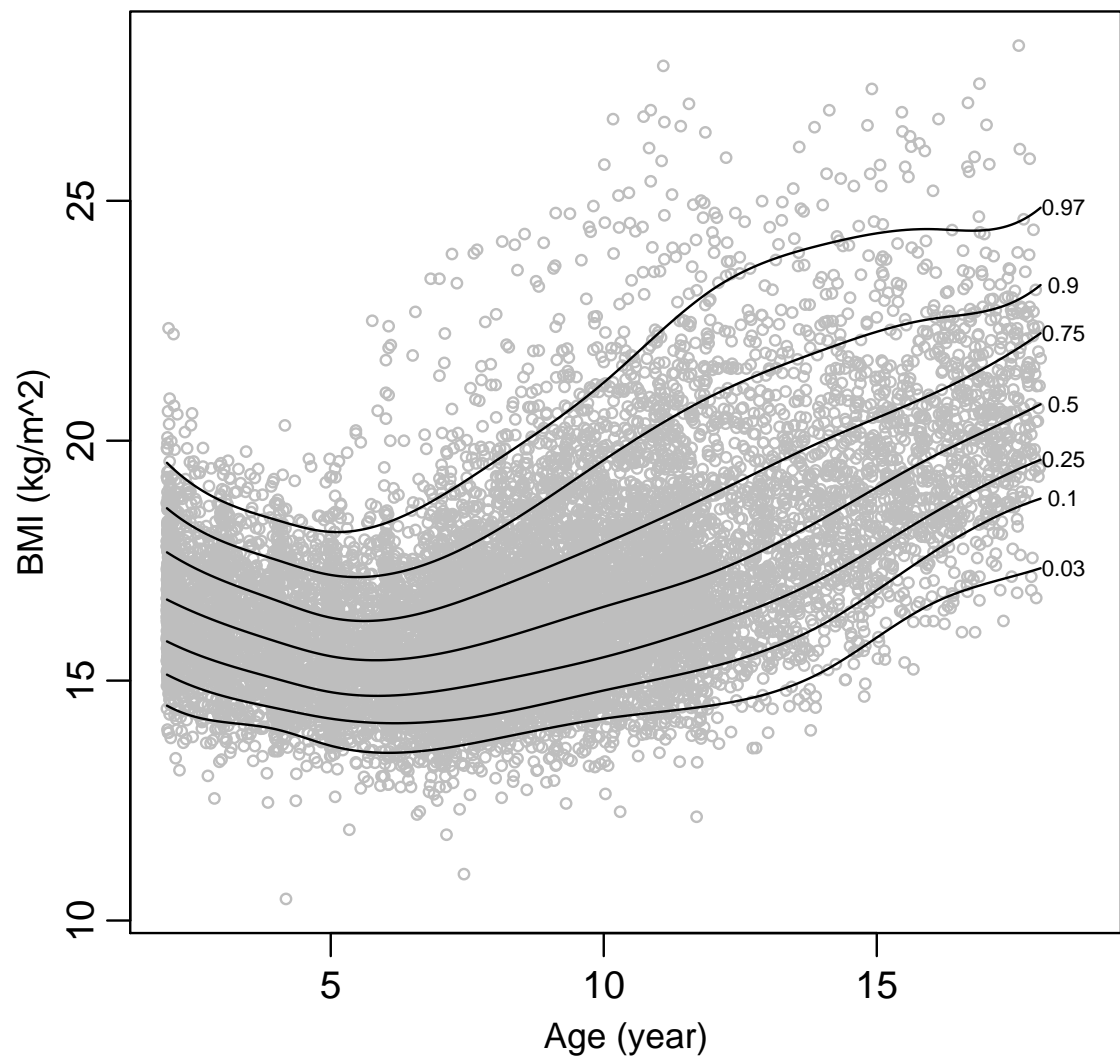
Figure 1

Fitted quantile curves, age 2 – 18 , boy, BMI
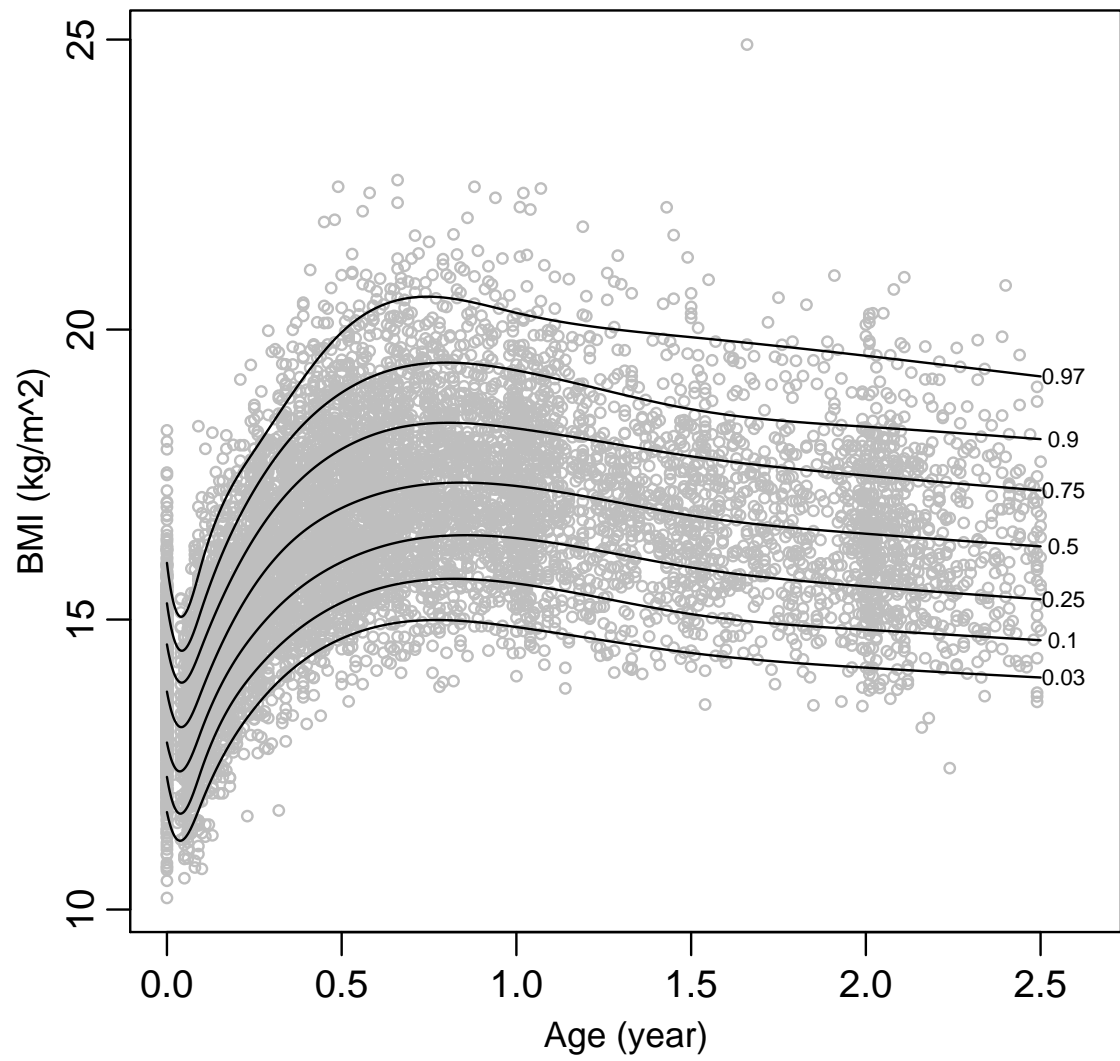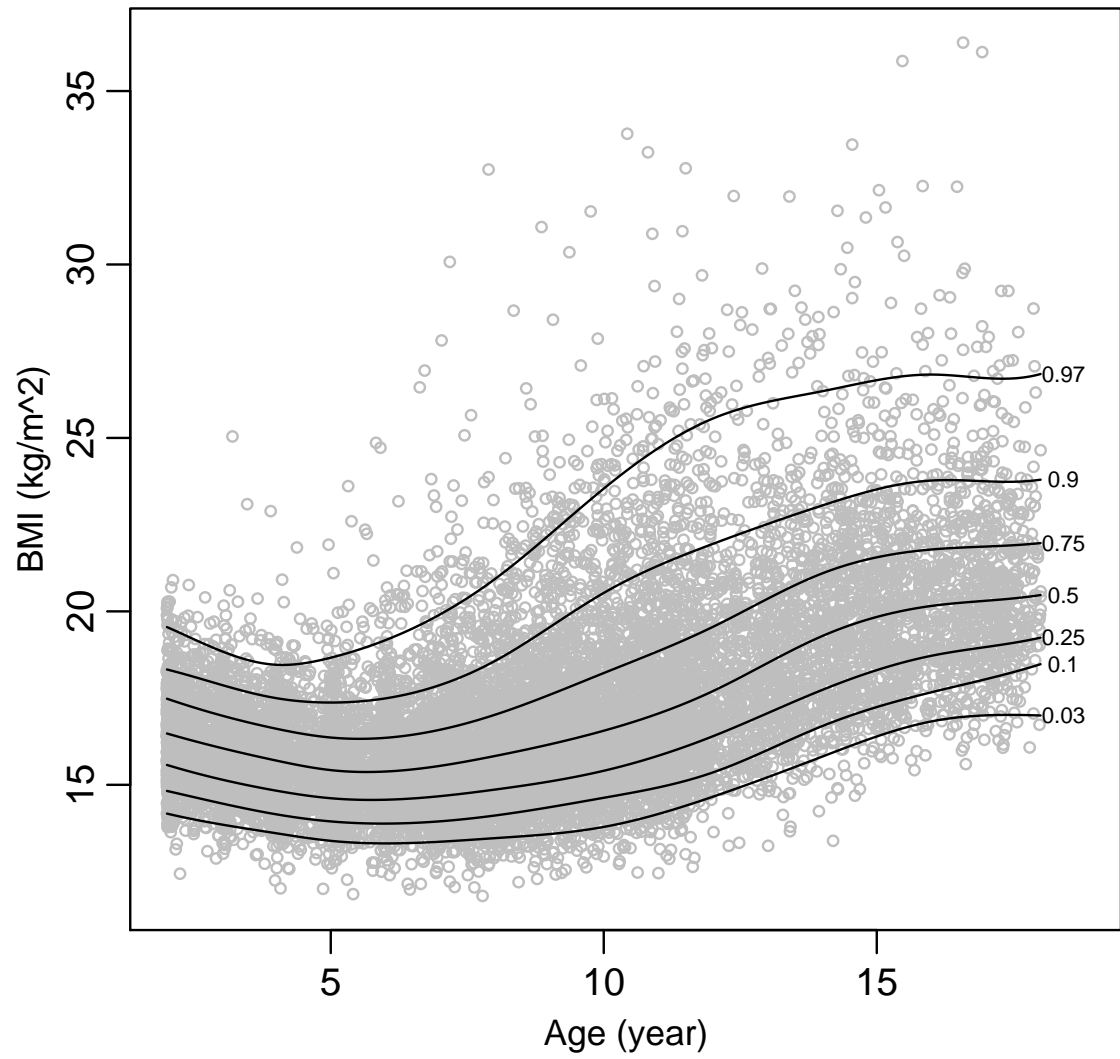
Figure 2

Fitted quantile curves, age 0 – 2.5 , girl, BMI

Figure 3

Figure 4

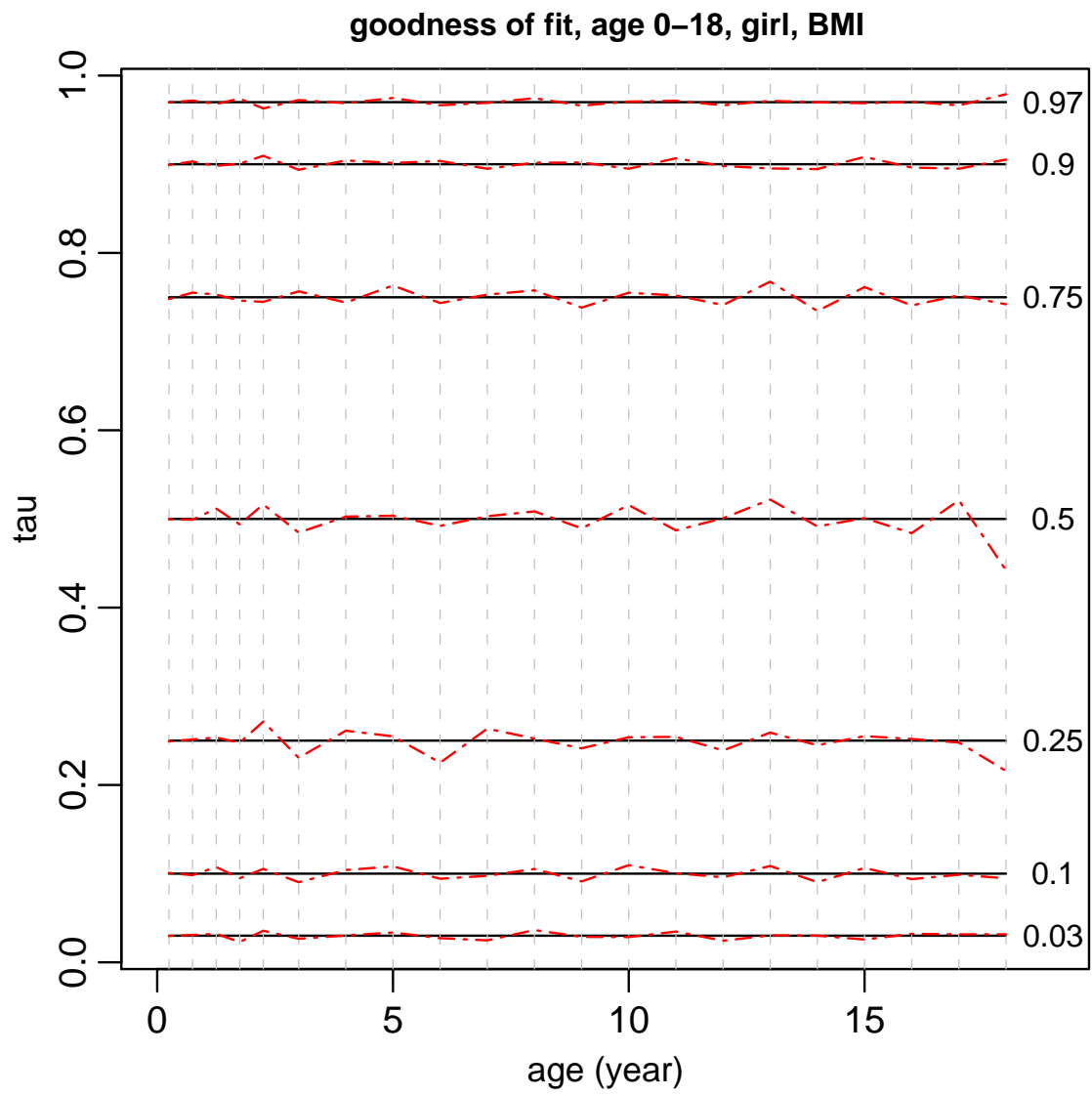Figure 5

goodness of fit, age 0–18, girl, BMI

Figure 6