# Characteristics, Predictors, and Consequences of Infant Growth Trajectories

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## Introduction

**Background:**

Infant growth is important for short-term survival and long-term health. Valuable information contained in infant growth trajectories remains underexplored.

**Specific Aim 1:**

To identify predictors for infant growth trajectories including breastfeeding vs. formula feeding, introduction of solid foods, maternal height, maternal obesity, gestational weight gain, gestational age, gestational diabetes, and infant sleep patterns

**Specific Aim 2:**

To examine the health outcomes of infant growth trajectories up to 12 months of age, and identify the effects of the predictors on infant growth

**Hypothesis:**

- Infants who are being formula fed will exacerbate the rate of growth, while breastfeeding should allow for an infant to have an optimal growth rate. Infant rate of growth will be influenced by when solid foods are introduced, and by what types of food are given.
- The mothers' weight gain during her pregnancy and the duration of her pregnancy is another major factor in the infant's initial growth, but is not expected to have a major effect on the infant's growth rate past the first few weeks.
- Infant of mothers with gestational diabetes will have a higher BMI and rate of growth.
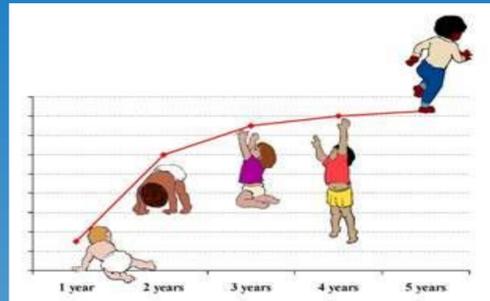- A decreased amount of sleep will have an inhibitory effect on the infant growth rate.

## Methods

**Sample size**: 21 mother-infant pairs from UB Smoking Cessation Study

| During pregnancy N=54 | Birth N = 21 | 1-12 months N = 21 |
|---|---|---|
| **Maternal predictors**: <br> - Maternal short stature <br> - Maternal obesity <br> - Gestational weight gain <br> -Gestational diabetes | **Infant predictors:** <br> - Gestational age/pre-term delivery | **Infant growth measures:** <br> - Weight <br> - Length <br> - 4 circumferences <br> - Skinfold thickness <br> **Infant predictors:** <br> - Feeding practices <br> - Sleep |

Data obtained during **monthly** visits via surveys and growth measures

| Predictors | Surveys |
|---|---|
| **Maternal Predictors** (short stature, obesity, gestational weight gain, diabetes, gestational age) | UB Smoking Cessation Study Surveys during Pregnancy |
| **Infant Feeding Practices** | Infant Practice Study |
| **Infant Sleep** | Infant Sleep Questionnaire Summary |

## Methods (cont.)



**Infant anthropometric measurements**:

❖ Body weight, length, BMI → SECA Weight and Length Scales

❖ 4 circumferences (head, chest, abdominal, mid-upper arm) → tape measure

❖ 6-site skinfold thickness (biceps, triceps, subscapular, flank, quadriceps, and suprailiac) → Skinfold Caliper

**Data Analysis:**

❖ Data analysis and the creation of tables and figures was completed with the World Health Organization Anthropometric software and Statistical Analytic Software (SAS).

❖ Statistical tests including t-test, ANOVA, correlation, and mixed modeling were used to identify significant predictors and outcomes of infant growth trajectories.
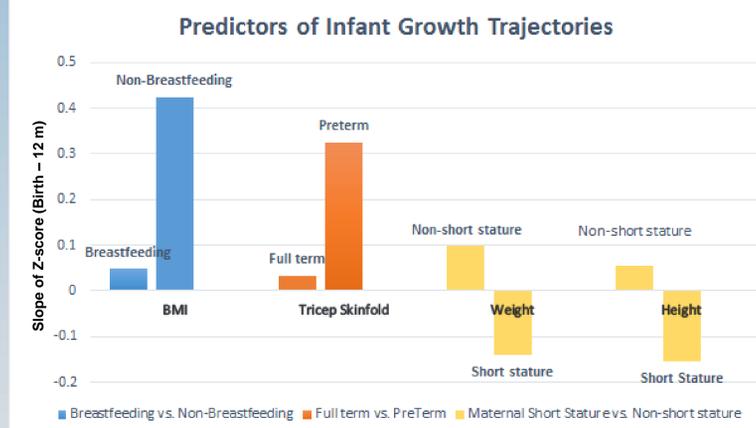
## Results



**Predictors of Infant Growth Trajectories**

Figure 1. Effects of predictors on infant rate of growth:

⚙ Non-breastfed infants had a faster rate of increase in BMI

⚙ Preterm infants had a higher rate of increase in triceps skinfold thickness

⚙ Infants of mothers with a short stature were below the standard slope of weight for age and height for age compared to infants of non-short stature mothers which were slightly above the standard
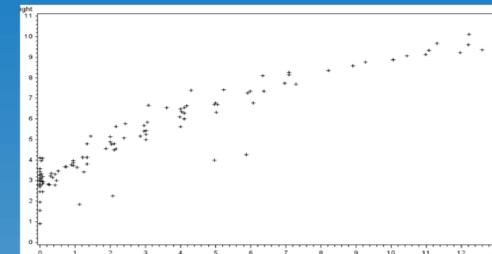
## Results (cont.)



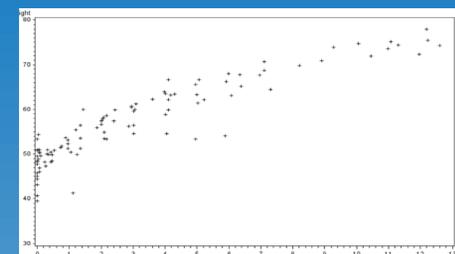*Figure 2. Overall infant height trajectories from birth to 12 months*



*Figure 3. Overall infant length trajectories from birth to 12 months*
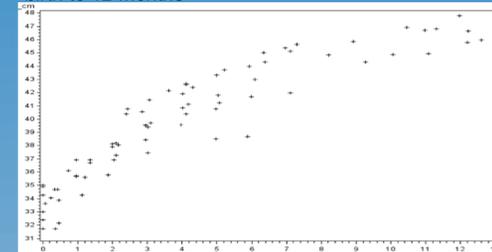


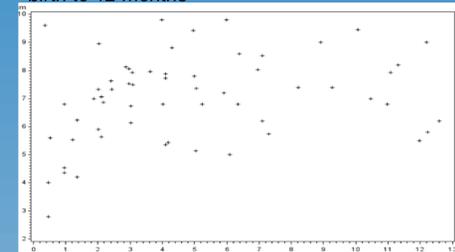*Figure 4. Overall infant head circumference trajectories from birth to 12 months*



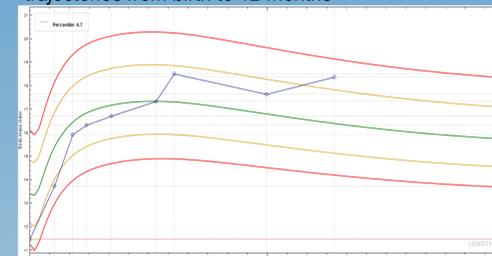*Figure 5. Overall infant triceps skinfold trajectories from birth to 12 months*



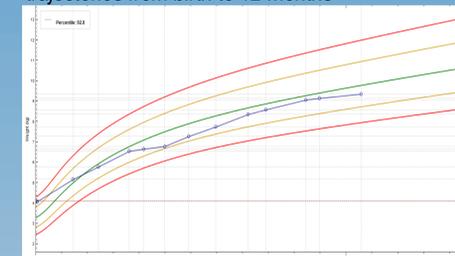*Figure 6. An example of a catch-up growth trajectory in weight*



*Figure 7. An example of a catch-down growth trajectory in weight*



*Figure 8. An example of a below standard growth trajectory in weight*

**We identify 3 patterns of infant growth trajectories in this sample:**

⚙ Catch-up growth

⚙ Catch-down growth

⚙ Below standard growth

⚙ *Catch up/down growth is when an infant's growth trajectory crosses 2 or more major percentile lines within the first 12 months of life*
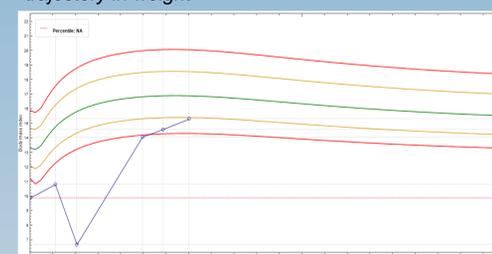
## Conclusion

- In conclusion, non-breastfed infants exhibited a faster rate of growth compared to breast-fed infants, pre-term infants had a higher rate of increase in triceps skinfold thickness, and infants of mothers with a short stature were below the standard slope for height and weight.

## Acknowledgements