

Early formula supplementation rates are high and differ among infants by maternal BMI class in the PREVAIL Cohort

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Background

- Exclusive breastfeeding (EBF) is recommended to about 6 months of age¹; only ~25% of US women meet this recommendation²
- Early formula supplementation and maternal obesity are independently associated with reduced breastfeeding duration³
- The Ten Steps to Successful Breastfeeding requires that only medically indicated formula be given to EBF newborns⁴
- We compared early formula supplementation by maternal BMI category and recovery of EBF in a cohort of mothers with a strong prenatal intention to exclusively breastfeed to six months of age

Methods

The PREVAIL Cohort⁵ is a CDC-sponsored, 2-year prospective birth cohort in Cincinnati, OH

Participant inclusion

- Delivery of healthy, term, singleton infant
- Gave birth at one of two birth hospitals in Cincinnati with medical formula policies in place
- Indicated a strong prenatal intention to exclusively breastfeed to 6 months of age⁶

Data

- Maternal-reported pre-pregnancy weight/height
 - BMI (kg/m²): Healthy (18.5-24.9), Overweight (25-29.9), Obesity (≥30)
- Family socio-demographics
- Breastfeeding outcomes
 - Early formula supplementation: introduction of formula on or before child’s second day of life
 - Self-reported breastfeeding status at post-natal month 6 study visit
 - Exclusively breastfed
 - Partially breastfed
 - Exclusively formula fed
 - Duration of any breastfeeding

Statistical Analysis

- Fisher’s exact compared proportions
- Logistic regression compared odds of return to EBF
- Mediation analysis: early formula supplementation, BMI category and breastfeeding duration

Works Cited

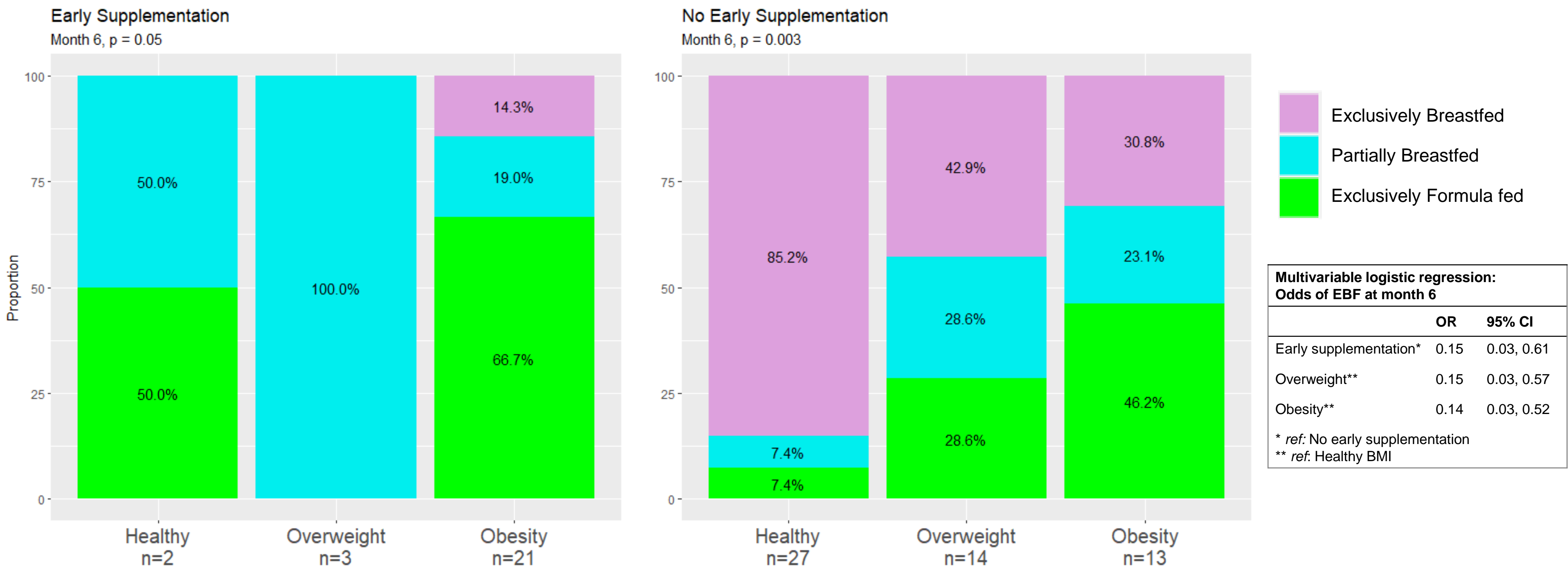
1. U.S. Department of Agriculture and U.S. Department of Health and Human Services. Dietary guidelines for americans, 2020-2025. 9th edition. [DietaryGuidelines.gov]. 2020.9th Edition.
2. Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion. Breastfeeding report card. . 2022.
3. Tsai T, Huang S, Lee SD. Maternal and Hospital Factors Associated with First-Time Mothers’ Breastfeeding Practice: A Prospective Study. Breastfeeding Medicine. 2015;10(6):334-40.
4. World Health Organization. Baby-friendly hospital initiative: Revised, updated and expanded for integrated care. Geneva: World Health Organization and UNICEF; 2009.
5. Morrow AL, Staat MA, DeFranco EA, et al. Pediatric respiratory and enteric virus acquisition and immunogenesis in US mothers and children aged 0-2: PREVAIL cohort study. JMIIR Res Protoc [e22222. doi: 10.2196/22222. PMID: 33576746; PMCID: PMC7910118]. 2021;12:10(2).
6. Nommsen-Rivers LA, Cohen RJ, Chantry CJ, Dewey KG. The infant feeding intentions scale demonstrates construct validity and comparability in quantifying maternal breastfeeding intentions across multiple ethnic groups. Matern Child Nutr. 2010;Jul. 6(3):220-227.

Results

Cohort Characteristics

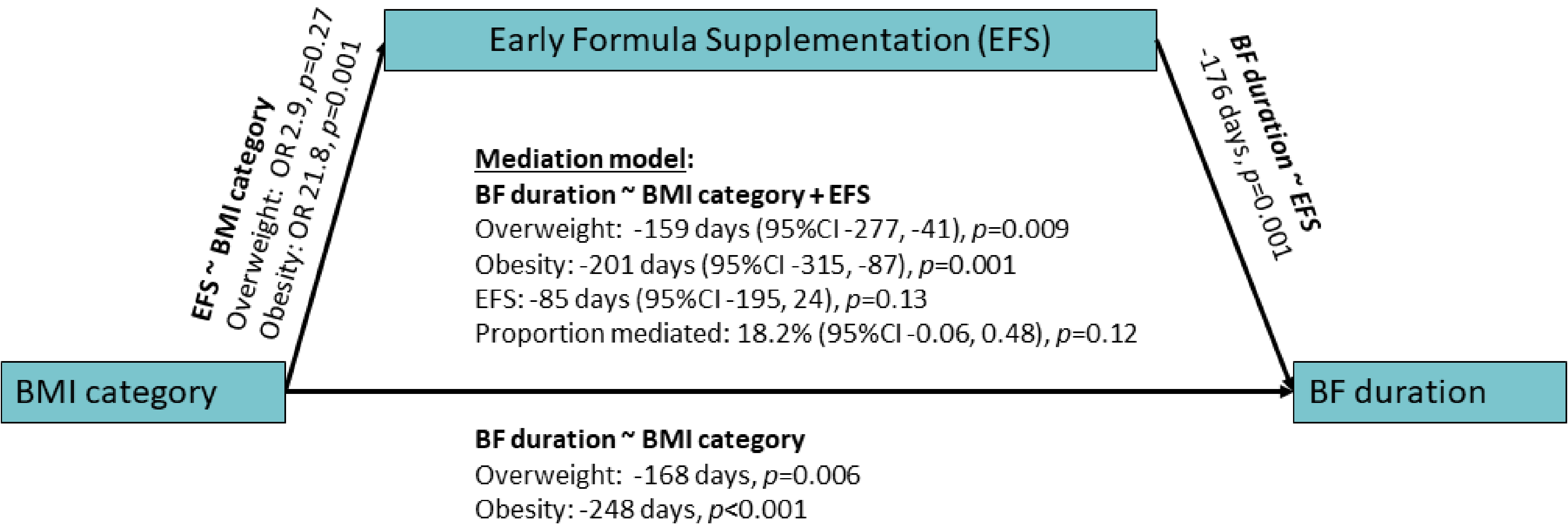
| | Sample N=80 | Heathy BMI n=29 (36%) | Overweight BMI n=17 (21%) | Obesity BMI n=34 (43%) | p |
|-----------------------------------|-------------------|--------------------------|------------------------------|---------------------------|--------|
| Maternal age (med, IQR) | 30.3 (27.6, 34.1) | 30.4 (28.1, 32.9) | 33.2 (29.2, 35.5) | 29.4 (26.4, 33.7) | 0.38 |
| Black race | 26 (33%) | 4 (14%) | 3 (18%) | 19 (56%) | <0.001 |
| Not married | 31 (39%) | 8 (28%) | 5 (29%) | 18 (53%) | 0.09 |
| Income < \$50,000/year | 29 (36%) | 7 (24%) | 4 (24%) | 18 (53%) | 0.03 |
| Public Insurance | 34 (43%) | 8 (28%) | 5 (29%) | 21 (62%) | 0.02 |
| <2 years post-secondary education | 24 (30%) | 5 (17%) | 4 (24%) | 18 (53%) | 0.06 |
| Early formula supplementation | 26 (33%) | 2 (8%) | 3 (12%) | 21 (62%) | <0.001 |

Recovery of exclusive breastfeeding before month 6 by early supplementation + maternal BMI category



Mediation analysis

Does early formula supplementation explain differences in breastfeeding duration by maternal BMI category?



Discussion

While infants of mothers with higher BMIs were far more likely to receive supplemental formula, early formula supplementation was associated with lack of EBF at 6 months for all

- All mothers were unlikely to recover EBF after early supplementation
- BMI category and early formula supplementation both predictors of EBF at age 6 months
- Understanding the reasons for early supplementation is integral to improving EBF rates

Early formula supplementation may have a disproportionate effect on exclusive breastfeeding rates in lower socio-economic position (SEP) families

- Over half of Black, unmarried, lower income, publicly insured, and lower education mothers had obesity
- 62% of infants of mothers with obesity received supplemental formula

Early formula supplementation explained ~18% of the effect, but did not significantly mediate BMI category as a predictor of reduced any breastfeeding duration

- With strong breastfeeding intentions, mothers may have been more likely to continue breastfeeding
- Small sample size = limited ability to detect effect

Strengths

- Longitudinal data, intense follow-up
- Prenatally-collected data, validated intention scale⁶
- Demographically representative of region

Limitations

- Modest sample size
- Did not assess reasons for supplementation

Future Directions

- This is a pilot study; will expand sample size by including additional cohort
- Will include chart reviews to determine reasons for supplementation

Key Points

In this pilot study of highly-intentioned mothers we found:

- High rates of early formula supplementation, with the highest rates among infants of mothers with obesity
- All mothers were less likely to recover EBF after early supplementation, regardless of BMI
- Strong associations between SEP and obesity rates, suggesting that infants of lower SEP families are more likely to be early formula supplemented
- Strong intentions may protect against early breastfeeding cessation after early supplementation
- Further research with a larger sample is warranted