

DISCUSSION: CONDITIONAL GROWTH CHARTS

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I will use the terms “reference centiles” or “centile charts,” as the setting that I consider here is more general than that of “growth charts.”

Longitudinal reference centiles over some measure of time (typically age) are almost always implemented repeatedly on the same individual. In this kind of setting the notion of conditional or adaptive centile charts is very appealing, particularly when the within-individual variability is much less than that between individuals. While marginal or unconditional centile charts are common in many areas of application, conditional charts are still rarely encountered and further methodological development in this area is to be welcomed. The flexibility of the quantile regression approach of Wei and He (WH), for instance in allowing the dependence on past history to vary across centiles, is most attractive, as are the rigor and scope of their consideration of the problem.

I do, nevertheless, want to make a few cautionary remarks. The first relates to regression quantiles in particular, the second concerns a constraint common to all existing methods of constructing conditional percentiles, and the third and final point addresses the use of centile charts for screening. To concretize the discussion, the following setting will be considered throughout: the measurement of interest is assumed to be diastolic blood pressure in pregnant women, monitored between weeks 16 and 36 of pregnancy. There is typically an initial dip in blood pressure over this period, followed by a rise toward the end of pregnancy.

1. Bias and precision. My experience with the use of marginal regression quantiles has been that they are readily and robustly fitted, with far less of the “fine-tuning” that is needed for distributionally based centile estimation. Nevertheless, the flexibility of quantile regression estimates may come at a cost—should an appropriate distribution be identified, distributionally based estimates may well be more precise.

To evaluate bias and precision in marginal and conditional centile estimates, a simulation study was carried out on a presumed cohort of 1000 pregnant women, where it was assumed that the women were scheduled to attend an antenatal clinic once in each of five pregnancy intervals, namely during the weeks of gestation (“gestational age”): [16, 20), [20, 24), [24, 28), [28, 32), [32, 36). The

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