Types and Amounts of Complementary Foods and Beverages and Growth, Size, and Body Composition: A Systematic Review

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- P/B-24 Project overview: Stoody EE, Spahn JM, Casavale KO. The Pregnancy and Birth to 24 Months Project: a series of systematic reviews on diet and health. *Am J Clin Nutr*. 2019;109(7):685S–97S. Available at: https://doi.org/10.1093/ajcn/nqy372.

- P/B-24 Project systematic review methodology: Obbagy JE, Spahn JM, Wong YP, Psota TL, Spill MK, Dreibelbis C, Gungor DE, Nadaud P, Raghavan R, Callahan EH, English LK, Kingshipp BL, LaPergola CC, Shapiro MJ, Stoody EE. Systematic review methodols used in the Pregnancy and Birth to 24 Months Project. *Am J Clin Nutr.* 2019;109(7):698S–704S. Available at https://doi.org/10.1093/ajcn/nqy226.

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All TEC and NESR team members, Project leads, and FEG-TEC liaisons participated in establishing the research questions, analytic framework, and study inclusion and exclusion criteria. LKE, JEO, TLP, YWP, PN, KJ, and NT developed and conducted the literature search, screened search results, and identified studies for inclusion. LKE and JEO extracted data and assessed risk of bias for included studies. NFC, KGD, DMF, MKF, FRG, NFK, and KSS reviewed and provided substantive feedback on all systematic review materials, including the synthesis of the body of evidence, conclusion

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statement, and grade of the strength of the evidence. LKE prepared this report and EES provided oversight. All authors critically reviewed and approved the final report. The authors declare no conflicts of interest.

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INTRODUCTION

This document describes a systematic review conducted to answer the following question: What is the relationship between types and amounts of complementary foods and beverages consumed and growth, size, and body composition?. This systematic review was conducted as part of the Pregnancy and Birth to 24 Months Project (P/B-24 Project) by USDA's Nutrition Evidence Systematic Review (NESR).

The purpose of the P/B-24 Project was to conduct a series of systematic reviews on diet and health for women who are pregnant and for infants and toddlers from birth to 24 months of age. This project was a joint initiative led by USDA and HHS, and USDA's NESR carried out all of the systematic reviews. A Federal Expert Group (FEG), a broadly representative group of Federal researchers and program leaders, also provided input throughout the P/B-24 Project. More information about the P/B-24 Project has been published[2] and is available on the NESR website: https://nesr.usda.gov/project-specific-overview-pb-24-0

NESR, formerly the Nutrition Evidence Library (NEL), specializes in conducting food- and nutrition-related systematic reviews using a rigorous, protocol-driven methodology. To conduct each P/B-24 systematic review, NESR's staff worked with a Technical Expert Collaborative (TEC), which is a group of 7-8 leading subject matter experts.

NESR's systematic review methodology involves developing and prioritizing systematic review questions, searching for and selecting studies, extracting and assessing the risk of bias of data from each included study, synthesizing the evidence, developing a conclusion statement, grading the evidence underlying the conclusion statement, and recommending future research. A detailed description of the methodology used in conducting systematic reviews for the P/B-24 Project has been published[3] and is available on the NESR website: https://nesr.usda.gov/pb-24-project-methodology-0. In addition, starting on page 62, this document includes details about the methodology as it was applied to the systematic review described herein. An analytic framework that illustrates the overall scope of the question, including the population, the interventions and/or exposures, comparators, and outcomes of interest, is found on page 62. In addition, the literature search plan, that was used to identify studies included in this systematic review is found on page 63.

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[2] Stoody EE, Spahn JM, Cassavale KO. The Pregnancy and Birth to 24 Months Project: a series of systematic reviews on diet and health. *Am J Clin Nutr*. 2019;109(7):685S-697S. doi:10.1093/ajcn/nqy372

[3] Obbagy JE, Spahn JS, Psota TL, Spill MK, Dreibelbis C, Gungor DE, Nadaud PN, Raghavan R, Callahan EH, English LK, Kingshipp BJ, Lapergola CC, Shapiro MJ, Stoody EE. Systematic review methodology used in the Pregnancy and Birth to 24 Months Project. *Am J Clin Nutr*. 2019;109(7):698S–704S. doi: 10.1093/ajcn/nqy226

List of abbreviations

Abbreviation	Full name
BF	Breast fed
BMIZ	Body mass index z-score
CF	Complementary feeding
CFB	Complementary food and beverage
DXA	Dual-energy X-ray absorptiometry
EBF	Exclusively breast-fed
EFF	Exclusively formula fed
FEG	Federal expert group
FF	Formula fed
FFQ	Food frequency questionnaire
FM	Fat mass
HAZ	Height-for-age z-score
HC	Head circumference
HHS	Department of Health and Human Services
LAZ	Length-for-age z-score
NEL	Nutrition Evidence Library
NESR	Nutrition Evidence Systematic Review
NIH	National Institutes of Health
P/B-24	Pregnancy and Birth to 24 Months Project
RCT	Randomized controlled trial
SSB	Sugar-sweetened beverage
TEC	Technical Expert Collaborative
USDA	United States Department of Agriculture
WAZ	Weight-for-age z score
WC	Waist circumference
WLZ	Weight-for-length z score

WHAT IS THE RELATIONSHIP BETWEEN THE TYPES AND AMOUNTS OF COMPLEMENTARY FOODS AND BEVERAGES CONSUMED AND GROWTH, SIZE, AND BODY COMPOSITION?

PLAIN LANGUAGE SUMMARY

What is the question?

- What is the relationship between the types and amounts of complementary foods and beverages consumed and growth, size, and body composition?

What is the answer to the question?

- Moderate evidence indicates that higher versus lower meat intake or meat versus iron-fortified cereal intake over a short duration (~3mo) during the complementary feeding period does not favorably or unfavorably influence growth, size, and/or body composition. There is insufficient evidence to determine a relationship between meat intake and prevalence/incidence of overweight or obesity.
- Limited evidence suggests that type or amount of cereal given does not favorably or unfavorably influence growth, size, body composition, and/or prevalence/incidence of overweight or obesity.
- Moderate evidence suggests that consumption of complementary foods with different fats and/or fatty acid composition does not favorably or unfavorably influence growth, size, or body composition. There is not enough evidence to determine a relationship between consumption of complementary foods with different fats and/or fatty acid composition and/or prevalence/incidence of overweight or obesity.
- Limited evidence suggests that sugar sweetened beverage consumption during the complementary feeding period is associated with increased risk of obesity in childhood, but is not associated with other measures of growth, size, and body composition.
- Limited evidence showed a positive association between juice intake and infant weight-for-length and child BMI z-scores.
- No conclusion could be made about the relationship between other complementary foods (vegetables, fruit, dairy products and/or cow's milk, cereal-based products, milk-cereal drink, and/or categories such as "ready-made foods") and growth, size, body composition, and/or prevalence/incidence of overweight or obesity.
- No conclusion could be made about the relationship between distinct dietary patterns during the complementary feeding period and growth, size, body composition, and/or prevalence/incidence of malnutrition, overweight or obesity.

Why was this question asked?

- This important public question was identified as part of the U.S. Department of Agriculture and Department of Health and Human Services Pregnancy and Birth to 24 Months Project

How was this question answered?

- A team of staff from the Nutrition Evidence Systematic Review conducted a systematic review in collaboration with a group of experts called a Technical Expert Collaborative.

What is the population of interest?

- Generally healthy infants and toddlers who were fed complementary foods and beverages from ages 0-24 months and had growth, size, and/or body composition outcomes measured across the lifespan

What evidence was found?

- Forty-nine articles were included that addressed type and/or amount of complementary foods and beverages consumed, including the introduction of specific complementary foods and beverages and dietary patterns during the complementary feeding period.
- The study designs included 18 randomized controlled trials, 1 non-randomized controlled trial, and 30 prospective cohort studies
- The studies varied in terms of the types and/or amounts of CFB examined, which included dietary patterns consumed during the complementary feeding period, meat, cereal, foods with different fatty acid composition, SSB, juice or 100% juice, and other CFB
- The gaps and limitations in the evidence may include the following:
    - Randomized controlled trials and studies that examine a wider range of specific types and amounts complementary foods and beverages,
    - Research that accounts for the rationale for type/amount of complementary foods and beverages given (e.g., reverse causality), and adjusts for potential confounders (e.g., human milk and/or formula-feeding and baseline growth status).

How up-to-date is this review?

- This review includes literature from 01/1980 to 07/2016

TECHNICAL ABSTRACT

Background

- The goal of this systematic review was to examine the following question: What is the relationship between types and amounts of complementary foods and beverages (CFB) consumed and growth, size, and body composition?
- Systematic reviews were conducted as part of the U.S. Department of Agriculture and Department of Health and Human Services Pregnancy and Birth to 24 Months Project.
- Complementary feeding is the process that starts when human milk or infant formula is complemented by other foods and beverages, beginning during infancy and typically continuing to 24 months of age. CFB were defined as foods and/or beverages other than human milk or infant formula (liquids, semisolids, and solids) provided to an infant or young child to provide nutrients and energy.

Conclusion Statement

- Moderate evidence indicates that higher versus lower meat intake or meat versus iron-fortified cereal intake over a short duration (~3mo) during the complementary feeding period does not favorably or unfavorably influence growth, size, and/or body composition. There is insufficient evidence to determine a relationship between meat intake and prevalence/incidence of overweight or obesity.
- Limited evidence suggests that type or amount of cereal given does not favorably or unfavorably influence growth, size, body composition, and/or prevalence/incidence of overweight or obesity.
- Moderate evidence suggests that consumption of complementary foods with different fats and/or fatty acid composition does not favorably or unfavorably influence growth, size, or body composition. There is not enough evidence to determine a relationship between consumption of complementary foods with different fats and/or fatty acid composition and/or prevalence/incidence of overweight or obesity.
- Limited evidence suggests that sugar sweetened beverage consumption during the complementary feeding period is associated with increased risk of obesity in childhood, but is not associated with other measures of growth, size, and body composition.
- Limited evidence showed a positive association between juice intake and infant weight-for-length and child BMI z-scores.
- No conclusion could be made about the relationship between other complementary foods (vegetables, fruit, dairy products and/or cow's milk, cereal-based products, milk-cereal drink, and/or categories such as "ready-made foods") and growth, size, body composition, and/or prevalence/incidence of overweight or obesity.
- No conclusion could be made about the relationship between distinct dietary patterns during the complementary feeding period and growth, size, body

composition, and/or prevalence/incidence of malnutrition, overweight or obesity.
- **Grades: Moderate - Meat; Different Fats and/or Fatty Acid Composition; Limited - Juice; Sugar-Sweetened Beverages; Grade Not Assignable - Cereal; Other CFB; Dietary Patterns**

Methods

- This systematic review was conducted by a team of staff from the Nutrition Evidence Systematic Review in collaboration with a Technical Expert Collaborative.
- Literature search was conducted using 4 databases (PubMed, Cochrane, Embase, and CINAHL) to identify articles that evaluated the intervention or exposure of types and amounts of CFB consumed and the outcomes of growth, size, and/or body composition. A manual search was conducted to identify articles that may not have been included in the electronic databases searched. Articles were screened by two analysts independently for inclusion based on pre-determined criteria.
- Data extraction and risk of bias assessment were conducted for each included study, and both were checked for accuracy. The body of evidence was qualitatively synthesized to inform development of a conclusion statement(s), and the strength of evidence was graded using pre-established criteria evaluating the body of evidence on risk of bias, adequacy, consistency, impact, and generalizability.

Summary of the Evidence

- This review includes 49 articles from 18 randomized controlled trials, 1 non-randomized controlled trial, and 30 prospective cohort studies
- The studies varied in terms of the types and/or amounts of CFB examined, which included dietary patterns consumed during the complementary feeding period, meat, cereal, foods with different fatty acid composition, sugar-sweetened beverages, juice or 100% juice, and other CFB
- Gaps and limitations in the evidence include the need for randomized controlled trials and studies that examine a wider range of specific types and amounts complementary foods and beverages, account for the rationale for type/amount of complementary foods and beverages given (e.g., reverse causality), and adjust for potential confounders (e.g., human milk and/or formula-feeding and baseline growth status).

FULL REVIEW

Systematic review question

What is the relationship between the types and amounts of complementary foods and beverages consumed and growth, size, and body composition?

Conclusion statement

Moderate evidence indicates that higher versus lower meat intake or meat versus iron-fortified cereal intake over a short duration (~3mo) during the complementary feeding period does not favorably or unfavorably influence growth, size, and/or body composition. There is insufficient evidence to determine a relationship between meat intake and prevalence/incidence of overweight or obesity.

Limited evidence suggests that type or amount of cereal given does not favorably or unfavorably influence growth, size, body composition, and/or prevalence/incidence of overweight or obesity.

Moderate evidence suggests that consumption of complementary foods with different fats and/or fatty acid composition does not favorably or unfavorably influence growth, size, or body composition. There is not enough evidence to determine a relationship between consumption of complementary foods with different fats and/or fatty acid composition and/or prevalence/incidence of overweight or obesity.

Limited evidence suggests that sugar-sweetened beverage consumption during the complementary feeding period is associated with increased risk of obesity in childhood, but is not associated with other measures of growth, size, and body composition.

Limited evidence showed a positive association between juice intake and infant weight-for-length and child BMI z-scores.

No conclusion could be made about the relationship between other complementary foods (vegetables, fruit, dairy products and/or cow's milk, cereal-based products, milk-cereal drink, and/or categories such as "ready-made foods") and growth, size, body composition, and/or prevalence/incidence of overweight or obesity.

No conclusion could be made about the relationship between distinct dietary patterns during the complementary feeding period and growth, size, body composition, and/or prevalence/incidence of malnutrition, overweight or obesity.

Grades

Moderate - Meat; Different Fats and/or Fatty Acid Composition; Limited - Juice; Sugar-Sweetened Beverages; Grade Not Assignable - Cereal; Other CFB; Dietary Patterns

Summary

- This review includes 49 studies that examined the association between types and amounts of complementary foods and beverages (CFB) and growth, size, body composition, and/or overweight or obesity status including:
    - 18 randomized controlled trials (RCTs)
    - One non-RCT
    - 30 prospective cohort studies
- The types and amounts of CFB consumed during the complementary feeding (CF) period that were examined varied across studies. The types of CFB included meat, fortified and unfortified cereal, foods with different fats and/or fatty-acid composition, sugar-sweetened beverages (SSBs), juice drinks and/or 100% juice, and other CFB (e.g., fruits, vegetables, eggs, fish).
    - Distinct dietary patterns during the CF period were also examined but difficult to compare
    - Introduction of specific types of CFB was also examined but varied widely (e.g., SSB <6mo vs. never; ground meat/soy product <3, 4-6, >6mo)
- Growth, size, and body composition outcomes varied across studies. These outcomes included weight, length/height, body circumferences (e.g., head, arm, chest, waist), fat mass (FM), lean mass, weight-to-height ratio (e.g., body mass index (BMI), weight-for-length z-score (WLZ)), and/or incidence/frequency/prevalence/risk of malnutrition, overweight, or obesity measured either at a single time point or change over time.
- The relationship between the types and/or amounts of CFB and growth, size, and/or body composition remains unclear.
    - In many cases, the amount of CFB provided would not be expected to affect these outcomes over the limited duration of time in which it was tested or how long after the intervention subjects were followed-up
    - Given the normal variation in healthy child growth patterns, caution should be used when interpreting results between timing, types and amounts of CFB and outcomes for individuals based on findings at the population level.
- Additional factors that need to be considered when examining the relationship between types and/or amounts of CFB and growth, size, and/or body composition outcomes include:
    - Early infant milk feeding practices (human milk, formula, and/or mixed)
    - Variability of normal early infant growth patterns
    - Parental feeding styles and the rationale for choosing specific types of CFB (e.g., perceived infant readiness, infant growth or size, fear of inadequate milk supply, sleep promotion, responsive feeding, infant food neophobia/acceptance)
    - Cultural preference related to parental history and/or feeding practices

Description of the evidence

This SR includes 49 studies that examined the association between the types and amounts of CFB and growth, size, and body composition. The study designs in this review included 18 RCTs (1-18), one of which was a cross-over design (1), one non-RCT (19), and 30 prospective cohort studies (20-49) (Supplemental Table S1). Multiple articles used the same cohorts but represented different outcomes, different exposures, or exposures/outcomes at different ages (41, 42, 40, 49, 51, 56, 32, 50, 31, 38, 39).

Description of subject characteristics

The studies included in this SR enrolled both girls and boys (~29-67% females) who were healthy, full-term infants According to the Human Development Index (50), 37 articles were from studies conducted in countries categorized as "very high", and 12 articles were from studies conducted in countries categorized as "high. While most studies did not describe the race/ethnicity of subjects, they were all conducted in representative populations from the countries in which they were conducted.

A number of studies enrolled infants who were exclusively breastfed (EBF (4, 11-15, 17) or exclusively formula-fed (EFF (1, 9) up to at least 4 mo of age. The remaining studies varied in terms of whether infants were fed human milk, infant formula, or both and most adjusted for feeding method (e.g., BF duration) in analyses.

Description of types and amounts of complementary foods and beverages

The types of CFB commonly examined in these studies included meats, fortified and unfortified cereals/porridges, foods that varied in fats or fatty acid profiles, and sugar-sweetened beverages (SSBs), juice drinks, and 100% fruit juice. In most cases, cereal refers to infant cereals that were fortified with iron (Fe), and variably fortified with additional micronutrients (e.g., zinc). Fewer studies examined other foods and/or food groups such as fruit and/or vegetable snacks, biscuits, fried potatoes, confectionary or sweetened foods, home-based CFB (prepared with a blender according to a provided recipe), and self-made vs. ready-made CFB. Types and amounts of CFB were analyzed in several ways, such as different types of CFB, different amounts of the same CFB, by age of introduction of specific CFB, and dietary patterns during the CF period (Supplemental Table S1).

The included articles were categorized according to how types and/or amounts of CFB were assessed:

- Meat, with or without cereal (2, 3, 5, 11, 14, 15, 18, 32, 33, 39, 44, 49). These studies examined meat as a CFB, including meat intake compared to another CFB such as cereal, the amount of meat consumed, or meat introduction;
- Cereal (9, 11, 17, 35, 38, 49). These studies examined cereal(s), including different types of cereal, amount of cereal, or timing of cereal intake. Several articles randomized groups to receive meat vs. cereal, or meat and cereal vs. control. Those studies are not discussed in the "cereal" section to avoid redundancy with the "meat with or without cereal" section;
- CFB with different fats and/or fatty acid composition (4, 6, 10, 13). These studies examined different types of CFB including fish and egg that naturally

contain or were manipulated to contain different amounts or types of fat;

- SSBs (26, 31-33, 38, 40, 43, 45). These studies examined either amount or timing of SSBs consumed during the CF period;
- Juice drinks and/or 100% juice (31-33, 38, 43, 45). These studies examined the consumption of juice, which may or may not have contained added sugar. Studies examined the amount or timing of juice, included 100% juice, juice drinks, and/or other beverages, during the CF period;
- Other CFB (8, 16, 19, 21, 22, 27, 29, 30, 32, 33, 36-38, 43, 44, 48, 49)(7, 8, 19, 21, 22, 27, 29, 30, 32, 33, 36-38, 43, 44, 49). These remaining studies examined other or multiple CFB, which were not addressed in the aforementioned categories (e.g., vegetables, ready-made foods, confectionary foods);
- Dietary patterns (12, 20, 23-25, 27, 28, 34, 41, 42, 46, 47). These studies examined dietary patterns during the CF period classified either by observation (e.g., macrobiotic diet) or statistical analyses (e.g., adherence scores for patterns derived from latent class, cluster, or principal component analysis).

Description of growth, size, and body composition outcomes

Outcomes that were reported in relation to types and amounts of CFB consumed included growth, size, and body composition at various ages, ranging from birth to 42 y (Supplemental Table S1). The majority of studies reported that standard procedures were used to obtain weight and height (e.g., measured from calibrated scales/stadiometers) and were assessed within the first two years of life (1, 3-9, 11, 12, 14, 15, 18, 19, 23, 24, 28, 36, 39, 48). However, a few studies obtained weight and/or length or height via maternal-report (31, 42, 47, 49), clinical records (2, 37), unstandardized or various methods (38, 44), or did not specifically report their methods (10, 13, 17, 20).

Nineteen studies determined BMI, BMI trajectory, BMIZ, and/or WLZ from measured (5, 9, 14, 15, 21, 25, 28, 29, 32-34, 38, 41, 43, 45) or reported (42, 44, 47, 49), weight and length. Eleven studies assessed adiposity according to fat mass (FM) and/or lean mass measured by skinfold thickness (3, 4, 22, 23, 28, 30, 36) (9),or whole-body dual-energy X-ray apsorptiometry (DXA) (41),(48),(29). Six studies assessed central adiposity, either waist circumference (WC) or abdominal fat (14, 26, 29, 33, 34, 44) measured using flexible tape (26, 33, 34), ultrasound (29), self-report (44), or non-specified methods (14). Fourteen studies reported head circumference (HC) (1, 4, 5, 7, 9-12, 15, 18, 24, 28, 36, 39) and six reported mid-upper arm circumference (MUAC) (1, 3, 7, 12, 28, 36).Seven studies assessed overweight or obesity (20, 26, 29, 40, 42, 44, 49), using standards according to BMI or WLZ. Two studies assessed malnutrition outcomes (e.g., wasting, stunting) (28, 46).

Evidence synthesis

Results from the included studies are described according to specific CFB in Tables 1-6, placed after each respective section. Twenty-four of the 49 articles reported one or more significant associations, either positive, negative, or mixed, between types or amounts of CFB and growth, size, body composition, and/or risk of malnutrition, overweight or obesity (5, 14, 15, 19, 21, 23, 27, 28, 30-34, 37-42, 44-47, 49). Twenty-five of the 49 articles found no relationship between types and amounts of CFB and growth, size, body composition, and/or risk of overweight or obesity (1-4, 6-13, 16-18, 20, 22, 24-26, 29, 35, 36, 43, 48).

Meat

Twelve articles, including seven RCTs (2, 3, 5, 11, 14, 15, 18) and five articles from four observational studies (32, 33, 39, 44, 49) examined the relationship between meat intake and growth, size, body composition, and/or risk of overweight or obesity outcomes. Studies varied in terms of whether they assessed meat compared to cereal, meat and cereal compared to controls, or the amount of meat consumed (see **Table 1**).

Krebs et al. (5) reported that BF infants consuming meat compared to Fe-fortified cereal from 5-7 mo had a significantly greater rate of HC growth from 7-12 mo, but no significant differences in HC growth 4-7 mo, weight-for-length 4-7 mo or 7-12 mo, weight growth rate at 4-7 mo or 7-12 mo, WAZ 4-12 mo, length growth rate 4-7 mo or 7-12 mo, or LAZ 4-12 mo. Tang et al. (15) reported that Chinese infants randomly assigned to the meat vs. cereal groups had a smaller decline in WAZ, smaller decline in LAZ and greater increase in length from 6-18 mo but no significant differences in WLZ or in HC, or HC z-score from 6-18 mo. Tang and Krebs (14) also reported that U.S. infants randomly assigned to meat vs. cereal groups had significantly greater mean change in WAZ and LAZ from 5-9 mo, but there were no differences between groups in WLZ or BMIZ from 5-9 mo or in WC at 9 mo of age. In two other RCTs, there were no significant group differences in weight, length, or HC in the first year of life between those who received meat and Fe-fortified cereal relative to control groups (11, 18).

Two RCTs found no relationship between amount of meat consumed and growth, size, or body composition outcomes prior to 10 mo of age (2, 3). Three articles from two observational studies also examined meat intake (32, 33, 39). Garden et al. (33) and Garden et al. (32) reported significant positive associations between meat intake at 18 mo and BMI trajectory (i.e., 'early and persistent', 'late increase', or 'normal' according to CDC percentile curves) at different ages, 8 y and birth-11.5 y (in boys only). Morgan et al. (39) found that meat intake from 4-12 mo was significantly associated with higher weight gain from 4-12 mo but this did not persist in the fully-adjusted models or at older age intervals (4-16 mo, 4-24 mo), and there was no association with length or HC outcomes.

Meat introduction. Two observational studies examined the introduction of meat (44, 49). Zheng et al. (49) reported no significant association between age of ground meat/soy introduction and overweight or obesity or BMI at age 4-5 y. Schack-Nielsen et al. (44) found that, among other relationships identified, later introduction of meat was associated with decreased BMI and risk of overweight at 42 y, but not at 20-34 y of age.

Table 1. Studies that examined meat, with or without cereal, and growth, size, and body composition

Reference[1], country, analytic N	Independent variable/exposure[2]	Results for weight status	Results for body composition	Results for weight	Results for length/height	Results for head circumference
Dube et al., 2010 (2) RCT; Germany N: 97	Low meat group: meals 8% meat by weight for 7mo, ages 4-11mo vs. High meat group: meals 12% meat by weight for 7mo, ages 4-11mo			Weight at 4, 7, or 10mo, NSGD		
Engelmann et al., 1998 (3) RCT; Denmark N: 41	Low meat group: puree with 10g/d of meat for 2mo, ages 8-10mo vs. High meat group: puree with 27g/d of meat for 2mo, ages 8-10mo		Change in MUAC or triceps skinfold thickness at 10mo, NSGD	Change in weight at 10mo, NSGD	Change in crown-heel length at 10mo, NSGD	
Garden et al., 2011 (33) Australia N: 362 (339 WC)	Meat intake (g, % energy) at 18mo; e.g., chicken nuggets, ground beef, beef sausages, ham		BMI at 8y: g, β=0.25; 95% CI:0.04, 0.45, P=0.02; % energy, β=0.27; 95% CI:0.07, 0.47, P=0.01; WC at 8y: g, β=0.59; 95% CI:0.03, 1.15, P=0.04; % energy, β=0.63; 95% CI:0.10, 1.17, P=0.02			

Garden et al., 2012 (32) Australia N: 298	In boys, meat intake (g, % energy) at 18mo; e.g., chicken nuggets, ground beef, beef sausages, ham	Early and Persistent vs. Normal or Late Increase BMI from 0-11.5y: g, median 38.8 vs. 18.6 vs. 24.1, P=0.01; % energy, 9.2 vs. 4.4 or 4.1, P=0.01			
	In girls, meat intake (g, % energy) at 18mo; e.g., chicken nuggets, ground beef, beef sausages, ham	Any BMI from 0-11.5y, NSA			
Krebs et al., 2006 (5) RCT; U.S. N: 72	Meat group: pureed beef for 2mo, ages 5-7mo Cereal group: Fe-fortified infant cereal for 2mo, ages 5-7mo (1:2 ratio of cereal to human milk/water)	Mean weight-for-length percentiles at either 4-7mo or 7-12mo intervals, NSGD	Weight growth rate from 4-7mo, or from 7-12mo , or WAZ from 4-12mo , NSGD	Length growth rate from 4-7mo, or from 7-12mo , or LAZ from 4-12mo, NSGD	HC growth from 7-12mo: 0.48, SE: 0.018 vs. 0.41, SE: 0.019, P=0.02; from 4-7mo, NSGD
Makrides et al., 1998 (11) RCT; Australia N: 62 (Intervention, 36; Control, 26)	Meat+cereal group: 4, 30-40g servings/wk of red meat and 4, 113g jars/wk of Fe-fortified cereal for 2mo, ages 4-6mo Control group: Standard nutritional advice to consume Fe-fortified infant cereal for 2mo,		Weight at 9 or 12mo, NSGD	Length at 9 or 12mo, NSGD	HC at 9 or 12mo, NSGD

	ages 4-6mo					
Morgan et al., 2004 (39) U.K. N: 144	Meat intake: red (beef, pork and lamb) and white (chicken, turkey, fish) meat from age 4-12mo			Weight gain 4-12mo: β=0.40, 95%CI: 0.005, 0.79, P=0.05; effect disappeared after adjusting for protein intake, NSA	Length 4-12mo, NSA	HC 4-12mo, NSA
	Meat intake: red (beef, pork and lamb) and white (chicken, turkey, fish) meat from age 4-16mo			Weight 4-16mo, NSA	Length 4-16mo, NSA	HC 4-16mo, NSA
	Meat intake: red (beef, pork and lamb) and white (chicken, turkey, fish) meat from age 4-24mo			Weight 4-24mo , NSA	Length 4-24mo, NSA	HC 4-24mo, NSA
Schack-Nielsen et al., 2010 (44) Denmark N: 5068	Meat introduction continuous, mo	At 42y, Overweight OR 0.93, 95%CI: 0.87, 1.00, P=0.044; Obesity, NSA	BMIZ at ages: 42y β=-0.032, 95%CI: -0.059, -0.005; 20-34y, NSA			
	Meat introduction ≥4 vs. <4mo	Overweight at 42y, NSA				
Tang et al., 2014 (15) RCT; China N: 1318	Meat group: boiled pork for 12mo, ages 6-18mo vs. Cereal group: commercial rice cereal product for		Change in WLZ from 6-18mo, NSGD	Mean change in WAZ from 6-18mo: -0.35, SD: 0.60 vs. -0.43, SD: 0.61, P=0.05. Change	Mean change in LAZ from 6-18mo: -0.43, SD: 0.72 vs. -0.54, SD: 0.67, P<0.01. Length from 6-18mo,	Change in HC or HCZ from 6-18mo, NSGD

	12mo, ages 6-18mo			in weight from 6-18mo, NSGD	13.01cm, SD: 1.9 vs. 12.75cm, SD: 1.8, P=0.01	
Tang and Krebs, 2014 (14) RCT; U.S. N: 42	Meat group: pureed meat and gravy for 4mo, ages ~5-9mo vs. Cereal group: Fe or FeZn-fortified infant cereal for 4mo, ages ~5-9mo; asked to avoid meats		WLZ or BMIZ from 5 to 9mo, NSGD; WC at 9mo, NSGD	Mean change in WAZ 5-9mo: 0.24, SD: 0.19 vs. -0.07, SD: 0.17, P<0.05	Mean change in LAZ 5-9mo: 0.14, SD: 0.12 vs. -0.27, SD: 0.24, P<0.05	
Yeung and Zlotkin, 2000 (18) RCT; Canada N: 103 (Intervention, 49; Control, 54)	Meat+cereal group: pureed meat and Fe-fortified infant cereals for 6mo, ages 6 -12mo; all other foods allowed at parents' discretion except vitamin/mineral supplements containing Fe and Fe-fortified formulas vs. Control group: no dietary intervention			Weight at 8, 10, or 12mo, NSGD	Length at 8, 10, or 12mo, NSGD	HC at 8, 10, or 12mo, NSGD
Zheng et al., 2015 (49) China N: 40,510	Meat/soy introduction: ≤3, 4-6, >6mo	Overweight or obesity at 4-5y, NSA	BMI at 4-5y, NSA			

1. All studies followed a prospective cohort design unless noted as RCT or non-RCT
2. The independent variable/exposure of interest included types and/or amounts of CFB, which encompassed dietary patterns during the complementary feeding period and timing of specific CFB; this section of studies examined meat with or without cereal.
3. Outcomes were organized for practicality into columns: weight status, body composition, weight, length or height, and head circumference.

Results described in the respective columns are based on outcome similarity and in accordance with the analytical framework as follows: Weight status included risk/incidence/prevalence/frequency of malnutrition, healthy weight, overweight, or obesity; Body composition included measures, indices, and proxies of overall adiposity such as lean mass, fat mass (FM), % body fat, weight-to-height ratios such as BMI, BMIZ, WLZ, central adiposity or waist circumference, and arm or thigh circumferences; Weight included weight-specific measures such as weight-for-age z-score (WAZ), Length or Height included length-specific measures such as length-for-age z-score (LAZ); Head circumference included head circumference

Abbreviations: BF, breast-fed; BMIZ, BMI z-score; CFB, complementary food/beverage; Fe, iron; FF, formula-fed; HC, head circumference; HCZ, head circumference z-score; LAZ, length for age z-score; MUAC, mid-upper arm circumference; NR, not reported; NSA, no significant association; NSGD, no significant group differences; RCT, randomized controlled trial; WAZ, weight for age z-score; WC, waist circumference; WLZ, weight for length z-score; Zn, zinc

Cereal

The studies that examined cereal and meat intake or compared cereal intake relative to meat intake are discussed in the previous section. Three articles from RCTs examined cereal as a CFB in relation to multiple outcomes, including body composition, weight, length, and HC prior to 18mo of age (1, 9, 17) (see **Table 2**). Davidsson et al. (1) reported no differences in a cross-over trial with EFF infants receiving specially-developed weaning cereals that were fortified to match commercially-available fortified cereals made with wheat/soy or wheat/milk for 4 wk each and weight, length, HC, or arm or chest circumference at 7-17 wk. Lonnderdal and Chen (9) reported no differences between EFF infants receiving 25g/d of cereal (fortification not specified) vs. no cereal from age 4-7 mo and weight-for-height, skinfold thickness, weight gain, length gain, or HC from 4-7 mo of age. Walter et al. (17) reported no differences between EBF infants, who were randomized at 4 mo to receive 30 g/d of Fe-fortified vs. non-fortified cereal, in weight or length at 8, 12, or 15 mo of age.

Three articles from observational studies (35, 38, 49) also examined the relationship between cereal as a CFB and growth, size, body composition, and/or risk of overweight or obesity outcomes (see Table 3). Hertrampf et al. (35) reported no significant differences between infants consuming Fe-fortified cereal compared to routine CFB (including cereal that was not specified as fortified) from ~3-6 mo and weight at 8 or 12 mo of age. Using data from the PROBIT trial, Kramer et al. (38) found that any intake of cereal (non-fortified adult' cereals) vs. none at 3 mo of age was associated with lower WAZ, LAZ and HC from 3-6 mo of age, but not with WLZ at any time point (38). Kramer et al. (38) reported no significant associations between cereal intake and outcomes at either 6-9 mo or 9-12 mo of age. Finally, Zheng et al. (49) found no significant associations between introduction to rice cereal/porridge and risk of either overweight or obesity at age 4-5 y.

Table 2. Studies that examined cereal, and growth, size, and body composition

Reference[1], country, analytic N	Independent variable/exposure[2]	Results for weight status	Results for body composition	Results for weight	Results for length/height	Results for head circumference
Davidsson et al., 1996 (1) RCT; Scotland N: 57	FF infants received each cereal ad lib for 4wk each at ages 7-17wk: wheat/soy: 1.8-8% fiber vs. wheat/milk: 2-5.3% fiber		Arm or chest circumference at 7-17wk, NSA	Weight at 7-17wk, NSA	Length at 7-17wk, NSA	HC at 7-17wk, NSA
Hertrampf et al., 1990 (Hertrampf, 1990) Chile N: 189 4mo; 187 12mo	Fe-fortified cereal: received 20g/d at 4mo and 40g/d at 6mo vs. Control: routine CFB			Weight-for-age adequacy at 8, or 12mo, NSA		
Kramer et al., 2004 (38) Belarus N: 17,046	Cereal intake (any vs. none) at ages 3, 6, or 9mo		WLZ 3-6, NSA	WAZ 3-6mo, β=-0.293, 95% CI: -0.386, -0.199, P=NR	LAZ 3-6mo, β=-0.240, 95% CI: -0.353, -0.127, P=NR	HC 3-6mo , β=-0.291, 95% CI: -0.463, -0.120, P=NR
Lonnerdal and Chen., 1990 (9) RCT; China N: NR	EFF infants vs. FF+cereal for 3mo, ages 4-7mo		Weight-for-length from 4-7mo, NSGD; Skinfold thickness, data NR, NSGD	Weight gain from 4-7mo, NSGD	Length gain from 4-7mo, NSGD	HC from 4-7mo, data NR, NSGD
Walter et al., 1993 (17) RCT; Chile N: 444 8mo; 370 12mo; 340	Fe-fortified cereal + breastmilk vs. Unfortified cereal + breastmilk, age 4-15mo			Weight at 8, 12, or 15mo, NSGD	Length at 8, 12, or 15mo, NSGD	

15mo				
Zheng et al., 2015 (49) China N: 40,510	Rice cereal/porridge introduction: ≤3, 4-6, >6mo	Overweight or obesity at 4-5y, NSA	BMI at 4-5y, NSA	

1. All studies followed a prospective cohort design unless noted as randomized controlled trial (RCT) or non-RCT.
2. The independent variable/exposure of interest included types and/or amounts of CFB, which encompassed dietary patterns during the complementary feeding period and timing of specific CFB; this section of studies examined cereal.
3. Outcomes were organized for practicality into columns: weight status, body composition, weight, length or height, and head circumference. Results described in the respective columns are based on outcome similarity and in accordance with the analytical framework as follows: Weight status included risk/incidence/prevalence/frequency of malnutrition, healthy weight, overweight, or obesity; Body composition included measures, indices, and proxies of overall adiposity such as lean mass, fat mass (FM), % body fat, weight-to-height ratios such as BMI, BMIZ, WLZ, central adiposity or waist circumference, and arm or thigh circumferences; Weight included weight-specific measures such as weight-for-age z-score (WAZ), Length or Height included length-specific measures such as length-for-age z-score (LAZ); Head circumference included head circumference

Abbreviations: BF, breast-fed; CFB, complementary food/beverage; EFF, exclusively formula-fed; Fe, iron; FF, formula-fed; HC, head circumference; LAZ, length for age z-score; NR, not reported; NSA, no significant association; NSGD, no significant group differences; RCT, randomized controlled trial; WAZ, weight for age z-score; WLZ, weight for length z-score

CFB with different fat/fatty acid composition

Table 3 describes results from 4 RCTs, which examined the influence of CFB that varied in fatty acid profiles (4, 6, 10, 13). No relationship was found between groups consuming CFB that differed in fatty acid content with respect to growth, size, or body composition outcomes. Hoffman et al. (4) found no significant differences between infants randomly assigned to receive one jar/d of CFB with or without egg-yolk for 6 mo (ages 6-12 mo) in weight, length, skinfold thickness, or HC at 6, 9, or 12 mo of age. Libuda et al. (6) randomly assigned infants to receive rapeseed oil, salmon, or corn-oil from 4-10 mo, but found no differences between groups in weight or length at 10 mo of age. Makrides et al. (10) randomly assigned infants (BF and/or FF) to consume eggs (~ 4/wk, regular or omega-3 enriched) or receive no dietary intervention for 6 mo, and reported no differences in weight, length, or HC at 12 mo of age. Schwartz et al. (13) found no significant differences between infants randomly assigned to receive one jar/d of CFB with either rapeseed oil vs. corn oil with respect to weight at 10 mo or weight gain from 4 to 10 mo of age.

Table 3. Studies that examined CFB with different fats/fatty acid composition and growth, size, and body composition

Reference[1], country, analytic N	Independent variable/exposure[2]	Results for weight status	Results for body composition	Results for weight	Results for length/height	Results for circumference
Hoffman et al., 2004 (Hoffman, 2004) RCT; U.S. N: 51	DHA-enriched group: CFB enriched with DHA from egg-yolk, ages 6-12mo vs. Control: unenriched CFB, ages 6-12mo		Skinfold thickness at 6, 9, or 12mo, NSGD	Weight at 6, 9, or 12mo, NSGD	Length at 6, 9, or 12mo, NSGD	HC at 6, 9, or 12mo, NSGD
Libuda et al., 2015 (6) RCT; Germany N: 155-158	Rapeseed oil (ALA) group: CFB with rapeseed oil, ages 4-10mo vs. Fish group: Salmon 2x/wk (preformed DHA), ages 4-10mo vs. Corn oil (LA) group: CFB with corn oil, ages 4-10mo			Weight at 10mo, NSGD	Length at 10mo, NSGD	
Makrides et al., 2002 (10) RCT; Australia N: 137	Regular egg group: 4 eggs/wk for 6mo, ages 6-12mo; vs. n-3 egg group: 4 DHA-enriched eggs/wk for 6mo, ages 6-12mo; vs. Control group: Standard weaning diet of choice for 6mo, ages 6- 12mo			Weight at 12mo, NSGD	Length at 12mo, NSGD	HC at 12mo, NSGD
Schwartz et al., 2009 (13) RCT; Germany N: 102	Rapeseed oil group: meat-based CFB with LA/ALA ratio of 3.9 for 6mo, ages 4-10mo; vs. Corn oil group (control): meat-based CFB with LA/ALA ratio of 35.7 for 6mo, ages 4-10mo			Weight at 10mo or gain from 4-10mo, NSGD		

1. All studies, except those noted as RCT or non-RCT, followed a prospective cohort design
2. The independent variable/exposure of interest included types and/or amounts of CFB, which encompassed dietary patterns during the complementary feeding period and timing of specific CFB; this section of studies examined CFB with either different fats or fatty acid composition.
3. Outcomes were organized for practicality into columns: weight status, body composition, weight, length or height, and head circumference.

Results described in the respective columns are based on outcome similarity and in accordance with the analytical framework as follows: Weight status included risk/incidence/prevalence/frequency of malnutrition, healthy weight, overweight, or obesity; Body composition included measures, indices, and proxies of overall adiposity such as lean mass, fat mass (FM), % body fat, weight-to-height ratios such as BMI, BMIZ, WLZ, central adiposity or waist circumference, and arm or thigh circumferences; Weight included weight-specific measures such as weight-for-age z-score (WAZ), Length or Height included length-specific measures such as length-for-age z-score (LAZ); Head circumference included head circumference

Abbreviations: ALA, alpha-linolenic acid; BF, breast-fed; CFB, complementary food/beverage; DHA, docosahexaenoic acid; FF, formula-fed; HC, head circumference; LA, linoleic acid; NR, not reported; NSA, no significant association; NSGD, no significant group differences; RCT, randomized controlled trial

SSBs.

Five articles examined SSB intake (26, 32, 33, 40, 43) (see **Table 4**).One article reported that any vs. no intake of SSBs, including during infancy was associated with higher prevalence of obesity at age 6 y and that higher frequency of SSB intake (≥3/wk vs. never) at age 10-12 mo was associated with a 2-fold increase in odds of obesity at age 6 y (40). In addition, SSB introduction before age 6 mo vs. never during infancy was associated with 92% higher odds of obesity at age 6 y. Four articles reported no association with BMI, BMIZ, odds of obesity or abdominal obesity (26, 32, 33, 43). Specifically, there were no significant associations between intake of SSBs (which included cordials, fruit drinks, and soft drinks but excluded juice) at 18mo and BMI-trajectory at 8 y (33) or from birth-11.5 y (32). Cantoral et al. (26) reported no significant association between SSB introduction (based on the sum of daily intake of soda, commercial fruit drinks, or flavored water with sugar exclusive of natural fruit juice) at or before 12 mo vs. after 12 mo of age and odds of obesity or abdominal obesity at age 8-14 y. Santorelli et al. (43) found no significant association between introduction of SSBs, including cola, lemonade, sweetened tea and pre-prepared 'baby' drinks, before 17 wk and BMIZ at 3 y of age.

Juice drinks and 100% fruit juice.

Six articles examined juice consumption primarily at or <1y of age (31-33, 38, 43, 45) (see Table 4). Juice was inconsistently described and juice consumption was defined differently across studies as follows: any vs. no intake of 'juice or other liquids' at ages 1, 3, 6, or 9 mo of age (38); fluid oz/d of orange juice or 100% fruit juice at 0, 1-7, 8-15,or >16 oz/d (45); servings of "juice" at 0, 1, or >1 serving/2d (31); and intake of "non-milk beverages" including juice,cordials, fruit drinks, and soft drinks (32, 33). Two studies found significant positive associations between juice consumption and weight relative to length (38, 45) but both studies reported additional null results. Results from Kramer et al. show that intake of juice at 9 mo was associated with higher WLZ from 9-12 mo of age but not WAZ, LAZ, or HC at any age (38). Sonneville et al. (45) found that 8-15 oz/d of fruit juice at 1 y vs. none was associated with increased BMIZ at 7.7 y, but lesser or greater amounts (1-7 oz, or >16 oz/d) were not associated with BMIZ at 7.7 y. In addition, the amount of fruit juice at 1 y was not associated with BMIZ at 3.1 y in fully-adjusted models. Gaffney et al. (31) found that infants who were given greater amounts of juice (>1 serving of juice/2d vs. none) had significantly higher WAZ at 12 mo. However, there were no significant associations between lesser amounts (≤1 serving of juice/2d vs. none) and WAZ at 12 mo. Garden et al. (33) and Garden et al. (32) found no association between intake of non-milk beverages which included juice, cordials, fruit drinks, and soft drinks at 18 mo and BMI-trajectory at 8y (33) or from birth-11.5 y (32). Collectively, the findings from these observational studies suggest positive associations but are inconsistent given the variation in the definitions and amounts of juice intake and outcomes at different ages.

Table 4. Studies that examined SSB, juice drinks and/or 100% juice and growth, size, and body composition

Reference[1], country, analytic N	Independent variable/exposure[2]	Results for weight status	Results for body composition	Results for weight	Results for length/height	Results for head circumference
Cantoral et al., 2016 (26) Mexico N: 227	SSB introduction, ≤12 vs >12mo: sum daily intake of soda, commercial fruit drinks, flavored water with sugar; excludes natural fruit/vegetable juice	Obesity at 8-14y, NSA	Abdominal obesity at 8-14y, NSA			
Garden et al., 2011 (33) Australia N: 362; 339 for WC	SSB intake (g, % energy) at age 18mo; sweetened drinks including cordials, fruit drinks, and soft drinks		BMI at 8y, NSA; WC at 8y, NSA			
	Juice+SSB intake (g, % energy) at age 18mo; non-milk beverages including juice, cordials, fruit drinks, and soft drinks		BMI at 8y, NSA; WC at 8y, NSA			
Garden et al., 2012 (32) Australia N: 298	In boys, SSB intake (g, % energy) at age 18mo; sweetened drinks including cordials, fruit drinks, and soft drinks		BMI trajectory birth-11.5y, NSA			
	In girls, SSB intake (g, % energy) at age 18mo; sweetened drinks including cordials, fruit drinks, and soft drinks		BMI trajectory birth-11.5y, NSA			
	In boys, Juice+SSB intake (g, % energy) at age 18mo; non-milk beverages including juice, cordials, fruit drinks, and soft drinks		BMI trajectory birth-11.5y, NSA			
	In girls, Juice+SSB intake (g, % energy) at age 18mo; non-milk		BMI trajectory birth-11.5y, NSA			

	beverages including juice, cordials, fruit drinks, and soft drinks			
Pan et al., 2014 (40) U.S. N: 1189	SSB introduction: <6mo vs. never; SSB included juice drinks, soft drinks, soda, sweet tea, and Kool-Aid	Obesity at 6y: OR 1.92, 95% CI: 1.01, 3.66, P<0.05		
	SSB introduction: <6 vs. ≥6mo;	Obesity at 6y, NSA		
	SSB introduction: never vs. ≥ 6mo;	Obesity at 6y, NSA		
	SSB intake: any vs. none during infancy	Obesity at 6y: prevalence 17% vs. 8.6%; OR: 1.63, 95%CI: 1.03, 2.56, P <0.05		
	SSB frequency: ≥3/wk vs. never during age 10-12mo	Obesity at 6y: OR 2, 95%CI: 1.02, 3.90, P<0.05		
	SSB frequency: ≥3/wk vs. <1/wk < during age 10-12mo	Obesity at 6y, NSA		
	SSB frequency: ≥3/wk vs. 1-<3/wk during age 10-12mo	Obesity at 6y, NSA		
Santorelli et al., 2014 (43) U.K. N: 1327	SSB introduction: <17wk or not; cola, lemonade, sweetened tea and pre-prepared 'baby' drinks		BMIZ at 3y, NSA	

Gaffney et al., 2012 (31) U.S. N: 691	Juice intake intensity in the first year: >1 vs. 0 serving/2d; type of juice NR			WAZ at 12mo, β=0.25, P=0.002		
	Juice intake intensity in the first year: ≤1 vs. 0 serving/2d; type of juice NR			WAZ at 12mo, NSA		
Kramer et al., 2004 (38) Belarus N: 17,046	Juice/other liquids, any vs. none at 1, 3, 6, or 9mo		WLZ from age 9-12mo: β=0.061, 95% CI: 0.003, 0.119, P=NR; from 1-3, 3-6, and 6-9mo, NSA	WAZ from age 1-3, 3-6, 6-9 or 9-12mo, NSA	LAZ from age 1-3, 3-6, 6-9 or 9-12mo, NSA	HC from age 1-3, 3-6, 6-9 or 9-12mo, NSA
Sonneville et al., 2015 (45) U.S. N: 1163	Fruit juice (orange juice or 100% fruit juice) intake at age 1y: 0, 1-7, 8-15, 16-31, or >32oz		BMIZ at 7.7y: 1-7oz: β=0.07, 95%CI: -0.06, 0.21; 8-15oz: β=0.23, 95%CI: 0.005, 0.40; >16oz: β=0.27, 95%CI: -0.05, 0.59 vs. 0oz, P=0.05; BMIZ at 3.1y, NSA			

1. All studies, except those noted as RCT or non-RCT, followed a prospective cohort design
2. The independent variable/exposure of interest included types and/or amounts of CFB, which encompassed dietary patterns during the complementary feeding period and timing of specific CFB; this section of studies examined sugar-sweetened beverage, juice drinks, and/or 100% juice.
3. Outcomes were organized for practicality into columns: weight status, body composition, weight, length or height, and head circumference. Results described in the respective columns are based on outcome similarity and in accordance with the analytical framework as follows: Weight status included risk/incidence/prevalence/frequency of malnutrition, healthy weight, overweight, or obesity; Body composition included measures, indices, and proxies of overall adiposity such as lean mass, fat mass (FM), % body fat, weight-to-height ratios such as BMI, BMIZ, WLZ, central adiposity or waist circumference, and arm or thigh circumferences; Weight included weight-specific measures such as weight-for-age z-score (WAZ), Length or Height included length-specific measures such as length-for-age z-score (LAZ); Head circumference included head circumference

Abbreviations: BF, breast-fed; BMIZ, BMI z-score; CFB, complementary food/beverage; HC, head circumference; LAZ, length for age z-score; NR, not reported; NSA, no significant association; NSGD, no significant group differences; RCT, randomized controlled trial; SSB, sugar-sweetened beverage; WAZ, weight for age z-score; WLZ, weight for length z-score

Other CFB

Sixteen articles examined distinct types, amounts, groups, or introductions of other CFB (7, 8, 19, 21, 22, 27, 29, 30, 32, 33, 36-38, 43, 44, 49) using different assessment methods and are described in more detail in **Table 5**. These other CFB were examined during intervals or at specific ages, primarily between 4 and 12 mo, relative to various outcomes ranging in age from 4 mo up to 42 y. Although a few significant associations were identified (see Table 5), there was insufficient evidence, inconsistency, and substantial methodological limitations across these studies that prevented conclusions from being drawn.

Types of Other CFB. Lind et al. (7) reported no differences between groups randomized to receive regular-phytate vs. reduced-phytate milk-cereal drink and porridge from 6-12 mo in WAZ, LAZ, MUAC, or HC at 6, 12, or 18 mo of age (7). Liu et al. (8) found no differences between BF infants and toddlers receiving a fortified (Fe, Zn, vitamin A, calcium, folic acid) or non-fortified biscuit daily for 3 mo in weight or length at ages 9-16 mo of age. de Silva et al. (19) reported that infants who were assigned to receive 'home-based CFB' (i.e., a CFB made with common foods including red rice, red lentils, and vegetable oil) from 4-12 mo had significantly greater weight gain from 4-12 mo than those receiving mom's choice of CFB, but found no differences in length gain 4-12 mo of age. Virtanen et al. (16) found no significant differences between infants, who were randomly assigned to receive cow's milk that was either standard-fat, low-fat, or iron-fortified with either 50% vegetable fat and vitamin C, or 100% vegetable fat, with respect to weight at 18 mo, or weight change from 12-18 mo of age. Almquist-Tangen et al. (21) found that MCD at 6 mo of age, but not porridge or semi-solid foods, was significantly associated with high BMI (>1SD) at 12 mo and 18 mo of age. However, several potential key confounders were not adjusted for in analyses (SES, race/ethnicity, feeding practices) and no other outcomes were examined that could inform the results. For instance, it is unknown whether high BMI was driven by gains in FM or weight or decreases in length percentiles. Carruth et al. (27) reported that consumption of meat, mixed food, and/or table food by age 8 mo was associated with a smaller weight change from age 2-8 mo, although this did not remain significant after adjusting for length slope. Ianotti et al. (36) reported no differences between infants consuming animal source foods (meat, fish, egg, or milk) or other CFB (cereal, mixed or blended foods, stews, bread or other cereal products) from 6-12 mo of age with respect to MUAC, weight, length, or HC from 1-12 mo of age. Kalies et al. (37) reported a significantly lower risk of elevated weight gain (difference between weight at birth and at 24 mo of age) among infants consuming 'ready-made' vs. 'self-made' foods and 'mixed CFB' vs. 'self-made' foods. Santorelli et al. (43) found no significant association between intake of non-sweetened solid foods (e.g., baby rice, pureed vegetables, fruits or rice, and lentils/dhal) or sweetened foods (e.g. egg custard, rice pudding, sweetened rusks, biscuits and cake) and BMIZ at 3 y of age. Wosje et al. (48) found no significant differences between those consuming whole-milk vs. 2% fat milk with respect to (absolute or change in) weight, length, and body fat from 12-24 mo of age.

Amount of Other CFB. Two articles from one observational study mentioned previously (32, 33) examined intake in quintiles by weight and % total energy of additional CFB at 18 mo of age including dairy foods (milk, yogurt, cheese, ice cream, custard), milk (skim, whole and evaporated), fruits, vegetables, total extra foods (e.g., savory sauces, fats, and oils), fried potatoes, salty snacks (e.g., cheese snacks, corn chips), confectionary (e.g., chocolate, jellies), cereal foods, including bread, pasta, rice, and breakfast cereals and cereal-based products (e.g., cookies, cakes). In terms of significant findings, negative associations were identified between the amount of cereal-based products and dairy foods consumed and BMI at age 8 y. In addition, positive associations were identified between the amount of fruit intake and WC at 8 y of age. Although they did not reach significance, there were trends suggesting that greater intake of vegetables was associated with higher BMI at 8 y whereas greater intake of confectionary foods was associated with lower BMI at 8 y. The amount consumed of other remaining foods (e.g., milk, cereal-foods, fried potatoes; salty snacks) were not significantly associated with BMI in either analysis (32, 33).

Other CFB introduction. Three articles from one observational study (Generation R) examined the age of introduction to fruit or vegetable snacks (22, 29, 30). Two articles found no significant associations between fruit or vegetable snack introduction and body composition (22, 29). Durmus et al. (30) found that fruit or vegetable snack introduction at 4-5 mo relative to >5 mo was significantly associated with greater thickness (total FM) at age 24 mo. Durmus et al. (30) found no other associations between introduction at <4, 4-5, or >5 mo and other outcomes including total, peripheral, or central FM at 24 mo or odds of overweight or obesity at 6 y of age.

Kramer et al. (38) found that intake of “other solids” (not described) at age 9 mo was associated with significantly lower LAZ from 9-12 mo of age but found no association with WLZ, WAZ, or HC at any age interval. Carruth et al. (27) reported that age of vegetable introduction was associated with lower weight change from age 2-8 mo in the final predictive model, although this did not remain significant after adjusting for length slope. Schack-Nielsen et al. (44) reported that later introduction of vegetables and firm food were significantly associated with decreased risk of overweight at 42 y but not with BMI at 20-34 y. Later introduction of vegetables was associated with decreased BMI at 20–34 y and 42 y. Associations between egg introduction (continuous) and overweight at ages 20–34 y or 42 y were not significant. Introduction of firm food (bread and biscuits mixed with milk) was negatively associated with BMIZ at age 1 y, 10 y and 11 y but this did not persist at 42 y. Later introduction of spoon-feeding (continuous) was not associated with risk of overweight at 42 y but was significantly associated with lower BMI at 42 y and smaller WC at 42 y. When examined categorically, there was a non-significant trend for later introduction (≥ 4 vs. <4 mo) of spoon-feeding to be associated with decreased risk of overweight at 42 y. Schack-Nielsen et al. (44) also found no significant associations between number of food items from the CFB groups at ages 3, 4, 5, or 6 mo and risk of overweight at 42 y. Zheng et al. (49) reported that introduction to fish liver oil <3 vs. at 4-6 mo was significantly associated with increased risk of overweight at 4-5 y, but not obesity at 4-5 y. There were no significant associations between introduction to other CFB examined in that study (e.g., egg yolk, liver paste, tofu) and risk of overweight or obesity at 4-5 y of age (49).

Table 5. Studies that examined other CFB and growth, size, and body composition

Reference[1], country, analytic N	Independent variable/exposure[2]	Results for weight status	Results for body composition	Results for weight	Results for length/height	Results for circumference
Almquist-Tangen et al., 2013 (Almquist-Tangen, 2013) Sweden N: 2,404 12mo; 2,241 18mo	Milk cereal drink , Y/N at age 6mo	High BMI: at 12mo OR=1.66, 95%CI: 1.07-2.57, P=0.02; at 18mo OR=1.58 95%CI: 1.04-2.39, P=0.03				
	Porridge intake, Y/N at age 6mo	High BMI at 12 or 18mo, NSA				
	Semi-solids intake, Y/N at age 6mo	High BMI at 12 or 18mo, NSA				
Ay et al., 2008 (22) Netherlands N: 1012	Fruit snack introduction: <5 or >5mo		Skinfold thickness at 24mo, NSA			
Carruth et al., 2000 (27) U.S. N: 94	Food cluster present by age 8mo: any meat, mixed foods or table foods			Weight change 2-8mo, β=-0.1755, P=0.0324 but final model, NSA		
	Vegetable introduction, continuous			Weight change 2-8mo, β=-0.0567, P=0.0457 but final model,		

				NSA	
de Silva et al., 2007 (19) Non-RCT; Sri Lanka N: 152	Intervention: home-based CFB + recipes + mechanical blender from age 4-12mo vs. Control: CFB of mothers' choice from age 4-12mo			Weight gain 4-12mo: 2.43, SD=0.72kg vs. 2.02; SD=0.62kg, P=0.0002	Length gain 4-12mo, NSGD
Durmus et al., 2012 (30) Netherlands N: 779	Fruit or vegetable snack introduction: 4-5 vs. >5mo		Total, peripheral or central FM at 6mo, NSA; Total FM at age 24mo, β=1.46, 95%CI: 0.05, 2.88, P<0.05; Peripheral or central FM at 24mo, NSA		
	Fruit or vegetable snack introduction: <4 vs. >5mo		Total, peripheral or central FM at 6 or 24mo, NSA		
Durmus et al., 2014 (29) Netherlands N: 5063	Fruit or vegetable snack introduction: <4, 4-4.9, ≥5mo	Overweight or obesity at 6y, NSA	Total FM, android-gynoid fat ratio, abdominal fat, or BMI at 6y		
Garden et al., 2011 (33) Australia N: 362 (WC: 339)	Dairy products: combined milk and milk product yogurt, cheese, ice cream, custard intake (g, % total energy) at age 18mo		BMI at 8y, % energy, β=-0.21; 95% CI:-0.41, -0.01; P=0.04; g, NSA; WC at 8y, NSA		
	Milk: skim, whole, and evaporated intake (g, % total energy) at age 18mo		BMI at 8y, NSA; WC at 8y, NSA		

Fruit intake (g, % total energy) at age 18mo	BMI at 8y, NSA; WC at 8y, g β=0.63; 95% CI: 0.05, 1.2, P=0.03; % total energy β=0.56, 95% CI: 0.00, 1.1, P=0.05
Vegetables intake (g, % total energy) at age 18mo	BMI at 8y , g B=0.20; 95% CI:0.00, 0.40; Trend P=0.05, NSA; % energy, NSA; WC at 8y, NSA
Cereal-foods: bread, pasta, rice, breakfast cereals, etc. intake (g, % total energy) at age 18mo	BMI at 8y, NSA; WC at 8y, NSA
Total Extra foods: savory sauces, fats, and oils, etc. intake (g, % total energy) at age 18mo	BMI at 8y, NSA; WC at 8y, NSA
Fried Potatoes intake (g, % total energy) at age 18mo	BMI at 8y, NSA; WC at 8y, NSA
Salty snacks: potato crisps, cheese snacks, corn chips intake (g, % total energy) at age 18mo	BMI at 8y, NSA; WC at 8y, NSA
Confectionary Foods: chocolate, jellies, energy bars intake (g, % total energy) at age 18mo	BMI at 8y, β=-0.25, 95% CI: -0.49, 0.00, Trend P=0.05, NSA; WC at 8y, NSA
Cereal-based products: cookies, cakes, pies, buns, etc. intake (g, % total energy) at age 18mo	BMI at 8y, g: β=-0.23, 95% CI:-0.44, -0.22, P=0.03; %

		Energy, β=-0.27; 95% CI:-0.47, -0.07, P=0.01; WC at 8y g β=-0.61; 95% CI: -1.17, -0.05, P=0.03; % energy, β=-0.76, 95% CI: -1.29, -0.23, P=0.01
Garden et al., 2012 (32) Australia N: 298	Dairy products: combined milk and milk product yogurt, cheese, ice cream, custard intake (g, % total energy) at age 18mo	BMI trajectory birth-11.5y in boys or girls, NSA
	Milk: skim, whole, and evaporated intake (g, % total energy) at age 18mo	BMI trajectory birth-11.5y in boys or girls, NSA
	Fruit intake (g, % total energy) at age 18mo	BMI trajectory birth-11.5y in boys or girls, NSA
	Vegetables intake (g, % total energy) at age 18mo	BMI trajectory birth-11.5y in boys or girls, NSA
	Cereal-foods: bread, pasta, rice, breakfast cereals, etc. intake (g, % total energy) at age 18mo	BMI trajectory birth-11.5y in boys or girls, NSA
	Total Extra foods: savory sauces, fats, and oils, etc. intake (g, % total energy) at age 18mo	BMI trajectory birth-11.5y in boys or girls, NSA

	Fried Potatoes intake (g, % total energy) at age 18mo		BMI trajectory birth-11.5y in boys or girls, NSA			
	Salty snacks: potato crisps, cheese snacks, corn chips intake (g, % total energy) at age 18mo		BMI trajectory birth-11.5y in boys or girls, NSA			
	Confectionary Foods: chocolate, jellies, energy bars intake (g, % total energy) at age 18mo		BMI trajectory birth-11.5y in boys or girls, NSA			
	Cereal-based products: cookies, cakes, pies, buns, etc. intake (g, % total energy) at age 18mo		BMI trajectory birth-11.5y in boys or girls, NSA			
Iannotti et al., 2009 (36) Peru N: 232	CFB vs. CFB from animal sources (i.e., meat, fish, egg, or milk) at age 6-12mo		Skinfolds from 6-12mo or MUAC from 1-12mo, NSA	Weight 1-12mo, NSA	Length 1-12mo, NSA	HC 1-12mo, NSA
Kalies et al., 2005 (37) Germany N: 2,337	Mixed CFB vs. Self-made CFB			Weight gain at 24mo, NSA		
	Ready-made CFB vs. Self-made CFB			Weight gain at 24mo: OR 0.56, 95%CI: 0.39, 0.81, P=NR		
Kramer et al., 2004 (38) Belarus N: 17,046	Other solids intake, any vs. none at ages 1, 3, 6, or 9mo		WLZ 1-3, 3-6, 6-9, and 9-12mo of age, NSA	WAZ from 1-3, 3-6, 6-9, 9-12mo of age, NSA	LAZ from age 9-12mo: β=-0.082, 95% CI: -0.156, -0.008, P=NR; 1-3, 3-6, 6-9mo,	HC from 1-3, 3-6, 6-9, or 9-12mo of age, NSA

					NSA	
Liu et al., 1993 (8) RCT; China N: 164	Fortified Rusk: fortified (Fe, Zn, vit. A, calcium, folic acid) biscuit, 1/d for 3mo, ages 6-16mo vs. Unfortified Rusk: unfortified biscuit 1/d for 3mo, ages 6-16mo			Weight or increase in weight at ages ~9-16mo, NSGD	Length or increase in length, at ages ~9-16mo, NSGD	
Lind et al., 2004 (7) RCT; Sweden N: 263	Regular-phytate group: commercial MCD from oat and wheat flours mixed with milk powder and Fe-fortifed, at ages 6 to 12 mo Reduced-phytate group: phytate-reduced MCD from white-wheat flour and porridge from age 6-12 mo Infant formula group: milk-based infant formula and porridge			WAZ at 6, 12, 18 mo, NSGD	LAZ at 6, 12, 18 mo, NSGD	HC at 6, 12, 18 mo, NSGD; MUAC at 6, 12, 18 mo, NSGD
Santorelli et al., 2014 (43) U.K. N: 1327	Non-sweetened solid foods introduction: baby rice, pureed vegetables, fruits or rice, and lentils/dhal		BMIZ at 3y, NSA			
	Sweetened foods introduction: egg custard, rice pudding, sweetened rusks, biscuits and cake (plus non-sweetened foods when given together)		BMIZ at 3y, NSA			
Schack-Nielsen et al., 2010 (44) Denmark N: 5068	Spoon-feeding introduction, continuous	At 42y, overweight, NSA; obesity, NSA	BMI ages: 1-34y, NSA; 42y, β=-0.046, 95%CI: -0.86, -0.006, P=0.03; WC at 42y, -0.25 cm/mo, 95% CI -			

		0.49, -0.01
Spoon-feeding introduction, ≥4 vs. <4mo	Lower risk of overweight at 42y, P=0.053	
Vegetable introduction, continuous	At 42y, overweight, OR 0.90, 95%CI: 0.81, 0.98, P=0.014; obesity, NSA	BMIZ at ages: 20–34y, β=-0.072; 95% CI -0.133, -0.010; 42y, β=-0.064; 95%CI: -0.101, -0.027
Vegetable introduction, ≥4 vs. <4mo	Lower risk of overweight at 42y, P=0.046	
Egg introduction, continuous	At 42y, overweight, NSA; obesity, NSA	BMI at 20-34y or 42y, NSA
Egg introduction, ≥4 vs. <4mo	Overweight at 42y, NSA	
Firm food introduction, continuous	At 42y, overweight, OR 0.92, 95%CI: 0.86, 0.98, P=0.012; obesity, NSA	BMIZ at ages: 1y, β=-0.053, 95%CI: -0.082, -0.024; 10y, β=-0.054, 95%CI: -0.096, -0.012; 11y, β=-0.057, 95%CI: -0.101, -0.0103; 20-34y or 42y, NSA
Firm food introduction, ≥4 vs. <4mo	Overweight at 42y, NSA	

	# of food items at 3, 4, 5, 6mo	Overweight at 42y, NSA			
Virtanen et al., 2001 (16) RCT; Sweden N: 36	Cow's milk: Low-fat or standard-fat, ad libitum at age 12-18mo vs. Fe-fortified cow's milk: ferrous gluconate-fortified with 50% vegetable fat or ferrous lactate-fortified with 100% vegetable fat, ad libitum at age 12-18mo			Weight at 18mo,NSGD; weight change from 12-18mo, NSGD	
Wosje et al., 2001 (48) U.S. N: 51	2% cow's milk vs. whole at age 12mo		% body fat, % body fat z score, % body fat gain, or change in % body fat z-score from 12-24mo, NSA	Weight, weight z-score, weight gain, or change in weight z-score from 12-24mo, NSA	Length, length z score, length gain, or change in length z score from 12-24mo, NSA
Zheng et al., 2015 (49) China N: 40,510	Fish liver oil introduction, ≤3 vs 4-6mo	Overweight at 4-5y, OR 1.08, 95%CI: 0.99, 1.17, P=0.004; Obesity, NSA	Higher BMI at 4-5y, P<0.001		
	Fish liver oil introduction, 4-6 vs. >6mo	Overweight at 4-5y, NSA; Obesity at 4-5y, NSA	BMI at 4-5y, NSA		
	Egg yolk introduction, ≤3 vs 4-6mo	Overweight at 4-5y, NSA; Obesity at 4-5y, NSA	Lower BMI at 4-5y, P=0.046		
	Egg yolk introduction, 4-6 vs. >6mo	Overweight at 4-5y, NSA; Obesity at 4-5y, NSA	BMI at 4-5y, NSA		

	Other foods introduction, ≤3 vs 4-6mo or 4-6 vs. >6mo: fish paste, liver paste, tofu, bread/steamed bun/fine dried noodle, or pureed noodle/cookies	Overweight at 4-5y, NSA; Obesity at 4-5y, NSA	BMI at 4-5y, NSA

1. All studies, except those noted as RCT or non-RCT, followed a prospective cohort design
2. The independent variable/exposure of interest included types and/or amounts of CFB, which encompassed dietary patterns during the complementary feeding period and timing of specific CFB; this section of studies examined various other CFB that did not fit into previously labeled sections such as milk and/or dairy products, vegetables, fruits, egg, and categories such as “ready-made” or “animal source” foods.
3. Outcomes were organized for practicality into columns: weight status, body composition, weight, length or height, and head circumference. Results described in the respective columns are based on outcome similarity and in accordance with the analytical framework as follows: Weight status included risk/incidence/prevalence/frequency of malnutrition, healthy weight, overweight, or obesity; Body composition included measures, indices, and proxies of overall adiposity such as lean mass, fat mass (FM), % body fat, weight-to-height ratios such as BMI, BMIZ, WLZ, central adiposity or waist circumference, and arm or thigh circumferences; Weight included weight-specific measures such as weight-for-age z-score (WAZ), Length or Height included length-specific measures such as length-for-age z-score (LAZ); Head circumference included head circumference

Abbreviations: BF, breast-fed; CFB, complementary food/beverage; Fe, iron; FF, formula-fed; FM, fat mass; LAZ, length for age z-score; MUAC, mid-upper arm circumference; NR, not reported; NSA, no significant association; NSGD, no significant group differences; RCT, randomized controlled trial; WC, waist circumference; WAZ, weight for age z-score; WLZ, weight for length z-score; Zn, zinc

Dietary patterns

Eleven articles examined distinct dietary patterns during the CF period, including one RCT *(12)* and 10 articles from observational studies *(20, 23-25, 28, 34, 41, 42, 46, 47)*. Dietary patterns at different ages from the same cohort were analyzed in multiple articles as follows: Infant Feeding Practices Study *(42, 47)* and the Southampton Women's Survey *(23, 41)* (see **Table 6**).

Seven articles from observational studies identified various associations between the dietary patterns examined and growth, size, body composition and/or overweight or obesity status outcomes (23, 28, 34, 41, 42, 46, 47). Results reported in these seven articles are summarized below briefly. Table 6 provides details regarding the specific dietary patterns that were compared and additional information can be found in Supplemental Table 1.

Baird et al. (33) found that adherence to the ‘Infant guidelines’ pattern at age 6 mo was associated with significantly greater conditional gains in weight and skinfold thickness from 6-12 mo and greater absolute skinfold thickness at 12 mo of age. Infants who were in the highest compared to lowest quartile for scores on the U.K. ‘Infant guidelines’ pattern at 6 mo gained ~0.12kg more weight and ~0.49mm more in skinfold thickness from 6-12 mo of age. Greater adherence to the 'Adult foods' pattern at 6 mo was significantly associated with lower weight gain from 6-12 mo of age but not with skinfold thickness (at age 12 mo or gain from 6-12 mo). There were no significant associations between either dietary pattern at 6 mo and weight or length at 12 mo or change in length from 6-12 mo of age.

Robinson et al. (51) reported that greater adherence to the U.K. ‘Infant guidelines’ pattern at age 12 mo was significantly associated with increased lean mass and lean mass index, but not with BMI, FM, or FMI at 4 y of age.

Rose et al. (52) used latent class analysis to assign infants based on frequency of intake to one of five dietary patterns described in Table 6. Outcomes were assessed based on maternal-report of height and weight. Rose et al. (52) reported that infants in the ‘MXHED’ group had the highest prevalence of overweight at 1 y of age compared to all other classes. The ‘MXHED’ and ‘FFLV’ groups had significantly higher WLZ at 1 y than other classes (‘BFLV’, ‘BFFV’, or ‘FFFV’).

Wen et al. (57) assigned adherence scores to each infant for four dietary patterns at age 6 mo, identified via principal component analysis. Outcomes were assessed based on reported weight and height. Wen et al. (57) found no significant association between adherence to the U.S. ‘Infant guideline solids’ pattern at 6 mo and change in BMIZ from 6-12 mo. However, greater adherence to the other three patterns at 6 mo was associated with greater change in BMIZ from 6-12 mo. Both the ‘High dairy/regular cereal’ and ‘High sugar/fat/protein’ patterns were associated with smaller increases in LAZ from age 6-12 mo.

Golley et al. (44) assigned each infant a CF utility index (CFUI) score at age 6 mo, which was derived and analyzed from dietary pattern scores as a continuous variable from 14 components such as BF duration, age of introduction to solids, textured foods, and minimizing ready-made infant foods. Higher CFUI scores reflected higher adherence to U.K. guidelines for CF. Golley et al. (44) reported that higher CFUI scores at 6 mo were not associated with BMI at 7 y of age but were (weakly) associated with smaller WC at 7 y.

Two articles (28, 46) from observational studies reported similar relationships between dietary patterns and wasting (defined according to arm-muscle-area, which was calculated from MUAC and triceps skinfold thickness) and/or malnutrition (defined as WAZ, LAZ, and/or WLZ of less than 2 SD, respectively underweight, stunting, or wasting, according to Thai references). Dagnelie and Staveren found that a ‘Macrobiotic’ diet compared to ‘Omnivorous’ diet at age 4-18 mo (see Table 6) was significantly associated with higher wasting, lower weight-for-length, lower weight velocity, lower length velocity, lower MUAC velocity, lower arm muscle area velocity, and lower HC velocity (37). However, there were no significant differences in crown-rump length velocity, triceps or subscapular skinfold thickness velocities (mm/y), biiliacal width velocity (cm/y), or arm fat area velocity (mm^2/y). Tantrecheewathorn reported that ‘Inadequate’ compared to ‘Adequate’ diets (see Table 6) were significantly associated with increased relative risk of malnutrition, defined as either underweight, stunted, or wasted (55).

Four articles reported no significant associations between dietary patterns (observed, or derived by analyses) during the CF period and growth, size, and body composition outcomes (12, 20, 24, 25). Results showed no significant differences between the respective dietary patterns examined in each study and the following outcomes examined: (mean or change in) weight, length, HC, or MUAC at 6-12 mo of age (21), overweight/obesity status at 45-48mo (29); body composition, weight, or length at 4-6 mo (ref 33); or body composition at age 24 mo (34).

Table 6. Studies that examined dietary patterns during the complementary feeding period and growth, size, and body composition

Reference[1], country, analytic N	Dietary patterns[2]	Comparison	Results for weight status	Results for body composition	Results for weight	Results for length/height	Results for head circumference
Abraham et al., 2012 (20) Scotland N: 4493	Two dietary patterns were identified at age 19-24mo: 'Negative pattern': low fruit, vegetable; high sweets, crisps, soft drinks, snacking 'Positive pattern': high fruit, vegetable; low snacking	'Negative' vs. 'Positive' pattern	Overweight or obese at 45-48mo, NSA				
Baird et al., 2008 (23) U.K. N: 1740	Two dietary patterns were identified at age 6mo: 1) 'Infant guidelines': high frequency of consumption of vegetables, fruit, meat, fish, home-prepared foods, breast milk; low frequency of consumption of commercial baby foods in jars and formula	Higher vs. lower quintiles for 'Infant guidelines'		Gain in skinfold age 6-12mo, β=0.11, 95%CI: 0.04, 0.18, P=0.002; corresponding to 0.26 SDS; Skinfold thickness at 12mo, β=0.13, 95%CI: 0.01, 025, P=0.03	Gain in weight age 6-12mo, β=0.10, 95%CI: 0.04, 0.17; P=0.002, corresponding to 0.24 SDS; Weight at 12mo, NSA	Gain in length age 6-12mo, NSA; Length at 12mo, NSA	
	2) 'Adult foods': high frequency of consumption of bread, savory snacks, biscuits, squash, breakfast cereals, and crisps;	Higher vs. lower quintiles for 'Adult foods'		Gain in skinfold age 6-12mo, NSA; Skinfold thickness at 12mo, NSA	Gain in weight age 6-12mo, β=-0.08, 95%CI: -0.15, -0.02, P=0.0015; Weight at	Gain in length age 6-12mo, NSA; Length at 12mo, NSA	

	low frequency of breast milk, baby rice, and cooked and canned fruit				12mo, NSA		
Barton et al., 2002 (24) U.S. N: 52	Two dietary patterns were observed at age ≤4-6mo: ‘Inappropriate foods’: home-prepared mashed potatoes and gravy, green beans with fat-back, pork, bacon, steak, high-sugar high-fat puddings, desserts, soda, and juice >6oz/d ‘Appropriate foods’: Parent-prepared solids w/o extra fat, salt, sugar	‘Inappropriate’ vs. ‘Appropriate’			Weight at 4-6mo, NSA	Length at 4-6mo, NSA	HC at 4-6mo, NSA
Bell et al., 2013 (25) Australia N: 493	Four dietary patterns were identified at age 13-16mo: ‘Core’: fruit, grains, nonwhite bread, vegetables, cheese, eggs, nuts and seeds ‘Basic combination’: basic core + non-core w/o fruit or vegetables ‘Basic core’: white bread, milk ‘Non-core’: spreads, juice, ice-cream	Each pattern relative to outcomes		BMIZ at 24mo, NSA			

Dagnelie and van Staveren, 1994 (28) Netherlands N: 106	Two dietary patterns were observed at ages 4-10mo 'Macrobiotic diet': Included unpolished rice, pulses and vegetables with a high fiber content, small additions of seaweeds, fermented foods, nuts, seeds, and seasoned foods; Avoided vit. D supplements, products of animal origin such as meat and dairy product, fat/oil, and fish. 'Omnivorous diet': Not described	'Macrobiotic 'vs. 'Omnivorous'	Wasting 30% vs. 2%, P<0.001	MUAC velocity, 1.0 vs. 2.3 cm/y, P < 0.01; Smaller arm muscle area velocity, 413 vs. 624 mm^2/y, P < 0.01; Slower weight-for-length, P<0.05. Triceps or subscapular skinfold thickness velocities, NSA; biiliacal width velocity, NSA; arm fat area velocity, NSA	Weight velocity, 3.3 vs. 4.4 kg/y, P<0.001	Length velocity, 13.2 vs. 16.7 cm/y, P<0.001; Crown-rump length velocity, NSA	Lower HC velocity, 5.2 vs. 6.1cm/y. P < 0.05
Golley et al., 2013 (34) U.K. N: 7834	Each infant received a CFUI score at age 6mo, derived and analyzed as a continuous variable from 14 components such as BF duration, textured foods, and minimizing ready-made infant foods	CFUI scores (higher scores reflected higher adherence to CF guidelines)		BMI at 7y, NSA; WC at 7y: β=-0.15, 95% CI: -0.31, -0.002, P=0.046			
Olaya et al., 2013 (12) RCT; Colombia N: 76	Intervention group: individual, face-to-face nutrition counseling with 3 key messages, 1) the importance of continuing BF alongside CFB, 2) red meat as a source	Intervention vs. Control		MUAC at 12mo, NSGD; Change in MUAC 6-12mo, NSGD	Mean WAZ at 12mo, NSGD; Change in WAZ 6-12mo, NSGD	Mean LAZ at 12mo, NSGD; Change in LAZ 6-12mo, NSGD	HC at 12mo, NSGD; Change in HC 6-12mo, NSGD

	of Fe to prevent anemia (>5 portions/wk, red meat, chicken liver and heart), and 3) daily fruit and vegetables as part of a healthy diet from ages 6-12mo Control group: standard CF advice from health care professionals on meat consumption, but no advice on frequency or amount of foods was given, from ages 6-12mo				
Robinson et al., 2009 (Robinson, 2009) U.K. N: 536	One dietary pattern was identified at age 12mo: ‘Infant guidelines’ pattern: High consumption of fruit, vegetables, cooked meat and fish, and other home-prepared foods (rice, pasta), and low consumption of commercial baby foods	Higher vs. lower ‘Infant guidelines’ . scores		Increased lean mass at 4y, P=0.003; Increased lean mass index at 4y, P=0.004; BMI, FM, or FMI at 4y, NSA	
Rose et al., 2016 (42) U.S. N: 1029	Five dietary patterns were identified at age 9mo: BFFV, ‘Breastfed Fruits and Vegetables’: Breastmilk, fruits, and vegetables, and low	Each pattern relative to outcomes	Prevalence of overweight at 1y highest for MXHED relative to prevalence	WLZ at 1y: BFFV: 0.09; BFLV: -0.02; FFFV: 0.47; FFLV: 0.70, MXHED: 0.74, P<0.01	WAZ at 1y: BFFV: -0.30; BFLV: -0.60; FFFV: -0.06; FFLV: -0.11, MXHED: -0.10. P<0.001

	intake of energy-dense foods BFLV, ‘Breastfed Low Variety’: Breastmilk, and low intake of fruits and vegetables, low diet variety FFFV, ‘Formula-Fed Fruits and Vegetables’: Formula, fruits, and vegetables, and low intake of energy-dense foods FFLV, ‘Formula-Fed Low Variety’: Formula, and low intake of fruits and vegetables, low diet variety MXHED, ‘Mixed High Energy Density’: Breastmilk and formula, low intake of fruits and vegetables, diet variety, and higher intake of energy-density foods (e.g. french fries, sweet foods)		for BFFV, BFLV, FFFV, FFLV, values NR
Tantracheewathorn, 2005 (46) Thailand N: 140	Two dietary patterns were observed prior to age 12mo: ‘Adequate’ CFB: consumed a variety of food from various food groups (rice and grains, fruits, vegetables, milk, meat, eggs, fat), and	‘Inadequate’ vs. ‘Adequate’	Malnutrition, OR 4.7, 95%CI: 1.1, 21.9, P=0.04

	adequate amounts of nutrient and energy compared with Thai Recommended Dietary Allowances ‘Inadequate’ CFB: not described						
Wen et al., 2014 (47) U.S. N: 530	Four dietary patterns were identified at age 6mo: ‘Infant guideline solids’: Baby cereal, fruit, vegetables, meat/chicken ‘High sugar/fat/protein’: Sweet drinks, french fries, fish/shellfish, nut foods, eggs, sweet foods ‘High dairy/regular cereal’: Cow's milk, other dairy, 100% juice, non-baby cereals/starches ‘Formula’: Formula, low intakes of breast milk	Each pattern relative to outcomes		Change in BMIZ from age 6-12mo: High sugar/fat/protein pattern: β=1.00, 95%CI: 0.11, 1.89; Infant guideline solids: β=0.06, 95%CI: -0.09, 0.22; Formula β=0.25, 95%CI: 0.09, 0.40; High dairy/regular cereal β=0.32, 95%CI: 0.10, 0.53		Change in LAZ from age 6-12mo, High sugar/fat/protein pattern: β=-1.36, 95%CI: -2.35, -0.37; Infant guideline solids: β=0.12, 95%CI: -0.05, 0.29; Formula β=0.01, 95%CI: -0.16, 0.18; High dairy/regular cereal β=-0.30, 95%CI: -0.54, -0.06	

1. All studies, except those noted as RCT or non-RCT, followed a prospective cohort design
2. The independent variable/exposure of interest included types and/or amounts of CFB, which encompassed dietary patterns during the complementary feeding period and timing of specific CFB; The studies in this section examined dietary patterns classified by observation or statistical analyses (e.g., adherence scores derived from latent class, cluster, or principal component analysis)
3. Outcomes were organized for practicality into columns: weight status, body composition, weight, length or height, and head circumference. Results described in the respective columns are based on outcome similarity and in accordance with the analytical framework as follows: Weight status included risk/incidence/prevalence/frequency of malnutrition, healthy weight, overweight, or obesity; Body composition included measures, indices, and proxies of overall adiposity such as lean mass, fat mass (FM), % body fat, weight-to-height ratios such as BMI, BMIZ, WLZ, central adiposity or waist circumference, and arm or thigh circumferences; Weight included weight-specific measures such as weight-for-age z-score (WAZ), Length or Height

included length-specific measures such as length-for-age z-score (LAZ), linear velocity; Head circumference included head circumference.

Abbreviations: BF, breast fed; BFFV, breast fed fruits and vegetables pattern; BFLV, breast fed low variety pattern; CFB, complementary food/beverage; CFUI, complementary feeding utility index; Fe, iron; FF, formula-fed; FFFV, formula-fed fruits and vegetables pattern; FFLV, formula-fed low variety pattern; FM, fat mass; FMI, fat mass index; LAZ, length for age z-score; MUAC, mid-upper arm circumference; MXHED, mixed high energy density pattern; NR, not reported; NSA, no significant association; NSGD, no significant group differences; RCT, randomized controlled trial; SSB, sugar-sweetened beverage; WC, waist circumference; WAZ, weight for age z-score; WLZ, weight for length z-score

Discussion

Meat

Moderate evidence indicates that higher versus lower meat intake or meat versus Fe-fortified cereal intake over a short duration (~3 mo) during the CF period does not favorably or unfavorably influence growth, size, or body composition. There is insufficient evidence to determine a relationship between meat intake and prevalence/incidence of overweight or obesity. Despite the majority of evidence coming from well-designed RCTs, these studies were not necessarily designed to determine the effects of adequate or inadequate amounts of meat consumption on growth-related outcomes. For example, the objective of Yeung and Zlotkin (18) was to prevent iron depletion in cow's milk-fed infants by testing CFBs that are higher in iron content, and collected anthropometric measurements mainly to ensure that growth was not impaired during the trial. Among the trials, there are several important methodological limitations such as short durations ~3 mo, variable length of follow-up, relatively small sample sizes, insufficiently described data, statistical analyses, and/or outcome assessment methods. Findings from one study in China may be less generalizable due to participants coming from a rural community with high rates of stunting (15). All of the RCTs reported outcomes prior to 18 mo of age and therefore do not provide information on growth, size, or body composition later in childhood.

Five studies (two RCTs and three observational studies) examined the amount of meat given and BMI only, weight only, or weight and other outcomes. Neither of the trials assessed the impact of high loss to follow-up or provided sufficient detail to determine the reliability/validity of outcome assessment (2, 3)and did not adjust for baseline differences between groups (3), or did not report results for all potential outcomes (2). Observational studies pointed to positive relationships between meat intake and outcomes but varied in terms of when meat intake was examined, how outcomes were assessed, and did not adjust analyses for potential key confounders (SES, maternal age, or gestational age).

Cereal

Limited evidence suggests that type or amount of cereal given does not favorably or unfavorably influence growth, size, body composition, and/or prevalence/incidence of overweight or obesity. Results from six studies (3 RCTs) provided little evidence of a strong relationship between the type or amount of cereal and the outcomes assessed. Studies varied considerably in the type or amount of cereal provided (e.g., wheat/soy vs. wheat/milk fortified weaning cereal; Fe-fortified vs. non-fortified cereal) and outcomes examined. Limitations include a lack of description regarding statistical methods, potential impact of unintended exposures due to other CFB consumed, indirectness, failure to adjust statistical analyses for multiple comparisons, and limited generalizability.

CFB with different fats/ fatty acid composition

Moderate evidence suggests that consumption of complementary foods with different fats and/or fatty acid composition does not favorably or unfavorably influence growth, size, or body composition although there is not enough evidence regarding overweight or obesity specifically. There was variation in the different CFB and/or fats/fatty acids tested (4, 6, 10, 13), with two studies examining egg-yolk as sources of DHA, one examining fish, and another examining a CFB meal with fatty-acids from different oil sources. None of the studies examined outcomes at ages older than 24 mo. Most of the articles lacked sufficient description of outcome assessment methods and therefore, the validity/reliability of outcomes could not be determined. Two articles did not account for high loss to follow-up (6, 13). One of the RCTs may not have been adequately powered to detect differences in growth (13).

SSBs.

Limited evidence suggests that SSB consumption during the CF period is associated with increased risk of obesity in childhood, but is not associated with other measures of growth, size, and body composition. Two studies examined the relationship between SSB consumption during the CF period and risk of obesity in childhood. One of those two studies demonstrated significant increased risk of obesity in childhood and was weighed more heavily than the other study due to its strength including sample size and adjustment for potential confounders. Three studies examined the relationship between SSB consumption during the CF period and other outcomes (BMI, BMI trajectory, BMIZ, and WC) in childhood, with all finding no significant associations with these other measures. The relationship between early introduction of SSBs in the CF period and later childhood overweight or obesity could reflect unmeasured confounding factors. A stronger conclusion could not be drawn due to an inadequate number of studies (all were observational), inconsistencies in how SSBs were examined (e.g., age of introduction of SSBs), and lack of information on quantities consumed.

Juice drinks and 100% juice.

Limited evidence suggested a significant positive association between juice intake and infant weight-for-length and child BMI z-scores. However, there is not enough evidence to determine the relationship between juice intake and other outcomes (i.e., growth, size, and/or body composition). The evidence came from only a few observational studies, most of which examined juice intake without describing the type of fruit or % of fruit juice in the juice, although one study specified orange juice or other 100% fruit juice (45). Notably, there were a few positive and significant associations observed between juice intake in relatively large amounts (e.g., 8-15 oz) or at young ages (e.g., at 9 mo) and WLZ, BMIZ, or WAZ. There was variation in types and age of outcomes assessed across studies, with most reporting weight relative to length outcomes (e.g., WLZ, BMI) at different ages. The reliability/validity of measures for outcome assessment could not be determined in several of these studies because weight and/or length was obtained from maternal report, unstandardized methods, or was not reported.

Other CFB

No conclusion could be made about the relationship between other CFB (vegetables, fruit, dairy products and/or cow's milk, cereal-based products, milk-cereal drink, and/or categories such as "ready-made" foods) and growth, size, body composition, and/or prevalence/incidence of overweight or obesity. This was primarily due to heterogeneity in study design and the types of other CFB examined (e.g., distinct CFB such as cow's milk, MCD, vegetables, fruit, tofu, biscuits/breads, and/or groupings such as dairy products, animal source foods, sweetened/confectionary foods, 'mixed' foods, and ‘ready-made’ foods). The majority of evidence was observational, although data were included from several RCTs and one non-RCT. There were also the following:

- limited generalizability to the U.S. population due to CFB used or CF practices at the time of the study,
- inadequacy of statistical methods regarding adjustment for multiple comparisons,
- indirectness with which some studies examined the link between types or amounts of other CFB and outcomes,
- variation in outcome types and assessment methods, and
- inconsistency in which analyses were adjusted for potential confounders (e.g., SES, race and/or ethnicity, feeding practices, or birth size).

Dietary patterns

No conclusion could be made about the relationship between distinct dietary patterns during the CF period and growth, size, body composition, or prevalence/incidence of malnutrition, overweight or obesity (Table 8). The conflicting evidence precludes the ability to draw a conclusion due to heterogeneous analyses of dietary patterns. The studies were difficult to compare and contrast due to the wide variation in the specific dietary patterns compared, as well as the outcomes assessed. In several cases, the labelling of dietary patterns carried judgement (e.g., ‘Inappropriate’ or ‘Inadequate’), which may or may not correspond to evidence-based infant feeding.

Several articles examined the relationship between dietary patterns that align with CF guidelines and growth, size, and/or body composition outcomes. Although some studies emphasized fruits, vegetables, and meats in a pattern labelled “Infant guidelines’, there were differences in other emphasized foods, such as baby cereal (56) or commercial baby food (50), across other patterns. Several articles identified dietary patterns that do not clearly align with CF guidelines and varied widely in specific foods or food groups included (e.g., high frequency of french fries, sweet foods, fish/shellfish, nut foods, and eggs (47) compared to bread, snacks, crisps, breakfast cereals and low frequency of human milk and cooked/canned fruit (23)).These prospective studies are likely confounded by unmeasured factors that may differ between families that follow infant feeding guidelines vs. those who do not. For example, families that adhere to infant feeding guidelines may choose healthier diets and lifestyles (e.g. physical activity) later in the child’s upbringing.

The results from Dagnelie and van Staveren (37) and Tantracheewathorn (55) are less generalizable to the U.S. population due to the types of dietary patterns examined (i.e., ‘Macrobiotic’ vs. ‘Omnivorous’; ‘Inadequate’ vs. ‘Adequate’). Neither of these observational studies adjusted for several confounding factors nor provided sufficient detail regarding comparison diets (e.g., ‘Omnivorous’; ‘Inadequate’). The relationship between dietary patterns during the CF period and overweight or obesity status was examined in two articles from observational studies, which varied in the specific dietary patterns assessed and reported inconsistent results.

Limitations

Across the entire body of evidence, there were concerns surrounding methodological limitations and internal validity. One methodological limitation across most of the observational studies includes the potential for reverse causality. That is, the child may already be growing faster or slower when decisions regarding feeding frequency, types, or amounts of CFB are made. Another limitation includes the variability in controlling for confounding factors. While most studies did account for infant milk-feeding practices, the majority of observational studies (22 of 30) did not adjust for two or more key confounders (see Figure 1). Most of the RCTs enrolled infants who were EBF (4, 5, 11-15, 17) or EFF (1, 9) to 4 mo of age or older.

With few exceptions, the included studies were not designed to evaluate different amounts of CFB but rather varying types of CFB relative to outcomes. In addition, many studies were designed to test the influence of CFB in relation to outcomes other than those of interest in this SR. For example, several studies aimed to test the influence of Fe-fortified cereal on iron status, using anthropometric measures as secondary outcomes. In many cases, the amount of CFB provided would not be expected to affect growth and body composition over the duration in which it was tested. Several studies examined timing of specific types of CFB as opposed to more directly comparing different types and/or amounts of CFB in relation to growth outcomes (22, 26, 29, 30, 38, 43, 44, 49).

Most of the studies examined outcomes at multiple time points or assessed change over time to capture growth. However, a few trials (3, 6, 10) and many observational studies (20, 22, 25, 29, 31, 34, 41-43, 47-49) examined outcomes at only a single time point. Of those studies, all of the observational studies adjusted analyses for baseline or current anthropometric status (25, 29, 34, 47, 49), or birth weight (20, 31, 41-43, 49). Engelmann (3) reported differences between groups in baseline anthropometrics that were not accounted for in analyses. Both Libuda et al. (6) and Makrides et al. (10) lacked sufficient detail regarding outcome assessment, though Libuda et al. (6) reported no differences in birth weight between groups at baseline.

Another limitation is the limited reliability/validity of assessment methods for both outcome assessment and assessment of types and/or amounts of CFB. Several studies used weight/height that was reported weight/height, not measured, from various sources (31, 40, 42, 44, 47), did not fully describe their methods for assessing all outcomes (10, 13, 17, 20, 24, 35, 49), or used unstandardized methods (2, 37, 38).

Several authors of the RCTs noted limitations regarding insufficient sample size/power and/or did not assess the impact of high loss to follow-up (2, 3, 6, 13, 16-18). Most of the observational studies had adequate sample sizes to investigate the relationship between types and/or amounts of CFB and outcomes although 15 (of 30) did not account for missing data/high attrition rates. Adequacy of statistical methods in several of the RCTs was insufficient due to a lack of detail describing data in analyses or figures (9, 17, 19, 27, 46). Adequacy of statistical methods in several of the observational studies could not be determined due to insufficient description and/or lack of statistical correction for multiple comparisons (32, 33, 35, 44, 49). In many of the RCTs, blinding of investigators could not be determined and participants were not blinded due to receipt of specific types and/or amounts of CFB. Blinding of outcome assessors could not be determined in the majority of the observational studies

Research recommendations

In order to better understand the relationship between types and/or amounts of CFB and growth, size, body composition, and/or risk of overweight or obesity, future research should consider:

- Rigorous study designs that directly examine the effects of specific types and amounts of CFB such as fruits, vegetables, meat, cereal, oil sources of fat/fatty acids, and dairy products on multiple growth-related outcomes over longer duration of intervention and follow-up.
- Evidence examining foods that may be historically non-traditional complementary foods in settings such as the U.S. (e.g., legumes, nuts and seeds).
- Additional observational evidence regarding consumption of CFB that are not nutrient-dense (e.g., contain added sugars, refined starches, or solid fats) during the CF period, which may influence energy balance, growth, and development
- Sufficient breadth and depth of duration of follow-up to determine short- and long-term influences of CFB on growth, size, and body composition (i.e., multiple studies that examine the relationship between types and amounts of CFB consumed and outcomes shortly after the CF period as well as into childhood, adolescence, and adulthood).
- Consistency across research investigating dietary patterns during the CF period, with respect to labeling dietary patterns (avoiding judgements about "adequacy"), analytical methods used to derive and assign patterns, foods and food groupings included; and documentation of human milk and/or formula intake.

Additional adjustments in observational studies to the extent possible for confounding factors, including: parental education, socioeconomic status, child sex, maternal age, race/ethnicity, feeding practices including dietary intake/patterns between baseline and follow-up, birth size, gestational age, baseline growth status.

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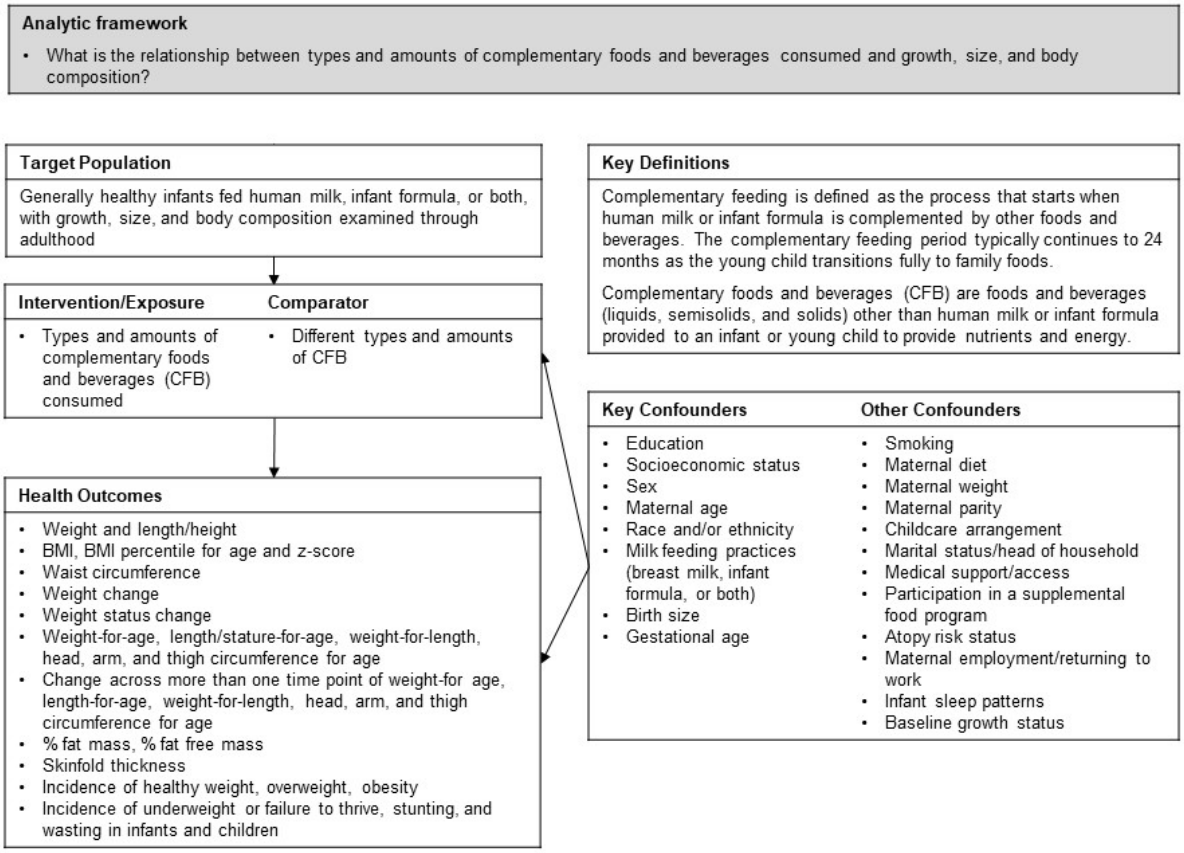
ANALYTIC FRAMEWORK

The analytic framework illustrates the overall scope of the review, including the population, the interventions and/or exposures, comparators, and outcomes of interest. It also includes definitions of key terms and identifies key confounders considered in the systematic review. This is the analytic framework for the systematic reviews conducted to examine the relationship between complementary feeding and growth, size, and body composition.

Figure 1: Analytic framework



SEARCH PLAN AND RESULTS

Inclusion and exclusion criteria

This table provides the inclusion and exclusion criteria for the systematic review question(s) on the types and amounts of CFB consumed and growth, size, and body composition. The inclusion and exclusion criteria are a set of characteristics to determine which studies will be included or excluded in the systematic review.

Table 7. Inclusion and exclusion criteria

Category	Inclusion Criteria	Exclusion Criteria
Study design	• Randomized controlled trials • Non-randomized controlled trials • Prospective cohort studies • Retrospective cohort studies • Case-control studies • Pre/post studies with a control	• Cross-sectional studies • Uncontrolled studies • Pre/post studies without a control • Narrative reviews • Systematic reviews • Meta-analyses
Independent variable (intervention or exposure)	Types and amounts of complementary foods and beverages (CFB) consumed. CFB are foods and beverages other than human milk or infant formula (liquids, semisolids, and solids) provided to an infant or young child to provide nutrients and energy.	Isolated consumption of human milk, infant formulas (e.g., milk-based, soy, partially-hydrolyzed, extensive-hydrolyzed, amino acid-based), fluid cow's milk before 12 months of age, or vitamin and mineral supplements (e.g., iron drops)
Comparator	Different types and amounts of CFB	N/A
Dependent variables (outcomes)	• Weight and length/height • BMI, BMI percentile for age and z-score • Waist circumference • Weight change • Weight status change • Weight-for-age, length/stature-for-age, weight-for-length, head, arm, and thigh circumference for age • Change across more than one time point of weight-for age, length-for-age, weight-for-	N/A

	length, head, arm, and thigh circumference for age • % fat mass, % fat free mass • Skinfold thickness • Incidence of healthy weight, overweight, obesity • Incidence of underweight or failure to thrive, stunting, and wasting in infants and children	
Date range	• January 1980 - July 2016	
Language	• Studies published in English	• Studies published in languages other than English
Publication status	• Studies published in peer-reviewed journals	• Grey literature, including unpublished data, manuscripts, reports, abstracts, conference proceedings
Country [1]	• Studies conducted in Very High or High Human Development Countries	• Studies conducted in Medium or Low Human Development Countries
Study participants	• Human subjects • Males • Females	• Hospitalized patients, not including birth and immediate post-partum hospitalization of healthy babies
Age of study participants	• Age at intervention or exposure: o Infants (0-12 months) o Toddlers (12-24 months) • Age at outcome: o Infants (0-12 months) o Toddlers (12-24 months)	• Age at intervention or exposure: o Child (2-5 years) o Child (6-12 years) o Adolescents (13-18 years) o Adults (19 and older) o Older adults (65 to 79 years)

	o Child (2-5 years) o Child (6-12 years) o Adolescents (13-18 years) o Adults (19 and older) o Older adults (65 to 79 years) o Older adults (80+ years)	o Older adults (80+ years)
Health status of study participants	• Studies done in generally healthy populations • Studies done in populations where infants were full term (≥37 weeks gestational age) • Studies done in populations with elevated chronic disease risk, or that enroll some participants with a disease or with the health outcome of interest	• Studies that exclusively enroll subjects with a disease or with the health outcome of interest • Studies done in hospitalized or malnourished subjects • Studies of exclusively pre-term babies (gestational age <37 weeks) or babies that are small for gestational age (<2500g) • Studies of subjects with infectious diseases (e.g. HIV/AIDS) (or with mothers diagnosed with an infectious disease)

[1] The ratings of country development (e.g., high, medium, low, very low) were based on the Human Development Report 2014 (50). When a country was not included in the Human Development Report 2014 ranking, country classification from the World Bank was used instead (51). Medium Development countries were originally included, but due to concerns about generalizability to the U.S. of study participants (i.e., baseline health status) and complementary foods and beverages typically consumed, a decision was made to exclude “Medium” countries in October 2017

Search terms and electronic databases used

PubMed:

Date(s) Searched: 7/19/2016
Search Terms:

Final:

Complementary OR supplementary OR wean* OR transition* OR introduc* OR "Infant Nutritional Physiological Phenomena"[Mesh:noexp] OR weaning[mesh] OR ((bottle*) NOT (milk OR formula))

AND (feeding* OR food OR beverage*[tiab] OR beverages[mh] OR eating OR diet[tiab] OR diet[mh] OR meal*[tiab] OR meals[mh] OR "Food and Beverages"[Mesh] OR diets[tiab] OR cereal*[tiab] OR "Edible Grain"[Mesh] OR bread*[tiab] OR whole grain* OR juice*[tiab] OR milk[tiab] OR "Milk"[Mesh] OR dairy[tiab] OR "Dairy Products"[Mesh] OR meat[tiab] OR cheese[tiab] OR yogurt[tiab] OR yoghurt*[tiab] OR fruit*[tiab] OR "Fruit"[Mesh] OR vegetable*[tiab] OR "Vegetables"[Mesh] OR egg*[tiab] OR "Eggs"[Mesh] OR nut[tiab] OR nuts[tiab] OR peas[tiab] OR beans[tiab] OR legume*[tiab] OR snack*[tiab] OR bread[mh] OR honey[mh] OR vegetable*[tiab] OR "Vegetables"[Mesh] OR egg*[tiab] OR "Eggs"[Mesh:noexp] OR “egg white”[mh] OR “egg yolk”[mh] OR snack*[tiab] OR candy[mh] OR "Fast Foods"[Mesh] OR meat[mh] OR molasses[mh] OR nuts[mh] OR "Raw Foods"[Mesh] OR seeds[mh])

OR “infant food”[mesh]

OR infant feed*

OR
(breast feeding[mh] OR breastfeeding[tiab] OR breast feeding*[tiab] OR breast-feeding*[tiab] OR breastfed[tiab] OR breast-fed[tiab] OR breast-feed OR breast-feeds)

OR
(Bottle feeding[mh] OR bottle feeding*[tiab]s OR bottle feeding OR bottle-feeding*[tiab] OR bottle-feedings OR bottle-fed[tiab] OR “bottle fed”[tiab])

NOT (editorial[ptyp] OR comment[ptyp] OR news[ptyp] OR letter[ptyp] OR review[ptyp] OR systematic[sb])

OR ((Solid food*) OR solids));
AND

Growth[mh:noexp] OR "Child Development"[Mesh] OR "Growth Charts"[Mesh] OR "growth and development" [Subheading] OR "growth and development"[tiab] OR "Growth and Development"[Mesh:noexp] OR "Growth"[tiab] OR development*[tiab] OR "Child Development"[Mesh] OR child develop*[tiab] OR tooth[mh] OR tooth[tiab] OR teeth[tiab] OR movement[mh] OR "Overnutrition"[Mesh] OR under-nutrition[tiab] OR undernutrition[tiab] OR “developmental delay”[tiab] OR "Motor Skills"[Mesh] OR "Nonverbal Communication"[Mesh]

Standing[tiab] OR sitting[tiab] OR walking[tiab] OR crawling[tiab] OR "Motor Skills"[Mesh] OR Ages and Stages Questionnaire* OR ASQ[tiab]

OR Cognitive[tiab] OR cognition[mh] OR cognition OR learning OR "Learning Disorders"[Mesh] OR "Intellectual Disability"[Mesh] OR intelligence[tiab] OR intelligence[mh] OR "Achievement"[Mesh] OR "Aptitude"[Mesh] OR "Executive Function"[Mesh] OR memory OR inhibitory control*[tiab] OR “problem solving”[tiab] OR“Social-emotional development”[tiab] OR “Neurological development”[tiab] OR “mental development”[tiab] OR
“Motor development”[tiab] OR anxiety[tiab] OR anxiety[mh:noexp] OR "Anxiety, Separation"[Mesh] OR depression[tiab] OR depression[mh] OR "Depression, Postpartum"[Mesh] OR "Depressive Disorder"[Mesh] OR
"Visual Acuity"[Mesh] OR "Auditory Perception"[Mesh] OR "Psychological Tests"[Mesh]

OR
("Bone Density"[Mesh] OR “bone density”[tiab] OR "Bone Development"[Mesh] OR "Bone Development"[tiab] OR "Fractures, Bone"[Mesh] OR "Bone Diseases"[Mesh] OR osteoporosis[tiab] OR (bone[tiab] AND fracture*[tiab]) OR "Rickets"[Mesh] OR ricket*[tiab] OR bone mineral*[tiab] OR “bone mass”[tiab] OR bone health*[tiab] OR "Bone Demineralization, Pathologic"[Mesh] OR bone demineral*[tiab])

OR
("body size"[tiab] OR body size[mh] OR obesity[tiab] OR obese[tiab] OR overweight[mh] OR obesity[mh] OR overweight [tiab] OR adipos*[tiab] OR adiposity[mh] OR “body composition”[mh] OR body fat distribution[mh] OR “body fat”[tiab] OR "body weight"[tiab] OR body weight[mh] OR birth weight*[tiab] OR weight gain[mh] OR weight loss[mh] OR “body-weight”[tiab] OR "weight gain"[tiab] OR weight-gain[tiab] OR weight loss[tiab] OR weight-loss[tiab] OR “Body Weights and Measures”[mh] OR weight[ti] OR "Anthropometry"[Mesh:noexp] OR body mass index[mh] OR “body mass index”[tiab] OR BMI[tiab] OR “weight status”[tiab] OR “adipose tissue”[mh] OR "healthy weight"[tiab] OR waist circumference[mh] OR “body mass”[ti] OR “fat mass”[tiab] OR body weight changes[mh] OR “waist circumference”[tiab] OR ideal body weight[mh] OR waist-hip ratio[mh] OR Waist Hip*[tiab] OR body height*[tiab] OR Crown-Rump Length*[tiab] OR head circumference*[tiab] OR arm circumference*[tiab] OR thigh circumference* OR limb circumference* OR fat free mass*[tiab] OR skinfold[tiab] OR skin fold*[tiab])

AND

infant* OR baby OR babies OR toddler* OR newborn*[tiab] OR "Child, Preschool"[Mesh] OR preschool*[tiab] OR pre-school*[tiab] OR “early childhood”[tiab] OR “early years”[tiab] OR pre-k[tiab] OR pre-primary[tiab] OR under five*[ti] OR young child*[ti] OR “head start”[tiab] OR prekindergarten[tiab] OR pre-kindergarten[tiab] OR weanling*
OR limit to child, preschool

for child 0-18 all develop outcomes

for all; body wgt/comp/bone

NOT
nutritional status[mh] OR nutritional status*[tiab] OR Nutrition Status*[tiab] OR Iron[mh] OR iron[tiab] OR "Anemia"[Mesh] OR "Anemia"[tiab] OR iron deficien*[tiab] OR ferritin*[tiab] OR ferrous[tiab] OR "Transferrin"[Mesh] OR "Transferrin"[tiab] OR zinc OR "Vitamin D"[Mesh] OR "Vitamin D"[tiab] OR "Vitamin D Deficiency"[Mesh] OR "Vitamin B 12"[Mesh] OR "Vitamin B 12"[tiab] OR "Vitamin B12"[tiab] OR "Vitamin B 12 Deficiency"[Mesh] OR Cobamide*[tiab] OR Cobalamin*[tiab] OR Cyanocobalamin[tiab] OR Folate[tiab] OR "Folic Acid"[Mesh] OR folacin[tiab] OR vitamin b9*[tiab] OR Fatty acid*[tiab] OR "Fatty Acids"[Mesh:noexp] OR fatty acid*[tiab] OR "Fatty Acids, Unsaturated"[Mesh:noexp] OR Arachidonic acid*[tiab] OR linolenic acid*[tiab] OR linoleic acid*[tiab] OR Docosahexaenoic Acid*[tiab] OR Eicosapentaenoic Acid*[tiab] OR gamma-Linolenic Acid*[tiab] OR "Arachidonic Acids"[Mesh] OR "Fatty Acids, Essential"[Mesh] OR "Fatty Acids, Omega-3"[Mesh] OR "Fatty Acids, Omega-6"[Mesh] OR alpha-Linolenic Acid*[tiab] OR "Fatty Acids, Essential"[Mesh] OR "Linolenic Acids"[Mesh] OR "Trans Fatty Acids"[Mesh] OR "Fatty Acids, Monounsaturated"[Mesh]

for nonmedline[sb]: NOT animals by: NOT (sheep[ti] OR lamb[ti] OR lambs[ti] OR calving[ti] OR calves[ti] OR mice[ti] OR mouse[ti] OR pigs[ti] OR cows[ti] OR piglets[ti] OR cow[ti] OR piglet[ti] OR monkey[ti] OR rats[ti] OR rat[ti] OR animal*[ti])

Embase:

Date(s) Searched: 8/1/16
Search Terms:

(Complementary OR supplementa* OR wean* OR transition* OR introduc* OR family) NEAR/3 (feed* OR food* OR beverage* OR eating OR diet)

OR
(Complementary OR transition* OR introduct* OR wean*) AND (food/exp OR 'baby food'/exp OR 'cereal'/exp OR 'dairy product'/exp OR 'egg'/exp OR 'fruit'/exp OR 'meat'/exp OR 'sea food'/exp OR 'milk'/exp OR fish/exp OR 'poultry'/exp OR 'beverage'/exp OR 'vegetable'/exp OR nut/exp OR pea/exp OR meal/exp)

OR
(Complementary OR supplementa* OR wean* OR transition* OR introduc*) NEAR/5 (‘whole grain’ OR ‘whole grains’ OR dairy OR egg OR eggs OR meat OR poultry OR seafood OR fruit* OR milk OR fish* OR poultry OR beverage* OR vegetables* OR pea OR peas OR nut OR nuts OR cereal OR bread* OR yog*urt* OR cheese* OR juice* OR rice OR soup OR legume* OR snack* OR meal*) (for Embase)

OR 'baby food'/de OR (solid NEAR/2 food*):ab,ti

AND
(infant*:ti,ab OR infant/exp) OR (baby OR babies OR toddler* OR newborn* OR

nurser*):ti,ab OR 'newborn'/exp OR 'newborn care'/exp OR preschool*:ti,ab OR pre-school:ti,ab OR 'preschool child'/exp OR 'infancy'/exp OR "early childhood":ti,ab OR "early years" OR pre-k:ti,ab OR 'nursery'/exp OR 'nursery school'/exp OR prekindergarten:ti,ab OR pre-kindergarten:ti,ab OR weanling*

AND ([in process]/lim OR [article]/lim OR [article in press]/lim) AND ([embase]/lim NOT [medline]/lim)

AND

Limit to humans:

AND

'executive function'/exp OR 'executive function':ti,ab OR 'learning'/exp OR 'intelligence'/exp OR 'mental development'/exp OR 'mental development':ti,ab OR intelligence:ti,ab OR cogniti*:ti,ab OR 'cognition'/exp OR 'cognition assessment'/exp OR aptitude:ti,ab OR 'memory'/exp OR memory:ti,ab OR 'anxiety'/exp OR 'anxiety':ti,ab OR 'depression'/exp OR depressi*:ti,ab OR 'visual acuity'/exp OR visual:ti OR 'hearing'/exp OR hearing:ti,ab OR auditory:ti,ab OR 'postnatal development'/exp OR 'postnatal development':ti,ab OR 'overnutrition'/exp OR 'overnutrition':ti,ab OR undernutrition:ti,ab OR "developmental delay":ti,ab OR 'nonverbal communication'/exp
OR

('metabolic bone disease'/exp OR osteoporosis:ti,ab OR (bone NEAR/2 (disease* OR fracture* OR injur* OR health* OR density OR mineralize* OR demineraliz*)):ti,ab OR ricket*:ti,ab OR 'bone injury'/exp OR 'bone density'/exp)

AND
'body size'/de OR 'body size':ti,ab OR 'obesity'/exp OR overweight:ab,ti OR 'macrosomia'/exp OR obese:ab,ti OR obesity:ab,ti OR 'weight gain':ab,ti OR adiposity:ab,ti OR adipose:ab,ti OR 'body weight'/exp OR 'body weight':ti,ab OR 'weight gain'/de OR 'body composition'/exp OR 'body composition':ti,ab OR 'body fat':ab,ti OR 'anthropometry'/de OR 'body mass'/de OR bmi:ab,ti OR 'body mass':ab,ti OR weight:ab,ti OR (waist NEXT/1 hip NEXT/1 ratio*) OR 'body fat'/de OR 'adipose tissue'/exp OR skinfold OR 'skin fold':ti,ab OR 'fat mass':ti,ab OR 'fat mass'/exp OR 'anthropometric parameters'/exp OR circumference OR length OR height

OR
'body growth'/exp 'body growth':ti,ab OR 'growth rate and growth regulation'/exp OR 'postnatal growth'/exp OR 'human development'/exp OR 'Bayley Scales of Infant Development'/exp OR 'cognition assessment'/exp OR 'mental function assessment'/de

Cochrane:

Date(s) Searched: 8/9/16
Search Terms:

(feed* OR food* OR beverage*OR diet* OR ‘whole grain’ OR ‘whole grains’ OR dairy OR egg OR meat OR poultry OR seafood OR fruit* OR milk OR fish* OR poultry OR vegetables* OR pea OR beans OR legume* OR nut OR cereal OR beverage* OR bread* OR seafood OR yog*urt* OR cheese OR juice OR snack OR yogurt OR yoghurt OR nut OR nuts OR honey OR meal OR meals) NEAR/3 (Complementary OR supplementa* OR wean* OR transition* OR introduct* OR family)

OR

[mh ^"Infant Nutritional Physiological Phenomena"] OR [mh weaning] OR ((bottle*) NOT (milk OR formula))
AND ([mh beverages] OR [mh eating] OR [mh diet] OR [mh meals] OR [mh "Food and Beverages"] OR [mh "Edible Grain"] OR [mh "Milk"] OR dairy[:ti,ab OR [mh "Dairy Products"] OR [mh "Fruit"] OR [mh "Vegetables"] OR [mh "Eggs"] OR [mh bread] OR [mh honey] OR [mh "Vegetables"] OR [mh ^"Eggs"] OR [mh “egg white”] OR [mh “egg yolk”] OR [mh candy] OR [mh "Fast Foods"] OR [mh meat] OR [mh molasses] OR [mh nuts] OR [mh "Raw Foods"] OR [mh seeds])

OR
((Infant* OR baby* OR babies) NEAR/2 food*):ti,ab OR [mh "infant food"]

AND

[mh ^Growth] OR [mh "Child Development"] OR [mh "Growth Charts"] OR "growth and development" OR [mh ^"Growth and Development"] OR [mh "Child Development"] OR (child NEAR/1 develop*):ti,ab OR [mh tooth] OR tooth:ti,ab OR teeth:ti,ab OR [mh movement] OR [mh "Overnutrition"] OR ”under-nutrition:ti,ab OR undernutrition:ti,ab OR [mh "Motor Skills"] OR [mh "Nonverbal Communication"]

OR
‘body growth’:ti,ab OR 'growth rate and growth regulation' OR 'postnatal growth':ti,ab OR 'human development':ti,ab OR 'Bayley Scales of Infant Development'

OR Standing:ti,ab OR sitting:ti,ab OR walking:ti,ab OR crawling:ti,ab OR “Ages and Stages Questionnaire” OR ASQ:ti,ab

OR [mh cognition] OR [mh learning] OR [mh "Learning Disorders"] OR [mh "Intellectual Disability"] OR intelligence:ti,ab OR [mh intelligence] OR [mh "Achievement"] OR [mh "Aptitude"] OR [mh "Executive Function"] OR (inhibitory NEAR/1 control*):ti,ab OR “problem solving”:ti,ab OR “Social-emotional development”:ti,ab OR “Neurological development”:ti,ab OR “mental development”:ti,ab OR “Motor development”ti,ab OR [mh ^anxiety] OR [mh "Anxiety, Separation"] OR [mh depression] OR [mh "Depression, Postpartum"] OR [mh "Depressive Disorder"] OR [mh "Visual Acuity"] OR [mh "Auditory Perception"] OR [mh "Psychological Tests"]

OR Stunt*:ti,ab OR wasting:ti,ab
OR

cogniti*:ti,ab OR aptitude:ti,ab OR memory:ti,ab OR [mh memory] OR 'anxiety':ti,ab OR depressi*:ti,ab OR visual:ti,ab OR vision:ti,ab OR hearing:ti,ab OR auditory:ti,ab OR 'postnatal development':ti,ab OR 'overnutrition':ti,ab OR “developmental delay”:ti,ab OR 'nonverbal communication'

OR

[mh "Bone Density"] OR [mh "Bone Development"] OR [mh "Fractures, Bone"] OR [mh "Bone Diseases"] OR [mh "Rickets"] OR [mh "Bone Demineralization, Pathologic"] OR osteoporosis:ti,ab OR (bone NEAR/2 (disease* OR fracture* OR injur* OR health* OR density OR mineral* OR demineral* OR develop* OR mass)):ti,ab OR ricket*:ti,ab

OR
‘body size’:ti,ab OR overweight:ab,ti OR 'macrosomia':ti,ab OR obese:ab,ti OR obesity:ab,ti OR adipos*:ab,ti OR ‘body weight’:ti,ab OR 'weight gain':ti,ab OR ‘body composition’:ti,ab OR 'body fat':ab,ti OR 'anthropometr*':ti,ab OR bmi:ab,ti OR 'body mass':ab,ti OR (waist NEXT/1 hip NEXT/1 ratio*) OR 'body fat':ti,ab OR 'adipose tissue':ti,ab OR skinfold:ti,ab OR ‘skin fold’:ti,ab OR ‘fat mass’:ti,ab OR circumference:ti,ab OR length:ti,ab OR height:ti,ab

([mh “body size”] OR [mh overweight] OR [mh obesity] OR [mh adiposity] OR [mh “body composition”] OR [mh “body fat distribution”] OR [mh “body weight”] OR [mh “weight gain”] OR [mh “weight loss”] OR "weight gain":ti,ab OR “weight loss”:ti,ab OR “weight-loss”:ti,ab OR [mh "Body Weights and Measures"] OR weight:ti OR [mh ^"Anthropometry"] OR [mh “body mass index”] OR “weight status”:ti,ab OR [mh “adipose tissue”] OR "healthy weight":ti,ab OR [mh “waist circumference”] OR [mh “body weight changes”] OR [mh “ideal body weight”] OR [mh “waist-hip ratio”] OR “Waist Hip”:ti,ab OR “waist-hip”:ti,ab OR “Crown-Rump”:ti,ab OR “fat free mass”:ti,ab)

NOT (pubmed OR embase)

CINAHL

Date(s) Searched: 8/22/2016
Search Terms:

(MH "Food and Beverages+") OR (MH "Food") OR (MH "Diet") OR (MH "Eating") OR (MH "Eating Behavior") OR (MH "Taste") OR (MH "Taste Buds") OR (MH "Cereals") OR (MH "Dairy Products") OR (MH "Yogurt") OR (MH "Cheese") OR (MH "Milk") OR (MH "Eggs") OR (MH "Fruit") OR (MH "Fruit Juices") OR (MH "Meat") OR (MH "Seafood") OR (MH "Fish") OR (MH "Poultry") OR (MH "Vegetables") OR (MH "Nuts") OR (MH "Legumes") OR (MH "Bread") **AND** (Complementary OR supplementa* OR wean* OR transition* OR introduc*)

OR
(‘whole grain’ OR ‘whole grains’ OR dairy OR egg OR eggs OR meat OR poultry OR seafood OR fruit* OR milk OR fish* OR poultry OR vegetables* OR pea OR peas OR nut OR nuts OR cereal OR beverage* OR bread* OR seafood OR yog*urt* OR

cheese* OR juice*) **N5** (Complementary OR supplementa* OR wean* OR transition* OR introduc* OR family)

OR (Infant* OR baby OR babies) N2 food*

NOT
(MH "Nutritional Status") OR "nutritional status" OR (MH "Nutritional Requirements") OR (MH "Vitamin D") OR (MH "Vitamin D Deficiency") OR (MH "Vitamin B12 Deficiency") OR (MH "Anemia") OR "anemia" OR (MH "Anemia, Iron Deficiency") OR (MH "Iron") OR (MH "Zinc") OR (MH "Vitamin B12") OR (MH "Vitamin B12 Deficiency") OR (MH "Folic Acid") OR (MH "Niacin") OR (MH "Folic Acid Deficiency") OR "folate" OR "folacin" OR cyanocobalamin* OR cobalamin* OR cobamamide* OR (MH "Fatty Acids") OR "fatty acids" OR (MH "Fatty Acids, Omega-6") OR (MH "Fatty Acids, Omega-3") OR (MH "Fatty Acids, Unsaturated") OR (MH "Trans Fatty Acids") OR (MH "Fatty Acids, Monounsaturated") OR (MH "Fatty Acids, Saturated") OR (MH "Fatty Acids, Essential") OR (MH "Arachidonic Acids") OR (MH "Docosahexaenoic Acids") OR (MH "Linolenic Acids") OR (MH "Linoleic Acids")

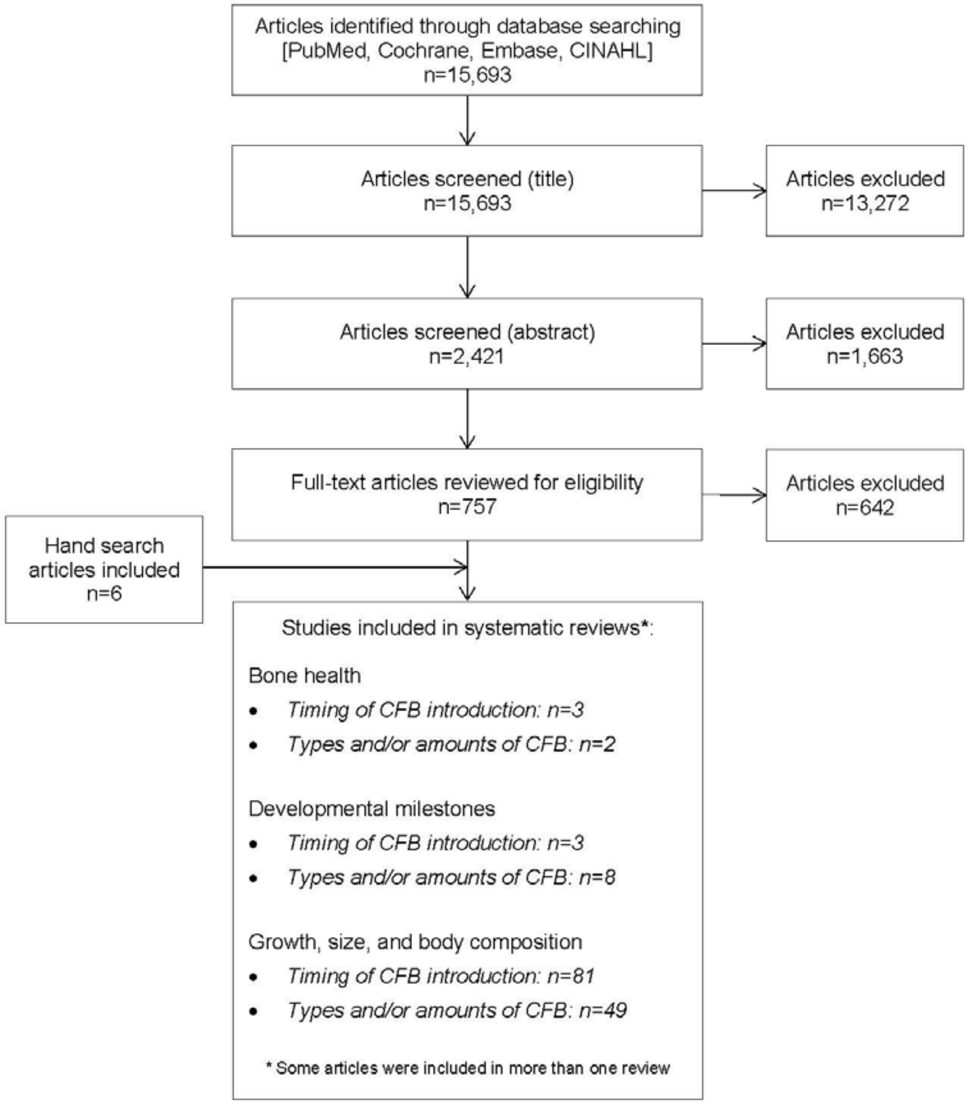
AND
osteoporosis OR (bone n2 (disease* OR fracture* OR injur* OR health* OR density OR mineralize* OR demineraliz*)) OR ricket* OR (MH "Osteoporosis") OR (MH "Bone Density") OR
(MH "Bone Diseases+") OR (MH "Bone Diseases, Developmental+") OR (MH "Rickets+")

OR
(MH "Executive Function") OR (MH "Learning+") OR (MH "Intelligence+") OR "intelligence" OR (MH "Intelligence Tests") OR (MH "Cognition+") OR "cognition" OR "mental development" OR (MH "Aptitude") OR "aptitude" OR (MH "Aptitude Tests+") OR (MH "Memory+") OR "memory" OR (MH "Anxiety+") OR "anxiety" OR (MH "Depression+") OR "depression" OR (MH "Visual Acuity") OR (MH "Visual Perception+") OR (MH "Hearing+") OR "auditory" OR "overnutrition" OR "undernutrition" OR (MH "Nonverbal Communication+") OR “postnatal development” OR OR “developmental delay”

OR

(MH "Anthropometry+") OR (MH "Body Weights and Measures+") OR (MH "Body Weight+") OR
(MH "Bone Development+") OR (MH "Growth+") OR (MH "Human Development+") OR "bayley scales" OR "mental function" OR (MH "Body Size") OR (MH "Obesity+") OR "overweight" OR "macrosomia" OR (MH "Weight Gain+") OR (MH "Waist-Hip Ratio") OR (MH "Body Composition+") OR (MH "Adipose Tissue+") OR (MH "Abdominal Fat") OR (MH "Fat Free Mass") OR (MH "Body Mass Index") OR (MH "Skinfold Thickness") OR (MH "Head Circumference") OR (MH "Arm Circumference") OR (MH "Waist Circumference") OR (MH "Growth and Development (Omaha)") OR (MH "Body Height") OR (MH "Crown-Rump Length") OR (MH "Leg Length Inequality") OR (MH "Mean Length of Utterance")

Figure 2: Flow chart of literature search and screening results



This flow chart illustrates the literature search results for articles examining the relationship between complementary feeding and growth, size, and/or body composition. The results of an electronic database search were screened independently by two NESR analysts by reviewing titles, abstracts, and full text articles to determine which articles met the criteria for inclusion. A manual search was done to ascertain articles not identified through the electronic database search. The systematic review on timing of introduction of CFB included 81 articles, and the systematic review on types and amounts of CFB consumed included 49 articles. The literature search was conducted for multiple systematic reviews that addressed complementary feeding and various health outcomes.

Excluded articles

The table below lists the excluded articles with at least one reason for exclusion, but may not reflect all possible reasons.

Table 8. Excluded articles

	Citation	Rationale [1]
1	Complementary feeding in the WHO Multicentre Growth Reference Study. Acta Paediatr Suppl.2006;450:27-37.	DV
2	Weaning and the weaning diet. Report of the Working Group on the Weaning Diet of the Committee on Medical Aspects of Food Policy. Rep Health Soc Subj (Lond).1994;45:1-113.	Design
3	Aarts, C.,Kylberg, E.,Hofvander, Y.,Gebre-Medhin, M. Growth under privileged conditions of healthy Swedish infants exclusively breastfed from birth to 4-6 months: a longitudinal prospective study based on daily records of feeding. Acta Paediatr.2003;92:145-51.	IV
4	Abarin, T.,Yan Wu, Y.,Warrington, N.,Lye, S.,Pennell, C.,Briollais, L. The impact of breastfeeding on FTO-related BMI growth trajectories: an application to the Raine pregnancy cohort study. Int J Epidemiol.2012;41:1650-60.	IV
5	Abou Samra, H.,Stevens, D.,Binkley, T.,Specker, B. Determinants of bone mass and size in 7-year-old former term, late-preterm, and preterm boys. Osteoporos Int.2009;20:1903-10.	Design, IV
6	Aboud, F. E.,Akhter, S. A cluster-randomized evaluation of a responsive stimulation and feeding intervention in bangladesh. Pediatrics.2011;127:e1191-7.	IV
7	Aboud, F. E.,Shafique, S.,Akhter, S. A responsive feeding intervention increases children's self-feeding and maternal responsiveness but not weight gain. J Nutr.2009;139:1738-43.	IV
8	Adu-Afarwuah, S.,Lartey, A.,Brown, K. H.,Zlotkin, S.,Briend, A.,Dewey, K. G. Randomized comparison of 3 types of micronutrient supplements for home fortification of complementary foods in Ghana: effects on growth and motor development. Am J Clin Nutr.2007;86:412-20.	IV
9	Agarwal, K. N.,Agarwal, D. K.,Gupta, A.,Bansal, A. K. Relationship of exclusive breast feeding for 6 mo to linear growth up to 18 mo of age. Indian J Pediatr.2013;80:11-5.	Country
10	Aggarwal, A.,Arora, S.,Patwari, A. K. Breastfeeding among urban women of low-socioeconomic status: factors influencing introduction of supplemental feeds before four months of age. Indian Pediatr.1998;35:269-73.	Design, IV,DV
11	Agostoni, C.,Fiocchi, A.,Riva, E.,Terracciano, L.,Sarratud, T.,Martelli, A.,Lodi, F.,D'Auria, E.,Zuccotti, G.,Giovannini, M. Growth of infants with IgE-mediated cow's milk allergy fed different formulas in the complementary feeding period. Pediatr Allergy Immunol.2007;18:599-606.	IV
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16		Allen, L.,Shrimpton, R. The International Research on Infant Supplementation study: implications for programs and further research. J Nutr.2005;135:666s-669s.	Design
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21		Andersen,A. D.,Michaelsen,K. F.,Hellgren,L. I.,Trolle,E.,Lauritzen,L. A randomized controlled intervention with fish oil versus sunflower oil from 9 to 18 months of age: exploring changes in growth and skinfold thicknesses. Pediatr Res.2011;70:368-74.	IV
22		Andersen,L. B.,Pipper,C. B.,Trolle,E.,Bro,R.,Larnkjaer,A.,Carlsen,E. M.,Molgaard,C.,Michaelsen,K. F. Maternal obesity and offspring dietary patterns at 9 months of age. Eur J Clin Nutr.2015;69:668-75.	DV
23		Anderson, G. H.,Morson-Pasut, L. A.,Bryan, H.,Cleghorn, G.,Tanaka, P.,Yeung, D.,Zimmerman, B. Age of introduction of cow's milk to infants. J Pediatr Gastroenterol Nutr.1985;4:692-8.	Design
24		Anderson, V. P.,Cornwall, J.,Jack, S.,Gibson, R. S. Intakes from non-breastmilk foods for stunted toddlers living in poor urban villages of Phnom Penh, Cambodia, are inadequate. Matern Child Nutr.2008;4:146-59.	Design,Health status
25		Andres, A.,Casey, P. H.,Cleves, M. A.,Badger, T. M. Body fat and bone mineral content of infants fed breast milk, cow's milk formula, or soy formula during the first year of life. J Pediatr.2013;163:49-54.	IV
26		Andres, A.,Cleves, M. A.,Bellando, J. B.,Pivik, R. T.,Casey, P. H.,Badger, T. M. Developmental status of 1-year-old infants fed breast milk, cow's milk formula, or soy formula. Pediatrics.2012;129:1134-40.	IV
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28		Anfield,L. Nutrition in the first year. Midwife Health Visit Community Nurse.1985;21:161-4.	Design

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30		Armstrong, J.,Reilly, J. J. Breastfeeding and lowering the risk of childhood obesity. Lancet.2002;359:2003-4.	IV
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33		Asha Bai, P. V.,Leela, M.,Subramaniam, V. R. Adequacy of breast milk for optimal growth of infants. Trop Geogr Med.1980;32:158-62.	IV
34		Assuncao, M. L.,Ferreira, H. S.,Coutinho, S. B.,Santos, L. M.,Horta, B. L. Protective effect of breastfeeding against overweight can be detected as early as the second year of life: a study of children from one of the most socially-deprived areas of Brazil. J Health Popul Nutr.2015;33:85-91.	Design, Health status, IV
35		Atladottir, H.,Thorsdottir, I. Energy intake and growth of infants in Iceland-a population with high frequency of breast-feeding and high birth weight. Eur J Clin Nutr.2000;54:695-701.	IV
36		Auestad,N. Infant nutrition--brain development--disease in later life. An introduction. Dev Neurosci.2000;22:472-3.	Design
37		Augusto,R. A.,Souza,J. M. Effectiveness of a supplementary feeding program in child weight gain. Rev Saude Publica.2010;44:793-801.	Design, IV
38		Axelsson,I. E.,Jakobsson,I.,Raiha,N. C. Formula with reduced protein content: effects on growth and protein metabolism during weaning. Pediatr Res.1988;24:297-301.	IV
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40		Badger, T. Effects of soy infant formula on growth and development in the first year of life. Food Nutr Bull.2013;34:252-3.	Design, IV
41		Bahamondes L,Bahamondes MV,Modesto W,Tilley IB,Magalhaes A,Pinto e Silva JL,Amaral E, Jr. Mishell DR. Effect of hormonal contraceptives during breastfeeding on infant's milk ingestion and growth. Fertil Steril.2013;100:445-50.	IV
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43		Balaban, G.,Motta, M. E.,Silva, G. A. Early weaning and other potential risk factors for overweight among preschool children. Clinics (Sao Paulo).2010;65:181-7.	IV, Age
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60	Bindon, J. R.,Cabrera, C. Infant feeding patterns and growth of infants in American Samoa during the first year of life. Hum Biol.1988;60:81-92.	Design, IV, DV

61		Bindon, J. R. The body build and composition of Samoan children: relationships to infant feeding patterns and infant weight-for-length status. Am J Phys Anthropol.1984;63:379-88.	IV
62		Bindon, J. R. The influence of infant feeding patterns on growth of children in American Samoa. Med Anthropol.1985;9:183-95.	Country
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65		Bjorke-Monsen, A. L. Is exclusive breastfeeding ensuring an optimal micronutrient status and psychomotor development in infants?. Clin Biochem.2014;47:714.	Design
66		Block,S. L. Delayed introduction of solid foods to infants: not so fast!. Pediatr Ann.2013;42:143-7.	Design
67		Bogen, D. L.,Hanusa, B. H.,Whitaker, R. C. The effect of breast-feeding with and without formula use on the risk of obesity at 4 years of age. Obes Res.2004;12:1527-35.	IV
68		Bonuck, K.,Avraham, S. B.,Lo, Y.,Kahn, R.,Hyden, C. Bottle-weaning intervention and toddler overweight. J Pediatr.2014;164:306-12.e1-2.	IV
69		Borschel, M. W.,Baggs, G. E.,Barrett-Reis, B. Growth of healthy term infants fed ready-to-feed and powdered forms of an extensively hydrolyzed casein-based infant formula: a randomized, blinded, controlled trial. Clin Pediatr (Phila).2014;53:585-92.	IV
70		Boulton J. Nutrition in childhood and its relationships to early somatic growth, body fat, blood pressure, and physical fitness. Acta Paediatr Scand Suppl.1981;284:1-85.	Design,DV
71		Brakohiapa, L. A.,Yartey, J.,Bille, A.,Harrison, E.,Quansah, E.,Armar, M. A.,Kishi, K.,Yamamoto, S. Does prolonged breastfeeding adversely affect a child's nutritional status?. Lancet.1988;2:416-8.	IV, DV
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73		Breij, L. M.,Mulder, M. T.,van Vark-van der Zee, L. C.,Hokken-Koelega, A. C. Appetite-regulating hormones in early life and relationships with type of feeding and body composition in healthy term infants. Eur J Nutr.2016.	IV
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75		Brew,B. K.,Toelle,B. G.,Webb,K. L.,Almqvist,C.,Marks,G. B. Omega-3 supplementation during the first 5 years of life and later academic performance: a randomised controlled trial. Eur J Clin Nutr.2015;69:419-24.	IV
76		Briend,A.,Bari,A. Breastfeeding improves survival, but not nutritional status, of 12-35 months old children in rural Bangladesh. Eur J Clin Nutr.1989;43:603-8.	Health status, IV

77		Briend,A.,Darmon,N. Determining limiting nutrients by linear programming: A new approach to predict insufficient intakes from complementary foods. Pediatrics.2000;106:1288-9.	Design
78		Brito,A.,Olivares,M.,Pizarro,T.,Rodriguez,L.,Hertrampf,E. Chilean complementary feeding program reduces anemia and improves iron status in children aged 11 to 18 months. Food Nutr Bull.2013;34:378-85.	Design
79		Brown A,Lee MD. Early influences on child satiety-responsiveness: the role of weaning style. Pediatr Obes.2015;10:57-66.	IV
80		Brown, A.,Lee, M. Breastfeeding during the first year promotes satiety responsiveness in children aged 18-24 months. Pediatr Obes.2012;7:382-90.	IV
81		Brown,K. H.,Lopez de Romana,D.,Arsenault,J. E.,Peerson,J. M.,Penny,M. E. Comparison of the effects of zinc delivered in a fortified food or a liquid supplement on the growth, morbidity, and plasma zinc concentrations of young Peruvian children. Am J Clin Nutr.2007;85:538-47.	IV
82		Brown,L. V.,Zeitlin,M. F.,Peterson,K. E.,Chowdhury,A. M.,Rogers,B. L.,Weld,L. H.,Gershoff,S. N. Evaluation of the impact of weaning food messages on infant feeding practices and child growth in rural Bangladesh. Am J Clin Nutr.1992;56:994-1003.	IV
83		Brulotte, J.,Bukutu, C.,Vohra, S. Complementary, holistic, and integrative medicine: fish oils and neurodevelopmental disorders. Pediatr Rev.2009;30:e29-33.	Design
84		Bulk-Bunschoten, A. M.,van Bodegom, S.,Reerink, J. D.,de Jong, P. C.,de Groot, C. J. Weight and weight gain at 4 months (The Netherlands 1998): influences of nutritional practices, socio-economic and ethnic factors. Paediatr Perinat Epidemiol.2002;16:361-9.	IV
85		Burnham, L.,Matlak, S.,Makrigiorgos, G.,Braun, N.,Knapp, B. P.,Merewood, A. Breastfeeding and coffee consumption in children younger than 2 years in Boston, Massachusetts, USA. J Hum Lact.2015;31:267-72.	DV
86		Caleyachetty A,Krishnaveni GV,Veena SR,Hill J,Karat SC,Fall CH,Wills AK. Breastfeeding duration, age of starting solids and high BMI risk and adiposity in Indian children. Matern Child Nutr.2013;9:199-216.	Design,Country
87		Calvo,E. B.,Galindo,A. C.,Aspres,N. B. Iron status in exclusively breast-fed infants. Pediatrics.1992;90:375-9.	IV, DV
88		Calvo,E.,Hertrampf,E.,Pablo,S.,Amar,M.,Stekel,A. Haemoglobin-fortified cereal: an alternative weaning food with high iron bioavailability. European journal of clinical nutrition.1989;43:237-43.	Design, DV
89		Cameron, S. L.,Heath, A. L.,Gray, A. R.,Churcher, B.,Davies, R. S.,Newlands, A.,Galland, B. C.,Sayers, R. M.,Lawrence, J. A.,Taylor, B. J.,Taylor, R. W. Lactation Consultant Support from Late Pregnancy with an Educational Intervention at 4 Months of Age Delays the Introduction of Complementary Foods in a Randomized Controlled Trial. J Nutr.2015;145:1481-90.	DV
90		Capozzi,L.,Russo,R.,Bertocco,F.,Ferrara,D.,Ferrara,M. Diet and iron deficiency in the first year of life: a retrospective study. Hematology.2010;15:410-3.	DV
91		Capozzi,L.,Russo,R.,Bertocco,F.,Ferrara,D.,Ferrara,M. Effect on haematological and anthropometric parameters of iron supplementation in the first 2 years of life. Risks and benefits. Hematology.2011;16:261-4.	IV
92		Carruth,B. R.,Nevling,W.,Skinner,J. D. Developmental and food profiles of infants born to adolescent and adult mothers. J Adolesc Health.1997;20:434-41.	IV, DV, Age

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97	Chang, S. Y.,He, W.,Chen, C. M. Complementary feeding and growth of infant and young child in China. Biomed Environ Sci.2008;21:264-8.	Design
98	Chatterjee, M. K. Feeding pattern practised by the mothers attending an under five clinic. Indian J Public Health.1987;31:268-9.	Design
99	Chavez A,Martinez C,Schlaepfer L. Health effects of supplementary feeding programs. Prog Clin Biol Res.1981;67:129-39.	Design
100	Chawla, P.,Puri, R.,Pershad, D. Impact of pre-school supplementary feeding on mental abilities. Indian Pediatr.1983;20:513-6.	Age
101	Chawla, P.,Puri, R. Impact of pre-school supplementary feeding programme on anthropometry. Indian Pediatr.1983;20:363-7.	Age
102	Cheng, T. S.,Loy, S. L.,Cheung, Y. B.,Chan, J. K.,Pang, W. W.,Godfrey, K. M.,Gluckman, P. D.,Kwek, K.,Saw, S. M.,Chong, Y. S.,Lee, Y. S.,Lek, N.,Yap, F. Sexually dimorphic response to feeding mode in the growth of infants. Am J Clin Nutr.2016;103:398-405.	IV
103	Chirmulay, D.,Nisal, R. Nutritional status of tribal underfive children in Ahmadnagar District, Maharashtra in relation to weaning/feeding practices. Indian Pediatr.1993;30:215-22.	Design
104	Chitra, P. Development of banana-based weaning food mixes for infants and its nutritional quality evaluation. Rev Environ Health.2015;30:125-30.	IV
105	Chivers, P.,Hands, B.,Parker, H.,Bulsara, M.,Beilin, L. J.,Kendall, G. E.,Oddy, W. H. Body mass index, adiposity rebound and early feeding in a longitudinal cohort (Raine Study). Int J Obes (Lond).2010;34:1169-76.	IV
106	Cho, H. N.,Hong, S.,Lee, S. H.,Yum, H. Y. Nutritional status according to sensitized food allergens in children with atopic dermatitis. Allergy, Asthma and Immunology Research.2010;3:53-57.	Design, IV, DV
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108	Choudhury, N.,Bromage, S.,Alam, M. A.,Ahmed, A. M.,Islam, M. M.,Hossain, M. I.,Mahfuz, M.,Mondal, D.,Haque, M. R.,Ahmed, T. Intervention study shows suboptimal growth among children receiving a food supplement for five months in a slum in Bangladesh. Acta Paediatr.2016.	Health status, IV
109	Christoffel, K. A pediatric perspective on vegetarian nutrition. Clin Pediatr (Phila).1981;20:632-43.	Design

110		Christopher, G. C. First food: the essential role of breastfeeding. Breastfeed Med.2009;4 Suppl 1:S9-s10.	Design
111		Chuang, C. H.,Yang, S. H.,Chang, P. J.,Chen, P. C.,Chen, Y. C. Dietary supplement intake by 6-month-old Taiwanese infants. J Pediatr Gastroenterol Nutr.2012;54:71-6.	DV
112		Closa-Monasterolo, R.,Gispert-Llaurado, M.,Luque, V.,Ferre, N.,Rubio-Torrents, C.,Zaragoza-Jordana, M.,Escribano, J. Safety and efficacy of inulin and oligofructose supplementation in infant formula: results from a randomized clinical trial. Clin Nutr.2013;32:918-27.	IV
113		Cloutier, M. M.,Wiley, J.,Wang, Z.,Grant, A.,Gorin, A. A. The Early Childhood Obesity Prevention Program (ECHO): an ecologically-based intervention delivered by home visitors for newborns and their mothers. BMC Public Health.2015;15:584.	Design
114		Cockburn,F. Neonatal brain and dietary lipids. Arch Dis Child Fetal Neonatal Ed.1994;70:F1-2.	Design
115		Cohen RJ,Brown KH,Canahuati J,Rivera LL,Dewey KG. Effects of age of introduction of complementary foods on infant breast milk intake, total energy intake, and growth: a randomised intervention study in Honduras. Lancet.1994;344:288-93.	Country
116		Cohen, R. J.,Brown, K. H.,Canahuati, J.,Rivera, L. L.,Dewey, K. G. Determinants of growth from birth to 12 months among breast-fed Honduran infants in relation to age of introduction of complementary foods. Pediatrics.1995;96:504-10.	IV
117		Coleman,B. L. Early introduction of non-formula cow's milk to southern Ontario infants. Can J Public Health.2006;97:187-90.	IV, DV
118		Colombo,J.,Carlson,S. E.,Cheatham,C. L.,Shaddy,D. J.,Kerling,E. H.,Thodosoff,J. M.,Gustafson,K. M.,Brez,C. Long-term effects of LCPUFA supplementation on childhood cognitive outcomes. Am J Clin Nutr.2013;98:403-12.	IV
119		Coppi, S.,Iacoponi, F.,Fommei, C.,Strambi, M. Growth trend during the first six months of life in male infants with different type of feeding. Minerva Pediatr.2013;65:51-9.	IV
120		Costom, B. H.,Shore, D. Effect of a comprehensive nutritional program on the growth and ponderosity of infants. Clin Pediatr (Phila).1983;22:105-11.	Design
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183	Fawcett, J. N. Feeding from birth to 18 months. Nursing (Lond).1981:956-8.	Design
184	Feldens CA,Vitolo MR,Rauber F,Cruz LN,Hilgert JB. Risk factors for discontinuing breastfeeding in southern Brazil: a survival analysis. Matern Child Health J.2012;16:1257-65.	IV, DV
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197		Foroushani, A. R.,Mohammad, K.,Mahmoodi, M.,Siassi, F. Effect of breastfeeding on cognitive performance in a British birth cohort. East Mediterr Health J.2010;16:202-8.	IV
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212		Garza, C. The INTERGROWTH-21st project and the multicenter growth reference study: enhanced opportunities for monitoring growth from early pregnancy to 5 years of age. Breastfeed Med.2014;9:341-4.	Design
213		Geuns, M.,Huisinga, C.,van Staveren, W. A.,Deurenberg, P.,Hautvast, J. G. Intakes of energy, protein and calcium and weaning pattern of a group of Dutch infants aged 6-12 months. Tijdschr Kindergeneeskd.1985;53:50-6.	Design, IV, DV
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218		Gill, D. G.,Vincent, S.,Segal, D. S. Follow-on formula in the prevention of iron deficiency: a multicentre study. Acta Paediatr.1997;86:683-9.	IV
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227		Greene, L. C.,Lucas, A.,Livingstone, M. B.,Harland, P. S.,Baker, B. A. Relationship between early diet and subsequent cognitive performance during adolescence. Biochem Soc Trans.1995;23:376s.	Design, IV
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309		Khan, A. I.,Kabir, I.,Hawkesworth, S.,Ekström, E. C.,Arifeen, S.,Frongillo, E. A.,Persson, L. A. Early invitation to food and/or multiple micronutrient supplementation in pregnancy does not affect body composition in offspring at 54 months: Follow-up of the MINIMat randomised trial, Bangladesh. Maternal and Child Nutrition.2015;11:385-397.	IV, Age
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315		King,S.,Prawitz,A. D.,Umoren,J.,O'Gorman,T. The impact of high diastase malted barley flour on weight and height of malnourished children in Panama. Journal of Hunger and Environmental Nutrition.2007;1:23-35.	Health status, Age
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328		Kramer, M. S. Do breast-feeding and delayed introduction of solid foods protect against subsequent obesity?. J	Design

	Pediatr.1981;98:883-7.	
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412		Morgan JB,Mumford PM. A follow-up study of nutrition and anthropometry in pre-school children. Proc Nutr Soc.1980;39:5a.	Design
413		Morgan, J. B.,Lucas, A.,Fewtrell, M. S. Does weaning influence growth and health up to 18 months?. Archives of Disease in Childhood: Education and Practice Edition.2004;89:728-733.	Design
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430		Ntouva, A.,Rogers, I.,MacAdam, A.,Emmett, P. Weaning practices and iron status of exclusively breast fed infants. Journal of Human Nutrition & Dietetics.2011;24:297-298 2p.	Design
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	gain and childhood body mass index. Pediatrics.2006;117:e503-8.	
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548		Sloan, S.,Gildea, A.,Stewart, M.,Sneddon, H.,Iwaniec, D. Early weaning is related to weight and rate of weight gain in infancy. Child Care Health Dev.2008;34:59-64.	Design
549		Snijders, B. E.,Thijs, C.,van Ree, R.,van den Brandt, P. A. Age at first introduction of cow milk products and other food products in relation to infant atopic manifestations in the first 2 years of life: the KOALA Birth Cohort Study. Pediatrics.2008;122:e115-22.	DV
550		Soto-Ramirez, N.,Karmaus, W.,Zhang, H.,Davis, S.,Agarwal, S.,Albergottie, A. Modes of infant feeding and the occurrence of coughing/wheezing in the first year of life. J Hum Lact.2013;29:71-80.	IV, DV
551		Sparks, J. W. Fetal growth and diet. Mead Johnson Symp Perinat Dev Med.1984:21-7.	Design
552		Specker BL,Beck A,Kalkwarf H,Ho M. Randomized trial of varying mineral intake on total body bone mineral accretion during the first year of life. Pediatrics.1997;99:E12.	IV
553		Spence,A. C.,Campbell,K. J.,Crawford,D. A.,McNaughton,S. A.,Hesketh,K. D. Mediators of improved child diet quality following a health promotion intervention: the Melbourne InFANT Program. Int J Behav Nutr Phys Act.2014;11:137.	IV, DV
554		Sreedhara, M. S.,Banapurmath, C. R. A study of nutritional status of infants in relation to their complementary feeding practices. Current Pediatric Research.2014;18:39-41.	Design
555		Stahl, M. D.,Guida, D. A. Slow weight gain in the breast-fed infant: management options. Pediatr Nurs.1984;10:117-20, 164.	Design
556		Stang,J. Improving the eating patterns of infants and toddlers. J Am Diet Assoc.2006;106:S7-9.	Design
557		Stifter, C. A.,Anzman-Frasca, S.,Birch, L. L.,Voegtline, K. Parent use of food to soothe infant/toddler distress and child weight status. An exploratory study. Appetite.2011;57:693-9.	Design, IV
558		Strbak, V.,Skultetyova, M.,Hromadova, M.,Randuskova, A.,Macho, L. Late effects of breast-feeding and early weaning: seven-year prospective study in children. Endocr Regul.1991;25:53-7.	IV
559		Stuff, J. E.,Garza, C.,Boutte, C.,Fraley, J. K.,Smith, E. O.,Klein, E. R.,Nichols, B. L. Sources of variance in milk and caloric intakes in breast-fed infants: implications for lactation study design and interpretation. Am J Clin Nutr.1986;43:361-6.	Design, IV
560		Stuff, J. E.,Nichols, B. L. Nutrient intake and growth performance of older infants fed human milk. J Pediatr.1989;115:959-68.	DV
561		Stunkard, A. J.,Berkowitz, R. I.,Schoeller, D.,Maislin, G.,Stallings, V. A. Predictors of body size in the first 2 y of life: a high-risk study of human obesity. Int J Obes Relat Metab Disord.2004;28:503-13.	IV
562		Stunkard, A. J.,Berkowitz, R. I.,Stallings, V. A.,Schoeller, D. A. Energy intake, not energy output, is a determinant of body size in infants. Am J Clin Nutr.1999;69:524-30.	IV
563		Super, C. M.,Herrera, M. G.,Mora, J. O. Long-term effects of food supplementation and psychosocial intervention on the physical growth of Colombian infants at risk of malnutrition. Child Dev.1990;61:29-49.	IV
564		Svahn,J. C.,Feldl,F.,Raiha,N. C.,Koletzko,B.,Axelsson,I. E. Different quantities and quality of fat in milk products given to young children: effects on long chain polyunsaturated fatty acids and trans fatty acids in plasma. Acta Paediatr.2002;91:20-9.	DV
565		Taitz, L. S.,Lukmanji, Z. Alterations in feeding patterns and rates of weight gain in South Yorkshire infants, 1971-1977. Hum Biol.1981;53:313-20.	IV, Date

566		Taitz, L. Feeding children in the first year of life. Midwife Health Visitor & Community Nurse.1990;26:81-84.	Design
567		Tann, S. P.,Wheeler, E. F. Food intakes and growth of young Chinese children in London. Community Med.1980;2:20-4.	IV, DV
568		Tantracheewathorn,S.,Lohajaroensub,S. Incidence and risk factors of iron deficiency anemia in term infants. J Med Assoc Thai.2005;88:45-51.	IV, DV
569		Tanzer F,Gumuser C. A study of the growth of 200 newborn babies for a period of 6 months according to the type of nutrition. Ann Trop Paediatr.1989;9:54-8.	IV
570		Tarrant, M.,Fong, D. Y.,Wu, K. M.,Lee, I. L.,Wong, E. M.,Sham, A.,Lam, C.,Dodgson, J. E. Breastfeeding and weaning practices among Hong Kong mothers: a prospective study. BMC Pregnancy Childbirth.2010;10:27.	DV
571		Taveras EM,Blackburn K,Gillman MW,Haines J,McDonald J,Price S,Oken E. First steps for mommy and me: a pilot intervention to improve nutrition and physical activity behaviors of postpartum mothers and their infants. Matern Child Health J.2011;15:1217-27.	IV
572		Tawia, S. Breastfeeding, brain structure and function, cognitive development and educational attainment. Breastfeed Rev.2013;21:15-20.	Design
573		Tawia, S. Childhood obesity and being breastfed. Breastfeed Rev.2013;21:42-8.	Design
574		Taylor,A.,Redworth,E. W.,Morgan,J. B. Influence of diet on iron, copper, and zinc status in children under 24 months of age. Biol Trace Elem Res.2004;97:197-214.	DV
575		Thakur, R.,Singh, M. G.,Chaudhary, S.,Manuja, N. Effect of mode of delivery and feeding practices on acquisition of oral Streptococcus mutans in infants. Int J Paediatr Dent.2012;22:197-202.	DV
576		Theron, M.,Amissah, A.,Kleynhans, I. C.,Albertse, E.,MacIntyre, U. E. Inadequate dietary intake is not the cause of stunting amongst young children living in an informal settlement in Gauteng and rural Limpopo Province in South Africa: the NutriGro study. Public Health Nutr.2007;10:379-89.	Design
577		Thomson, J. L.,Tussing-Humphreys, L. M.,Goodman, M. H. Delta Healthy Sprouts: a randomized comparative effectiveness trial to promote maternal weight control and reduce childhood obesity in the Mississippi Delta. Contemp Clin Trials.2014;38:82-91.	Design, IV
578		Thorisdottir, B.,Gunnarsdottir, I.,Thorisdottir, A. V.,Palsson, G. I.,Halldorsson, T. I.,Thorsdottir, I. Nutrient intake in infancy and body mass index at six years in two population-based cohorts recruited before and after revision of infant dietary recommendations. Ann Nutr Metab.2013;63:145-51.	IV
579		Thorsdottir, I.,Gunnarsdottir, I.,Palsson, G. I. Birth weight, growth and feeding in infancy: relation to serum lipid concentration in 12-month-old infants. Eur J Clin Nutr.2003;57:1479-85.	IV, DV
580		Timby, N.,Domellof, E.,Hernell, O.,Lonnerdal, B.,Domellof, M. Neurodevelopment, nutrition, and growth until 12 mo of age in infants fed a low-energy, low-protein formula supplemented with bovine milk fat globule membranes: a randomized controlled trial. Am J Clin Nutr.2014;99:860-8.	IV
581		Townsend, E.,Pitchford, N. J. Baby knows best? The impact of weaning style on food preferences and body mass index in early childhood in a case-controlled sample. BMJ Open.2012;2:e000298.	IV

582		Tripathy, R.,Das, R. N.,Das, M. M.,Parija, A. C. Growth in the first year in children following IAP Policy on Infant Feeding. Indian Pediatr.2000;37:1051-9.	IV
583		Tulldahl, J.,Pettersson, K.,Andersson, S. W.,Hulthen, L. Mode of infant feeding and achieved growth in adolescence: early feeding patterns in relation to growth and body composition in adolescence. Obes Res.1999;7:431-7.	Design
584		Umer, A.,Hamilton, C.,Britton, C. M.,Mullett, M. D.,John, C.,Neal, W.,Lilly, C. L. Association between Breastfeeding and Childhood Obesity: Analysis of a Linked Longitudinal Study of Rural Appalachian Fifth-Grade Children. Child Obes.2015;11:449-55.	IV
585		Unni, J. C.,Richard, J. Growth and morbidity of breast-fed and artificially-fed infants in urban south Indian families. J Trop Pediatr.1988;34:179-81.	IV
586		Vail, B.,Prentice, P.,Dunger, D. B.,Hughes, I. A.,Acerini, C. L.,Ong, K. K. Age at Weaning and Infant Growth: Primary Analysis and Systematic Review. Journal of Pediatrics.2015;167:317-324.e1.	Design
587		Valman, H. B. The first year of life: feeding and feeding problems. Br Med J.1980;280:457-60.	Design
588		van der Willik, E. M.,Vrijkotte, T. G.,Altenburg, T. M.,Gademan, M. G.,Kist-van Holthe, J. Exclusively breastfed overweight infants are at the same risk of childhood overweight as formula fed overweight infants. Arch Dis Child.2015;100:932-7.	IV
589		van Dijk, C. E.,Innis, S. M. Growth-curve standards and the assessment of early excess weight gain in infancy. Pediatrics.2009;123:102-8.	IV, DV
590		van Eijsden, M.,Meijers, C. M.,Jansen, J. E.,de Kroon, M. L.,Vrijkotte, T. G. Cultural variation in early feeding pattern and maternal perceptions of infant growth. Br J Nutr.2015;114:481-8.	DV
591		van Rheenen,P. F.,de Moor,L. T.,Eschbach,S.,Brabin,B. J. A cohort study of haemoglobin and zinc protoporphyrin levels in term Zambian infants: effects of iron stores at birth, complementary food and placental malaria. Eur J Clin Nutr.2008;62:1379-87.	Country
592		van t Hof Msc, M. A. The influence of breastfeeding and complementary foods on growth until three years of age in the Euro-Growth Study. Pediatrics.2000;106:1281a-1281.	Design
593		Vazir,S.,Engle,P.,Balakrishna,N.,Griffiths,P. L.,Johnson,S. L.,Creed-Kanashiro,H.,Fernandez Rao,S.,Shroff,M. R.,Bentley,M. E. Cluster-randomized trial on complementary and responsive feeding education to caregivers found improved dietary intake, growth and development among rural Indian toddlers. Matern Child Nutr.2013;9:99-117.	IV
594		Veena SR,Krishnaveni GV,Srinivasan K,Wills AK,Hill JC,Kurpad AV,Muthayya S,Karat SC,Nalinakshi M,Fall CH. Infant feeding practice and childhood cognitive performance in South India. Arch Dis Child.2010;95:347-54.	Country
595		Veena, S. R.,Krishnaveni, G. V.,Wills, A. K.,Hill, J. C.,Karat, S. C.,Fall, C. H. Glucose tolerance and insulin resistance in Indian children: relationship to infant feeding pattern. Diabetologia.2011;54:2533-7.	Country
596		Vehapoglu, A.,Yazici, M.,Demir, A. D.,Turkmen, S.,Nursoy, M.,Ozkaya, E. Early infant feeding practice and childhood obesity: the relation of breast-feeding and timing of solid food introduction with childhood obesity. J Pediatr Endocrinol Metab.2014;27:1181-7.	Design
597		Venancio, S. I.,Saldiva, S. R.,Mondini, L.,Levy, R. B.,Escuder, M. M. Early interruption of exclusive breastfeeding and associated factors, state of Sao Paulo, Brazil. J Hum Lact.2008;24:168-74.	Design, DV

598		Verd S,Barriuso L,Gich I,Gutierrez A,Nadal-Amat J,Carreras E. Risk of early breastfeeding cessation among symmetrical, small for gestational age infants. Ann Hum Biol.2013;40:146-51.	Health status, DV
599		Victora, C. G.,Matijasevich, A.,Santos, I. S.,Barros, A. J.,Horta, B. L.,Barros, F. C. Breastfeeding and feeding patterns in three birth cohorts in Southern Brazil: trends and differentials. Cad Saude Publica.2008;24 Suppl 3:S409-16.	IV, DV
600		Victora,C. G.,Vaughan,J. P.,Martines,J. C.,Barcelos,L. B. Is prolonged breast-feeding associated with malnutrition?. Am J Clin Nutr.1984;39:307-14.	IV
601		Villalpando, S. Feeding mode, infections, and anthropometric status in early childhood. Pediatrics.2000;106:1282-3.	Design
602		Virtanen, S. M.,Laara, E.,Hypponen, E.,Reijonen, H.,Rasanen, L.,Aro, A.,Knip, M.,Ilonen, J.,Akerblom, H. K. Cow's milk consumption, HLA-DQB1 genotype, and type 1 diabetes: a nested case-control study of siblings of children with diabetes. Childhood diabetes in Finland study group. Diabetes.2000;49:912-7.	DV
603		Virtanen, S. M.,Rasanen, L.,Ylonen, K.,Aro, A.,Clayton, D.,Langholz, B.,Pitkaniemi, J.,Savilahti, E.,Lounamaa, R.,Tuomilehto, J.,et al.,. Early introduction of dairy products associated with increased risk of IDDM in Finnish children. The Childhood in Diabetes in Finland Study Group. Diabetes.1993;42:1786-90.	DV
604		Vobecky,J. S.,Vobecky,J.,Shapcott,D.,Demers,P. P. Nutrient intake patterns and nutritional status with regard to relative weight in early infancy. Am J Clin Nutr.1983;38:730-8.	IV
605		Wandel, M.,Fagerli, R. Aa,Olsen, P. T.,Borch-Iohnsen, B.,Ek, J. Iron status and weaning practices among Norwegian and immigrant infants. Nutrition Research.1996;16:251-265.	Design
606		Wang RJ,Trehan I,LaGrone LN,Weisz AJ,Thakwalakwa CM,Maleta KM,Manary MJ. Investigation of food acceptability and feeding practices for lipid nutrient supplements and blended flours used to treat moderate malnutrition. J Nutr Educ Behav.2013;45:258-63.	Health status, Country
607		Watt, R. G.,Tull, K. I.,Hardy, R.,Wiggins, M.,Kelly, Y.,Molloy, B.,Dowler, E.,Apps, J.,McGlone, P. Effectiveness of a social support intervention on infant feeding practices: randomised controlled trial. J Epidemiol Community Health.2009;63:156-62.	IV, DV
608		Weber, M.,Grote, V.,Closa-Monasterolo, R.,Escribano, J.,Langhendries, J. P.,Dain, E.,Giovannini, M.,Verduci, E.,Gruszfeld, D.,Socha, P.,Koletzko, B. Lower protein content in infant formula reduces BMI and obesity risk at school age: follow-up of a randomized trial. Am J Clin Nutr.2014;99:1041-51.	IV
609		Weijs, P. J.,Kool, L. M.,van Baar, N. M.,van der Zee, S. C. High beverage sugar as well as high animal protein intake at infancy may increase overweight risk at 8 years: a prospective longitudinal pilot study. Nutr J.2011;10:95.	IV
610		Wen, L. M.,Baur, L. A.,Simpson, J. M.,Xu, H.,Hayes, A. J.,Hardy, L. L.,Williams, M.,Rissel, C. Sustainability of Effects of an Early Childhood Obesity Prevention Trial Over Time: A Further 3-Year Follow-up of the Healthy Beginnings Trial. JAMA Pediatr.2015;169:543-51.	IV
611		West, C. E.,Hernell, O.,Andersson, Y.,Sjostedt, M.,Hammarstrom, M. L. Probiotic effects on T-cell maturation in infants during weaning. Clin Exp Allergy.2012;42:540-9.	IV, DV
612		Westphal, R.,Phillips, G.,Irwig, L. M. Infant care and feeding in an urban black population. S Afr Med J.1981;60:778-81.	DV, Date

613		Weyermann, M.,Rothenbacher, D.,Brenner, H. Duration of breastfeeding and risk of overweight in childhood: a prospective birth cohort study from Germany. Int J Obes (Lond).2006;30:1281-7.	IV
614		Wharf,S. G.,Fox,T. E.,Fairweather-Tait,S. J.,Cook,J. D. Factors affecting iron stores in infants 4-18 months of age. Eur J Clin Nutr.1997;51:504-9.	Design
615		Whitehead, R. G.,Paul, A. A.,Ahmed, E. A. Weaning practices in the United Kingdom and variations in anthropometric development. Acta Paediatr Scand Suppl.1986;323:14-23.	Design, IV
616		Whitehead, R. G.,Paul, A. A. Infant growth and human milk requirements. A fresh approach. Lancet.1981;2:161-3.	IV
617		Whitten, C. F.,Stewart, R. A. The effect of dietary sodium in infancy on blood pressure and related factors. Studies of infants fed salted and unsalted diets for five months at eight months and eight years of age. Acta Paediatr Scand Suppl.1980;279:1-17.	IV
618		Wiberger, M.,Eiben, G.,Lissner, L.,Mehlig, K.,Papoutsou, S.,Hunsberger, M. Children consuming milk cereal drink are at increased risk for overweight: The IDEFICS Sweden study, on behalf of the IDEFICS Consortium. Scand J Public Health.2014;42:518-24.	Design
619		Wigg, N. R.,Tong, S.,McMichael, A. J.,Baghurst, P. A.,Vimpani, G.,Roberts, R. Does breastfeeding at six months predict cognitive development?. Aust N Z J Public Health.1998;22:232-6.	IV
620		Wijga,A.,Vyas,U.,Vyas,A.,Sharma,V.,Pandya,N.,Nabarro,D. Feeding, illness and nutritional status of young children in rural Gujarat. Hum Nutr Clin Nutr.1983;37:255-69.	Design, IV
621		Williams, D. M.,Martin, R. M.,Davey Smith, G.,Alberti, K. G.,Ben-Shlomo, Y.,McCarthy, A. Associations of infant nutrition with insulin resistance measures in early adulthood: evidence from the Barry-Caerphilly Growth (BCG) study. PLoS One.2012;7:e34161.	IV, DV
622		Williams, J.,Wolff, A.,Daly, A.,MacDonald, A.,Aukett, A.,Booth, I. W. Iron supplemented formula milk related to reduction in psychomotor decline in infants from inner city areas: randomised study. Bmj.1999;318:693-7.	IV
623		Winick, M. The role of early nutrition in subsequent development and optimal future health. Bull N Y Acad Med.1989;65:1020-5.	Design
624		Winkelstein,M. L. Overfeeding in infancy: the early introduction of solid foods. Pediatr Nurs.1984;10:205-8, 236.	Design
625		Wölfle, J. Growth and puberty in German children: is there still a positive secular trend? In reply..Consumption of milk as a vital factor in growth development. Melnik B, Dtsch Arzetebl 2009, volume 206. Deutsches Aerzteblatt International.2009;106:656-656.	Design
626		Wright, C. M.,Parkinson, K. N.,Drewett, R. F. Why are babies weaned early? Data from a prospective population based cohort study. Arch Dis Child.2004;89:813-6.	DV
627		Wright, C. M.,Parkinson, K.,Scott, J. Breast-feeding in a UK urban context: who breast-feeds, for how long and does it matter?. Public Health Nutr.2006;9:686-91.	IV
628		Wright, M. J.,Bentley, M. E.,Mendez, M. A.,Adair, L. S. The interactive association of dietary diversity scores and breast-feeding status with weight and length in Filipino infants aged 6-24 months. Public Health Nutr.2015;18:1762-73.	Country

629		Yew, K. S.,Webber, B.,Hodges, J.,Carter, N. J. Clinical inquiries: are there any known health risks to early introduction of solids to an infant's diet?. J Fam Pract.2009;58:219-20.	Design
630		Young RJ,Antonson DL,Ferguson PW,Murray ND,Merkel K,Moore TE. Neonatal and infant feeding: effect on bone density at 4 years. J Pediatr Gastroenterol Nutr.2005;41:88-93.	Design
631		Yousafzai, A. K.,Rasheed, M. A.,Rizvi, A.,Armstrong, R.,Bhutta, Z. A. Effect of integrated responsive stimulation and nutrition interventions in the Lady Health Worker programme in Pakistan on child development, growth, and health outcomes: a cluster-randomised factorial effectiveness trial. Lancet.2014;384:1282-93.	Country
632		Ystrom, E. Breastfeeding cessation and symptoms of anxiety and depression: a longitudinal cohort study. BMC Pregnancy Childbirth.2012;12:36.	IV, DV
633		Zadik Z,Borondukov E,Zung A,Reifen R. Adult height and weight of breast-fed and bottle-fed Israeli infants. J Pediatr Gastroenterol Nutr.2003;37:462-7.	IV
634		Zaman, S.,Jalil, F.,Saleemi, M. A.,Mellander, L.,Ashraf, R. N.,Hanson, L. A. Changes in feeding patterns affect growth in children 0-24 months of age living in socioeconomically different areas of Lahore, Pakistan. Adv Exp Med Biol.2002;503:49-56.	Country
635		Zaman,S.,Ashraf,R. N.,Martines,J. Training in complementary feeding counselling of healthcare workers and its influence on maternal behaviours and child growth: a cluster-randomized controlled trial in Lahore, Pakistan. J Health Popul Nutr.2008;26:210-22.	IV, Country
636		Zavaleta,N.,Kvistgaard,A. S.,Graverholt,G.,Respicio,G.,Guija,H.,Valencia,N.,Lonnerdal,B. Efficacy of an MFGM-enriched complementary food in diarrhea, anemia, and micronutrient status in infants. J Pediatr Gastroenterol Nutr.2011;53:561-8.	DV
637		Zhang,J.,Shi,L.,Chen,D. F.,Wang,J.,Wang,Y. Effectiveness of an educational intervention to improve child feeding practices and growth in rural China: updated results at 18 months of age. Matern Child Nutr.2013;9:118-29.	IV
638		Zhu, B.,Zhang, J.,Qiu, L.,Binns, C.,Shao, J.,Zhao, Y.,Zhao, Z. Breastfeeding Rates and Growth Charts--the Zhejiang Infant Feeding Trial. Int J Environ Res Public Health.2015;12:7337-47.	IV, DV
639		Ziegler, E. E.,Fields, D. A.,Chernausek, S. D.,Steenhout, P.,Grathwohl, D.,Jeter, J. M.,Nelson, S. E.,Haschke, F. Adequacy of Infant Formula With Protein Content of 1.6 g/100 kcal for Infants Between 3 and 12 Months. J Pediatr Gastroenterol Nutr.2015;61:596-603.	IV
640		Ziegler,E. E.,Fomon,S. J.,Nelson,S. E.,Rebouche,C. J.,Edwards,B. B.,Rogers,R. R.,Lehman,L. J. Cow milk feeding in infancy: further observations on blood loss from the gastrointestinal tract. J Pediatr.1990;116:11-8.	IV, DV
641		Zive, M. M.,McKay, H.,Frank-Spohrer, G. C.,Broyles, S. L.,Nelson, J. A.,Nader, P. R. Infant-feeding practices and adiposity in 4-y-old Anglo- and Mexican-Americans. Am J Clin Nutr.1992;55:1104-8.	Design
642		Zutavern, A.,Brockow, I.,Schaaf, B.,von Berg, A.,Diez, U.,Borte, M.,Kraemer, U.,Herbarth, O.,Behrendt, H.,Wichmann, H. E.,Heinrich, J. Timing of solid food introduction in relation to eczema, asthma, allergic rhinitis, and food and inhalant sensitization at the age of 6 years: results from the prospective birth cohort study LISA. Pediatrics.2008;121:e44-52.	DV

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[1] Abbreviations: DV- Dependent variable; IV- Independent variable/exposure/intervention

APPENDIX

This table describes the characteristics of included studies in alphabetical order of first author's last name.

Supplemental Table S1. Description of studies examining types and amounts of complementary foods and beverages consumed and growth, size, and body composition.

Study	**Intervention/Exposures**	**Outcomes**	**Confounders & Limitations**
Abraham, 2012 Prospective Cohort Study; Scotland **Sample Size**: Baseline N: 5,217 Analytic N: 4,493 Attrition: 13.9% Power Analysis: NR **Sex:** NR **Race/Ethnicity**: 4% non-white ethnic group (Bradshaw, 2007) **Background Diet**: BF at 45-48mo: 61.0% ever BF, 39.0% never BF Infants in the negative pattern: 69% ever BF; started CFB at 0-3mo (20%), 4-5mo (64%), and 6-10mo (16%) Infants in the positive pattern: 50% ever BF; started CFB at 0-3mo (12%), 4-5mo (69%), and 6-10mo (20%)	Two dietary patterns were identified at 19-24mo using cluster analysis, and each infant was classified by cluster membership: Negative pattern: low fruit, vegetable; high sweets, crisps, soft drinks, snacking Positive pattern: high fruit, vegetable; low snacking **Age:** 0-24mo **Assessment Methods** Cluster analysis of survey at 19-24mo	Weight status **Age:** 45-48mo **Assessment Methods** Weight status: frequency of overweight/obese based on BMIZ >1.04; not overweight/obese ≤ 1.04 (UK 1990 ref. curves); methods used to obtain weight and height NR	SES: X Birth size: X **Limitations:** Cannot determine whether groups were similar at baseline on key characteristics; Key confounders from the analytic framework were NR or adjusted for in analyses including sex, race/ethnicity, maternal age, or birth size/gestational age; Cannot determine if outcome assessors were blinded, primary interviewers were unblinded Other: IV/Exposure was self-report; Bradshaw, 2007 summarizes Sweep 1 baseline characteristics
Almquist-Tangen, 2013 Prospective Cohort Study; Sweden **Sample Size**: Baseline N: 2,666 Analytic N at 12mo: 2,404 Analytic N at 18mo: 2,241 Attrition at 12mo: 9.8% Attrition at 18mo: 15.9%	Milk cereal drink (MCD) vs. porridge vs. semi-solids MCD (68kcal/100mL) defined as a soup-like liquid offered in a bottle containing: 1.8 g protein, 8.7 g CHO and 2.9 g fat, fortified with calcium, Fe, Zn, iodine and vitamins A, D, E, C, thiamine, niacin, B6 folic acid, B12 and	**Outcomes:** Weight status **Age**: 12mo, 18mo **Assessment Methods** Weight status: "high BMI" defined as 1SD above study population; BMI calculated from measured weight (digital scale) and height (stadiometer)	**Confounders accounted for:** Education: X SES: Sex: X Maternal age: Race/ethnicity: Feeding practices: Birth size: X

Power Analysis: NR **Sex:** 49.4% female **Race/Ethnicity**: NR **Background Diet**: At 4mo: 78.7% BF, 74.4% EBF; 21.3% FF; 4.3% MF (BF and FF); At 6 mo, 58.3% BF; 1.6% EBF	pantothenic acid; Porridge and semi-solids not defined **Age:**18mo **Assessment Methods** Y/N consumption of CFB at 6mo	-	Gestational age: X Other: maternal obesity; paternal obesity; paternal education; maternal smoking; BMI at 1, 4, and 6 mo. **Limitations:** Cannot determine whether groups were similar at baseline on key characteristics; Cannot determine reliability/validity of survey items; Did not adjust for potential key confounders (SES, race/ethnicity, feeding practices)
Ay, 2008 Prospective Cohort Study; The Netherlands **Sample Size**: Baseline N: 1232 Analytic N: 1012 Attrition: 17.9% Power Analysis/Sample Size Calculation: NR **Sex:** 48.2% Female **Race/Ethnicity**: 100% "Dutch ethnicity" **Background Diet**: ~90% ever BF, duration of BF = ~5mo	Age of CFB introduction: <5mo or >5mo CFB: Fruit snack **Age:** 2, 6, and 12mo **Assessment Methods**: Caregiver questionnaire	**Outcomes:** Body composition (Adiposity) **Age:** 24mo **Assessment Methods**: Body composition: sum of skinfold thickness (biceps, triceps, suprailiacal, subscapular) measured by study personnel using calipers	**Confounders accounted for:** Education: X Sex: X Maternal age: X Gestational age: X Other: Smoking **Limitations:** Cannot determine whether groups were similar at baseline on key characteristics; Cannot determine whether outcome assessors were blinded; Did not adjust for any key confounders (SES, race/ethnicity/feeding practices, birth size)
Baird, 2008 Prospective Cohort Study; United Kingdom **Sample Size**: Baseline N = 1,973 Analytic N = 1,740 Attrition = 11.8% Power Analysis and Sufficient Sample Size: NR	Two dietary patterns were identified at 6mo using principal component analysis, and each infant received a score for adherence to the pattern: Infant Guidelines: high frequency of consumption of vegetables, fruit, meat, fish, home-prepared foods, breast milk; low frequency	**Outcomes:** Body composition; Weight; Length **Age**: Birth, 6mo, 12mo, 0-6mo; 6-12mo **Assessment Methods** Body composition: triceps and subscapular skinfold calipers;	**Confounders accounted for:** Education: X Sex: X Other: Parity; Smoking **Limitations:** Cannot determine whether groups were similar at baseline; Unclear whether outcome assessors were blinded to the infants' feeding

Sex: 46.9% female **Race/Ethnicity**: 94% white **Background Diet**: 0-6mo: 7.5% BF; ~21% FF, ~71.5% MF combination of BF and FF assessed via caregiver-report at 6mo	of consumption of commercial baby foods in jars and formula Adult Foods: high frequency of consumption of bread, savory snacks, biscuits, squash, breakfast cereals, and crisps; low frequency of breast milk, baby rice, and cooked and canned fruit **Age:**12mo **Assessment Methods** Timing: Maternal report Type: FFQ over 7d at 6mo; FFQ over 28d at 12mo; Dietary patterns identified by PCA	crude and thickness SD score from 0-6mo and 6-12mo Weight: digital scale; crude and change in weight SD score from 0-6mo and 6-12mo Length: infantometer; crude and change in length SD score from 0-6mo and 6-12mo	histories; Did not adjust for potential key confounders (SES, maternal age, race/ethnicity, feeding practices, birth size, gestational age) BF duration and infant diet was retrospectively self-reported by mothers at 6 and 12mo, thus may have been biased; ethnic minorities were underrepresented in this sample.
Barton, 2002 Prospective Cohort Study; United States **Sample Size**: Baseline N = 52 Analytic N = 52 Attrition = 0% Power Analysis and Sufficient Sample Size: NR **Sex:** NR **Race/Ethnicity**: NR **Background Diet**: 46% BF, 54% FF at birth 33% BF, 67% FF at 1-2mo 83% received CFB <4mo	Two dietary patterns were observed in infants based on intake before or at 4-6mo: Inappropriate foods: home-prepared mashed potatoes and gravy, green beans with fat-back, pork, bacon, steak, high-sugar high-fat puddings, desserts, soda, and juice >8oz/d Appropriate foods: Parent-prepared solids w/o extra fat, salt, sugar **Age:**4-6mo **Assessment Methods** Caregiver report	**Outcomes:** Weight, length, HC **Age**: 1-2mo; 4-6mo **Assessment Methods** Weight: measured by study personnel on balance-beam scale Length: measured by trained personnel, on standard length board HC: measured by study personnel with nonfabric measuring tape	**Confounders accounted for:** Other: NR **Limitations:** Cannot determine whether groups differed at baseline on key characteristics; Cannot determine whether outcome assessors were blinded; Length of follow-up varied from 4 to 6mo of age; Cannot determined validity/reliability of measures used to assess outcomes; Did not adjust for any potential key confounders (including education, SES, sex, maternal age, race/ethnicity, feeding practices, birth size, gestational age) Did not adjust for baseline values though weight/length at 1-2mo was similar between groups; Groups were unbalanced (40 infants in the CFB <4mo group vs. 8 infants in the >4mo group)

Bell, 2013 Prospective Cohort Study; Australia **<u>Sample Size</u>**: Baseline N = 552 Analytic N = 493 Attrition = 10.7% Power Analysis: NR **<u>Sex:</u>** 54% female **<u>Race/Ethnicity</u>**: NR **<u>Background Diet</u>**: 3% never BF, 34% BF>6 mo, 29% BF 6-12 mo, 29% BF>12 mo, 6% missing Age of introduction to solids: 20.9 wk (SD=5.1)	Four dietary patterns were identified at 13-16mo using principal component analysis, and each infant received a score for adherence to the pattern: Core: fruit, grains, nonwhite bread, vegetables, cheese, eggs, nuts and seeds Basic combination: basic core + non-core w/o fruit or vegetables Basic core: white bread, milk Non-core: spreads, juice, ice-cream **Age:**13-16mo **Assessment Methods** 3d multiple-pass 24hr recalls (2d week, 1d weekend); Dietary patterns identified by PCA	**<u>Outcomes:</u>** BMIZ **Age:** 24mo **Assessment Methods** Body composition: age and sex-specific BMIZ calculated from measured weight/height (measured by trained personnel, physicians, nurses without shoes or garments)	**<u>Confounders accounted for:</u>** Education: X SES: X (SEIFA decile) Sex: X Maternal age: X Feeding practices: X Other: smoking status, marital status, weight status, parity, child age, age of introduction to solids **<u>Limitations:</u>** Cannot determine whether groups differed at baseline on key characteristics; Cannot detrmined wheter outcome assessors were blinded; Cannot determine reliability of outcome assessment, 17% of outcomes measured by general practitioners or child health nurses, not study staff; Did not adjust for birth size, gestational age, or race/ethnicity Mothers may have reported more favorable dietary intakes (highly educated sample who may have greater knowledge of dietary recommendations)

Cantoral, 2016 Prospective Cohort Study; Mexico **Sample Size**: Baseline N: 622 (enrolled in F/U) Analytic N: 227 Attrition: ~64% Power Analysis and Sufficient Sample Size: NR **Sex:** 54% female **Race/Ethnicity**: NR **Background Diet**: 31% at least partial BF; 73% introduced to SSB <12mo	Age of CFB introduction: ≤12mo vs >12mo CFB: SSB: sum of daily intake of soda, commercial fruit drinks, flavored water with sugar; Not including natural fruit or vegetable juice **Age:** 12mo; every 6mo until 5y; at 8-14y **Assessment Methods**: 116-item FFQ	Weight status; WC **Age:** 8-14y **Assessment Methods**: Weight status: risk of obesity classified as BMI>2 SD of z-score; BMI from measured weight (digital scale to 0.1kg) and height (stadiometer to 0.1cm) WC: measuring tape to 0.1cm for abdominal obesity: WC≥ 90th %tile	**Confounders accounted for:** SES: X Sex: X Feeding practices: X Other: non-SSB intake, TV watching, physical activity, maternal obesity at 12mo post-partum **Limitations:** Cannot determine whether groups differed at baseline on key characteristics; Cannot determine if outcome assessors were blinded; Did not account for high attrition rate; Did not adjust for key confounders of education, maternal age, race/ethnicity, birth size or gestational age Risk for measurement error associated with FFQ; Assumes that SSB intake was constant during the months evaluated on FFQ
Carruth, 2000 Prospective Cohort Study; United States **Sample Size**: Baseline N = 98 Analytic N = 94 Attrition = 4.1% Power Analysis and Sufficient Sample Size: Use of an incomplete block design maintained statistical power **Sex:** 48.0% female (Skinner, 1997) **Race/Ethnicity**: 100% White **Background Diet**: 83% any BF, 33% EBF at 4mo, 33% MF at 4mo; 12% EBF at 6mo	Food cluster: yes/no if any meats, mixed foods or table foods Vegetables: yes/no CFB: 1 or more foods including cereal, juice, fruits, vegetables, meat, mixed food, and table foods; Infant could still be BF or FF with CFB; Mean age of introduction of cereal = 4.0mo, juice = 4.5mo, fruit = 5.0mo, vegetables = 5.5mo, food cluster (mixed foods, table foods, meat) = 7.0mo **Age:** 2, 3, 4, 6, 8, 10, 12, 16, 20, and 24mo **Assessment Methods** 24h recall	Weight change **Age:** 2-8mo **Assessment Methods** Weight slope: kg/mo; standard protocol Length slope: cm/mo; standard protocol Interview schedules were done using an incomplete block design, such that the number of times measures were taken for each infant 3-5 times from 2 to 10mo, and 2-4 times from 12 to 24mo	**Confounders accounted for:** Sex: X Other: Final model 2-8mo rate of change weight: gender, length slope **Limitations:** Cannot determine whether groups differed at baseline on key characteristics; Cannot determine whether outcome assessors were blinded; Cannot determine adequacy of statistical methods (prior versions of regression models not described, data not shown); Did not adjust for potential key confounders (education, SES, maternal age, race/ethnicity, birth size, or gestational age); Limited

~64% CFB by 4mo; Median age for introducing CFB: cereal 4.0 (range .50–6.5 mo), juice 4.50 (1–11 mo), fruit 5.0 (.50–8.2 mo), vegetables 5.5 (1–7.7 mo) and the food cluster (mixed foods, table foods, meat) 7.0 (3–12 mo)			generalizability (small sample of white middle- to upper class subjects from TN); Results reports only age of intro of vegetables and food cluster remained as significant predictors in rate of change in weight but age of any foods not significant predictor in weight gain 12-24mo; Unclear how addition of cereal ≤4 or >4mo was analyzed in relation to weight outcomes
Dagnelie, 1994 Prospective Cohort Study; The Netherlands **<u>Sample Size</u>**: Baseline N: 110 Analytic N: 106 Attrition: 3.6% Power Analysis/Sample Size Calculation: NR **<u>Sex:</u>** ~49.0% Female **<u>Race/Ethnicity</u>**: 100% White **<u>Background Diet</u>**: Macrobiotic: BF for ~13mo Omnivorous: BF for ~6.5mo	Two dietary patterns were observed in infants based on diet followed at weaning,~4-10mo: Macrobiotic diet: Included unpolished rice, pulses and vegetables with a high fiber content, small additions of seaweeds, fermented foods, nuts, seeds, and seasoned foods; Avoided vitamin D supplements, products of animal origin such as meat and dairy product, fat/oil, and fish. Omnivorous diet: Not described **Age:**4mo-18mo, each cohort followed for 6mo **Assessment Methods** Food record, 3d, weighed	Weight status; Body composition; Weight; Length; Circumferences **Age:** 4-18mo **Assessment Methods** Results in Dagnelie, 1989 reported as velocities (units/year) Weight, length, sitting height: measured without clothing on Seca scale; flexible steel tape; used to obtain weight-for-length Crown-heel length, crown-rump length: supine infantometer (for infants <2y) HC, MUAC, biiliacal (pelvic) width: plastic insertion tape; used to obtain fat and muscle areas of arm Skinfold thickness: Triceps and subscapular via caliper to 0.2mm Wasting: arm-muscle-area calculated from MUAC and tricep skinfold	**<u>Confounders accounted for:</u>** Education: X Sex: X Other: Birthweight self-reported; unclear if adjusted for rickets **<u>Limitations:</u>** Strategy to recruit/allocate participants was not similar across groups; Groups differed at baseline on birth weight and feeding practices and cannot determine if these were adjusted for in analyses; Cannot determine the level of adherence to macrobiotic diet, or omnivorous control diet, as specific details regarding diet not provided; Did not adjust for potential key confounders (SES, maternal age, race/ethnicity, feeding practices, birth size, gestational age; Cannot determine when outcomes were assessed Growth deficit in macrobiotic infants driven by the 8-14mo cohort, with significantly lower triceps skinfold, arm fat area, and lower growth rate, relative to omnivorous infants.

			Combination of lack of energy and protein may have caused gowth retardation in weight and MUAC Cannot determine if rickets and vitamin D deficiency were adjusted for as macrobiotic vs. omnivorous infants had greater rates of both
Davidsson, 1996 Cross-Over Study; Scotland **Sample Size**: Baseline N: 57 Analytic N: 57 Attrition: 0% Power Analysis and Sufficient Sample Size: NR **Sex:** ~53% Female **Race/Ethnicity**: NR **Background Diet**: 100% FF (CM, no soy)	Cereal varied by fiber content for 4wk: Wheat/soy: 8% fiber (A) or 1.8% fiber (B) Wheat/milk: 5.3% fiber (C) or 2% fiber (D) Cereal ad lib (~10-60g servings); Additional weaning foods were provided upon request (apple puree, apple juice, exotic fruit juice, and maize puree); **Age:** 7-17wk **Assessment Methods** Cereal intake was quantified by weighing the containers before the start of the study and at each visit to the homes every 14d	Weight; Length; Circumferences **Age**: 7-17wk **Assessment Methods** Weight, height, arm and chest circumference in cm, and HC in cm were measured monthly	**Confounders accounted for:** Other: NR **Limitations:** Cannot determine whether groups differed at baseline on key characteristics; Cannot determine if outcome assessors or investigators were blinded; Cannot determine influence from intake of other weaning foods provided; Adherence not described; Cannot determine relability/validity of outcome assessment Cross-over design but characteristics not described

de Silva, 2007 Non-Randomized Controlled Trial; Sri Lanka **Sample Size**: Baseline N: 182 Analytic N: 152 Attrition: 16.5% Power: NR **Sex:** ~62% female **Race/Ethnicity**: NR **Background Diet**: ~22.9% receiving formula ~75% EBF for 4mo	Intervention: home-based CFB (containing 110-130 kcal/100 ml) + recipes + mechanical blender from 4-12mo Control: CFB of mothers' choice from 4-12mo **Age:** 8mo **Assessment Methods** Maternal questionnaire and interview	Weight; Length **Age:** 4-12mo **Assessment Methods** Weight: gain; measuerd via digital scale monthly Length: gain, measured via standard infantometer monthly	**Confounders accounted for:** Education: X SES: X Maternal age: X Birth size: X **Limitations:** Group allocation methods were not described; Cannot determine whether groups differed at baseline on key characteristics; Cannot determine if investigators and outcome assessors were blinded; Statistical methods were not described; Cannot determine validity/reliabiilty of outcome assessment; Did not adjust for potential key confounders (sex, race/ethnicity, feeding practices though # of feeds identical, or gestational age) Influence of having the recipes and blender available could be concurrent IV/Exposure aside from CFB itself; Race/ethnicity data was lacking; information on maternal health was lacking; data on z scores for weight for age not adequately presented
Dube, 2010 Randomized Controlled Trial; Germany **Sample Size**: Baseline N: 132 Analytic N : 97 Attrition: 26.6% Sample Size Calculation: N=74 to detect a 1SD difference in Hb	High Meat Group (HM): Received commercial baby jars from 4-11mo with meat content of 12% by weight (according to pediatric guidelines); 20g/d 4-7mo, 28.6g/d 8-10mo Low Meat Group (LM): Received meals 4-11mo with meat content	Weight **Age:** 4, 7, and 10mo **Assessment Methods** Weight and length were measured at the local clinic	**Confounders accounted for:** Sex: X Feeding practices: X Birth size: All >2.5kg Gestational age: All full-term **Limitations:**

Sex: 49.5% Female **Race/Ethnicity**: NR **Background Diet**: Fully BF at 17wk: ~55% Fully BF at 26wk: ~16% Partially BF at 10mo: 23% Start of CF: ~22wk	8% by weight (the lowest level of EU law); ~15g/d 4-7mo; 17.6g/d 8-10mo 50% of jars contained beef, 50% contained poultry; Parents were advised to start CF by using the study food between 4-6mo, and to continue until 10m, with a frequency of 1 jar/d at least 5 times/wk **Age:** 6mo **Assessment Methods** Diet record		Did not assess the impact of high loss to follow-up (~27%); Cannot determine validity of outcome measurement (weight NR) The small difference between LM (8%) vs. HM (12%) was acknowledged as a limitation Length was measured but not reported in results
Durmus, 2012 Prospective Cohort Study; The Netherlands **Sample Size**: Baseline N: 1106 Analytic N: 779 Attrition: 29.6% Power Analysis and Sufficient Sample Size: NR **Sex:** 49% female **Race/Ethnicity**: 100% "Dutch ethnicity" **Background Diet**: 87.5% ever BF; ~4.5mo BF duration	Fruit and/or vegetable snack first given (<4, 4-5, >5mo) **Age:** 2, 6, and 12mo **Assessment Methods**: Caregiver questionnaire	Body composition (Adiposity) **Age:** 6mo, 24mo **Assessment Methods**: Body composition: • Subcutaneous fat mass via skinfold thickness (biceps, triceps, suprailiacal, subscapular) measured by study personnel using calipers	**Confounders accounted for:** Education: X Sex: X Feeding practices: X Birth size: X (Birth weight) Gestational age: X Other: Maternal BMI, Smoking; Parity; Current height; Observer **Limitations:** Cannot determine whether groups were similar at baseline on all key characteristics; Cannot determine whether outcome assessors were blinded; Did not assess the impact of high loss to follow-up (~27%); Did not adjust for key confounders (SES, maternal age, race/ethnicity) BF information only available in 78% of sample; CFB included only a fruit or vegetable snack and other products could have been introduced; Homogenous, highly-educated sample; Limited generalizability

Durmus, 2014 Prospective Cohort Study; The Netherlands **Sample Size**: Baseline N: 6054 Analytic N: 5063 Attrition: 16.4% Power Analysis and Sufficient Sample Size: NR **Sex:** 50.2% female **Race/Ethnicity**: 100% "Dutch ethnicity" **Background Diet**: 92.4% ever BF; 20.4% EBF to 4mo	Fruit and/or vegetable snack first given (<4, 4-4.9, ≥5mo) **Age:** 2, 6, and 12mo **Assessment Methods**: Caregiver questionnaire	**Outcomes:** Weight status; Body composition; WC **Age:** 6y **Assessment Methods**: Weight status: risk of overweight or obesity based on IOTF categories for BMI Body composition: • Adiposity: total fat mass, android-gynoid ratio (DXA) • BMI: calculated from measured height/weight (stadiometer/ mechanical scale) Abdominal/WC: abdomial fat via ultra-sound	**Confounders accounted for:** Education: X Sex: X Maternal age: X Race/ethnicity: X Birth size: X Gestational age: X Other: Child age, Child height; Parity; Maternal BMI, Smoking; TV watching **Limitations:** Cannot determine whether groups were similar at baseline on all key characteristics; Cannot determine whether outcome assessors were blinded; Did not adjust for key confounders (SES or feeding practices) Did not collect information on BM consumption or composition
Engelmann, 1998 Randomized Controlled Trial; Denmark **Sample Size**: Baseline N: 55 Analytic N: 41 Attrition: 25.5% Power Analysis/Sample Size Calculation: NR **Sex:** 29.3% Female **Race/Ethnicity**: NR **Background Diet**: 100% BF (for ≥1/d); HM consumed more formula (p=0.06) than LM; LM consumed more Fe-fortified gruel than HM (p=0.03). Fish, cow's milk, fruits, vegetables, and other foods (NS)	Low-meat group (LM): Received a diet with 10g/d of meat High-meat group (HM): Received a diet with 27g/d of meat Parents choose from 7 purees containing vegetables and meat (beef, pork, lamb, turkey, cod) prepared in low- and high-meat versions. All other foods were served ad libitum. **Age:** 8-10mo **Assessment Methods** Food record, weighed 1/wk	**Outcomes:** Body composition; Weight; Length; MUAC **Age:** 10mo **Assessment Methods** Body composition: triceps skinfold via calipers Weight: Electronic scale to 1g Length (crown-heel): Electronic measuring board to 0.1cm MUAC: non-stretchable tape;	**Confounders accounted for:** Other: all full-term, >2.5kg; Baseline growth measures NSD between groups; birth weight and length significantly higher in LMG **Limitations:** Cannot determine whether group allocation was concealed; Groups differed at baseline (varied in consumption of formula and gruel) and differences were not adjusted for in analyses; Cannot determine whether subjects or investigators were blinded; Cannot determine validity and reliability of outcome assessment; Did not assess the impact of high loss to follow-up (~26%); Did not adjust analyses for

4600)			potential key confounders (education, SES, sex, feeding practices, race/ethnicity, birth weight, or gestational age) Groups differed on birth weight and length at baseline, and consumption of formula and gruel, and these differences were not controlled for in the analyses
Gaffney, 2012 Prospective Cohort Study; United States **Sample Size**: Baseline N = 4902 Analytic N = 691 Attrition = 85.9% Power Analysis and Sufficient Sample Size: NR **Sex:** 49.3% Female **Race/Ethnicity**: NR **Background Diet**: BF intensity in late infancy: 52.1% low, 24.3% medium, 23.6% high	Juice intake intensity according to servings per 2d: 0 juice/2d, 1 juice/2d, >1 juice/2d **Age:**1, 2, 3, 4, 5, 6, 7, 9, 10, and 12mo **Assessment Methods** Maternal questionnaire	WAZ **Age:** 12mo **Assessment Methods** WAZ: maternal-report from recent doctor visit; calculated age and sex-specific z scores by CDC standards	**Confounders accounted for:** Education: X SES: X Maternal age: X Race/ethnicity: X Feeding practices: X Birth size: X Other: Mother's smoking status, weight gain in pregnancy, pregravid BMI **Limitations:** Cannot determine whether groups were similar at baseline on key characteristics; Cannot determine reliability/validity of outcome assessment and outcome assessors were not blinded due to both feeding and outcome data self-reported by mothers; Did not assess the impact of high loss to follow-up (~40%); Did not adjust analyses for potential confounders (sex, gestational age) Generalizability limited due to sample not being representative (Data not derived from a nationally representative sample, underrepresented minority groups;

			sample biased toward mothers with more education and higher SES)
Garden, 2011 Prospective Cohort Study; Australia **<u>Sample Size</u>**: Baseline N: 616 Analytic N: 362 (339 WC) Attrition: 41.2% (44.5%) Power Analysis and Sufficient Sample Size: NR **<u>Sex:</u>** N:362 for BM: 49.5% female N:339 for WC: 48.7% female **<u>Race/Ethnicity</u>**: N:362 for BMI: 55% Caucasian, 8.8% European, 3.6% Middle Eastern, 5% Indian 3.9% Asian, 23.8% Undefined N: 339 for WC: 54.3% Caucasian, 8.8% European, 3.5% Middle Eastern, 5% Indian 4.1% Asian, 24.2% Undefined **<u>Background Diet</u>**: N:362 for BMI: 41.7% BF ≥ 6mo N:339 for WC: 42.2% BF ≥ 6mo	Quintiles of grams (g) and % total energy intake (%kcal) from CFB of core and extra foods at 18mo: Dairy: combined milk and milk products: yogurt, cheese, ice cream, custard Milk: skim, whole and evaporated Fruit Vegetables Cereal: bread, pasta, rice, breakfast cereals, etc. Meats: chicken nuggets, ground beef, beef sausages, ham, etc Total extra foods: savory sauces, fats, and oils Non-milk beverages: juice, cordial, fruit drinks and soft drinks Sweetened drinks: cordial, fruit drinks and soft drinks; Fried potatoes Salty snacks: potato crisps, cheese snacks, corn chips Confectionary: e.g., chocolate, jellies, energy bars Cereal-based products: e.g., cookies, cakes, pies, buns **Age:**18mo **Assessment Methods** Food record, 3d, weighed	Body composition; WC **Age:** 8y **Assessment Methods** Body composition: BMI calculated from measured weight and length using kg/m2 Weight: electronic bathroom scale; to 1kg Length: portable stadiometer to 1cm WC: flexible, steel tape below costal border and iliac crest to 0.1cm Measurements made by study nurses	**<u>Confounders accounted for:</u>** Education: X Sex: X Maternal age: X Race/ethnicity: X Feeding practices: X Birth size: X Gestational age:X Other: Parent obesity; smoking; daycare; n3 v. n6 group; Maternal and Gestational age were removed from model **<u>Limitations:</u>** Cannot determine whether groups were similar on baseline characteristics; Cannot determine whether outcome assessors were blinded; Did not account for high attrition rate/lost to follow-up (22%); Did not adjust for potential key confounders (SES) Study was not powered to detect differences in obesity outcomes; Did not measure physical activity; Did not calculate intake from total core foods but calculated, analyzed, and reported intake from total extra foods

Garden, 2012 Prospective Cohort Study; Australia **Sample Size**: Baseline N: 616 Analytic N: 370 (at 3mo, Timing) Analytic N: 298 (at 18mo, Type) Attrition: 40% (3mo) Attrition: 51.6% (18mo) Power Analysis and Sufficient Sample Size: NR **Sex:** 49% female **Race/Ethnicity**: NR **Background Diet**: 40% BF 0-3mo; 16.8% BF 3-6mo; 43.2% BF ≥6mo	Grams (g) and % total energy intake (%kcal) from CFB at 18mo: Dairy: combined milk and milk products: yogurt, cheese, ice cream, custard Milk: skim, whole and evaporated Fruit Vegetables Cereal: bread, pasta, rice, breakfast cereals, etc. Meats: chicken nuggets, ground beef, beef sausages, ham, etc. Total extra foods: savory sauces, fats, and oils Non-milk beverages: juice, cordial, fruit drinks and soft drinks Sweetened drinks: cordial, fruit drinks and soft drinks; Fried potatoes Salty snacks: potato crisps, cheese snacks, corn chips Confectionary: e.g., chocolate, jellies, energy bars Cereal-based products: e.g., cookies, cakes, pies, buns **Age:** 3mo; 18mo **Assessment Methods** Questionnaire; Food record, 3d, weighed	Body composition **Age:** 0-11.5y **Assessment Methods** Body composition: BMI trajectory calculated in kg/m2 based on measured weight and height (weight, electronic bathroom scale to 1kg; length: portable stadiometer to 1cm); categorized using CDC %tile curves for BMI: Normal: tracks at 50th Early and Persistent: at 75th at 2y crossing to 95th at 11.5y Late Increase: tracks at 50th at 2y; crossed to 85th at 8y, and 90th at 11.5y Measurements made by study nurses at 1, 3, 6, and 9mo; every 6mo from 9mo-5y, at 8y, at 11.5y WC measured but NR	**Confounders accounted for:** Education: X Sex: X Race/ethnicity: X Feeding practices: X Other: n3 vs. n6 intervention group; parent obesity; smoking **Limitations:** Cannot determine whether groups were similar on baseline characteristics; Cannot determine whether outcome assessors were blinded; Did not account for high attrition rate/lost to follow-up (40%); Did not adjust for potential key confounders (SES, maternal age, birth size, gestational age)

Golley, 2013 Prospective Cohort Study; United Kingdom **<u>Sample Size</u>**: Baseline N: 13,978 Analytical N: 7y: 7834; 8y: 7170 Attrition: 7y: 44%; 8y: 48.7% Power: NR **<u>Sex:</u>** 48.3% female **<u>Race/Ethnicity</u>**: NR **<u>Background Diet</u>**: Dietary pattern scores from FFQ collected at 7y; CFUI scores were negatively associated with a ''processed'' dietary pattern but positively associated with a ''health conscious'' dietary pattern	Each infant received a complementary feeding utility index (CFUI) score at 6mo, which was derived and analyzed as a continuous variable from 14 components (BF duration, age of introduction to solids, textured foods, and minimizing ready-made infant foods. Higher CFUI scores reflected higher adherence to CF guidelines. Dietary patterns were not analyzed in relation to growth outcomes. **Age:** 6mo **Assessment Methods** CFUI calculation from FFQ-derived dietary patterns	**<u>Outcomes:</u>** Body composition; WC **Age:** 7.5y **Assessment Methods** Body composition: BMI calculated from measured height/weight (stadiometer/Tanita scale) WC: flexible tape to the nearest 1mm	**<u>Confounders accounted for:</u>** Education: X SES: X Sex: X Maternal age: X Race/ethnicity: X Feeding practices: X (CFUI score) Birth size: X Gestational age: X Other: marital status, maternal smoking, maternal weight status, other children, singleton/twin and stimulating in the home environment; Model 2: height **<u>Limitations:</u>** Cannot determine validity/reliability of assessment for exposure; Cannot determine whether outcome assessors were blinded; Did not account for high attrition rate/lost to follow-up (44%) Race/ethnicity NR in article (collected in parent cohort) but adjusted for analyses

Hertrampf, 1990 Prospective Cohort Study; Chile **Sample Size**: Baseline N: 239 Analytic N: 189 at 4mo; 187 at 12mo Attrition: 20.9% at 4mo; 21.7% at 12mo Power Analysis and Sufficient Sample Size: NR **Sex:** NR **Race/Ethnicity**: 100% Hispanic **Background Diet**: All were BF at 3mo When BF stopped, infants fed non-fortified whole cow's milk	Fe-fortified cereal ~3-6mo: received 20g/d at 4mo and 40g/d at 6mo (100g: 360kcal, 11.6g pro, 0.3g fat, 14mg Fe) Control 3-6mo: routine CFB (at 3mo, fruit, cereal, juice; at 4mo, veg and meat; at 6mo, legumes and eggs) **Age:**4-6mo **Assessment Methods** NR	Weight **Age:** 8mo, 12mo **Assessment Methods** Weight: weight/age adequacy as % median of NCHS standard for weight/age ratio	**Confounders accounted for:** NSD in birth weight, BF duration, maternal age, or SES **Limitations:** Cannot determine group allocation methods; Cannot determine whether outcome assessors or investigators were blinded; Participants were not blinded to intervention status; Cannot determine reliablity/validity of outcome assessment (NR); Did not account for high attrition rate (~21%); Cannot determine adequacy of statistical methods (lack of detail)
Hoffman, 2004 Randomized Controlled Trial; United States **Sample Size**: Baseline N: 55 Analytic N: 51 Attrition: 93% Sample Size Calculation/Power Analysis: N:21 to detect a 1SD difference in visual acuity, (stereoacuity, and blood lipids) at 12mo **Sex:** NR **Race/Ethnicity**: NR **Background Diet**: All EBF to 9.7mo in control infants and to 8.8mo in DHA-rich infants; 65% of control infants, and 80% of DHA-rich infants were weaned to IF before 12mo	DHA-enriched CFB: receive 1 jar/day of solid baby food, enriched with DHA from egg-yolk, from 6 to 12mo Control CFB: receive 1 jar/day of solid baby food from 6 to 12mo CFB: solid baby food w/ and w/o DHA from egg yolk; DHA-rich food was 2.3 kJ/g higher in energy density than control food; 216 food jars in 5 varieties (vegetable, cereal w/ fruit, fruit custard) were shipped to participants **Age:**6-12mo **Assessment Methods** Baby food jars weighed to ensure adherence and intake at 1-2mo	Body composition; Weight; Length; HC **Age:** 6, 9, and 12mo **Assessment Methods** Body composition: Skinfold z-score Weight: z-score Length: z-score HC: z-score (Birch, 1998: Weight was measured using a Healthometer pediatric strain gauge scale accurate to 1g. Length was measured using Ellard Length Boards accurate to 0.1cm. Head circumference was measured using a nonstretching tape accurate to 0.1cm. Subscapular and triceps fat deposition were	**Confounders accounted for:** Feeding practices: All EBF Gestational age: All full-term **Limitations:** Cannot determine investigators or outcome assessors were blinded

		measured using a Lafayette skin fold caliper accurate to 1mm)	
Iannotti, 2009 Prospective Cohort Study; Peru **Sample Size**: Baseline N: 579 Analytic N: 232 Attrition: 59% Power Analysis: NR **Sex:** 49.1% Female **Race/Ethnicity**: NR **Background Diet**: 92% BF during 6-12mo	Infants categorized as receiving CFB or animal source foods (meat, fish, egg, or milk) if the mother reported consumption of solid foods (cereal, meat or fish, mixed or blended foods, stews, bread or other cereal products, and purées) plus breastmilk. Number of observed days that food was consumed was divided by number of observation days. **Age:** 6-12mo **Assessment Methods** Maternal report	Body composition; Weight; Length; HC; MUAC **Age:** 1-12mo (monthly) **Assessment Methods** Body composition: Skinfold thickness: calipers; MUAC, chest, and calf circumferences measured Weight: Seca scale to 10g; converted to z-score Length: measuring board to 0.1cm; converted to z-score HC: measured	**Confounders accounted for:** Education: X SES: X Sex: X Feeding practices: X Birth size: X Other: Similar SES; Maternal education NS **Limitations:** Cannot determine whether groups were similar at baseline; Cannot determine if outcome assessors were blinded; Did not adjust for potential key confounders (maternal age, race/ethnicity, gestational age)
Kalies, 2005 Prospective Cohort Study; Germany **Sample Size**: Baseline N = 3,036 Analytic N = 2,337 Attrition = 23% Power Analysis and Sufficient Sample Size: NR **Sex:** 49% Female **Race/Ethnicity**: NR **Background Diet**: Feeding mode during time of observation: 24.4% EBF first 0-1mo, 16.3% BF for 2-3mo, 20.8% BF for 4-5mo, 38.6% BF > or = 6mo.	CFB categorized as: self-made, ready-made, or mixture from both **Age:**2y **Assessment Methods** Caregiver questionnaire	Weight, weight gain **Age:** 24mo **Assessment Methods** Height, weight: recorded at preventive medical check-ups Risk of elevated weight gain at 24mo	**Confounders accounted for:** SES: X Sex: X Feeding practices: X Other: Smoking; maternal BMI; birth order; study center; All full-term **Limitations:** Cannot determine whether groups were similar on baseline characteristics; Cannot determine if outcome assessors were blinded; Cannot determine validity/reliability of outcome assessment (height and weight non-duplicate at medical check-ups); Did not account for high attrition rate (23%); Did not adjust for potential key confounders (education; maternal age; race/ethnicity)

			Parent self-reported feeding data; primary objective of study was not timing/type of CFB as such it appears IV/Exposure was used as a confounding in models
Kramer, 2004 Prospective Cohort Study; Belarus **Sample Size**: Baseline N: 17,601 Analytic N: 17,046 Attrition: 3% Power Analysis and Sufficient Sample Size: NR **Sex:** NR **Race/Ethnicity**: NR **Background Diet**: NR; 100% were BF at birth	Age of CFB introduction: based on intake at the start of the respective growth interval CFB: cereals, other solids, and juices **Age:** 0-12mo **Assessment Methods**: Maternal interview	Body composition; Weight; Length; HC **Age:** 1-3mo; 3-6mo; 6-9mo; 9-12mo **Assessment Methods**: Body composition: WLZ based on CDC/WHO, 2000 Weight: NR; used to calculate WAZ Length: NR; used to calculate LAZ HC: NR	**Confounders accounted for:** Education: X Birth size: X (All with birth weight >2.5kg) Gestational age: All full-term Other: Anthropometric outcome at current time (WAZ, LAZ, WLZ, HC), geographic region, urbanicity, hospital **Limitations:** Cannot determine whether groups were similar on baseline characteristics; Cannot determine whether outcome assessors were blinded; Cannot determine validity/reliability of outcome assessment (unstandardardized); Did not adjust for potential key confounders (SES, sex, maternal age, race/ethnicity though participants were from RCT) Cereals consumed may not be generalizable; Only 1.2% of infants were consuming cereals at 3mo; Cannot rule out reverse causality,

			residual confounding, and selection bias; Trial promoted breast-feeding; Outcome assessment was unstandardized (various methods used; not primary outcome of original RCT)
Krebs, 2006 Randomized Controlled Trial; United States **<u>Sample Size</u>**: Baseline N: 88 Analytic N: 72 Attrition: 18.2% Sample Size Calculation: N=100 to detect differences of 0.85 or more in weight-for-length z scores **<u>Sex:</u>** 51.1% Female **<u>Race/Ethnicity</u>**: NR **<u>Background Diet</u>**: All infants were EBF and receiving no routine vitamin or mineral supplements at enrollment Formula use was minimal before 7mo; by 9 and 12mo (14 infants in each group) were consuming formula, averaging 8 to 9oz/d	Meat: Received pureed beef (Gerber Beef and Beef Gravy, Second Foods) from 5-7mo Cereal: Received Fe-fortified cereal from 5-7mo (Gerber Fe fortified infant rice cereal, without Zn, First Foods), mixed with either expressed human milk or water on approximately a 1:2 ratio of cereal to fluid Both groups were encouraged to wait until 5 mo to introduce the CFB, remained on their assigned food (with fruits and vegetables as desired after 1mo, avoiding the alternate study food) until 7 mo, when they could liberalize their diet to all foods **Age:**5-7mo **Assessment Methods** Diet record, 3d	Body composition; Weight; Length; HC **Age:** Baseline, 4-7mo; 7-12mo; 4-12mo for WAZ and LAZ **Assessment Methods** Body composition: WLZ from measured weight/length Weight: gain and WAZ; electronic scale to 1g Length: gain and LAZ; infant stadiometer to 0.1cm HC: laminated tape WAZ, LAZ, WLZ reported but data not shown	**<u>Confounders accounted for:</u>** Sex: X Birth size: X Gestational age: X **<u>Limitations:</u>** Cannot determine whether group allocation was concealed; Participants were not blind; Cannot determine whether investigators and outcome assessors were blinded; Duration/length of follow-up differed because subjects started the intervention at different time points (e.g., only 22 infants (7 meat, 15 cereal) had started CFB at the 5mo visit) *Intake of protein and Zn at 7mo significantly predicted HC growth from 7-12mo in univaiate analyses
Krebs, 2013 Randomized Controlled Trial; United States **<u>Sample Size</u>**: Baseline N: 45 Analytic N: 41 Attrition: 8.9% Sample Size Calculation: N= 15 per group to detect a 0.20mg difference in total absorbed Zn	Meat: Received one jar (71g) pureed meat and gravy per d by 7mo and >1 to ≤2 jars/d by 9mo Fe-Zn Fortified Cereal: Received Fe and Zn fortified cereal, offer 1 serving/d (15g dry weight according to the manufacturer's label) by 7mo and 2 servings/d by 9mo Fe-Fortified Cereal: Received Fe-fortified cereal, offer 1 serving/d	Weight; Length **Age:** 7, 8, 9mo **Assessment Methods** Weight: naked; electronic digital balance to 1g in duplicate Length: infant stadiometer to 0.1cm in duplicate	**<u>Confounders accounted for:</u>** **<u>Limitations:</u>** Cannot determine whether group allocation was concealed; Participants were not blinded; Cannot determine if investigators or outcome assessors were blinded; Infants were allowed ad lib feeding for foods other than those assigned

Sex: NR **Race/Ethnicity**: NR **Background Diet**: EBF: 100%, all infants	(15g dry weight according to the manufacturer's label) by 7mo and 2 servings/d by 9mo Fruits, vegetables, teething biscuits, and unfortified cereals and other finger foods were allowed ad lib. Cereal groups were instructed to avoid single-ingredient meats; at 8 mo, commercial infant dinners were allowed. Meat group instructed to avoid fortified infant cereals but was allowed to use unfortified cereals such as quick oats or commercial unfortified cooked rice starting at 7mo (≤15 g/d). **Age:** 6-9mo **Assessment Methods** Food record, 3d		(e.g., fruits and vegetables), and dietary intake was not accounted for Multiple comparisons not adjusted for
Libuda, 2015 Randomized Controlled Trial; Germany **Sample Size**: Baseline N: 214 Analytic N: RBC fatty acids: 158; Plasma fatty acids: 155 Attrition: RBC fatty acids: 26.2%; Plasma fatty acids: 27.6% Sample Size Calculation: N=63 to detect a 0.33% difference in RBC-DHA phospholipids **Sex:** ~50% Female **Race/Ethnicity**: NR **Background Diet**: ~58% BF, ~16% mixed feeding, ~26% FF	Rapeseed oil (ALA): Received CFB with ALA-rich rapeseed oil from 4-10mo Fish (DHA): Received CFB as salmon 2/wk to provide preformed DHA from 4-10mo Corn oil (Linoleic Acid): Received CFB with linoleic acid-rich corn oil from 4-10mo Study foods were commercial meals with vegetables, potatoes, and meat (Rapeseed oil, Corn oil) or fish (Fish) **Age:**4-10mo **Assessment Methods** Diet record, weighed	Weight; Length **Age:** 10mo **Assessment Methods** NR	**Confounders accounted for:** Groups did not differ at baseline on SES, sex, feeding practices, maternal age, birth size or gestational age **Limitations:** Fish group (IG-F) not able to be blinded; Cannot determine whether adherence to study protocol was similar across groups; Cannot determine whether outcome assessors were blinded; Cannot determine validity/reliability of outcome assessment; Did not account for high loss to follow-up (>20%)
Lind, 2004 Randomized Controlled Trial; Sweden	CC group: commercial MCD and porridge; MCD was oat and wheat	Weight; Length; HC; MUAC	**Confounders accounted for:**

Sample Size: Baseline N: 300 Analytic N: 263 Attrition: 12% Sample size calculation: n=58-84 per group at 80% power with a=0.05 to detect differences in length of 0.9cm, 0.4kg **Sex:** NR **Race/Ethnicity**: NR **Background Diet**: NR (BF or FF)	flour, mixed with milk powder and Fe-fortified PR group: phytate-reduced MCD and phytate-reduced porridge; MCD was replaced with white-wheat flour IF group: milk-based infant formula and porridge **Age:** 6-12mo **Assessment Methods** NR	**Age:** 6, 12, and 18mo **Assessment Methods** Weight: measured on Seca scale in triplicate to 0.02kg; used to calculate WAZ Length: measured on infantometer in triplicate to 1mm; used to calculate LAZ; HC and MUAC: measured via non-stretchable tape to 1mm -	Other: NR **Limitations:** Cannot determine whether groups differed at baseline on key characteristics; Cannot determine adherence to study protocols; Cannot determine impact of unintended exposures (partcipants allowed to consume anything from 12-18mo)
Liu, 1993 Randomized Controlled Trial; China **Sample Size**: Baseline N: 226 Analytic N: 164 Attrition: 27.4% Power Analysis and Sufficient Sample Size: NR **Sex:** 45% Female **Race/Ethnicity**: NR **Background Diet**: Most were partially BF	Fortified Rusk: received 1 biscuit/day for 3mo (presumed to be fortified with iron, zinc, vit. A, calcium, and folic acid) Unfortified Rusk: received 1 unfortified biscuit/day for 3mo CFB: Rusks were biscuits made from wheat flour, sugar, and vegetable oil **Age:**6-16mo **Assessment Methods** Doctors ensured delivery of weekly rusk supply; mothers monitored child intake	Weight; Length **Age:** 9-16mo **Assessment Methods** Weight: Beam balance Length: length board	**Confounders accounted for:** **Limitations:** Cannot determine group allocation sequencing or concealment methods; Cannot determine whether investigators, participants, or outcome assessors were blinded; Cannot determine validity/reliability of outcome assessment; Cannot determine influence of background or usual diet on growth outcomes; Didnot adjust analyses for sex, which was unbalanced across groups Limited generalizability due to sample from rural villages with high-rates of malnutrition

Lonnerdal, 1990 Randomized Controlled Trial; China **Sample Size**: Baseline N: NR Analytic N: NR Attrition: CD Power Analysis and Sufficient Sample Size: NR **Sex:** NR **Race/Ethnicity**: NR **Background Diet**: 100% FF	Group A: Fed formula A w/o cereal; continued exclusive use of formula from 4-7mo Group D: Fed formula A with 25g/d cereal from 4-7mo Other groups confounded by formula: Formula B+ Cereal: Fed formula B and 25g/d cereal from 4-7mo Formula C+ Cereal: Fed formula C and 25g/d cereal from 4-7mo **Age:**4-7mo **Assessment Methods** Trained nurses assisted mothers in weighing a/o recording intake of infant at home visits	Body composition; Weight; Length; HC **Age:** 4, 5, 6, and 7mo **Assessment Methods** Weight, length, and HC measured at clinic Weight-for-height: calculated from measures Skinfold thickness: NR	**Confounders accounted for:** Other: NR **Limitations:** Cannot determine group allocation or randomization methods; Cannot determine whether groups were similar on baseline characteristics; Cannot determine validity/reliability of outcome assessment; Cannot determine attrition because sample size was not reported; Did not adjust for other sources of bias; Adequacy of statistical methods insufficient Lack of reporting on sample size, characteristics, IV/Exposure assessment
Makrides, 1998 Randomized Controlled Trial; Australia **Sample Size**: Baseline N High-Fe Group: 40 Baseline N Control Group: 39 Analytic N High-Fe Group: 36 Analytic N Control Group: 26 Attrition: 22% Sample Size Calculation: N=60 to detect differences of 6g/L in Hb and 18mg/L in SF **Sex:** 50% Female **Race/Ethnicity**: NR **Background Diet**: EBF: 100% at 6mo; BF: 100% through 9mo	High-Fe weaning diet: Offered four 30-40g servings/wk of red meat and four 113g jars/wk of Fe-fortified cereal Control: Standard nutritional advice (including advice to consume iron-fortified infant cereal from 4 to 6mo) **Age:** 6-12mo **Assessment Methods** FFQ (for iron-containing foods)	Weight; Length; HC **Age:** 9mo, 12mo **Assessment Methods** Weight: Measured by study personnel Length: Measured by study personnel, supine to nearest 0.5cm HC: Measured by study personnel, to nearest 0.1cm	**Confounders accounted for:** Feeding practices: X (All EBF) Birth size: X (All >2500g) Gestational age: X (All >37wk) **Limitations:** Cannot determine if group allocation was concealed; Participants were not blinded; cannot determine if outcome assessors or investigators were blinded; Cannot determine the validity/reliability of outcome assessment (i.e., single vs multiple growth measures); Statistical analyses not described and data not shown

Makrides, 2002 Randomized Controlled Trial; Australia **<u>Sample Size</u>**: Control Baseline N: 28 (BF), 27 (FF) Regular Egg Baseline N: 27 (BF), 26 (FF) N-3 Egg Baseline N: 27 (BF(, 26 (FF) Control Analytic N: 23 (BF), 23 (FF) Regular Egg Analytic N: 23 (BF), 24 (FF) N-3 Egg Analytic N: 24 (BF, 20 (FF) Attrition: 15% Power Analysis/Sufficient Sample Size: N=40 per egg group, N=20 in control to detect differences in iron status outcomes (8g/L (SD=10) in Hb and 20g/L (SD=25) in SF). **<u>Sex:</u>** 53% Female **<u>Race/Ethnicity</u>**: NR **<u>Background Diet</u>**: BF: 51%	Regular egg group: Provided 4 eggs/wk from 6 to 12mo N-3 egg group: Provided 4 DHA enriched eggs/wk from 6 to 12mo Control group: Followed standard weaning diet of choice from 6 to 12mo **Age:** 6-12mo **Assessment Methods** Maternal questionnaire	Weight; Length; HC **Age:**12mo **Assessment Methods** Weight: NR Length: NR HC: NR	**<u>Confounders accounted for:</u>** Feeding practices: X Birth size: X (All >2500g) Gestational age: X (All >37wk) **<u>Limitations:</u>** Cannot determine validity/reliability of outcome assessment (methods were not described)
Morgan, 2004 Prospective Cohort Study; United Kingdom **<u>Sample Size</u>**: Baseline N: 144 Analytic N: 144 Attrition: 0% Power Analysis: NR **<u>Sex:</u>** 47% Female **<u>Race/Ethnicity</u>**: 97% White **<u>Background Diet</u>**: Ever BF: 83%; BF at 4mo: 37%; BF at 6mo: 2%	Meat intake: Total grams of red (beef, pork and lamb) and white (chicken, turkey, fish) meat consumed from 4-12mo and from 4-16mo Median for all infants >20mo: 278g/d (178-425g/d) **Age:** 4-12mo, 4-16mo, 4-24mo **Assessment Methods** Food record, 7d, weighed	Weight; Length; HC **Age:** 4, 8, 12, 16, 20 and 24mo **Assessment Methods** Weight: Measured in duplicate or triplicate by study personnel, to nearest 10g Length: Measured in duplicate or triplicate by study personnel, supine to nearest 1mm HC: Measured in duplicate or triplicate by study personnel	**<u>Confounders accounted for:</u>** Feeding practices: X Birth size: X Other: Energy intake, protein intake **<u>Limitations:</u>** Cannot determine whether groups were similar at baseline on key characteristics; Cannot determine if outcome assessors were blinded; Did not adjust for potential key confounders (education, SES, sex, maternal age, race/ethnicity or gestational age)

Olaya, 2013 Randomized Controlled Trial; Colombia **Sample Size**: Baseline N: 85 Analytic N: 76 Attrition: 11% Sample Size Calculation: N=64 per group to detect a 0.5SD difference in outcomes **Sex:** 50% Female **Race/Ethnicity**: NR **Background Diet**: EBF: 100% at 4mo; At 6mo: 8% >11 bottle-feed/d, 7% consuming cow's milk Age of introduction to CFB: 45% between 4-6mo; 30% consumed red meat at 6mo	Intervention group: Received individual, face-to-face nutrition counseling with 3 key messages: the importance of continuing BF alongside CF, red meat as a source of Fe to prevent anemia (>5 portions/wk, red meat, chicken liver and heart), and daily fruit and vegetables as part of a healthy diet Control group: Received standard complementary feeding advice from health care professionals (including meat consumption, but no advice on frequency or amount of foods was given) CFB: At 12mo, the Intervention group consumed more meat, red meat, fruit, vegetables, and legumes, while the Control group was more likely to consume follow-on formula, milk, cow milk, and sweetened foods (sugar, jelly, chocolate, sweets) **Age:** 6-12mo **Assessment Methods**: FFQ	Weight; Length; HC; MUAC **Age:** 12mo **Assessment Methods** Weight: Measured by study personnel; z scores determined using WHO, 2007 standards Length: Measured in triplicate by study personnel, recumbent to nearest 1mm; z scores determined using WHO, 2007 standards MUAC: Measured by study personnel to nearest 1mm HC: Measured by study personnel to nearest 1mm	**Confounders accounted for:** SES: X Sex: X Other: Baseline growth measures **Limitations:** Groups differed at baseline on key characteristics and differences were not adjusted for in analyses (father's age, baseline weight, baseline MUAC); Despite intervention, control and intervention groups consumed similar CFB; Participants were not blinded; cannot determine if outcome assessors or investigators were blinded
Robinson, 2009 Prospective Cohort Study; United Kingdom **Sample Size**: Baseline N: 1195 Analytic N: 536 Attrition: 55% Power Analysis and Sufficient Sample Size: NR **Sex:** 47% Female **Race/Ethnicity**: NR	One dietary pattern was identified at 12mo using principal component analysis, and each infant received a score for adherence to the pattern: Infant guidelines pattern: High consumption of fruit, vegetables, cooked meat and fish, and other home-prepared foods (rice, pasta), and low consumption of commercial baby foods	Body composition **Age:** 4y **Assessment Methods** Body composition: • BMI: Calculated using measured height, weight • Lean mass (LM): Whole-body DXA • LM index: lean mass divided by height2 • Fat mass (FM): Whole-body DXA	**Confounders accounted for:** SES: X Maternal age: X Feeding practices: X Birth size: X Other: Maternal BMI, maternal height, smoking in late pregnancy **Limitations:** Cannot determine whether groups were similar at baseline on key characteristics; Cannot determine whether outcome assessors were

Background Diet: Never BF: 12.5%; BF for 6mo: 20% Age of introduction to CFB: 76% by 4mo	**Age:** 6 and 12mo **Assessment Methods** FFQ; maternal interview	• FM index: FM divided by height 2	blinded; Cannot determine the validity/reliability of some outcome measures (i.e., single vs multiple height, weight measures); Did not define age of introduction of CFB variable; Did not account for high loss to follow-up (55%); Did not adjust for potential key confounders (education, sex, race/ethnicity, gestational age)
Rose, 2016 Prospective Cohort Study; United States **Sample Size**: Baseline N: 1807 Analytic N: 1029 Attrition: 43% Power Analysis and Sufficient Sample Size: NR **Sex:** 51% Female **Race/Ethnicity**: ~90% White **Background Diet**: BF at 9mo: ~34% Age of introduction to CFB: ~5mo	Five dietary patterns were identified at 9mo using latent class analysis, and each infant was assigned to the pattern they scored highest on: 1. BFFV: Breastfed Fruits and Vegetables: Breastmilk, fruits, and vegetables, and low intake of energy-dense foods 2. BFLV: Breastfed Low Variety: Breastmilk, and low intake of fruits and vegetables, low diet variety 3. FFFV: Formula-Fed Fruits and Vegetables: Formula, fruits, and vegetables, and low intake of energy-dense foods 4. FFLV: Formula-Fed Low Variety: Formula, and low intake of fruits and vegetables, low diet variety **5.** MXHED: Mixed High Energy Density: Breastmilk and formula, low intake of fruits and vegetables, diet variety, and higher intake of energy-density foods (e.g.	Weight status; Body composition; Weight **Age:** 1y **Assessment Methods** Weight status: prevlance of overweight classified as ≥85th WFL percentile; WFL calculated using maternal-reported weight and length Body composition: WLZ Weight: WAZ; maternal-report	**Confounders accounted for:** Education: X SES: X Sex: X Maternal age: X Race/ethnicity: X Feeding practices: X Birth size: X Gestational age: X Other: Childcare, parity, prepregnancy BMI, marital status, postpartum depression, excessive gestational weight gain **Limitations:** Outcome assessors were not blinded (maternal report); Did not use valid/reliable methods to measure outcomes (weight was self-reported by mothers); Did not account for high loss to follow-up (43%)'; Did not describe p-values for all analyses reported

	French fries, sweet foods) **Age:**9mo **Assessment Methods** FFQ		
Santorelli, 2014 Prospective Cohort Study; United Kingdom **Sample Size**: Baseline N: 1735 Analytic N: 1327 Attrition: 24% Power Analysis and Sufficient Sample Size: NR **Sex:** NR **Race/Ethnicity**: 38% White, 49% Pakistani, 7% South Asian, 6% Other **Background Diet**: BF after CFB introduction: 32% Age of CFB introduction: 10% <17wk	Age of non-sweetened solid foods (e.g. baby rice, pureed vegetables, fruits or rice, and lentils/dhal); sweetened foods (e.g. egg custard, rice pudding, sweetened rusks, biscuits and cake) were introduced as a first food: whether sweetened foods were introduced as a first food (including sweetened and nonsweetened foods given together); Sweetened drinks (e.g. cola, squash, lemonade, sweetened tea and pre-prepared 'baby' drinks) given at <17wk of age **Age:** 6, 12mo **Assessment Methods** Maternal questionnaire	Body composition **Age:** 3y **Assessment Methods** Body composition: BMIZ, calculated via measured height, weight and converted into age- and sex-adjusted z-scores based on WHO, 2006 growth standards	**Confounders accounted for:** Education: X Sex: X Maternal age: X Race/ethnicity: X Feeding practices: X Birth size: X Gestational age: X Other: Marital status, smoking during pregnancy, maternal BMI, delivery mode **Limitations:** Cannot determine whether groups were similar at baseline on key characteristics; Cannot determine whether outcome assessors were blinded; Cannot determine the validity/reliability of outcome measures (i.e., single vs multiple growth measures); Did not account for high loss to follow-up (24%); Did not adjust for potential key confounders (SES)

Schack-Nielsen, 2010 Prospective Cohort Study; Denmark **<u>Sample Size</u>**: Baseline N: 8129 Analytic N: 5068 Attrition: 39% Power Analysis/Sample Size Calculation: NR **<u>Sex:</u>** NR **<u>Race/Ethnicity</u>**: NR **<u>Background Diet</u>**: BF duration: 3.5mo; BF <2wk: 18% Age of CFB introduction: 3.8mo 79% introduced to vegetables and spoon-feeding at the same age; 19% started spoon-feeding/gruel first	Age of introduction to CFB: Continuous, mo; Categorical, ≥4mo vs <4mo; Number of food items at 3, 4, 5, and 6mo CFB: spoon-feeding (i.e., gruel), vegetables, eggs, meat, firm food **Age:** 1y **Assessment Methods**: Maternal questionnaire	Weight status; Body composition; WC **Age:** 1-42y **Assessment Methods**: Weight status: risk of overweight based on BMI ≥25 using self-reported height and weight at 42y Body composition: BMI calculated using height, weight measured by study personnel at 1, 3, and 6y; school records at 7-14y; self-reported at 2-34y, 42y WC: Self-reported at 42y via mailed questionnaire and tape measure	**<u>Confounders accounted for:</u>** Education: X SES: X Sex: X Maternal age: X Feeding practices: X Birth size: X (Birth weight) Gestational age: X Other: Prepregnancy BMI, gestational weight gain, smoking during pregnancy, marital status, weight at 1y **<u>Limitations:</u>** Cannot determine whether groups were similar at baseline on key characteristics; Outcome assessors were not blinded at 20-34y, 42y; Did not use valid/reliable measures to assess outcomes (weight was self-reported at 20-34y and 42y); Did not account for high loss to follow-up (39%); Did not adjust for potential key confounders (race/ethnicity); Not all variables were analyzed in relation to all outcomes, and data from figures not adequately described Limited generalizability due to CFB practices at the time of original data collection (1959-1960)

Schwartz, 2009 Randomized Controlled Trial; Germany **Sample Size**: Intervention Group Baseline N: 66 Control Group Baseline N: 66 Intervention Group Analytic N: 53 Control Group Analytic N: 49 Attrition: 23% Power Analysis/Sufficient Sample Size: N=60/group to detect a 10% higher blood n-3 fatty acid levels with alpha of 0.05 and 95% power (SD of 12%). **Sex:** 50% Female **Race/Ethnicity**: NR **Background Diet**: EBF duration: 19wk Age of CFB introduction: 21wk	Intervention Group: Received one jar/d (190g for 4-7mo, 220g for 7-10mo) for 4mo of a meat meal with rapeseed (canola) oil (LA 20%; ALA 9%; LA/ALA 2.2); LA/ALA ratio of 3.9 Control Group: Received one jar/d (190g for 4-7mo, 220g for 7-10mo) for 4mo of a meat meal with corn oil (LA 55% of total fatty acid; ALA 1%; LA/ALA 55); LA/ALA ratio of 35.7 **Age:** 6-10mo **Assessment Methods** Food record, daily	Weight **Age:** 4-10mo; 10mo **Assessment Methods** NR	**Confounders accounted for:** Birth size: X (All >2.5kg) **Limitations:** Cannot determine validity/reliability of outcome measures (methods not described); Did not account for high loss to follow-up (23%) Study was powered to detect differences in plasma fatty acids levels, so may not have been adequately powered to detect differences in growth
Sonneville, 2015 Prospective Cohort Study; United States **Sample Size**: Baseline N: 2128 Analytic N: 1163 Attrition: 45% Power Analysis: NR **Sex:** 50% Female **Race/Ethnicity**: 70% White, 12% Black, 4% Hispanic, 3% Asian **Background Diet**: BF duration: 6.4mo	Juice intake (OJ, 100% fruit) servings/d: 0, 1-7, 8-15, 16-31, or >32 ounces **Age:**1y **Assessment Methods** Maternal questionnaire	Body composition **Age:** 3.1y, 7.7y **Assessment Methods** Body composition: BMIZ, calculated using measured height, weight, and converted to age- and sex-specific z-scores based on US reference growth data	**Confounders accounted for:** Education: X SES: X Sex: X Maternal age: X Race/ethnicity: X Other: Maternal age, prepregnancy BMI, child age, WLZ at 1y, caloric intake **Limitations:** Groups differed at baseline on BF duration, which was not adjusted for in analyses; Cannot determine whether outcome assessors were blinded; Cannot determine the validity/reliability of outcome assessment (i.e., single vs multiple growth measures); Did not account

			for high loss to follow-up (45%); Did not adjust for potential key confounders (feeding practices, birth size, gestational age) Did not distinguish between 100% fruit juice and non-100% fruit juice
Tang, 2014 Randomized Controlled Trial; China **Sample Size**: Baseline N: 1471 Analytic N: 1318 Attrition: 10% Power Analysis and Sufficient Sample Size: NR **Sex:** NR **Race/Ethnicity**: NR **Background Diet**: EBF: 100% at enrollment	Pork group: Received 60g/d of fresh, certified safe pork, to be boiled by the parents from 6-18mo Cereal group: Received daily supplements of a commercially available or isocaloric packaged pressed rice cereal product from 6-18mo **Age:** 6-18mo **Assessment Methods** Food diaries	Body composition; Weight; Length; HC **Age:** 6mo, 7mo, 9mo, 12mo, 15mo, 18mo **Assessment Methods** Body composition: WLZ from measured weight/length Weight: weight and WAZ, measured by study personnel, to nearest 5g Length: Measured by study personnel, to nearest 0.1cm HC: NR	**Confounders accounted for:** Education: X SES: X Feeding practices: X (all EBF) Gestational age: X (all full term) Other: Maternal height and weight, baseline length **Limitations:** Cannot determine whether group allocation was concealed; Cannot determine whether adherence was similar between groups; Participants were not blinded; cannot determine whether investigators or outcome assessors were blinded; Cannot determine the validity/reliability of outcome assessment (i.e., single vs multiple growth measures)

Tang, 2014b Randomized Controlled Trial; United States **<u>Sample Size</u>**: Baseline N: 45 Analytic N: 42 Attrition: 7% Power Analysis and Sufficient Sample Size: NR for this secondary analysis. Authors do state that they had 50% and 60% power to test changes in LAZ and WAZ respectively. **<u>Sex:</u>** 60% Female **<u>Race/Ethnicity</u>**: NR **<u>Background Diet</u>**: EBF: 100% at enrollment	Meat group: Received one jar/d of pureed meat and gravy (71 g total, equivalent to 8 g protein) by 7mo of age and 1-2 jars/d by 9mo of age Cereal group: Received 1 serving/d of cereal (15 g dry weight by manufacturer's label, iron or iron-zinc fortified) by 7 mo of age and 2 servings/d by 9 mo of age; asked to avoid meats **Age:** 5-9mo **Assessment Methods** Food records, 3d	Body composition; Weight; Length; WC **Age:** 5, 6, 7, 8, 9mo **Assessment Methods** Body composition: BMI and WLZ calculated via measured height, weight Weight:WAZ, measured by study personnel, duplicate Length: LAZ, ,easured by study personnel, to nearest 0.1cm, duplicate WC: NR	**<u>Confounders accounted for:</u>** Birth size: X (All appropriate for gestational age) Gestational age: X (All full term) **<u>Limitations:</u>** Cannot determine whether group allocation was concealed; Participants and investigators were not blinded; cannot determine whether outcome assessors were blinded; Cannot determine the validity/reliability of outcome assessment (i.e., head, waist circumference)
Tantracheewathorn, 2005 Prospective Cohort Study; Thailand **<u>Sample Size</u>**: Baseline N: 156 Analytic N: 140 Attrition: 10% Power Analysis and Sufficient Sample Size: N=156 to detect a 0.57kg (SD=1.16) difference in weight at 12mo with a power of 80%, pvalue of 0.05, and 20% loss to follow-up **<u>Sex:</u>** 50% Female **<u>Race/Ethnicity</u>**: NR **<u>Background Diet</u>**: BF: 50%, FF: 50%	Adequate complementary food: consumed a variety of food from various food groups (rice and grains, fruits, vegetables, milk, meat, eggs, fat), and adequate amounts of nutrient and energy compared with Thai Recommended Dietary Allowances **Age:** Data collected at 1, 2, 4, 6, 9, 12mo, but cannot determine when CFB adequacy was assessed **Assessment Methods** Parental interview, 24hr recall	Weight status **Age:** Cannot determine **Assessment Methods** Weight status: malnutrition (Wasting, Stunting, Underweight) calculated using measured height, weight, defined by WAZ, LAZ, or weight-for-height z-score (WHZ) <2SD of the Thai references**.**	**<u>Confounders accounted for:</u>** Feeding practices: X Birth size: X (All>2500g) Gestational age: X (All 37-42wk) **<u>Limitations:</u>** Cannot determine whether groups were similar at baseline on key characteristics; Cannot determine whether outcome assessors were blinded; Cannot determine the validity/reliability of outcome measures (i.e., single vs multiple measures); Did not adjust for key confounders (education, SES, sex, maternal age, race/ethnicity); Adequacy of statistical methods insufficient (unclear what time points were used to calculate the exposure and outcome variables)

Virtanen, 2001 Randomized Controlled Trial; Sweden **<u>Sample Size</u>**: Baseline N: 54 Analytic N: 36 Attrition: 33% Sample Size Calculation: N=50 (25 in each group) to detect differences in Hb (4.0g/L) and TfR (0.8mg/L) concentration **<u>Sex:</u>** 67% Female **<u>Race/Ethnicity</u>**: 100% White **<u>Background Diet</u>**: All feeding according to current Swedish guidelines (BF at birth, and if not, fed Fe-fortified infant formula until 6mo; After 6mo of age all (except 3) fed Fe-forti□fied follow-on formula with meal)	Cow's milk group: Received either low-fat or standard-fat cow's milk, ad libitum Iron-fortified cow's milk groups: Received either Fe-fortified cow's milk, fortified with ferrous gluconate-fortified cows milk with 50% of the fat being vegetable fat, or Fe-fortified cow's milk, fortified with ferrous lactate-fortified cows milk with 100% of the fat being vegetable fat, ad libitum **Age:**12-18mo **Assessment Methods** Food record, 7d	Weight **Age:** 12-18mo; 18mo **Assessment Methods** Weight: absolute and change in weight; measured by study personnel, to nearest 5g	**<u>Confounders accounted for:</u>** Race/ethnicity: X (100% white) **<u>Limitations:</u>** Cannot determine the validity/reliability of outcome assessment (i.e., single vs multiple measures); Did not account for high loss to follow-up (33%) Author noted study may not have been adequately powered
Walter, 1993 Randomized Controlled Trial; Chile **<u>Sample Size</u>**: Baseline N: 515 Analytic N: 444 at 8mo, 370 at 12mo, 340 at 15mo Attrition: 14% at 8mo, 28% at 12mo, 34% at 15mo Power Analysis/Sample Size Calculation: NR **<u>Sex:</u>** NR **<u>Race/Ethnicity</u>**: NR **<u>Background Diet</u>**: EBF: 100% at enrollment	FF infants were randomized to one of the following three groups: Group 1: Received Fe-fortified cereal (30g/d) + unfortified formula Group 2: Received unfortified cereal + unfortified formula Group 3: Received unfortified cereal + fortified formula BF infants were randomized to one of the following two groups: Group 4: Fe-fortified cereal + breastmilk Group 5: Unfortified cereal + breastmilk **Age:** 4-15mo **Assessment Methods** Food record, daily, measured	Weight; Length **Age:** 8, 12, 15mo **Assessment Methods** Weight: NR Length: NR	**<u>Confounders accounted for:</u>** Other: **<u>Limitations:</u>** Cannot determine whether group allocation was concealed; Cannot determine whether the groups differed at baseline on key characteristics; Cannot determine whether investigators or outcome assessors were blinded; Cannot determine the validity/reliability of outcome assessment (methods not described); Did not account for high loss to follow-up (60%); Adequacy of statistical methods insufficient (statistical tests and p-values are not consistently provided)

Wen, 2014a Prospective Cohort Study; United States **<u>Sample Size</u>**: Baseline N: 3033 Analytic N: 530 Attrition: 83% Power Analysis and Sufficient Sample Size: NR **<u>Sex:</u>** 50% female **<u>Race/Ethnicity</u>**: 91% White, 1% African American, 3% Hispanic, 3% Asian/Pacific Islander **<u>Background Diet</u>**: NR	Four dietary patterns were identified using principal component analysis, and infants were assigned an adherence score to each pattern at 6mo: Infant guideline solids: Baby cereal, fruit, vegetables, meat/chicken High sugar/fat/protein: Sweet drinks, French fries, fish/shellfish, nut foods, eggs, sweet foods High dairy/regular cereal: Cow's milk, other dairy, 100% juice, non-baby cereals/starches Formula: Formula, low intakes of breast milk **Age:** 6mo **Assessment Methods** FFQ	Body composition; Length **Age:** 6-12mo **Assessment Methods** Body composition: change in BMI, calculated using maternal report of weight/length Length: Maternal report	**<u>Confounders accounted for:</u>** Education: X SES: X Sex: X Maternal age: X Race/ethnicity: X Feeding practices: X (other dietary pattern scores) Gestational age: X Other: Growth at 6mo, pre-pregnancy BMI, gestational diabetes, gestational weigh gain **<u>Limitations:</u>** Dietary pattern adherence was associated with birth weight, which was not adjusted for in analyses; Outcome assessors were not blinded (maternal report); Did not use valid/reliable measures to assess outcomes (maternal report of infant weight, length); Did not account for high loss to follow-up (85%); Did not adjust for potential key confounders (birth size)
Wosje, 2001 Prospective Cohort Study; United States **<u>Sample Size</u>**: Baseline N: 121 Analytic N: 51 Attrition: 58% Power Analysis and Sufficient Sample Size: NR **<u>Sex:</u>** 45% Female **<u>Race/Ethnicity</u>**: 94% White	Type of milk consumed: 2% vs. whole milk **Age:**12mo **Assessment Methods** Food record, 3d	Body composition; Weight; Length **Age:** 24mo **Assessment Methods** Body composition: % body fat via DXA Weight: Measured by study personnel to 0.001kg Length: Measured by study personnel, to 0.5cm, recumbent	**<u>Confounders accounted for:</u>** **<u>Limitations:</u>** Did not account for dietary intake aside from type of milk consumed; Cannot determine whether outcome assessors were blinded; Cannot determine the validity/reliability of outcome assessment (i.e., single vs multiple measures) ; Did not account for high loss to follow-up (58%); Did not adjust for key confounders (education, SES, sex, maternal age,

Background Diet: NR			race/ethnicity, feeding practices, birth size, gestational age)
Yeung, 2000 Randomized Controlled Trial; Canada **Sample Size**: Intervention Baseline N: 79 Control Baseline N: 77 Intervention Analytic N: 49 Control Analytic N: 54 Attrition: 34% Sample Size Calculation: N=55 per group to detect differences in Fe depletion **Sex:** 48% Female **Race/Ethnicity**: NR **Background Diet**: All subjects in the intervention group were fed cow's milk; in the control group, cow milk was delayed until 10mo	Intervention group: Received pureed meat (1-2 jars/d) and Fe-fortified infant cereals (2/3 c/d) from 6 to 12mo; all other foods allowed at parents' discretion (except vitamin/mineral supplements containing Fe and Fe-fortified formulas) Control group: No dietary intervention **Age:** 6-12mo **Assessment Methods** Parent questionnaire	Weight; Length; HC **Age:** 8, 10, 12mo **Assessment Methods** Weight: Measured by study personnel, in triplicate Length: Measured by study personnel, recumbent, in triplicate HC: Measured by study personnel in triplicate	**Confounders accounted for:** Gestational age: X (All full term) **Limitations:** Participants and outcome assessors were not blinded; Did not account for high loss to follow-up (~34%)
Zheng, 2015 Prospective Cohort Study; China **Sample Size**: Baseline N: 90066 Analytic N: 40510 Attrition: 55% Power Analysis and Sufficient Sample Size: NR **Sex:** 48% Female **Race/Ethnicity**: NR **Background Diet**: Ever BF: 93%	Age of CFB introduction: <3, 4-6, >6mo CFB: fish liver oil, rice cereal/porridge, egg yolk, fish paste, liver paste, tofu, animal blood, bread/steamed bun/fine dried noodle, ground meat/soy product, and pureed noodle/cookies **Age:** 1, 3, 6mo **Assessment Methods**: Maternal interview	Weight status; Body composition **Age:** 4-5y **Assessment Methods**: Weight status: Obesity defined as BMI z-score>2SD, overweight defined as between 1-2SD Body composition: BMI calculated using self-reported weight, height	**Confounders accounted for:** Education: X SES: X Sex: X Feeding practices: X (BF, timing of other CFB) Birth size: X (Birth weight) Gestational age: X Other: Maternal menarcheal age, type of delivery, maternal BMI, maternal occupation, weight gain by 3mo, age of other children **Limitations:** Outcome assessors were not blinded; Did not use valid/reliable

			measures to assess outcomes (weight was self-reported; lack of detail provided); Did not account for high loss to follow-up (55%); Did not adjust for potential key confounders (sex, maternal age, race/ethnicity) Concern for multiple testing (analyzed two correlated outcomes [BMI, weight status] across many types of foods, increasing chance of false-positives Cohort data collected over a long interval (1999-2009) Limited generalizability due to population having very low prevalence of obesity (<2%)