The utility of standardized or crude weight measures in modeling of postnatal growth trajectories: Are there differences?

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Introduction

Analyses of growth trajectories are expanding in tandem with the growing interest in life course epidemiology. Z-scores are a frequent choice when modeling weight growth trajectories to standardize the sample to usually what is the CDC reference or WHO standard populations. When used for cross-sectional data, Z-scores have advantages including linear sex- and age-independent measures of weight outcomes. However, there is no appropriate rationale to use Z-scores, or an equivalent such as percentiles, when studying weight change in infancy.

Samples

Aim

Use simulations to assess differences in power, type I error measures, and coefficient estimates of weight change differences across three different outcome measures in child anthropometric measures: weight, weight Z-score and weight percentiles.

Method

We simulated infant growth data using a Reed first order parametric model:

$$y = \beta_0 + \beta_1 \cdot t + \beta_2 \cdot \ln(t) + \frac{\beta_3}{t}$$

After simulating data, three models were run on the data:

Model 1

$$y_{ij} = \beta_0 + \beta_1 \cdot t + \beta_2 \cdot \text{group} + \beta_3 \cdot t \cdot \text{group} + e_{ij}$$

Model 2

$$y_{ij} = \beta_0 + \beta_1 \cdot t + \beta_2 \cdot \text{group} + \beta_3 \cdot t \cdot \text{group} + \beta_4 \cdot t^2 + e_{ij}$$

Model 3

$$y_{ij} = \beta_0 + \beta_1 \cdot \text{month.6} + \beta_2 \cdot \text{group} + \beta_3 \cdot \text{month.6} \cdot \text{group} + e_{ij}$$

Model Terms

y_{ij}	the outcome: weight, Z-score or percentile
group	a binary exposure factor
month.6	a binary variable for time with 1=month 6 and 0=month 0
e_{ij}	error term with a autocorrelation structure, *rho*=0.5 and σ=0.75

Results

Figure: Simulated growth curves: weight and Z-score outcomes

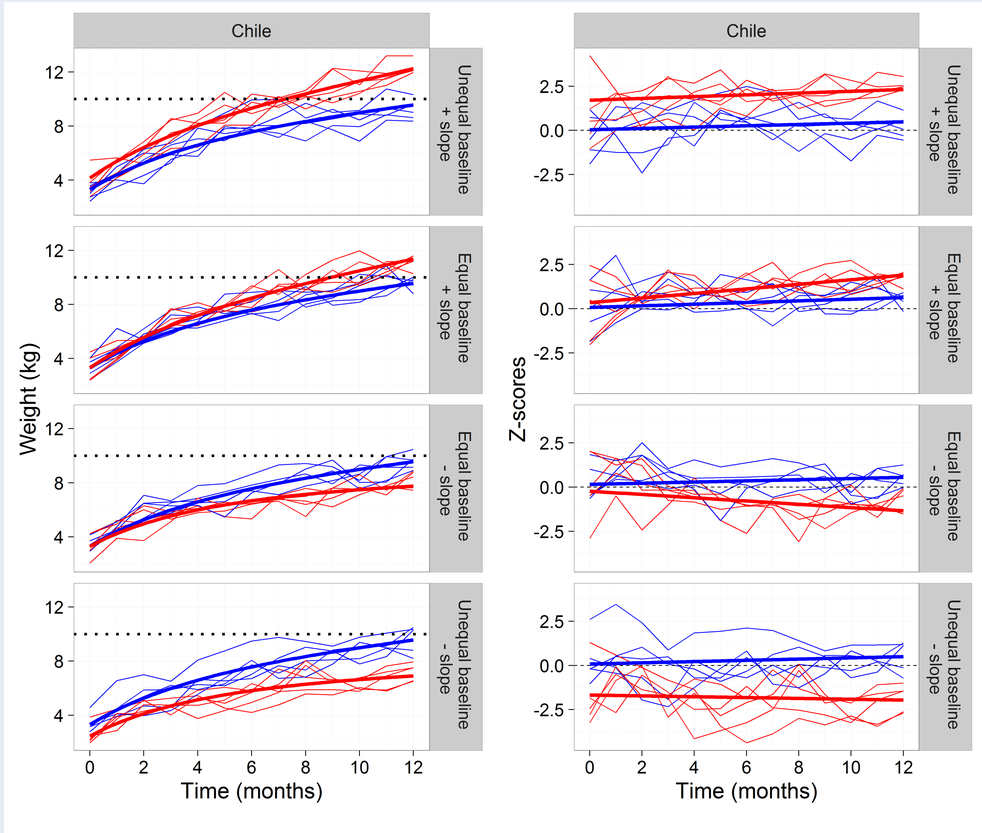
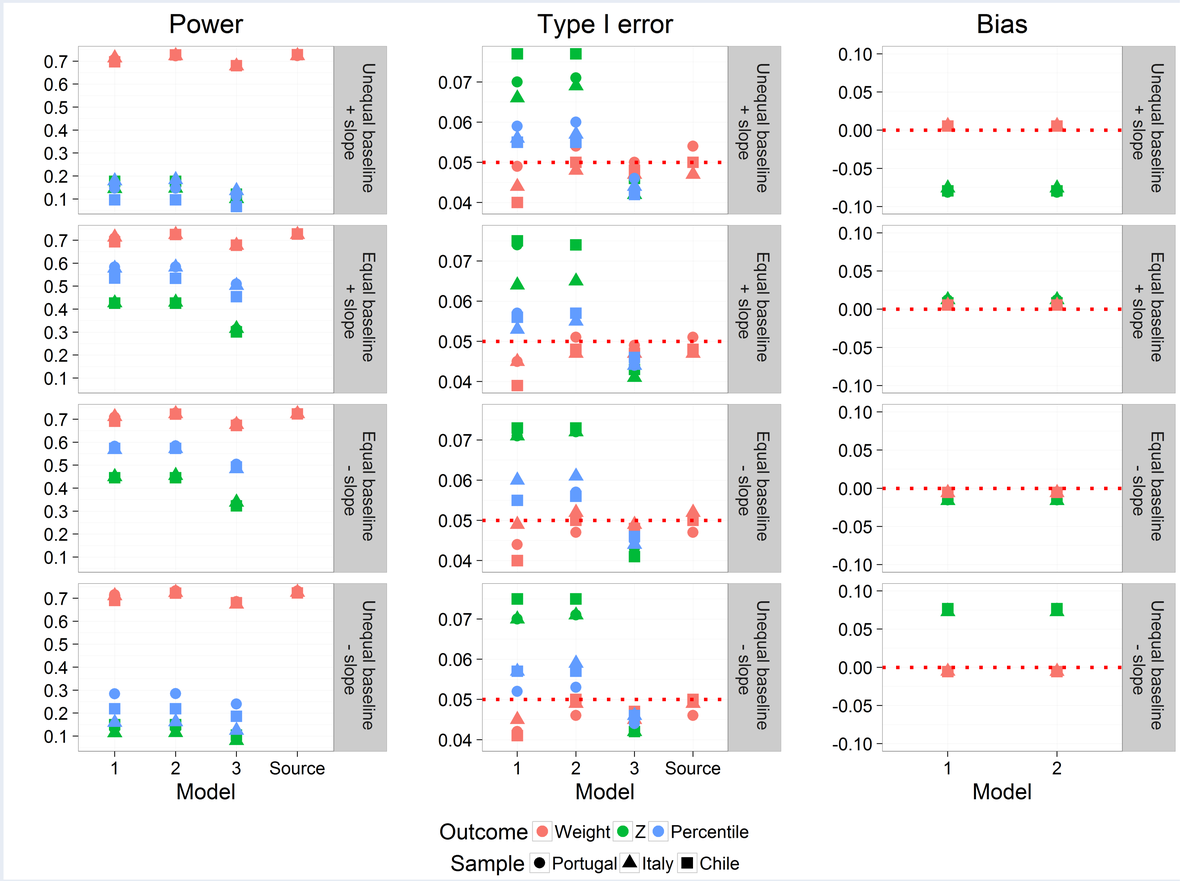


Figure: Comparison of power, type-I error and bias.



Summary

Put summary here

Future Efforts

Put future efforts here.

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