

Breastfeeding and Obesity: Breastfeeding - a key to reducing the double burden of malnutrition

**Carolina Global Breastfeeding Institute
Department of Maternal and Child Health
Gillings School of Global Public Health
UNC – Chapel Hill**



UNC
GILLINGS SCHOOL OF
GLOBAL PUBLIC HEALTH



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BREASTFEEDING INSTITUTE

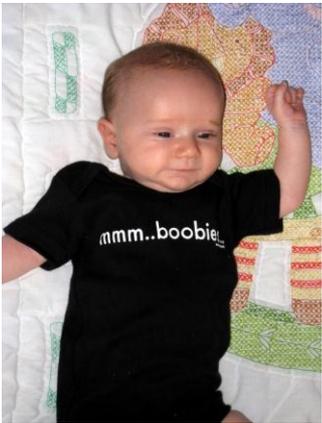
DEPARTMENT OF
MATERNAL AND CHILD HEALTH

Double Burden of Malnutrition

- Under-nutrition
- Over-nutrition



Lack of Breastfeeding and Obesity



- Lack of breastfeeding, or shorter breastfeeding duration, associated with increased risk of child obesity in multiple studies
- Lack of breastfeeding also associated with risk for type 1 and 2 diabetes in later childhood
- Lack of optimal breastfeeding associated with subsequent risk for type 2 diabetes and hypertension in mothers

Obesity/Breastfeeding Connections

- Realities of conflicting 'messages'
- Breastfeeding-> less child adiposity
- Breastfeeding -> less overfeeding
- Breastfeeding -> metabolic changes
- Breastfeeding-> maternal adiposity
- Maternal adiposity -> poor breastfeeding



Surgeon General's Call to Action to Support Breastfeeding:

Excess Health Risks Associated with Not Breastfeeding

Outcome	Excess Risk* (%)
<i>Among full-term infants</i>	
• Acute ear infection (otitis media)	100
• Eczema (atopic dermatitis)	47
• Diarrhea and vomiting (gastrointestinal infection)	178
• Infant hospitalization for pneumonia (LRTI)	257
• Asthma, with family history	67
• Asthma, no family history	35
• Childhood obesity	32
• Type 2 diabetes mellitus	64
• Acute lymphocytic leukemia	23
• Acute myelogenous leukemia	18
• Sudden infant death syndrome	56
<i>Among preterm infants</i> Necrotizing enterocolitis	138
<i>Among mothers</i>	
• Breast cancer	4
• Ovarian cancer	27

**Studies that confirm association between
breastfeeding and reduced child and
adolescent adiposity**

Breastfeeding and Maternal and Infant Health Outcomes in Developed Countries.

- Three systematic reviews and meta-analyses
- Breastfeeding is associated with a reduction in the risk of obesity in later life
- **Ever breastfeeders vs never breastfeeders was 0.76 (95%CI 0.67-0.86) and 0.93 (95%CI: 0.88–0.99)** Arenz 2004, Owen 2006
- **Duration of breastfeeding was significantly negatively related to the unadjusted risk of overweight (regression coefficient: 0.94, 95%CI 0.89 - 0.98), and each month of breastfeeding was found to be associated with a four percent decrease in risk** Harder 2005



Breastfeeding as Obesity Prevention in the United States: A Sibling Difference Model

- Linear-, logistic-, and sibling fixed-effects regression models
- Evaluate the association between infant feeding history and body mass index (BMI) in late childhood or adolescence.
- 976 participants (488 sibling pairs)
- **The breastfed sibling had an adolescent BMI that was 0.39 standard deviations lower than sibling, controlling for child-specific factors that may have influenced parents' feeding decisions. This effect is equivalent to a difference of more than 13 pounds for a 14-year-old child of average height.**
- Breastfed siblings were less likely to reach BMI thresholds
- Conclusion: breastfeeding in infancy may be an important protective factor against the development of obesity in the United States.

Does Breastfeeding Reduce the Risk of Child Overweight in North Carolina?

- NC data on breastfeeding and obesity
- 3,424 biological mothers completed the North Carolina BRFSS and CHAMP surveys
- Controlled for maternal race, education, smoking status, and weight status
- Analyze child overweight (ages 2 to 17 years) for never breastfed (aOR 1.39) vs breastfed less than three months (aOR 1.33) vs breastfed for at least three months



Why? Perhaps because it teaches satiety?

- Ability of self-regulation among infants directly fed at the breast.
- **Infant Feeding Practices Study II**
- Indicator: infants finishing the milk in the bottle/cup
- 1250 infants with complete measures.
- **27% of infants fed exclusively at the breast in early infancy emptied the milk in the bottle/cup**
- **54% of infants did so among those fed both at the breast and by bottle**
- **68% did so among those fed only by bottle**
- Multivariate regression analysis :infants who were bottle-fed more intensively early in life were about 2 times more likely to empty the bottle/cup
- When formula and pumped milk feeding were considered separately, similar dose-response relationships were observed regardless of milk types in the bottles.
- **Conclusions Infants who are bottle-fed in early infancy are more likely to empty the milk in the bottle/cup**

Why? Metabolic Programming?

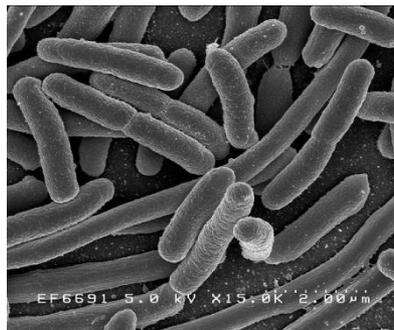
- Retrospective cohort study in Colorado: 89 children exposed to diabetes in utero, 379 unexposed
- BMI, waist circumference, skinfolds, visceral (VAT) and subcutaneous (SAT) abdominal fat.
- Low breastfeeding category, exposure to diabetes in utero associated with
 - 1.7 kg/m² higher BMI,
 - 5.8 cm higher waist circumference
 - 6.1 cm² higher VAT (P = 0.06),
 - 44.6 cm² higher SAT (P = 0.03), and 0.11 higher ratio of subscapular-to-triceps skinfold ratio (P = 0.008).

Effects most pronounced for those exposed to diabetes.

Why? Gut microbiology?

Ley, 2006: Differences in bacterial composition of the human intestine are associated with obesity risk.

Morelli, 2008: Exclusively breastfed infants have gut microflora dominated by probiotic bacteria like bifidobacteria and ruminococci, which thrive on the particular oligosaccharides in human milk. **Formula-fed** infants harbor a wide variety of bacterial species in their guts, including species associated with disease.



Studies showing that maternal obesity is increased by lack of breastfeeding

Journal of Women's Health, Cohen et al

- Cross-sectional design to assess the association of parity, race (controlling for income), breastfeeding, and obesity.
- Aged 40–79 at enrollment and attended Comprehensive Health Centers (CHC) in 12 southeastern U.S. states
- At all levels of parity and breastfeeding, Black= higher body mass index (BMI), gained more weight since age 21
- Having five or more children was associated with a 37% increase in risk of obesity (white) and a 22% increase in risk of obesity (black)
- Cumulative 12 mo BF associated with a 32% reduction in risk of obesity in white women and had no effect on obesity risk in black women. (Ambient higher levels?)
- Among women with at least one live birth, black women were more likely than white women to have never breastfed (69% vs. 64%).

Breastfeeding and Maternal Weight Loss

- Study: 46 women breastfed for 1 year, 39 women weaned infants by 3 months of age
- Average weight loss 4.4 lbs greater with breastfeeding
- Other studies with mixed results



Dewey et al. Maternal weight-loss patterns during prolonged lactation. *American Journal of Clinical Nutrition*. 1993;58(2):162-166.

**Or...Is it the early complementary feeding
that does it?**

Timing of Solid Food Introduction and Risk of Obesity in Preschool-Aged Children

- **Examine the association between timing of introduction** of solid foods during infancy and obesity at 3 years of age.
- **Prospective prebirth** cohort study, obesity at 3 years of age
- The primary exposure was the timing of introduction of solid foods, categorized as >4, 4 to 5, and 6 months.
- Adjusted for child and maternal characteristics
- At age 3 years, 75 children (9%) were obese
- **Among breastfed infants, the timing of solid food introduction was not associated with odds of obesity**
- **Among formula-fed infants, introduction of solid foods before 4 months was associated with a sixfold increase in odds of obesity at age 3 years; the association was not explained by rapid early growth (odds ratio after adjustment: 6.3 [95% confidence interval: 2.3– 6.9]).**

What can we do to address these issues?

- Does the research support minimum breastfeeding practices in order to impact obesity?
- Do we need to develop special skills to support breastfeeding in obese women? Is it metabolic or ergonomic?
- How do we raise breastfeeding on the list of preventive measures?



Does it matter if it is the obesity that causes the lack of breastfeeding or the obesity that begets obesity?

Programs that work

- Extra BF support for obese moms
- Extra BF support for diabetic moms
- Extra BF support for Hispanic and African-American moms
- How about....Extra BF support for all moms by:
 - Reducing obstacles in the immediate postpartum
 - Reducing obstacles in the homecoming
 - Reducing obstacles over time
 - Improving alternative feeding practices

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