UNITED STATES DEPARTMENT OF AGRICULTURE

Types and Amounts of Complementary Foods and Beverages and Micronutrient Status: A Systematic Review

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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. JEO, LKE, TLP, PN, KJ, YWP, and NT developed and conducted the literature search, screened search results, and identified studies for inclusion. JEO and LKE extracted data and assessed risk of bias for included studies. NFC, KGD, MKF, FRG, NFK, DF and KSS reviewed and provided substantive feedback on all systematic review materials, including the synthesis of the body of evidence, conclusion statement,

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and grade of the strength of the evidence. JEO 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 and micronutrient status? This systematic review was conducted as part of the Pregnancy and Birth to 24 Months (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[ii] and is available on the NESR website: https://nesr.usda.gov/project-specific-overview-pb-24-0.

NESR, formerly known as 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[iii] and is available on the NESR website: https://nesr.usda.gov/pb-24-project-methodology-0. In addition, starting on page 40, 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 40. In addition, the literature search plan that was used to identify studies included in this systematic review is found on page 40.

[ii] 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. doi: 10.1093/ajcn/nqy372.
[iii] Obbagy JE, Spahn JM, Wong YP, Psota TL, Spill MK, Dreibelbis C, et al. 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	Breastfed or breastfeeding
CFB	Complementary foods and beverages
FEP	Free erythrocyte protoporphyrin
FEG	Federal Expert Group
FF	Formula fed or formula feeding
Hb	Hemoglobin
Hct	Hematocrit
HHS	Department of Health and Human Services
ID	Iron deficiency
IDA	Iron deficiency anemia
MCV	Iron deficiency
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
RDW	Red cell distribution width
SF	Serum ferritin
TEC	Technical Expert Collaborative
Tf	Transferrin
TfR	Transferrin receptor
TIBC	Total iron binding capacity
UK	United Kingdom
US	United States
USDA	United States Department of Agriculture

Abbreviation	Full name
ZPP	Zinc-protoporphyrin

WHAT IS THE RELATIONSHIP BETWEEN TYPES AND AMOUNTS OF COMPLEMENTARY FOODS/BEVERAGES AND MICRONUTRIENT STATUS?

PLAIN LANGUAGE SUMMARY

What is the question?

- The question is: What is the relationship between types and amounts of complementary foods and beverages and micronutrient status?

What is the answer to the question?

- Strong evidence suggests that consuming complementary foods and beverages that contain substantial amounts of iron, such as meats or iron-fortified cereal, helps maintain adequate iron status or prevent iron deficiency during the first year of life among infants with insufficient iron stores or breastfed infants who are not receiving adequate iron from another source. However, the benefit of these types of complementary foods and beverages for infants with sufficient iron stores, such as those consuming iron-fortified infant formula, is less evident.
- There is not enough evidence to determine the relationship between other types/amounts of complementary foods and beverages containing lesser amounts of iron, such as fruits and vegetables, and iron status.
- Limited evidence suggests that consuming complementary foods and beverages that contain substantial amounts of zinc, such as meats or cereals fortified with zinc, supports zinc status during the first year of life, particularly among breastfed infants who are not receiving adequate zinc from another source. However, the benefit of these types of complementary foods for infants consuming fortified infant formula is less evident.
- Moderate evidence suggests that consuming complementary foods and beverages with differing fatty acid profiles, particularly long-chain polyunsaturated fatty acids, can influence fatty acid status.
- During the second year of life, good sources of micronutrients are still needed, but there is limited evidence to indicate which types and amounts of complementary foods and beverages are associated with adequate micronutrient status.
- There is not enough evidence to determine the relationship between types and amounts of complementary foods and beverages and vitamin B12, vitamin D, or folate status.

Why was this question asked?

- This important public health question was identified and prioritized 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 Nutrition Evidence Systematic Review staff 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 micronutrient status examined through 24 months of age

What evidence was found?

- This review includes 31 studies.
- These studies compared different types or amounts of complementary foods and beverages and micronutrient status.
- Complementary foods and beverages are foods and beverages other than human milk or infant formula provided to an infant or young child.
- Studies need to consider other factors that could impact this relationship.

How up-to-date is this review?

- This review includes literature from 1/1980 to 7/2016.

Technical abstract

Background

- 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.
- This systematic review was conducted by the Nutrition Evidence Systematic Review team as part of the U.S. Department of Agriculture and Department of Health and Human Services Pregnancy and Birth to 24 Months Project.
- The goal of this systematic review was to answer the following research question: What is the relationship between types and amounts of complementary foods and beverages and micronutrient status?

Conclusion Statement and Grades

- Strong evidence suggests that consuming complementary foods and beverages that contain substantial amounts of iron, such as meats or iron-fortified cereal, helps maintain adequate iron status or prevent iron deficiency during the first year of life among infants with insufficient iron stores or breastfed infants who are not receiving adequate iron from another source. However, the benefit of these types of complementary foods and beverages for infants with sufficient iron stores, such as those consuming iron-fortified infant formula, is less evident.
- There is not enough evidence to determine the relationship between other types/amounts of complementary foods and beverages containing lesser amounts of iron, such as fruits and vegetables, and iron status.
- Limited evidence suggests that consuming complementary foods and beverages that contain substantial amounts of zinc, such as meats or cereals fortified with zinc, supports zinc status during the first year of life, particularly among breastfed infants who are not receiving adequate zinc from another source. However, the benefit of these types of complementary foods for infants consuming fortified infant formula is less evident.
- Moderate evidence suggests that consuming complementary foods and beverages with differing fatty acid profiles, particularly long-chain polyunsaturated fatty acids, can influence fatty acid status.
- During the second year of life, good sources of micronutrients are still needed, but there is limited evidence to indicate which types and amounts of complementary foods and beverages are associated with adequate micronutrient status.
- There is not enough evidence to determine the relationship between types and amounts of complementary foods and beverages and vitamin B12, vitamin D, or folate status.
- Grades: Strong – Iron status; Moderate – Fatty Acid status; Limited – Zinc status; Grade Not Assignable – Vitamin B12 status, Vitamin D status, Folate status

Methods

- The systematic review was conducted by a team of staff from the Nutrition Evidence Systematic Review in collaboration with a Technical Expert

Collaborative.

- A literature search was conducted using 4 databases (CINAHL, Cochrane, Embase, and PubMed) to identify articles published from January 1980 to March 2016 that examined the types and amounts of complementary foods and beverages (CFB) consumed and micronutrient status. CFB were defined as foods and beverages other than human milk or infant formula provided to an infant or young child. Micronutrient status outcomes included iron, zinc, vitamin B12, folate, vitamin D, and/or folate status. A manual search was done to identify articles that may not have been included in the electronic databases searched. Articles were screened in a dual manner, independently by 2 NESR analysts, to determine which articles met predetermined criteria for inclusion.
- Data from each included article were extracted, risks of bias were assessed, and both were checked for accuracy. The body of evidence was qualitatively synthesized, a conclusion statement was developed, and the strength of the evidence (grade) was assessed using pre-established criteria including evaluation of the internal validity/risk of bias, adequacy, consistency, impact, and generalizability of available evidence.

Summary of Evidence

- Thirty-one studies published between 01/1980 and 07/2016 met the inclusion criteria for this systematic review.
    - Most studies examined the relationship between types and/or amounts of CFB and iron status, and the CFB examined were largely limited to Fe-fortified cereals and meats.
    - Several studies examined zinc and fatty acid status and few studies examined vitamin D, vitamin B12, and folate.
- One randomized controlled trial, conducted in both breastfed (BF) and formula fed (FF) infants, showed that consuming meats or Fe- and/or Zn-fortified cereals as CFB generally protected against Fe deficiency anemia and supported Zn status in the first year of life, though evidence is more limited in the second year of life.
    - Among BF infants, meat and Fe- and Zn-fortified cereals supported iron and zinc status in later infancy. Meat provided a valuable source of trace minerals for BF infants who may not have been fed Fe- and Zn-fortified products; in fact, the frequency of meat consumption was associated with iron status in the first and second years of life.
    - In infants/toddlers whose diets already contained other bioavailable Fe and Zn sources (i.e. infant formulas and cereal fortified with iron and/or zinc), meat offered little additional benefit for Fe or Zn status, though it is an important source of bioavailable Fe and Zn.
- Dietary sources of fatty acids, particularly LC-PUFA, in CFB (i.e., oils, fish, meats, and eggs) influenced the plasma fatty acid profile of infants and toddlers.
- A limitation of some of the studies included in this systematic review was lack of accounting for whether infants were fed breast milk and/or infant formula, and other aspects of the overall diet, including consumption of fortified products and bioavailability of nutrients consumed. Another limitation is a lack of studies that examined vitamin D, vitamin B12, and folate.

FULL REVIEW

Systematic review question

What is the relationship between types and amounts of complementary foods and beverages and micronutrient status?

Conclusion statement

Strong evidence suggests that consuming complementary foods and beverages that contain substantial amounts of iron, such as meats or iron-fortified cereal, helps maintain adequate iron status or prevent iron deficiency during the first year of life among infants with insufficient iron stores or breastfed infants who are not receiving adequate iron from another source. However, the benefit of these types of complementary foods and beverages for infants with sufficient iron stores, such as those consuming iron-fortified infant formula, is less evident.

There is not enough evidence to determine the relationship between other types/amounts of complementary foods and beverages containing lesser amounts of iron, such as fruits and vegetables, and iron status.

Limited evidence suggests that consuming complementary foods and beverages that contain substantial amounts of zinc, such as meats or cereals fortified with zinc, supports zinc status during the first year of life, particularly among breastfed infants who are not receiving adequate zinc from another source. However, the benefit of these types of complementary foods for infants consuming fortified infant formula is less evident.

Moderate evidence suggests that consuming complementary foods and beverages with differing fatty acid profiles, particularly long-chain polyunsaturated fatty acids, can influence fatty acid status.

During the second year of life, good sources of micronutrients are still needed, but there is limited evidence to indicate which types and amounts of complementary foods and beverages are associated with adequate micronutrient status.

There is not enough evidence to determine the relationship between types and amounts of complementary foods and beverages and vitamin B12, vitamin D, or folate status.

Grade

Strong – Iron status; Moderate – Fatty Acid status; Limited – Zinc status; Grade Not Assignable – Vitamin B12 status, Vitamin D status, Folate status

Summary

- Complementary foods and beverages (CFB) were defined as foods and/or beverages (liquids, semisolids, and solids) other than human milk or infant formula provided to an infant or young child to provide nutrients and energy. This systematic review includes studies that compared different types or different amounts of CFB.

- Micronutrient status outcomes included iron, zinc, vitamin D, vitamin B12, folate, and/or fatty acid status from birth to 24 months of age.
- Thirty-one studies published between 01/1980 and 07/2016 met the inclusion criteria for this systematic review.
    - Most studies examined the relationship between types and/or amounts of CFB and iron status, and the CFB examined were largely limited to Fe-fortified cereals and meats.
    - Several studies examined zinc and fatty acid status and few studies examined vitamin D, vitamin B12, and folate.
- One randomized controlled trial, conducted in both breastfed (BF) and formula fed (FF) infants, showed that consuming meats or Fe- and/or Zn-fortified cereals as CFB generally protected against Fe deficiency anemia and supported Zn status in the first year of life, though evidence is more limited in the second year of life.
    - Among BF infants, meat and Fe- and Zn-fortified cereals supported iron and zinc status in later infancy. Meat provided a valuable source of trace minerals for BF infants who may not have been fed Fe- and Zn-fortified products; in fact, the frequency of meat consumption was associated with iron status in the first and second years of life.
    - In infants/toddlers whose diets already contained other bioavailable Fe and Zn sources (i.e. infant formulas and cereal fortified with iron and/or zinc), meat offered little additional benefit for Fe or Zn status, though it is an important source of bioavailable Fe and Zn.
- Dietary sources of fatty acids, particularly LC-PUFA, in CFB (i.e., oils, fish, meats, and eggs) influenced the plasma fatty acid profile of infants and toddlers.
- A limitation of some of the studies included in this systematic review was lack of accounting for whether infants were fed breast milk and/or infant formula, and other aspects of the overall diet, including consumption of fortified products and bioavailability of nutrients consumed. Another limitation is a lack of studies that examined vitamin D, vitamin B12, and folate.

Description of the evidence

The systematic review that examined the relationship between the consumption of different types and amounts of CFB and micronutrient status from birth to 24mo of age includes 31 articles.

In general, the studies enrolled both girls and boys who were full term (>37wk) with a normal birthweight (≥2500g), and who were generally healthy, with many specifically excluding subjects with illnesses or conditions that could impact complementary feeding or nutritional status. In addition, most of the studies included subjects who were iron replete at baseline, though a few did include subject populations with relatively high prevalence of ID [1, 2]. Per the inclusion criteria, the studies were conducted in countries that were ranked as very high or high on the Human Development Index [3]. Most studies did not describe or confirm the racial/ethnic background of subjects, but they included subjects who were representative of the general population of the countries in which they were conducted. Several studies specified that the sample was majority white [4-10], 1 study included a sample that was 71% Jewish and 29% Bedouin [2], and 1 was conducted in Hispanic subjects [11].

The types of CFB introduced in these studies included meats, fortified and unfortified cereals, and a variety of other foods, for example, eggs, fruits and vegetables, and foods that varied in fatty acid content. Results for studies examining each of these types of food are discussed below.

Meat

Fifteen studies examined the relationship between consuming meat as a CFB and micronutrient status, including 8 RCTs reported in 9 publications [7, 12-18] and 7 prospective cohort studies [1, 2, 5, 6, 8, 19, 20] (Table 1).

Five studies examined the impact of consuming different amounts of meat on micronutrient status (iron and/or zinc status) and found few differences in iron or zinc status (Table 1). Two were RCTs [12, 13] and 3 were prospective cohort studies [1, 8, 19]. The studies compared different quantities of meat intake. Dube et al. [12] randomized BF and FF infants to either a low meat or high meat group for 6mo, and found no significant differences in any of the iron status measures assessed at ~10mo of age. Engelmann et al. [13] randomly assigned infants (partially BF) to low-meat and high-meat groups for 2mo (8 to 10mo of age), and reported that both groups experienced a significant decrease in Hb from 8 to 10mo of age, but that Hb decreased significantly more in the low meat compared to the high meat group. However, there were no significant differences between groups in SF, TfR, or serum zinc levels. Infants in this study also consumed iron from other less-bioavailable sources (formula, iron-fortified gruel and other CFB) but total iron intake did not differ between groups. Taylor et al. [8] found that consuming meat compared to not was associated with lower prevalence of low serum iron (iron <9umol/L) at 12mo of age, but found no significant associations with Hb<110g/L, SF <10ug/L, MCV, mean corpuscular hemoglobin concentration (MCHC), RDW, ZPP, or serum zinc. In this study, iron intake was similar between meat eaters and non-meat eaters at 4, 8, and 12mo, but was higher in non-meat eaters than meat eaters at 16, 20, and 24mo, and noted that a small percentage (2%) of dietary iron was from meat, with the vast majority coming from fortified infant formulas and foods. Michaelsen et al. [19] and Thorsdottir et al. [1] both found no significant associations between the amounts of meat consumed and iron status.

Several studies examined the duration or frequency of meat intake. Null findings were reported in 1 study looking at duration of meat intake and iron status, though it was noted that consumption of infant formula and iron-fortified cereal was common [5]. Three studies looked at whether the frequency of meat intake was related to micronutrient status, with all specifically interested in iron status [2, 6, 20]. Male et al. [6] reported no significant association between frequency of meat intake and iron status in subjects who were mostly FF. Urkin et al. [2] found that consuming meat less frequently (0-3 times/wk) compared to more frequently (4+ times/wk) was associated with significantly higher odds of ID or anemia in the second year of life in a population of toddlers, the majority of whom had been BF. Olaya et al. [20] examined frequency of red meat (>3 vs. <3 times/wk) intake in a group of infants during different time periods during the first year of life (6 to 8mo and 10 to 12mo). Results showed that higher frequency of red meat consumption from 6 to 8mo was also significantly associated with increased Hb between 6 and 12mo, and consuming red meat more frequently from 10 to 12mo was significantly associated with higher Hb, Hct, and MCV at 12mo, and a greater increase in Hb and MCV from 6 to 12mo. Infants in this study were exclusively BF through 4mo of age, and most continued BF throughout the study, though some were also given infant formula or cow's milk.

Four studies also examined the effects of meat as a CFB compared to other types of foods on micronutrient status (Table 1). Three of these studies utilized fortified infant cereal [14-16] and 1 study used cow's milk [7], both unfortified powdered whole cow's milk and an iron-fortified powdered cow's milk drink. Krebs et al. [15] compared meat to iron-fortified cereal consumed from 5-7mo of age in a US-based population of BF infants, and found no differences in Hb, SF, Hct, or plasma zinc at 9mo of age. In a different US-based trial, Krebs et al., [14, 16] compared meat to both iron-fortified cereal or iron- and zinc -fortified cereal consumed from 5-9mo of age, and found no significant differences in Hb, SF, TfR, prevalence of anemia, or in plasma zinc or exchangeable zinc pool size at 9mo of age. However, Krebs et al. [16] reported that total daily absorbed zinc was significantly higher among infants fed meat compared to those fed iron-fortified cereal without zinc fortification. In addition, Krebs et al. [14] also reported that significantly more infants in the meat group had elevated TfR levels (>1.8ug/dL) compared to the cereal groups, which may be indicative of increased risk of ID. Szymlek-Gay et al. [7] reported no significant differences in Hb, TfR, or measures of suboptimal iron status in BF and/or FF infants (12-20 mo of age) after 20wk of consuming meat, fortified cow's milk, or non-fortified cow's milk. The authors did find that SF was significantly higher among those who consumed meat or iron fortified milk, and body iron was higher among those who consumed fortified milk, compared to those who consumed non-fortified milk. However, infants in the meat group complied poorly with study protocol, consuming only 0.7 out of 2 recommended portions/day (d), such that the difference in meat intake between groups was minimal.

Two studies compared iron status among infants who were fed a combination of meat and cereal compared to those who received no intervention [17, 18]. Makrides et al. [17] reported no significant differences in iron status (Hb, SF, iron, Tf, Tf saturation) between exclusively BF infants who were fed a high-iron weaning diet (meat and iron-fortified cereal) or a standard weaning diet (recommendations to consume iron-fortified cereal) from 6 to 12mo of age. However, the intervention and control groups ended up consuming similar complementary feeding diets that contained comparable amounts of iron. Yeung et al. [18] reported no significant differences in incidence of iron depletion or early anemia among infants who received a combination of pureed meat and iron-fortified cereal compared to those who received no specific CFB intervention from 6 to 12mo of age. However, all subjects consumed cow's milk, and the control group received iron supplements (~25%) and were fed diets similar to those of the intervention group (including meat and cereals), so there was ultimately little difference in CFB intake between the intervention and control groups.

Cereal

Thirteen studies examined the relationship between consuming different types of cereals (fortified and unfortified) (**Table 2**) as a CFB and micronutrient status, including 10 RCTs [10, 11, 14-18, 21-23] and 3 prospective cohort studies [1, 6, 19].

Several of these studies examined the impact of consuming different types and/or amounts of cereal on micronutrient status (Table 2). Three RCTs compared the effects on micronutrient status of consuming different types of cereals. Davidsson et al. [21] found no significant differences in iron status (Hb, SF, Hct) between exclusively formula fed infants who consumed 2 different types of unfortified cereal (wheat/soy or wheat/milk) at 2 levels of fiber content (low: 1.8%, 2%; high: 5.3%, 8%), each for 4wk. Infants enrolled in this study consumed each cereal without a washout period for a total of 16wk and were allowed to consume additional CFB upon request. Lind et al. [22] compared the effects of consuming iron fortified high-phytate cereal, reduced-phytate cereal, or infant formula and porridge from 6 to 12mo, and found that Hb at 12mo was significantly higher in the reduced phytate group compared to the infant formula porridge group. However, there were no significant differences between the groups in SF, MCV, or prevalence of low SF or anemia at 12mo. Infants enrolled in this study were mostly BF (75% at 6mo), and were all iron replete at baseline. Walter et al. [23] found that infants (up to age 15mo), both BF and FF, fed iron-fortified rice cereals compared to those fed non-fortified cereals had higher Hb and were significantly less likely to have Hb<105g/L and IDA. Walter et al. [23] also reported that infants fed iron-fortified formula with non-iron fortified cereal had significantly higher MCV and Tf saturation and significantly lower erythrocyte protoporphyrin compared to infants fed fortified cereal and non-fortified formula.

A number of studies, the design and results of which are described in the previous section, examined the effects of consuming cereal compared to meat as CFB [15-18] (Table 1, 2). In general, the studies found no significant differences in iron and zinc status outcomes between infants fed meat or fortified cereal, with the exception of one study [14, 16] reporting significantly higher zinc absorption among infants fed meat (vs. cereal fortified with iron, but not zinc) and significantly higher TfR levels in those fed cereal (vs. meat).

Two studies compared iron status among infants who were fed cereal compared to those who received no intervention [10, 11]. Hertrampf et al. [11] examined the effects on iron status among exclusively BF infants consuming iron-fortified cereal from 4 to 6mo of age compared to exclusively BF infants who received standard CFB recommendations (3mo: fruit, cereal, juice; 4mo: add vegetables and meat; 6mo: add legumes and eggs). At 9mo, the cereal vs. control group had significantly higher serum iron/TIBC, lower free erythrocyte protoporphyrin (FEP), and higher SF; but no significant differences in Hb and MCV. At 12mo, the cereal vs. control group had significantly higher Hb, MCV, serum iron/TIBC, and SF; but no significant differences in FEP. There were also no significant differences between groups in serum zinc or prevalence of low serum zinc (<10.7mol/L). Ziegler et al. [10] found that predominantly BF infants (4-24 mo of age) who received iron-fortified cereal had significantly higher SF and lower TfR/SF levels at 5.5, 7.5, 9, 12, and 15mo compared to those in a control group who received no dietary intervention (many of whom consumed commercially available infant cereals that were fortified with the less bioavailable electrolytic form of iron). However, the groups did not differ significantly on these measures at 18, 21, or 24mo, nor did they differ in Hb, TfR, RDW, or MCV at any time point. In this study, more than a third of the control group was receiving iron fortified infant formula from ~5 to 9mo, and formula intake in the cereal group, while lower at 5.5mo, was comparable to the control by 7.5mo and older.

Three prospective cohort studies reported mainly null results for the relationship between the amount or frequency of cereal consumption and iron status. Male et al. [6] examined frequency of cereal consumption from 9 to 12mo of age and found no significant associations with any measure of iron status assessed in infants who were mostly FF, and Michaelsen et al. [19] found no significant associations between the amounts of commercial and homemade porridge consumed and SF from 6 to 9mo of age in infants who were also mostly FF. However, while Thorsdottir et al. [1] did not find any significant associations between porridge or fortified breakfast cereal intake from 9 to 12mo of age and TfR, MCV, or TFR:log SF at 12mo of age among infants who were mostly BF, increased porridge intake and increased iron-fortified breakfast cereal intake were positively associated with Hb and SF at 12mo, respectively.

Other CFB

Ten additional studies looked at various different foods and beverages (**Table 3**) consumed as CFB and their relationship with micronutrient status, including five RCTs [7, 9, 24-26] and five prospective cohort studies [1, 4, 6, 19, 27].

Fruits and Vegetables

Three prospective cohort studies examined the association between consumption of fruits and vegetables as CFB and iron status. However, none of these studies described the specific vegetables or fruits included in analyses, nor did they describe which vegetables or fruits were most commonly consumed by subjects, making it difficult to determine the amount of iron this category of CFB contributed to iron intake. Male et al. [6] found no significant associations between frequency of fruit and vegetable intake from 9 to 12mo and iron status in a group of infants who were mostly FF (Hb, MCV, SF, Tf saturation, TfR, anemia, ID, or IDA). Michaelsen et al. [19] and Thorsdottir et al. [1] examined the amount of fruits and vegetables consumed from 6 to 9mo and 9 to12mo, respectively, and found no significant associations with iron status (change in SF, or log SF, MCV, Hb, TfR, Tfr:log SF) in infants who were either mostly FF or mostly BF.

Cow's Milk

Two RCTs examined the effects of consuming different types of cow's milk during the second year of life on micronutrient status [7, 9]. Szymlek-Gay et al. [7] reported no significant differences in Hb, TfR, or measures of suboptimal iron status in BF and/or FF infants (12-20 mo of age) after 20wk of consuming meat, fortified cow's milk, or non-fortified cow's milk. Virtanen et al. [9] randomly assigned FF toddlers (11-18mo of age) for 7mo to consume either low-fat cow's milk, standard-fat cow's milk, iron-fortified cow's milk with 50% vegetable fat and vitamin C, or iron-fortified cow's milk with 100% vegetable fat and vitamin C, and found no significant differences in any measure of iron status (Hb, MCV, SF, or TfR).

A third RCT [26] compared iron, zinc, and folate status in infants who were randomized to receive CFB (cornstarch and milk) from 6 to 12mo of age that was enriched with either milkfat globule membrane (MFGM) protein or skim milk proteins. While Hb at 12mo was significantly higher in the skim milk protein group compared to the MFGM group, there were no significant differences between groups in any of the following outcomes: SF, anemia (Hb<11g/dL), IDA (SF<10ug/L), serum zinc, zinc deficiency (<10.7umol/L), serum folate, or folate deficiency (<6.8mg/nL).

Fish

Two prospective cohort studies examined the association between the amount of fish consumed (grams/day) as CFB and micronutrient status; none of the studies examined types of fish. Michaelsen et al. [19] examined the amount of fish consumed from 6 to 9mo, and found no significant associations with iron status (change in SF). Thorsdottir et al. [1] examined the amount of fish consumed from 9 to 12mo, and found a positive association with SF, but no significant associations with any other measure of iron status (MCV, Hb, TfR, or Tfr:log SF).

Bread and Biscuits

Two prospective cohort studies examined the association between the amount of bread consumed (grams/day) as CFB and micronutrient status. Michaelsen et al. [19] found a negative association between bread consumption from 6 and 9mo and change in SF. Thorsdottir et al. [1] found no significant associations between bread intake from 9 to 12mo and any measure of iron status examined (SF, MCV, Hb, TfR, or Tfr:log SF).

An RCT [24] compared iron status in partially BF infants and toddlers (ages 6-13mo) who received a fortified (iron, zinc, vitamin A, calcium, folic acid) or non-fortified biscuit daily for 3mo. Results showed that while Hb did not change in the fortified biscuit group, but decreased in the unfortified biscuit group and this change was significantly different between groups. However, there were no significant differences between groups in SF, FEP, or ratio of FEP:Hb.

Other

Thorsdottir et al. [1] examined the relationship between several other foods/food groups consumed from 9 to 12mo and subsequent iron status, and reported that butter and cheese intake was negatively associated with SF, MCV, and Hb; but not with TfR or TfR:log SF. However, consumption of other CFB, including other dairy products (not including fluid cow's milk, butter, or cheese), biscuits and crackers, cakes, and juices was not significantly associated with SF, CV, Hb, TfR, or TfR:log SF.

Makrides et al. [25] randomly assigned infants (BF and/or FF) to consume eggs (~ 4/wk, regular or omega-3 enriched) or receive no dietary intervention for 6mo, and reported no significant differences in Hb, SF, Tf, or prevalence of anemia. However, infants who received eggs had significantly higher plasma iron and Tf saturation compared to those in the control group who consumed a standard weaning diet of the parents' choice (~2 eggs/wk).

Dagnelie et al. [4] prospectively examined infants (4 to 18 mo of age) fed a macrobiotic diet and compared them to those fed an omnivorous diet, and found the following differences in macrobiotic compared to omnivorous infants: MCHC, serum folate, and prevalence of subclinical and clinical/major rickets were higher; Hct, RBC, MCV, MCH, and plasma vitamin B12 and vitamin D were lower; and Hb, FEP, and SF did not differ.

Tantrecheewathorn et al. [27] examined whether consuming "adequate" complementary food was associated with risk of IDA. Adequacy was defined as a variety of food from various food groups (rice and grains, fruits, vegetables, milk, meat, eggs, fat), and adequate amounts of nutrients and energy compared with Thai Recommended Dietary Allowances. Results showed that risk of IDA (Hb<11g/dL, SF<12ng/ml) was significant increased among infants who consumed "inadequate complementary food" compared to those who consumed "adequate" complementary food.

CFB with Different Fatty Acid Profiles

Five studies, all of which were RCTs, examined the effects of consuming foods with varied fatty acid profiles on micronutrient and fatty acid (FA) status, focusing on long-chain polyunsaturated fatty acids (LC-PUFA) [25, 28-31] (**Table 4**).

In these studies, the types of foods tested and their fatty acid content varied, though they all focused on LC-PUFA, as did the results related to fatty acid status. Hoffman et al. [28] fed exclusively BF infants baby food with or without DHA from egg-yolk daily from 6 to 12mo of age, and measured iron status and fatty acid status. There were no significant differences between infants who received CFB with or without DHA in Hb, Hct, or MCV at 12mo. Infants fed DHA-enriched CFB had significantly higher levels of the following fatty acids at 12mo: DHA, DPA (n-6), DHA/DPA(n-6), and n-6/n-3 (all P<0.002); but there were no significant differences between groups in alpha-LNA, EPA, DPA (m-3), LA, 20:3, ARA, or 22:4.

Makrides et al. [25] fed infants regular eggs vs. eggs enriched with DHA, or assigned them to no dietary intervention (i.e., fed standard weaning diet of parents' choice). Results showed that infants fed eggs enriched with DHA had significantly greater increases in DHA from 6 to 12mo and significantly higher mean DHA levels at 12mo compared to infants fed regular eggs or those in the control group. The authors also noted that overall, DHA levels were significantly higher in BF infants compared to FF infants, though FF infants fed n-3 eggs had DHA levels that were not significantly different from BF infants in the control group. In addition, there were no significant differences between any of the groups in AA at 12mo.

Libuda et al. [29] fed infants CFB with ALA-rich rapeseed oil, fish (salmon containing DHA), or CFB with linoleic acid (LA)-containing corn oil. The authors reported that infants fed CFB with rapeseed oil had significantly higher ALA and ALA:LA ratio compared to those fed CFB with corn oil, but there were no significant differences between groups in any other measure of fatty acid status (DHA, EPA, AA, LA, n3 LC PUFA, n3 PUDA, n3 LC-PUFA: n6 LC-PFA, n3 PUFA: n6 PUFA, EPA: AA). In addition, infants fed fish had significantly higher DHA, EPA, n3 LC-PUFA, n3 PUFA, n3 LC-PUFA: n6 LC-PUFA, PUFA: n6 PUFA, ALA:LA, and EPA:AA compared to the group fed CFB with corn oil, but LA, AA, and ALA did not differ significantly between groups.

Schwartz et al. [30] fed exclusively BF infants baby food (meat-based) with either rapeseed (canola) oil (LA 20%; ALA 9%; LA/ALA 2.2; LA/ALA ratio of 3.9) or corn oil (LA 55% of total fatty acid; ALA 1%; LA/ALA 55); LA/ALA ratio of 35.7) daily from 6 to 10mo of age. Infants fed CFB with rapeseed oil vs. corn oil had significantly higher levels of: n-3 fatty acids (P<0.001), EPA (P<0.001), and DHA at 10mo (P=0.0157). Infants fed CFB with corn oil vs. rapeseed oil had higher levels of: n-6 fatty acids (P=0.0012), LA (P=0.0002), n-6/n-3 (P<0.001), n-6/n-3 LCPUFA (P=0.0130), AA/EPA (P<0.001), and LA/ALA at 10mo (P=0.011). There were no significant differences between groups in GLA, ALA, or AA.

Svahn et al. [31] gave toddlers (12 to 15mo of age) cow's milk that was either low-fat, standard fat, made with 50% vegetable fat from rapeseed oil (partial vegetable fat, PVF), or made with 100% vegetable fat from palm-, coconut- and soybean oil (full vegetable fat, FVF). Results showed that LA was significantly greater in the FVF group and ALA was greater in the PVF group compared to the low-fat and standard fat cow's milk groups. In additional, total trans FA were lower in the PVF and FVF groups compared to the standard fat cow's milk group. However, there were no differences between groups in AA or DHA levels.

Evidence synthesis

A number of conclusions were drawn from the body of evidence examining the relationship between types and amounts of CFB and micronutrient status:

- Strong evidence suggests that consumption of CFB that contain substantial amounts of iron, such as meats or iron-fortified cereal, helps maintain adequate iron status or prevent iron deficiency during the first year of life among infants at risk for insufficient iron stores or low dietary intake (e.g. BF infants who are not receiving adequate iron from another source). However, the benefit of these types of CFB for infants with sufficient iron stores, such as those consuming iron-fortified infant formula, is less evident.
- Not enough evidence is available to determine the relationship between other types/amounts of CFB containing lesser amounts of iron, such as fruits and vegetables, and iron status.
- Limited evidence suggests that consuming CFB that contain substantial amounts of zinc, such as meats or cereals fortified with zinc, supports zinc status during the first year of life, particularly among BF infants who are not receiving adequate zinc from another source. However, the benefit of these types of CFB for infants consuming infant formula fortified with zinc is less evident.
- Moderate evidence suggests that consuming CFB with differing fatty acid profiles, particularly long-chain polyunsaturated fatty acids, can influence fatty acid status.
- During the second year of life, good sources of micronutrients are still needed, but there is limited evidence to indicate which types and amounts of CFB are associated with adequate micronutrient status.
- There is not enough evidence to determine the relationship between types and amounts of CFB and vitamin B12, vitamin D, or folate status.

The studies in this systematic review suggest that infants can accept and consume a wide range of different types of CFB. This was measured specifically by Krebs et al. [15], who found that acceptance of the study foods was similar between cereal and beef groups. Other studies demonstrated acceptability by good compliance with assigned diets or had free-living infants who were reported to consume a variety of foods as CFB. However, despite the substantial body of generalizable evidence available, including several RCTs designed to directly address this systematic review question, drawing conclusions is difficult due to inconsistency in study design and CFBs examined. The different types and/or amounts of CFB compared in this body of evidence, as well as the outcomes measured, varied widely from study to study. Studies differed in terms of the age at which CFB were introduced, timing of assessment of micronutrient status, duration of interventions, as well as the duration of monitoring of CFB intake and age of follow-up.

One particularly noteworthy limitation across many of the studies included in this systematic review was lack of comprehensive adjustment for feeding practices aside from complementary feeding, including whether infants were BF or consumed infant formula, particularly iron-fortified infant formula, were mixed fed (BF and FF), or were fed cow's milk. In many cases, infants in the comparison groups consumed different types of foods but had diets with similar overall micronutrient composition, making null findings less meaningful. Most studies enrolled a generally healthy population of infants who were iron replete, or had "normal" baseline micronutrient levels. In general, risk of iron or zinc deficiency was low at the beginning of the complementary feeding period due to adequate stores of both iron and zinc at birth. Risk of iron and zinc deficiency typically increases in later infancy, particularly among BF infants who are not consuming fortified infant formula and/or obtaining adequate amounts of these specific nutrients in their CFB. In addition, as BF and FF infants transition from breast milk or infant formula to unfortified cow's milk, typically after 12 months of age, changes in iron and/or zinc status can occur, making consumption of iron and zinc -containing CFB important for this age group as well.

A number of studies did avoid the confounding effects of infant formula by including infants who were exclusively BF prior to introduction of CFB, and who continued to receive human milk throughout the study (i.e., few infants were introduced to either fortified infant formula or cow's milk) [1, 2, 14-17, 20, 23]. Many studies suggested that BF infants who consumed iron-containing CFB, whether meat or iron-fortified cereal, maintained adequate iron status through the end of the first year of life. And, further, BF infants who consumed CFB with iron and zinc, such as meat or cereal fortified with iron and zinc, maintained adequate zinc status as well. While some of the null associations with iron status reported in cohort studies [1, 6, 19] suggest that consumption of fruits and vegetables may not displace intake of iron-rich foods, this needs further exploration. In addition, more information is needed regarding the overall contribution of fruits and vegetables to iron intake and/or bioavailability, and whether those higher in iron are commonly consumed as CFB.

Furthermore, while most studies examined iron status as the primary outcome of interest, there was substantial variation in the biomarkers or combinations of biomarkers used to assess iron status. In addition, most studies examined micronutrient status outcomes during the first year of life, with only a few studies examining outcomes during the second year of life (14 to 24mo) [4, 5, 7, 8, 10, 23]. For example, both Hb and SF levels were included as biomarkers in most studies except 1 that measured only SF [19]. Many studies included at least a third indicator of iron status related to either red blood cell function (e.g., Hct, MCV, FEP, ZPP), iron homeostasis (e.g., TfR, Tf saturation, TIBC), and/or the presence of anemia or IDA based on various biomarker values. While SF levels strongly correlate with iron storage and Hb levels strongly correlate with ID, the majority of infants from all studies had sufficient SF and Hb levels upon enrollment (i.e., participants already had sufficient iron status). Therefore, it is likely that any good source of iron can maintain sufficient iron status if deficiency at baseline is absent. When examining zinc status as an outcome, all studies used venous or capillary blood samples to assess plasma or serum zinc. Plasma/serum zinc as a biomarker of zinc status has low sensitivity, is influenced by inflammatory status, and does not adequately reflect zinc homeostasis. Therefore, the results related to the effect of types of CFB on zinc status outcomes should be considered with caution. Only 1 study assessed zinc homeostasis [16] by measuring total absorbed zinc from CFB and the exchangeable zinc pool and demonstrated poorer zinc status in infants randomized to infant cereal not fortified with zinc.

While the majority of studies examined iron and/or zinc status as the primary outcomes of interest, there were several RCTs that compared the effects of consuming CFB with different fatty acid profiles on fatty acid status. There was variation across studies in the CFB tested and the outcomes considered, but there was consistency in the finding that fatty acid content of CFB had a significant impact on infants' and toddlers' fatty acid status.

The RCTs in this review had fewer concerns related to internal validity, were more likely to be the true effects of the types and amounts of CFB consumed and micronutrient status compared to the results from the prospective cohort studies. However, in many cases it was important to consider the nutrient content of the CF diet consumed by the control or comparison group when interpreting null findings, as several indicated that these diets were often similar in nutrient content to the experimental CF diet. Several of the cohort studies have major methodological limitations related to confounding bias from factors such as education, socioeconomic status, maternal age, race/ethnicity, child sex, birth size, and gestational age. Few of the cohort studies described baseline characteristics of subjects, making it impossible to determine whether the comparison groups differed on any of these confounders at baseline, and few adjusted for many of the key confounders listed above in outcome analyses. In addition, it is likely that several studies did not include sufficient sample size to adequately analyze results from certain sub-sets of study subjects.

Research recommendations

In order to better assess the relationship between different types and/or amounts of CFB and micronutrient status, future research that addresses this topic should:

- Include both randomized controlled trials and prospective cohort studies with sufficient sample sizes, that clearly define types and amounts of CFB that are introduced and examine micronutrient status outcomes of public health concern, such as iron, zinc, vitamin D, vitamin B-12, folate, and/or fatty acid status
- Account for whether infants were fed breast milk and/or infant formula, and other aspects of the overall diet, including consumption of fortified products and bioavailability of nutrients consumed.
- Adjust for key confounding factors in observational studies, including: education, socioeconomic status, maternal age, race/ethnicity, child sex, birth size, gestational age, birth weight, post-natal growth, and iron stores at birth
- Include diverse populations with varying racial/ethnic and socioeconomic backgrounds, and with increased risk of poor nutritional status (including ID and IDA).
- Include sufficient duration of follow-up, through the second year of life and beyond, to assess the longer term effects (including functional outcomes) of complementary feeding.

Table 1. Description of studies examining the relationship between consuming meat as a complementary food and micronutrient status.

Reference; n; country; milk feeding practices	Intervention or exposure	Results for iron status	Results for zinc status
Randomized Controlled Trials			
Dube, 2010 [12]; 97; Germany; BF and/or FF	High Meat Group: Beef and poultry meals, 12% for 6mo (4 to 10mo)	Hb at 10mo: 12.0g/dL, 95% CI: 11.7, 12.3 vs. 11.7g/dL, 95% CI: 11.3, 12; P=0.0563	
	Low Meat Group: Beef and poultry meals, 8% for 6mo (4 to 10mo)	Hct, MCV, MCHC, SF, TfR, ZPP, serum iron at 10mo: No significant group differences	
Engelmann, 1998 [13]; N=41; Denmark; Partially BF	Low Meat Group: Beef, pork, lamb, turkey, or cod, 10g/d for 2mo (8 to 10mo)	Hb from 8 to 10mo: -0.49 g/dL, 95% CI: -1.29, 0.56 vs. -0.06 g/dL, 95% CI: -1.21, +0.73; P=0.0008	Serum Zinc at 10mo or change from 8 to 10mo: No significant group differences
	High Meat Group: beef, pork, lamb, turkey, or cod, 27g/d for 2mo (8 to 10mo)	SF, SF<10µg/l, TfR at 10mo or change from 8 to 10mo: No significant group differences	
Krebs, 2006 [15]; 72; US; Exclusively BF	Meat Group: Pureed beef ad libitum for 2mo (5 to 7mo)	Hb, SF, or Hct at 9mo: No significant group differences	Plasma Zinc at 9mo: No significant group differences
	Cereal Group: Iron-fortified rice cereal ad libitum for 2mo (5 to 7mo)		
Krebs, 2012 [16]; 42; US; Exclusively BF	Meat Group: Pureed beef, 1-2 jar/d for 3-4mo (5 to 9-10mo)		Fractional zinc absorption at 9-10mo: 0.22±0.01, 0.21±0.02 vs. 0.33±0.04, P=0.003
	Iron-Zinc Fortified Cereal Group: Iron + zinc fortified cereal, 1-2 serving/d for 3-4mo (5 to 9-10mo)		Total absorbed zinc at 9-10mo: Higher in the meat, iron-zinc fortified cereal groups vs. iron-fortified cereal group; P<0.05
	Iron-Fortified Cereal Group: Iron-fortified cereal, 1-2 serving/d for 3-4mo (5 to 9-10mo)		Exchangeable zinc pool at 9-10mo: No significant group differences

Reference; n; country; milk feeding practices	Intervention or exposure	Results for iron status	Results for zinc status
Krebs, 2013 [14]; 41; US; Exclusively BF	Meat Group: Pureed beef, 1-2 jar/d for 3-4mo (5 to 9-10mo)	TfR>1.8ug/dL at 9mo: 64% (meat) vs. 22% (cereal groups); P=0.03	
	Iron-Zinc Fortified Cereal Group: Iron + zinc fortified cereal, 1-2 serving/d for 3-4mo (5 to 9-10mo)	SF, Hb, low SF (<15ug/L), anemia (Hb<11.5g/dL), TfR at 9mo: No significant group differences	
	Iron-Fortified Cereal Group: Iron-fortified cereal, 1-2 serving/d for 3-4mo (5 to 9-10mo)		
Makrides, 1998 [17]; 62; Australia; Exclusively BF	High-Iron Weaning Diet Group: Advice to offer red meat and iron-fortified cereal for 6mo (6 to 12mo)	Hb, SF, iron, Tf, Tf saturation at 12mo: No significant group differences	
	Control Weaning Diet Group: Standard nutritional advice (iron-fortified cereal from 4-6mo)		
Szymlek-Gay, 2009 [7]; 205; New Zealand; BF or cow's milk	Meat Group: Red meat, 2 portions/d for 20wk (baseline 12-20mo)	SF: Meat, fortified milk groups (29ug/L, 95% CI: 1.02, 1.63; P=0.033, 1.68ug/L, 95% CI: 1.27, 2.24; P<0.001) vs. non-fortified milk group	
	Fortified Milk Group: Replaced cow's milk with iron-fortified powdered cow's milk	Body iron: Fortified milk group (1.9mg/kg, 95% CI: 0.8, 3.1; P<0.001) vs. non-fortified milk group	
	Non-Fortified Milk Group: Replaced regular cow's milk with non-fortified powdered cow milk,	Hb, TfR, depleted iron stores, iron-deficient erythropoiesis, IDA: No significant group differences	
Yeung, 2000 [18]; 103; Canada; Cow's milk fed	Treatment Group: Pureed meat, 1-2 jars/d, and iron -fortified infant cereals, 2/3 cup/d, for 6mo (6 to 12mo)	Iron depletion (SF<10 μg/L) or anemia (Hb<11.0g/dL): No significant group differences	
	Control Group: No intervention		
Prospective Cohort Studies			
Freeman, 1998 [5]; 76; Ireland	Age of meat introduction: Not defined	Hb, SF, or MCV at 12 or 24mo: No significant associations	

Reference; n; country; milk feeding practices	Intervention or exposure	Results for iron status	Results for zinc status
Male, 2001 [6]; 488; Austria, Germany, Greece, Hungary, Ireland, Italy, Portugal, Spain, Sweden	Frequency of meat consumption: Never, 1–2 times/wk, weekly, almost daily from 9 to 12mo	Hb, MCV, SF, TSAT, TfR, anemia, ID, IDA at 12mo: No significant associations	
Michaelsen, 1995 [19]; 84; Denmark	Amount of meat consumed: g/d	SF from 6-9mo: No significant associations	
Olaya, 2013 [20]; 76; Colombia	Frequency of red meat consumption: Mean times/wk from 6 to 8mo	Hb from 6 to 12mo: Increased red meat frequency, r=0.24, P=0.05	
		Hct, MCV, SF: No significant associations	
	Mean times/wk from 8 to 10mo	Hb from 6 to 12mo: r=0.32, P=0.006	
		Hct from 6 to 12mo: r=0.34, P=0.003	
		SF from 6 to 12mo: r=0.30, P=0.02	
		MCV: No significant associations	
	Mean times/wk from 10 to 12mo	Hb, Hct, MCV, SF: No significant associations	
	Mean times/wk from 6 to 12mo	Hb from 6 to 12mo: r=0.307, P=0.008	
		Hct from 6 to 12mo: r=0.27, P=0.02	
		MCV, SF: No significant associations	
	>3 vs. <3 times/wk from 6 to 8mo	MCV at 12mo: 72.5±4.4fL vs. 69.6±3.7fL; P=0.02	
		Higher MCV from 6 to 12mo: P<0.05	
	>3 vs. <3 times/wk from 10 to 12mo	Higher Hb at 12mo: P=0.016	
		Higher Hb from 6 to 12mo: P<0.01	
		Higher Hct at 12mo: P=0.03	
Taylor, 2004 [8]; 149 at 4mo, 149 at 12mo, 130 at 24mo; UK	Amount of meat (beef, lamb, pork, game, poultry, fish) consumed: 13-	Hb<110g/L, SF <10ug/L, MCV, MCHC, RDW, ZPP at 4, 12, or 24mo: No significant associations	Zinc at 4, 12, or 24mo: No significant associations

Reference; n; country; milk feeding practices	Intervention or exposure	Results for iron status	Results for zinc status
	767g, 768-1095g, 1096-3204g, nonmeat eaters from 4 to 24mo		
		Low serum iron (<9.0umol/L) at 12mo: Inverse association, data not provided; P<0.023	
Thorsdottir, 2003 [1]; 114; Iceland	Amount of meat consumed: g/d from 9 to 12mo	Hb, SF, TfR, MCV, Tfr:log SF at 12mo: No significant associations	
Urkin, 2007 [2]; 142; Israel	Frequency of meat consumption: 0-3 vs. ≥4 times/wk at 17mo (12-24mo)	ID or anemia at 24mo: 2.32. 95% CI: 1.06, 5.07; P=0.034	

Table 2. Description of studies examined the relationship between consuming cereal as a complementary food and micronutrient status.

Reference; n; country; milk feeding practices	Intervention or exposure	Results for iron status	Results for zinc status
Randomized Controlled Trials			
Davidsson, 1996 [21]; 57; Scotland; FF	Wheat/Soy, High Fiber: Wheat/soy cereal with 8% fiber, ad libitum for 4wk (crossover, no washout)	Hb, SF, or HCT after 16wk: No significant group differences	
	Wheat/Soy, Low Fiber: Wheat/soy cereal with 1.8% fiber, ad libitum for 4wk		
	Wheat/Milk, High Fiber: Wheat/milk cereal with 5.3% fiber, ad libitum for 4wk		
	Wheat/Milk, Low Fiber: Wheat/milk cereal with 2% fiber, ad libitum for 4wk		
Hertrampf, 1990 [11]; 188; Chile; Exclusively BF	Cereal group: Iron-fortified cereal, 20-40g/d from 4 to 6mo	SF at 9mo: 16 vs. 12ug/l; P<0.03	
	Control group: Standard complementary feeding recommendations	SF at 12mo: 14 vs. 11ug/l; P<0.03	

Reference; n; country; milk feeding practices	Intervention or exposure	Results for iron status	Results for zinc status
		Serum iron/TIBC at 9mo: 15.1% vs. 12.6%; P<0.001	
		Serum iron/TIBC at 12mo: 14.5% vs. 11.2%; P<0.002	
		FEP at 9mo: 1.59 vs. 1.80umol/l, P<0.004	
		Hb at 12mo: 122 vs. 117g/l; P<0.003	
		MCV at 12mo: 69 vs. 71fl, P<0.03	
		Hb, MCV at 9mo, FEP at 12mo: No significant group differences	
Krebs, 2006 [15]; 72; US; Exclusively BF	Meat Group: Pureed beef ad libitum for 2mo (5 to 7mo)	Hb, SF, or Hct at 9mo: No significant group differences	Plasma Zinc at 9mo: No significant group differences
	Cereal Group: Iron-fortified rice cereal ad libitum for 2mo (5 to 7mo)		
Krebs, 2012 [16]; 42; US; Exclusively BF	Meat Group: Pureed beef, 1-2 jar/d for 3-4mo (5 to 9-10mo)		Fractional zinc absorption at 9-10mo: 0.22±0.01, 0.21±0.02 vs. 0.33±0.04, P=0.003
	Iron-Zinc Fortified Cereal Group: Iron + zinc fortified cereal, 1-2 serving/d for 3-4mo (5 to 9-10mo)		Total absorbed zinc at 9-10mo: Higher in the meat, iron-zinc fortified cereal groups vs. iron-fortified cereal group; P<0.05
	Iron-Fortified Cereal Group: Iron-fortified cereal, 1-2 serving/d for 3-4mo (5 to 9-10mo)		Exchangeable zinc pool at 9-10mo: No significant group differences
Krebs, 2013 [14]; 41; US; Exclusively BF	Meat Group: Pureed beef, 1-2 jar/d for 3-4mo (5 to 9-10mo)	TfR>1.8ug/dL at 9mo: 64% (meat) vs. 22% (cereal groups); P=0.03	

Reference; n; country; milk feeding practices	Intervention or exposure	Results for iron status	Results for zinc status
	Iron-Zinc Fortified Cereal Group: Iron + zinc fortified cereal, 1-2 serving/d for 3-4mo (5 to 9-10mo)	SF, Hb, low SF (<15ug/L), anemia (Hb<11.5g/dL), TfR at 9mo: No significant group differences	
	Iron-Fortified Cereal Group: Iron-fortified cereal, 1-2 serving/d for 3-4mo (5 to 9-10mo)		
Lind, 2003 [22]; 267; Sweden; BF and/or FF	Commercial Phytate Group: Commercial milk-cereal (iron-fortified oat and wheat cereal drink/porridge) with regular phytate levels from 6 to 12mo	Hb at 12mo: Reduced phytate vs. infant formula group (120 vs. 117g/L); P=0.05	Serum zinc, low serum zinc (<10.7mol/L) at 12mo: No significant group differences
	Reduced Phytate Group: Phytate-reduced milk-cereal-drink/porridge from 6 to 12mo	MCV, SF, low SF (SF<12ug/l), anemia ((Hb<10.0g/dL) at 12mo: No significant group differences	
	Infant formula group: Infant formula and porridge from 6 to 12mo		
Makrides, 1998 [17]; 62; Australia; Exclusively BF	High-Iron Weaning Diet Group: Advice to offer red meat and iron-fortified cereal for 6mo (6 to 12mo)	Hb, SF, iron, Tf, Tf saturation at 12mo: No significant group differences	
	Control Weaning Diet Group: Standard nutritional advice (iron-fortified cereal from 4-6mo)		
Walter, 1993 [23]; 444 at 8mo; 370 at 12mo; 340 at 15mo; Chile; FF or BF	Group 1: Iron-fortified rice cereal and unfortified formula for 11mo (from 4 to 15mo)	Hb at 8, 12, and 15 mo: Group 1>2; P<001	
	Group 2: Non-fortified rice cereal and unfortified formula for 11mo (from 4 to 15mo)	Hb at 8, 12, and 15mo: Group 1, 3, no significant differences	
	Group 3: Non-fortified rice cereal and fortified formula for 11mo (from 4 to 15mo)	Hb at 12 and 15mo: Group 4>5; P<0.05	
	Group 4: Iron -fortified rice cereal and breast milk for 11mo (from 4 to 15mo)	Hb<105 g/L: Group 1<2, P<0.05; Group 3 < 2, P<0.001; Group 4<5, P<0.025	
	Group 5: Non-fortified rice cereal and breast milk for 11mo (from 4 to 15mo)	IDA (Hb<110g/L + MCV<70, SAT<10%, and/or SF<10 pg/L: Groups 1, 3<2 (8%, 4% vs. 24%),	

Reference; n; country; milk feeding practices	Intervention or exposure	Results for iron status	Results for zinc status
		P<0.05; Group 4<5 (13% vs. 27%) P<0.01	
		MCV, Tf saturation: Group 3>1 (P=NR)	
		Erythrocyte protoporphyrin: Group 1>3 (P=NR)	
Yeung, 2000 [18]; 103; Canada; Cow's milk fed	Treatment Group: Pureed meat, 1-2 jars/d, and iron -fortified infant cereals, 2/3 cup/d, for 6mo (6 to 12mo)	Iron depletion (SF<10 µg/L) or anemia (Hb<11.0g/dL): No significant group differences	
	Control Group: No intervention		
Ziegler, 2009 [10]; 93 US; Exclusively BF	Iron-fortified Cereal Group: Iron-fortified cereal) for 5mo (from 4 to 9mo)	SF at 5.5, 7.5, 9, 12, and 15mo: 82 vs. 42, 61 vs. 36, 48 vs. 28, 39 vs. 25, 28 vs. 28ug/L; P<0.05	
	Control Group: No intervention	SF at 18, 21, and 24mo: No significant group differences	
		ln[TfR/SF] 5.5, 7.5, 9, 12, and 15mo: Cereal < control group; P<0.05	
		ln[TfR/SF] at 18, 21, or 24mo: No significant group differences	
		Hb, TfR, RDW, or MCV: No significant group differences	
Prospective Cohort Studies			
Male, 2001 [6]; 488; Austria, Germany, Greece, Hungary, Ireland, Italy, Portugal, Spain, Sweden	Frequency of cereal consumption: Never, 1–2 times/wk, weekly, almost daily from 9 to 12mo	MCV: β=0.13; P<0.01	
		SF: β=0.23; P<0.001	
		TfR: β=0.16; P<0.05	
		Hb, Tf saturation, anemia, ID, IDA: No significant associations	

Reference; n; country; milk feeding practices	Intervention or exposure	Results for iron status	Results for zinc status
Michaelsen, 1995 [19]; 84; Denmark	Amount of industrial and home-made porridge consumed: 100g/d	SF from 6 to 9mo: No significant associations	
Thorsdottir, 2003 [1]; 114; Iceland	Amount of porridge consumed: g/d from 9-12mo	Hb at 12mo: 0.102 (SD=0.042), P=0.017	
		No associations with SF, TfR, MCV, TfR:log SF at 12mo: No significant associations	
	Amount of fortified breakfast cereal consumed: g/d from 9-12mo	SF at 12mo: 0.010 (SD=0.004), P= 0.009	
		No associations with Hb, TfR, MCV, TfR:log SF at 12mo: No significant associations	

Table 3. Description of studies examined the relationship between consuming complementary foods other than meat or cereal and micronutrient status.

Reference; n; country; milk feeding practices	Intervention or exposure	Results for iron status	Results for zinc status	Results for vitamin B12 and folate status	Results for Vitamin D status
Randomized Controlled Trials					
Liu, 1993 [24]; 164; China; Partially BF	Fortified Biscuit Group: Fortified (with iron, zinc, vitamin A, calcium, and folic acid) biscuits daily for 3mo (baseline 6-13mo)	Hb: -0.79g/L, P<0.01 in unfortified biscuit group			
	Unfortified Biscuit Group: Unfortified biscuits daily for 3mo (baseline 6-13mo)	FEP, FEP:Hb, SF: No significant group differences			
Makrides, 2002 [25]; 137; Australia; BF and FF	Egg Groups: Regular or DHA-enriched eggs, 4 yolks/wk for 6mo (6 to 12mo)	Plasma iron at 12mo in BF and FF infants: 10.5 vs. 8.3g/L, P<0.05			
	Control group: No intervention	Tf saturation at 12mo in BF infants: 14.3% vs. 10.8%, P<0.05			
		Tf saturation at 12mo in FF infants: 14.6% vs. 11.6%, P<0.05			
		Hb, SF, and Tf values, or anemia at 12mo: No significant group differences			
Szymlek-Gay, 2009 [7]; 205; New Zealand; BF or cow's milk	Meat Group: Red meat, 2 portions/d for 20wk (baseline 12-20mo)	SF: Meat, fortified milk groups (29ug/L, 95% CI: 1.02, 1.63; P=0.033, 1.68ug/L, 95% CI: 1.27, 2.24; P<0.001) vs. non-fortified milk group			

Reference; n; country; milk feeding practices	Intervention or exposure	Results for iron status	Results for zinc status	Results for vitamin B12 and folate status	Results for Vitamin D status
	Fortified Milk Group: Replaced cow's milk with iron-fortified powdered cow's milk	Body iron: Fortified milk group (1.9mg/kg, 95% CI: 0.8, 3.1; P<0.001) vs. non-fortified milk group			
	Non-Fortified Milk Group: Replaced regular cow's milk with non-fortified powdered cow milk,	Hb, TfR, depleted iron stores, iron-deficient erythropoiesis, IDA: No significant group differences			
Virtanen, 2001 [9]; 36; Sweden; BF and/or FF	Cow's Milk, Low-Fat Group: Low-fat cow's milk, ad libitum for 7mo (11 to 18mo)	Hb, MCV, SF, TfR from 12 to 18 mo: No significant group differences			
	Cow's Milk, Standard-Fat Group: Standard-fat cow's milk, ad libitum for 7mo (11 to 18mo)				
	Fortified Cow's Milk, 50% Vegetable Fat Group: Iron-fortified cow's milk with 50% vegetable fat, ad libitum for 7mo (11 to 18mo)				
	Fortified Cow's Milk, 100% Vegetable Fat Group: Iron-fortified cow's milk with 100% vegetable fat, ad libitum for 7mo (11 to 18mo)				
Zavaleta, 2011 [26]; 499; Peru; Exclusively BF	Intervention Group: CFB with milkfat globule membrane and iron, zinc, copper, folate, thiamin, riboflavin, vitamin A, vitamin B12, and ascorbic acid for 6mo (from 6 to 12mo)	Hb at 12mo: 109.9 vs 108.1 vs. 109.9g/L; P=0.049	Serum zinc, zinc deficiency (zinc <10.7umol/L) at 12mo: No significant group differences	Serum folate, folate deficiency (folate<6.8mg/nL) at 12mo: No significant group differences	

Reference; n; country; milk feeding practices	Intervention or exposure	Results for iron status	Results for zinc status	Results for vitamin B12 and folate status	Results for Vitamin D status
	Control Group: CFB with skim milk proteins and iron, zinc, copper, folate, thiamin, riboflavin, vitamin A, vitamin B12, and ascorbic acid) for 6mo	SF, anemia (Hb<11g/dL), IDA (SF<10ug/L) at 12mo: No significant group differences			
Observational Studies					
Dagnelie, 1994 [4]; Prospective Cohort Study; 106; The Netherlands	Macrobiotic weaning diet: Unpolished rice, pulses, vegetables, seaweeds, fermented foods, nuts, seeds, and no vitamin D supplements, fat/oils, fish and animal products	MCHC: Macrobiotic > omnivorous; P<0.05		Vitamin B12: Macrobiotic < omnivorous; P<0.001	Vitamin D: Macrobiotic < omnivorous; P<0.001
	Omnivorous weaning diet: Not described	Hct, RBX, MCV, MCH: Macrobiotic < omnivorous; P<0.04, P<0.001, P<0.05, P<0.001		Folate: Macrobiotic < omnivorous; P<0.001	Rickets (total, subclinical, clinical): Macrobiotic > omnivorous; P<0.001
		Hb, FEP, SF: No significant associations			
Male, 2001 [6]; Prospective Cohort Study; 488; Austria, Germany, Greece, Hungary, Ireland, Italy, Portugal, Spain, Sweden	Frequency of fruit and vegetable consumption: Never, 1–2 times/wk, weekly, almost daily from 9 to 12mo	Hb, MCV, SF, TSAT, TfR, anemia, ID, IDA: No significant associations			
Michaelsen, 1995 [19]; Prospective Cohort Study; 84; Denmark	Amount of fish, bread, vegetables and fruits, other foods consumed: 100g/d	SF from 6 to 9mo: -2.68 (SD=0.71), P=0.001 for bread			

Reference; n; country; milk feeding practices	Intervention or exposure	Results for iron status	Results for zinc status	Results for vitamin B12 and folate status	Results for Vitamin D status
		SF from 6 to 9mo: No significant associations with fish, vegetables, fruits, "other foods"			
Thorsdottir, 2003 [1]; Prospective Cohort Study; 114; Iceland	Amount of cow's milk products, fish, fruit and vegetables, bread, biscuits and crackers, cakes, butter/cheese, juices consumed: g/d, 100g/d for juices from 9 to 12mo	SF at 12mo: 0.007 (SD=0.003), P=0.009 for fish; -0.009 (SD=0.004), P=0.042 for butter/cheese Hb at 12mo: -0.285 (SD=0.124), P= 0.024 for butter/cheese MCV at 12mo: 0.189 (SD=0.061), P= 0.002 for butter/cheese TfR, TfR:log SF at 12mo: No significant associations			
Tantrecheewathorn, 2005 [27]; Prospective Cohort Study; 140; Thailand	Dietary inadequacy vs. adequacy from 4-12mo, defined as a variety of food from various food groups (rice and grains, fruits, vegetables, milk, meat, eggs, fat), and adequate amounts of nutrients and energy compared with Thai Recommended Dietary Allowances	IDA at 12mo: RR=11.1, 95% CI: 4, 33.3; P<0.001			

Table 4. Description of studies examined the relationship between types and amounts of complementary foods and beverages varied in fat content and micronutrient status.

Reference; n; country; milk feeding practices	Intervention	Results for micronutrient and fatty acid status
Hoffman, 2004 [28]; RCT; 51; US; Exclusively BF	DHA Group: CFB enriched with DHA from egg-yolk for 6mo (from 6 to 12mo)	DHA, DPA (n-6), DHA/DPA(n-6), n-6/n-3 at 12mo: DHA > control group; P<0.002
	Control Group: Unenriched CFB for 6mo (from 6 to 12mo)	Hb, Hct, MCV, alpha-LNA, EPA, DPA (n-3), LA, 20:3, ARA, 22:4 at 12mo: No significant group differences
Libuda, 2015 [29]; RCT; 158; Germany; BF and/or FF	Rapeseed Oil Group: CFB meals with ALA-rich rapeseed oil for 4-6mo (from 4-6 to 10mo)	DHA, EPA, n3 LC-PUFA, n3 PUFA, n3 LC-PUFA:n6 LC-PUFA, n2 PUFA:n6 PUFA, ALA:LA, EPA:AA at 10mo: Fish > corn oil group; P=0.0001 (P=0.0002 for n3 PUFA, P=0.038 for ALA:LA)
	Fish Group: CFB meals with salmon (preformed DHA) for 4-6mo (from 4-6 to 10mo)	DHA, EPA, AA, LA, n3 LC PUFA, n3 PUDA, n3 LC-PUFA: n6 LC-PFA, n3 PUFA: n6 PUFA, EPA:AA at 10mo: No significant differences between the rapeseed and corn oil groups
	Corn Oil Group: CFB meals with linoleic acid-rich corn oil for 4-6mo (from 4-6 to 10mo)	ALA, ALA:LA at 10mo: Rapeseed > corn oil group; P=0.0001
		LA, AA, ALA at 10mo: No significant differences between the fish and corn oil groups
Makrides, 2002 [25]; RCT; 137; Australia; BF and/or FF	Regular Egg Group: Regular eggs, 4 yolks/wk for 6mo (from 6 to 12mo)	DHA at 12mo for BF infants: 6.7±0.1.3 vs 5.1±0.9, 4.8±0.8; P<0.05)
	N-3 Egg Group: Eggs enriched with DHA, 4 yolks/wk for 6mo (from 6 to 12mo)	DHA at 12mo for FF infants: 4.1±0.1.2 vs 3.3±0.7,3.0±0.5; P<0.05
	Control group: No intervention	AA at 12mo: No significant group differences
Schwartz, 2009 [30]; RCT; 102; Germany; Exclusively BF	Intervention Group: CFB meals with rapeseed (canola) oil (LA 20%; ALA 9%) for 4mo (from 6 to 10mo)	n-3 fatty acids, EPA, DHA at 10mo: Intervention > control; P<0.001, P<0.001, P=0.0157
	Control Group: CFB meals with corn oil (LA 55% of total fatty acid; ALA 1%) for 4mo (from 6 to 10mo)	Control vs. intervention group had higher n-6 fatty acids, LA, n-6/n-3, n-6/n-3 LCPUFA, AA/EPA, LA/ALA at 10mo: Control > intervention; P=0.0012, P=0.0002, P<0.001, P=0.0130, P<0.001, P=0.011

Reference; n; country; milk feeding practices	Intervention	Results for micronutrient and fatty acid status
		GLA, ALA, or AA at 10mo: No significant group differences
Svahn, 2002 [31]; RCT; 37; Sweden	Low-Fat Milk Group: Low-fat cow's milk (1.0g fat/dL) for 3mo (from 12 to 15mo)	Plasma LA at 15mo: Full vegetable fat > low-fat, standard-fat groups; P<0.001
	Standard-Fat Milk Group: Standard fat cow's milk (3.5g fat/dL) for 3mo (from 12 to 15mo)	Plasma ALA at 15mo: Partial vegetable > low-fat, standard-fat groups; Standard fat: P<0.001 in TG, P<0.05 in CE; Low-fat: P<0.01 in phospholipids and CE, P<0.05 in TG
	Partially Vegetable Fat Milk Group: Milk with 50% vegetable fat from rapeseed oil, 50% milk fat for 3mo (from 12 to 15mo)	Trans FA at 15mo: Partial, full vegetable fat < standard-fat group; SF vs PVF: P<0.05; SF vs FVF: P<0.01
	Full Vegetable Fat Milk Group: Milk with 100% vegetable fat from palm-, coconut- and soybean oil for 3mo (from 12 to 15mo)	Plasma AA or DHA in CE and PL: No significant group differences

Included articles

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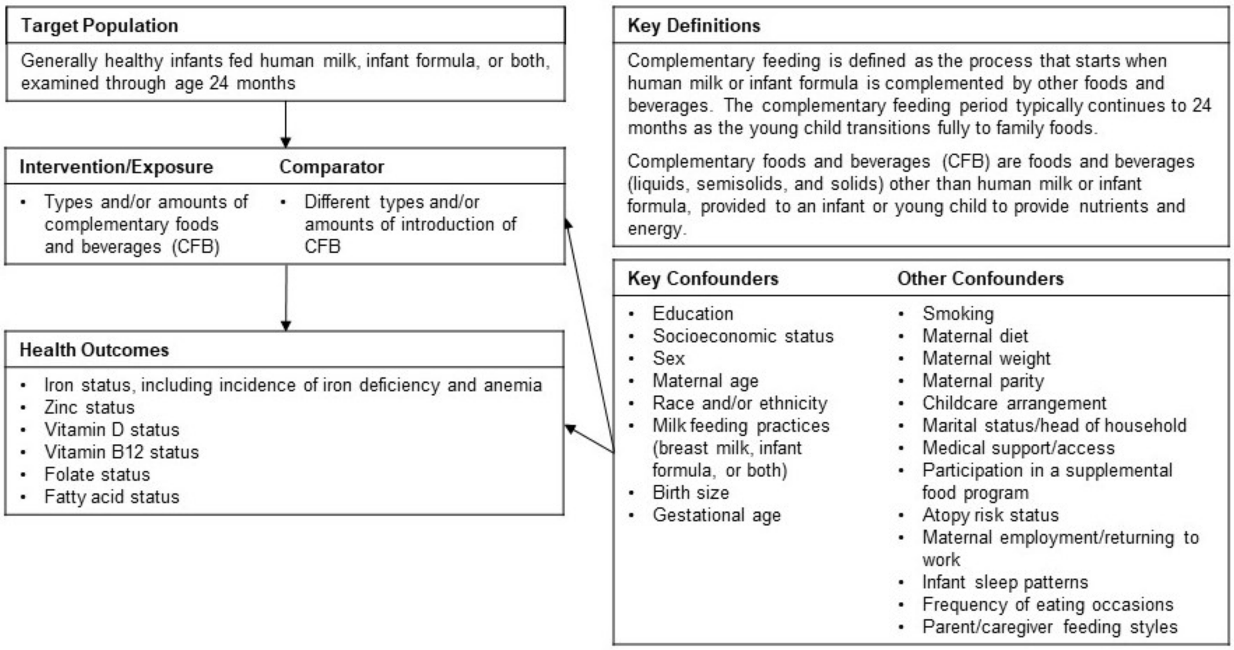
ANALYTIC FRAMEWORK

The analytic framework (Figure 1) illustrates the overall scope of the systematic 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 review conducted to examine the relationship between types and amounts of complementary foods and beverages and micronutrient status.

Figure 1: Analytic framework



SEARCH PLAN AND RESULTS

Inclusion and exclusion criteria

The inclusion and exclusion criteria are a set of characteristics to determine which studies will be included or excluded in the systematic review. This table provides the inclusion and exclusion criteria for the systematic review question: What is the relationship between types and amounts of complementary foods and beverages and micronutrient status?

Table 5. Inclusion and exclusion criteria

Category	Inclusion Criteria	Exclusion Criteria
Study design	Randomized controlled trials	Cross-sectional studies
	Non-randomized controlled trials	Uncontrolled studies
	Prospective cohort studies	Pre/post studies without a control

	Retrospective cohort studies	Narrative reviews
	Case-control studies	Systematic reviews
	Pre/post studies with a control	Meta-analyses
Independent variable (intervention or exposure)	Types and amounts of complementary foods and beverages (i.e., 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)	Consumption of fluid cow's milk before 12 months of age
Comparator	Different types and amounts of CFB	N/A
Dependent variables (outcomes)	Iron status, including incidence of iron deficiency and anemia	N/A
	Zinc status	
	Vitamin D status	
	Vitamin B12 status	
	Folate status	
	Fatty acid status	
Date range	January 1980 - March 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, 2, 3]	Studies conducted in Very High or High Human Development Countries	Studies conducted in Medium or Low Human Development Countries
Study participants	Human subjects	Hospitalized patients, not including birth and immediate post-partum hospitalization of healthy babies
	Males	
	Females	
Age of study participants	Age at intervention or exposure: Infants (0-12mo); Toddlers (12-24mo)	Age at intervention or exposure: Child (2-5 years (y)); Child (6-12y); Adolescents (13-18y); Adults (19y and older); Older adults (65 to 79y); Older adults (80+y)
	Age at outcome: Infants (0-12mo); Toddlers (12-24mo)	Age at outcome: Child (2-5y); Child (6-12y); Adolescents (13-18y); Adults (19y and older); Older adults (65 to 79y); Older adults (80+y)
Health status of study participants	Studies done in generally healthy populations	Studies that exclusively enroll subjects with a disease or with the health outcome of interest
	Studies done in populations where infants were full term (≥37wk gestational age)	Studies done in hospitalized or malnourished subjects

	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 of exclusively pre-term babies (gestational age <37wk) 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] United Nations Development Programme. Human Development Report 2014: Reducing Vulnerabilities and Building Resilience. Available from: http://hdr.undp.org/en/content/human-development-report-2014.[3]

[2] 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.

[3] When a country was not included in the HDI ranking, country classification from the World Bank was used instead [32]

Search terms and electronic databases used

PubMed, US National Library of Medicine (1966 to 9 March 2016):
Date(s) Searched: 12/9/2015; 3/9/2016
Search Terms:

((Complementary OR supplementary OR wean* OR transition* OR introduc* OR "Infant Nutritional Physiological Phenomena"[Mesh:noexp] OR weaning[mesh])

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 "infant food"[mesh]

AND

nutritional status[mh] OR nutritional status*[tiab] OR Nutrition Status*[tiab] OR "Nutritional Requirements"[Mesh] 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] 905815

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

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

OR
Nutrition*[ti] OR nutritional status[mh] OR nutritional status*[tiab] OR Nutrition Status*[tiab] OR "Child Nutrition Sciences"[majr] OR nutrient*[ti] OR "Nutritional Requirements"[Mesh]

"Vitamin B Deficiency"[Mesh] OR "Vitamins"[Mesh] 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]

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 in PubMed?

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

Embase, Elsevier (1947 to 9 December 2015):
Date(s) Searched: 12/9/2015
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)

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

OR
'nutritional status'/exp OR ((nutrition* OR diet) NEAR/3 (status OR requirement* OR state)):ti,ab OR 'nutritional requirement'/exp

OR

'ferrous ion'/exp OR ferrous:ti,ab OR 'iron absorption'/exp OR 'iron deficiency anemia'/exp OR anemia:ti,ab OR 'iron blood level'/exp OR 'iron'/exp OR 'ferritin'/exp OR ferritin:ti,ab OR transferrin:ti,ab OR 'transferrin'/exp OR 'vitamin D'/exp OR 'vitamin D deficiency'/exp OR 'zinc'/exp OR zinc:ti,ab OR 'cyanocobalamin'/exp OR “vitamin d”:ti,ab OR “vitamin b12”:ti,ab OR “vitamin b 12”:ti,ab OR cyanocobalamin:ti,ab OR 'folic acid'/exp OR 'folic acid':ti,ab OR folate:ti,ab OR folacin:ti,ab OR 'cobalamin'/exp OR cobalamin*:ti,ab OR 'cobamamide'/exp OR 'cobamamide':ti,ab OR cyanocobalamin*:ti,ab OR 'fatty acid'/exp OR (fatty NEXT/1 acid*):ti,ab OR (Arachidonic acid*):ti,ab OR (linolenic NEXT/1 acid*):ti,ab OR (linoleic NEXT/1 acid*):ti,ab OR (Docosahexaenoic NEXT/1 Acid*):ti,ab OR (Eicosapentaenoic NEXT/1 Acid*):ti,ab OR (gamma-Linolenic NEXT/1 Acid*):ti,ab OR (alpha-Linolenic NEXT/1

Acid*):ti,ab

Cochrane Central Register of Controlled Trials, John Wiley & Sons in the Cochrane Library (searched August 2015):

Date(s) Searched: 12/2015

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 nut OR cereal OR beverage* OR bread* OR seafood OR yog*urt* OR cheese OR juice) NEAR/3 (Complementary OR supplementa* OR wean* OR transition* OR introduct* OR family)

OR
((nutrition* OR diet) NEAR/3 (status OR requirement* OR state))
AND
ferrous OR iron OR anemia OR ferritin OR zinc OR “vitamin d” OR “vitamin b12” OR “vitamin b 12” OR cyanocobalamin OR 'folic acid' OR folate OR folacin OR cobalamin* OR 'cobamamide' OR cyanocobalamin* OR (fatty NEXT/1 acid*) OR (Arachidonic acid*) OR (linolenic NEXT/1 acid*) OR (linoleic NEXT/1 acid*) OR (Docosahexaenoic NEXT/1 Acid*) OR (Eicosapentaenoic NEXT/1 Acid*) OR (gamma-Linolenic NEXT/1 Acid*) OR (alpha-Linolenic NEXT/1 Acid*)

NOT (supplement*ti,ab OR pubmed OR embase)

AND (infant* OR baby OR babies OR toddler* OR newborn* OR nurser* OR preschool* OR pre-school OR “early childhood” OR pre-k OR prekindergarten OR pre-kindergarten OR “early years”)

NOT (pubmed OR embase OR supplement*:ti OR preterm:ti)

CINAHL Plus with Full Text, EBSCO (Cumulative Index to Nursing and Allied Health Literature; 1937 to 14 December 2015):
Date(s) Searched: 12/14/2015
Search Terms:

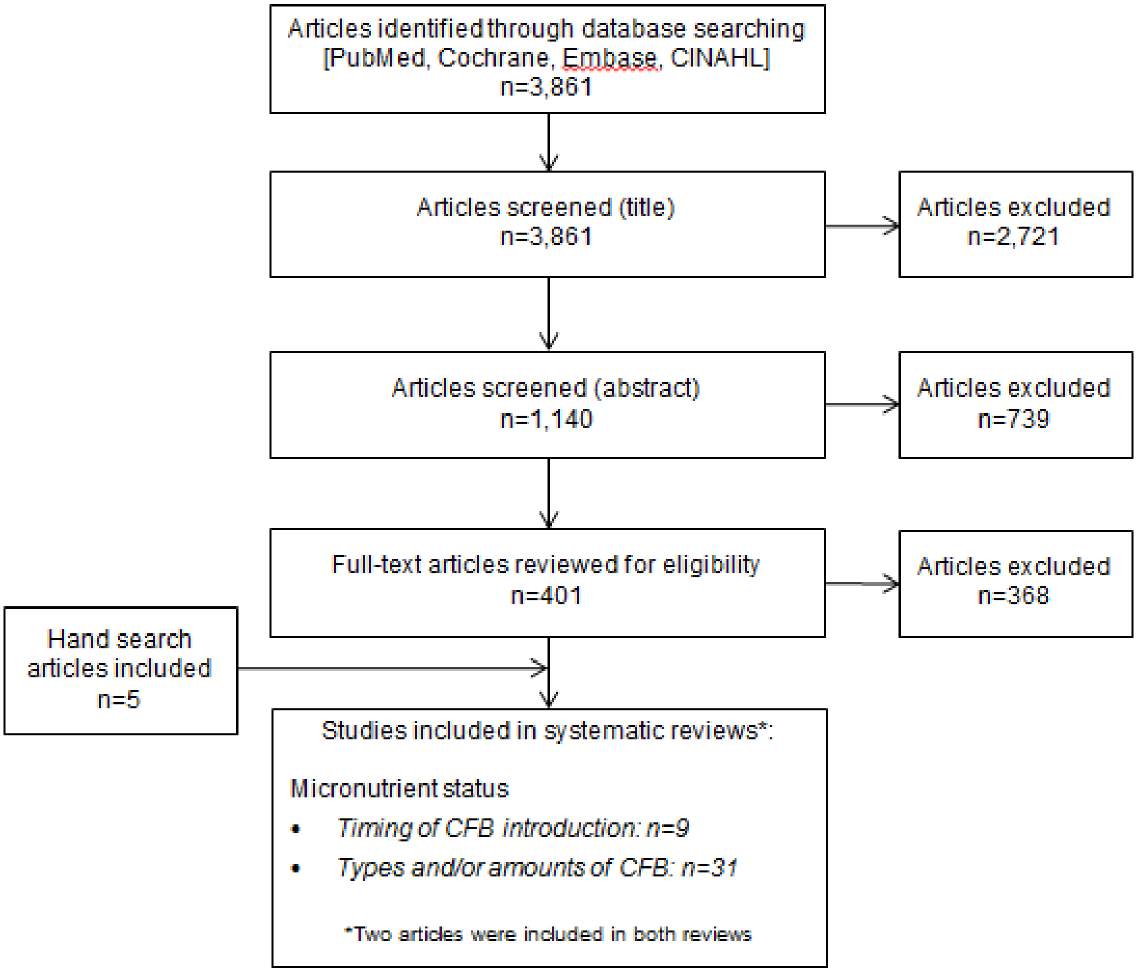
(MH "Food and Beverages+") OR (MH "Food") OR (MH "Diet") OR (MH "Eating") OR (MH "Eating Behavior") OR (MH "Taste") OR (MH "Taste Buds") OR (MH "Cereals") OR (MH "Dairy Products") OR (MH "Yogurt") OR (MH "Cheese") OR (MH "Milk") OR (MH "Eggs") OR (MH "Fruit") OR (MH "Fruit Juices") OR (MH "Meat") OR (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)

AND
(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")

Limit to “all infant” OR (MH "Infant") OR (MH "Infant, Newborn") OR (MH "Infant Behavior") OR (MH "Infant Feeding") OR (MH "Infant Feeding Schedules") OR (MH "Child, Preschool")

Figure 2: Flow chart of literature search and screening results



Flow chart of literature search and screening results for articles examining the relationship between complementary feeding and micronutrient status. The results of an electronic database search were screened in a dual, step-wise manner 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 nine articles, and the systematic review on types and amounts of CFB consumed included 33 articles.

Excluded articles

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

Table 6. Excluded articles

	Citation	Rationale
1	Bioavailability of milk zinc in infants. Nutr Rev. 1984;42:220-2.	Study design, Dependent variable
2	Nutritional findings in the U.S. preschool and young school-age population. J Bergen Cty Dent Soc. 1984;50:14-6.	Age
3	Aboud,F. E.,Moore,A. C.,Akhter,S.. Effectiveness of a community-based responsive feeding programme in rural Bangladesh: a cluster randomized field trial. Matern Child Nutr. 2008;4:275-86.	Independent variable, Dependent variable
4	Abrams,S. A.,O'Brien,K. O.,Wen,J.,Liang,L. K.,Stuff,J. E.. Absorption by 1-year-old children of an iron supplement given with cow's milk or juice. Pediatr Res. 1996;39:171-5.	Independent variable, Dependent variable
5	Abrams,S. A.,Wen,J.,Stuff,J. E.. Absorption of calcium, zinc, and iron from breast milk by five- to seven-month-old infants. Pediatr Res. 1997;41:384-90.	Study design, Independent variable
6	Adamska,I.,Światek,K.,Czerwionka-Szaflarska,M.,Zawadzka-Gralec,A.. Influence of elimination diet on nutritional assessment in children under the age of 2 years. Pediatria Wspolczesna. 2007;9:29-36.	Dependent variable, Language
7	Adu-Afarwuah,S.,Lartey,A.,Brown,K. H.,Zlotkin,S.,Briend,A.,Dewey,K. G.. Home fortification of complementary foods with micronutrient supplements is well accepted and has positive effects on infant iron status in Ghana. Am J Clin Nutr. 2008;87:929-38.	Country, Independent variable
8	Agarwal,R.,Virmani,D.,Jaipal,M.,Gupta,S.,Sankar,M. J.,Bhatia,S.,Agarwal,A.,Devgan,V.,Deorari,A.,Paul,V. K.,Toteja,G. S.. Poor zinc status in early infancy among both low and normal birth weight infants and their mothers in Delhi. Neonatology. 2013;103:54-9.	Country, Independent variable
9	Agostoni,C.,Marangoni,F.,Giovannini,M.,Galli,C.,Riva,E.. Prolonged breast-feeding (six months or more) and milk fat content at six months are associated with higher developmental scores at one year of age within a breast-fed population. Adv Exp Med Biol. 2001;501:137-41.	Independent variable

	Citation	Rationale
10	Agostoni,C.,Riva,E.. Dietary fatty acids and cholesterol in the first 2 years of life. Prostaglandins Leukot Essent Fatty Acids. 1998;58:33-7.	Study design
11	Agostoni,C.,Trojan,S.,Bellu,R.,Riva,E.,Bruzzese,M. G.,Giovannini,M.. Developmental quotient at 24 months and fatty acid composition of diet in early infancy: a follow up study. Arch Dis Child. 1997;76:421-4.	Independent variable, Dependent variable
12	Agustina,R.,Bovee-Oudenhoven,I. M.,Lukito,W.,Fahmida,U.,van de Rest,O.,Zimmermann,M. B.,Firmansyah,A.,Wulanti,R.,Albers,R.,van den Heuvel,E. G.,Kok,F. J.. Probiotics Lactobacillus reuteri DSM 17938 and Lactobacillus casei CRL 431 modestly increase growth, but not iron and zinc status, among Indonesian children aged 1-6 years. J Nutr. 2013;143:1184-93.	Age, Country, Independent variable
13	Al-Alawi,M.,Sarhan,N.. Prevalence of anemia among nine-month-old infants attending primary care in Bahrain. Journal of the Bahrain Medical Society. 2014;25:29-32.	Study design, Independent variable
14	Al-Atawi,M. S.,Al-Alwan,I. A.,Al-Mutair,A. N.,Tamim,H. M.,Al-Jurayyan,N. A.. Epidemiology of nutritional rickets in children. Saudi J Kidney Dis Transpl. 2009;20:260-5.	Study design, Independent variable
15	Alexy,U.,Kersting,M.,Sichert-Hellert,W.,Manz,F.,Schoch,G.. Energy intake and growth of 3- to 36-month-old German infants and children. Ann Nutr Metab. 1998;42:68-74.	Independent variable, Dependent variable
16	Almquist-Tangen,G.,Dahlgren,J.,Roswall,J.,Bergman,S.,Alm,B.. Milk cereal drink increases BMI risk at 12 and 18 months, but formula does not. Acta Paediatr. 2013;102:1174-9.	Dependent variable
17	Almqvist,C.,Garden,F.,Xuan,W.,Mihrshahi,S.,Leeder,S. R.,Oddy,W.,Webb,K.,Marks,G. B.. Omega-3 and omega-6 fatty acid exposure from early life does not affect atopy and asthma at age 5 years. J Allergy Clin Immunol. 2007;119:1438-44.	Independent variable, Dependent variable
18	Altucher,K.,Rasmussen,K. M.,Barden,E. M.,Habicht,J. P.. Predictors of improvement in hemoglobin concentration among toddlers enrolled in the Massachusetts WIC Program. J Am Diet Assoc. 2005;105:709-15.	Independent variable, Dependent variable

	Citation	Rationale
19	Anand,K.,Lakshmy,R.,Janakarajan,V. N.,Ritvik,A.,Misra,P.,Pandey,R. M.,Kapoor,S. K.,Sankar,R.,Bulusu,S.. Effect of consumption of micronutrient fortified candies on the iron and vitamin A status of children aged 3-6 years in rural Haryana. Indian Pediatr. 2007;44:823-9.	Age, Independent variable
20	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.	Independent variable
21	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.	Dependent variable
22	Anfield,L.. Nutrition in the first year. Midwife Health Visit Community Nurse. 1985;21:161-4.	Study design
23	Antunes,H.,Santos,C.,Carvalho,S.,Gonçalves,S.,Costa-Pereira,A.. Male gender is an important clinical risk factor for iron deficiency in healthy infants. e-SPEN Journal. 2012;7:e219-e222.	Study design, Independent variable
24	Arsenault,J. E.,Lopez de Romana,D.,Penny,M. E.,Van Loan,M. D.,Brown,K. H.. Additional zinc delivered in a liquid supplement, but not in a fortified porridge, increased fat-free mass accrual among young Peruvian children with mild-to-moderate stunting. J Nutr. 2008;138:108-14.	Health Status
25	Arvas,A.,Elgormus,Y.,Gur,E.,Alikasifoglu,M.,Celebi,A.. Iron status in breast-fed full-term infants. Turk J Pediatr. 2000;42:22-6.	Independent variable
26	Ayer,J. G.,Harmer,J. A.,Xuan,W.,Toelle,B.,Webb,K.,Almqvist,C.,Marks,G. B.,Celermajer,D. S.. Dietary supplementation with n-3 polyunsaturated fatty acids in early childhood: effects on blood pressure and arterial structure and function at age 8 y. Am J Clin Nutr. 2009;90:438-46.	Age
27	Baatenburg de Jong,R.,Bekhof,J.,Roorda,R.,Zwart,P.. Severe nutritional vitamin deficiency in a breast-fed infant of a vegan mother. Eur J Pediatr. 2005;164:259-60.	Study design

	Citation	Rationale
28	Bakker,E. C.,van Houwelingen,A. C.,Hornstra,G.. Early nutrition, essential fatty acid status and visual acuity of term infants at 7 months of age. Eur J Clin Nutr. 1999;53:872-9.	Study design
29	Balogun,T. A.,Lombard,M. J.,McLachlan,M.. The nutrient intake of children aged 12-36 months living in two communities in the Breede Valley, Western Cape province, South Africa. South African Family Practice. 2015;57:1-7 7p.	Study design, Country
30	Bamji,M. S.,Chowdhury,N.,Ramalakshmi,B. A.,Jacob,C. M.. Enzymatic evaluation of riboflavin status of infants. Eur J Clin Nutr. 1991;45:309-13.	Study design
31	Baptist,E. C.,Castillo,S. F.. Cow's milk-induced iron deficiency anemia as a cause of childhood stroke. Clin Pediatr (Phila). 2002;41:533-5.	Study design
32	Begin,F.,Santizo,M. C.,Peerson,J. M.,Torun,B.,Brown,K. H.. Effects of bovine serum concentrate, with or without supplemental micronutrients, on the growth, morbidity, and micronutrient status of young children in a low-income, peri-urban Guatemalan community. Eur J Clin Nutr. 2008;62:39-50.	Independent variable
33	Beinner,M. A.,Lamounier,J. A.,Tomaz,C.. Effect of iron-fortified drinking water of daycare facilities on the hemoglobin status of young children. J Am Coll Nutr. 2005;24:107-14.	Age, Independent variable
34	Beinner,M. A.,Velasquez-Melendez,G.,Pessoa,M. C.,Greiner,T.. Iron-fortified rice is as efficacious as supplemental iron drops in infants and young children. J Nutr. 2010;140:49-53.	Health Status, Independent variable
35	Ben,X. M.,Zhou,X. Y.,Zhao,W. H.,Yu,W. L.,Pan,W.,Zhang,W. L.,Wu,S. M.,Van Beusekom,C. M.,Schaafsma,A.. Growth and development of term infants fed with milk with long-chain polyunsaturated fatty acid supplementation. Chin Med J (Engl). 2004;117:1268-70.	Independent variable
36	Bentley,M. E.,Caulfield,L. E.,Ram,M.,Santizo,M. C.,Hurtado,E.,Rivera,J. A.,Ruel,M. T.,Brown,K. H.. Zinc supplementation affects the activity patterns of rural Guatemalan infants. J Nutr. 1997;127:1333-8.	Independent variable

	Citation	Rationale
37	Berger,J.,Ninh,N. X.,Khan,N. C.,Nhien,N. V.,Lien,D. K.,Trung,N. Q.,Khoi,H. H.. Efficacy of combined iron and zinc supplementation on micronutrient status and growth in Vietnamese infants. Eur J Clin Nutr. 2006;60:443-54.	Country, Independent variable
38	Bernal,M. J.,Periago,M. J.,Martinez,R.,Ortuno,I.,Sanchez-Solis,M.,Ros,G.,Romero,F.,Abellan,P.. Effects of infant cereals with different carbohydrate profiles on colonic function--randomised and double-blind clinical trial in infants aged between 6 and 12 months--pilot study. Eur J Pediatr. 2013;172:1535-42.	Independent variable, Dependent variable
39	Bilenko,N.,Fraser,D.,Vardy,H.,Belmaker,I.. Impact of multiple micronutrient supplementation ("sprinkles") on iron deficiency anemia in Bedouin Arab and Jewish infants. Isr Med Assoc J. 2014;16:434-8.	Independent variable
40	Birch,E. E.,Garfield,S.,Hoffman,D. R.,Uauy,R.,Birch,D. G.. A randomized controlled trial of early dietary supply of long-chain polyunsaturated fatty acids and mental development in term infants. Dev Med Child Neurol. 2000;42:174-81.	Independent variable
41	Birch,E. E.,Hoffman,D. R.,Uauy,R.,Birch,D. G.,Prestidge,C.. Visual acuity and the essentiality of docosahexaenoic acid and arachidonic acid in the diet of term infants. Pediatr Res. 1998;44:201-9.	Independent variable
42	Birkbeck,J. A.,Scott,H. F.. 25-Hydroxycholecalciferol serum levels in breast-fed infants. Arch Dis Child. 1980;55:691-5.	Independent variable
43	Birlouez-Aragon,I.,Rivière,S.,Bailly,L.,Burban,Y.,Dardenne,A.,Pertuis,S.. Restoration of nutritional balance in children between 6 and 8 years of age. Journal de Pediatrie et de Puericulture. 1998;11:98-103.	Age, Language
44	Black,A. P.,Vally,H.,Morris,P.,Daniel,M.,Esterman,A.,Smith,F.,O'Dea,K.. High folate levels in Aboriginal children after subsidised fruit and vegetables and mandatory folic acid fortification. Aust N Z J Public Health. 2014;38:241-6.	Study design, Age
45	Block,S. L.. Delayed introduction of solid foods to infants: not so fast!. Pediatr Ann. 2013;42:143-7.	Study design

	Citation	Rationale
46	Bloem,M. W.,Wedel,M.,Egger,R. J.,Speek,A. J.,Schrijver,J.,Saowakontha,S.,Schreurs,W. H.. Iron metabolism and vitamin A deficiency in children in northeast Thailand. Am J Clin Nutr. 1989;50:332-8.	Health Status
47	Bogard,J. R.,Hother,A. L.,Saha,M.,Bose,S.,Kabir,H.,Marks,G. C.,Thilsted,S. H.. Inclusion of Small Indigenous Fish Improves Nutritional Quality During the First 1000 Days. Food Nutr Bull. 2015;36:276-89.	Dependent variable
48	Bortolini,G. A.,Vitolo,M. R.. The impact of systematic dietary counseling during the first year of life on prevalence rates of anemia and iron deficiency at 12-16 months. J Pediatr (Rio J). 2012;88:33-9.	Independent variable
49	Brady,H.,Lamb,M. M.,Sokol,R. J.,Ross,C. A.,Seifert,J. A.,Rewers,M. J.,Norris,J. M.. Plasma micronutrients are associated with dietary intake and environmental tobacco smoke exposure in a paediatric population. Public Health Nutr. 2007;10:712-8.	Age, Independent variable
50	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.	Country, Independent variable, Dependent variable
51	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.	Study design
52	Brooke,O. G.. Supplementary vitamin D in infancy and childhood. Arch Dis Child. 1983;58:573-4.	Study design
53	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.	Independent variable
54	Brunskill,A. J.,Ng,K. T.. The prevalence of and antecedents to iron deficiency in infants in a Victorian shire. Community Health Stud. 1986;10:167-72.	Study design, Independent variable

	Citation	Rationale
55	Brunt,Deborah R.,Grant,Cameron C.,Wall,Clare R.,Reed,Peter W.. Interaction between risk factors for iron deficiency in young children. Nutrition & Dietetics. 2012;69:285-292 8p.	Study design
56	Calvo,E. B.,Galindo,A. C.,Aspres,N. B.. Iron status in exclusively breast-fed infants. Pediatrics. 1992;90:375-9.	Independent variable
57	Calvo,E. B.,Gnazzo,N.. Prevalence of iron deficiency in children aged 9-24 mo from a large urban area of Argentina. Am J Clin Nutr. 1990;52:534-40.	Study design, Independent variable
58	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.	Independent variable, Dependent variable
59	Cameron,S. L.,Taylor,R. W.,Heath,A. L.. Development and pilot testing of Baby-Led Introduction to SolidS--a version of Baby-Led Weaning modified to address concerns about iron deficiency, growth faltering and choking. BMC Pediatr. 2015;15:99.	Independent variable, Dependent variable
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61	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.	Independent variable
62	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.	Independent variable, Dependent variable
63	Chang,S.,Huang,Z.,Ma,Y.,Piao,J.,Yang,X.,Zeder,C.,Hurrell,R. F.,Egli,I.. Mixture of ferric sodium ethylenediaminetetraacetate (NaFeEDTA) and ferrous sulfate: an effective iron fortificant for complementary foods for young Chinese children. Food Nutr Bull. 2012;33:111-6.	Age

	Citation	Rationale
64	Chang,Y.,Zhai,F.,Li,W.,Ge,K.,Jin,D.,de Onis,M.. Nutritional status of preschool children in poor rural areas of China. Bull World Health Organ. 1994;72:105-12.	Study design, Age
65	Chavasit,V.,Porasuphatana,S.,Suthutvoravut,U.,Zeder,C.,Hurrell,R.. Iron bioavailability in 8-24-month-old Thai children from a micronutrient-fortified quick-cooking rice containing ferric ammonium citrate or a mixture of ferrous sulphate and ferric sodium ethylenediaminetetraacetic acid. Maternal and Child Nutrition. 2015.	Dependent variable
66	Chawla,P.,Puri,R.. Impact of pre-school supplementary feeding on clinical picture. Indian Pediatr. 1983;20:507-12.	Study design, Age
67	Chierici,R.,Sawatzki,G.,Tamisari,L.,Volpato,S.,Vigi,V.. Supplementation of an adapted formula with bovine lactoferrin. 2. Effects on serum iron, ferritin and zinc levels. Acta Paediatr. 1992;81:475-9.	Independent variable
68	Childs,F.,Aukett,A.,Darbyshire,P.,Ilett,S.,Livera,L. N.. Dietary education and iron deficiency anaemia in the inner city. Arch Dis Child. 1997;76:144-7.	Independent variable, Dependent variable
69	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.	Study design, Age, Country
70	Chmielewska,A.,Chmielewski,G.,Domellof,M.,Lewandowski,Z.,Szajewska,H.. Effect of iron supplementation on psychomotor development of non-anaemic, exclusively or predominantly breastfed infants: a randomised, controlled trial. BMJ Open. 2015;5:e009441.	Study design, Independent variable
71	Chorell,E.,Karlsson Videhult,F.,Hernell,O.,Antti,H.,West,C. E.. Impact of probiotic feeding during weaning on the serum lipid profile and plasma metabolome in infants. Br J Nutr. 2013;110:116-26.	Independent variable, Dependent variable
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	Citation	Rationale
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74	Cortese,M.,Riise,T.,Bjørnevik,K.,Holmøy,T.,Kampman,M. T.,Magalhaes,S.,Pugliatti,M.,Wolfson,C.,Myhr,K. M.. Timing of use of cod liver oil, a vitamin D source, and multiple sclerosis risk: The EnvIMS study. Multiple Sclerosis. 2015;21:1856-1864.	Age, Independent variable, Dependent variable
75	Cosenza,L.,Pezzella,V.,Nocerino,R.,Di Costanzo,M.,Coruzzo,A.,Passariello,A.,Leone,L.,Savoia,M.,Del Puente,A.,Esposito,A.,Terrin,G.,Berni Canani,R.. Calcium and vitamin D intakes in children: a randomized controlled trial. BMC Pediatr. 2013;13:86.	Age, Independent variable
76	Costa,A.,Oliveira,P.. About iron deficiency in early childhood. Nascer e Crescer. 2003;12:74-79.	Language
77	Dagnelie,P. C.,van Staveren,W. A.,Vergote,F. J.,Dingjan,P. G.,van den Berg,H.,Hautvast,J. G.. Increased risk of vitamin B-12 and iron deficiency in infants on macrobiotic diets. Am J Clin Nutr. 1989;50:818-24.	Study design
78	Dagnelie,P. C.,van Staveren,W. A.,Verschuren,S. A.,Hautvast,J. G.. Nutritional status of infants aged 4 to 18 months on macrobiotic diets and matched omnivorous control infants: a population-based mixed-longitudinal study. I. Weaning pattern, energy and nutrient intake. Eur J Clin Nutr. 1989;43:311-23.	Study design
79	Dallman,P. R.. Inhibition of iron absorption by certain foods. Am J Dis Child. 1980;134:453-4.	Study design, Dependent variable
80	Dalton,M. A.,Sargent,J. D.,O'Connor,G. T.,Olmstead,E. M.,Klein,R. Z.. Calcium and phosphorus supplementation of iron-fortified infant formula: no effect on iron status of healthy full-term infants. Am J Clin Nutr. 1997;65:921-6.	Independent variable
81	Davidsson,L.,Jamil,K. A.,Sarker,S. A.,Zeder,C.,Fuchs,G.,Hurrell,R.. Human milk as a source of ascorbic acid: no enhancing effect on iron bioavailability from a traditional complementary food consumed by Bangladeshi infants and young children. Am J Clin Nutr. 2004;79:1073-7.	Country, Independent variable

	Citation	Rationale
82	Davidsson,L.,Mackenzie,J.,Kastenmayer,P.,Aggett,P. J.,Hurrell,R. F.. Zinc and calcium apparent absorption from an infant cereal: a stable isotope study in healthy infants. Br J Nutr. 1996;75:291-300.	Independent variable, Dependent variable
83	Davidsson,L.,Sarker,S. A.,Jamil,K. A.,Sultana,S.,Hurrell,R.. Regular consumption of a complementary food fortified with ascorbic acid and ferrous fumarate or ferric pyrophosphate is as useful as ferrous sulfate in maintaining hemoglobin concentrations >105 g/L in young Bangladeshi children. Am J Clin Nutr. 2009;89:1815-20.	Independent variable
84	Davis,J. R.,Jr.,Goldenring,J.,Lubin,B. H.. Nutritional vitamin B12 deficiency in infants. Am J Dis Child. 1981;135:566-7.	Study design
85	Dawodu,A.,Davidson,B.,Woo,J. G.,Peng,Y. M.,Ruiz-Palacios,G. M.,de Lourdes Guerrero,M.,Morrow,A. L.. Sun exposure and vitamin D supplementation in relation to vitamin D status of breastfeeding mothers and infants in the global exploration of human milk study. Nutrients. 2015;7:1081-93.	Independent variable
86	de Almeida,C. A.,Dutra-De-Oliveira,J. E.,Crott,G. C.,Cantolini,A.,Ricco,R. G.,Del Ciampo,L. A.,Baptista,M. E.. Effect of fortification of drinking water with iron plus ascorbic acid or with ascorbic acid alone on hemoglobin values and anthropometric indicators in preschool children in day-care centers in Southeast Brazil. Food Nutr Bull. 2005;26:259-65.	Age, Independent variable
87	de Freitas,C. L.,Romani,S.,Amigo,H.. Breast-feeding and malnutrition in rural areas of northeast Brazil. Bull Pan Am Health Organ. 1986;20:138-46.	Study design, Independent variable, Dependent variable
88	Deegan,K. L.,Jones,K. M.,Zuleta,C.,Ramirez-Zea,M.,Lildballe,D. L.,Nexo,E.,Allen,L. H.. Breast milk vitamin B-12 concentrations in Guatemalan women are correlated with maternal but not infant vitamin B-12 status at 12 months postpartum. J Nutr. 2012;142:112-6.	Independent variable
89	Delgado,H. L.,Martorell,R.,Klein,R. E.. Nutrition, lactation, and birth interval components in rural Guatemala. Am J Clin Nutr. 1982;35:1468-76.	Country, Dependent variable
90	Dewey,K. G.,Cohen,R. J.,Brown,K. H.,Rivera,L. L.. Effects of exclusive breastfeeding for four versus six months on maternal nutritional status and infant motor development: results of two randomized trials in Honduras. J Nutr. 2001;131:262-7.	Dependent variable

	Citation	Rationale
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92	Dewey,K. G.,Domellof,M.,Cohen,R. J.,Landa Rivera,L.,Hernell,O.,Lonnerdal,B.. Iron supplementation affects growth and morbidity of breast-fed infants: results of a randomized trial in Sweden and Honduras. J Nutr. 2002;132:3249-55.	Independent variable
93	Dewey,K. G.,Huffman,S. L.. Maternal, infant, and young child nutrition: combining efforts to maximize impacts on child growth and micronutrient status. Food Nutr Bull. 2009;30:S187-9.	Study design
94	Dewey,K. G.,Lonnerdal,B.. Milk and nutrient intake of breast-fed infants from 1 to 6 months: relation to growth and fatness. J Pediatr Gastroenterol Nutr. 1983;2:497-506.	Dependent variable
95	Dewey,K. G.,Reinhart,G. A.. Introduction. Fatty acid status in early life in low-income countries: determinants & consequences. Matern Child Nutr. 2011;7 Suppl 2:1.	Study design
96	Dewey,K. G.,Romero-Abal,M. E.,Quan de Serrano,J.,Bulux,J.,Peerson,J. M.,Eagle,P.,Solomons,N. W.. Effects of discontinuing coffee intake on iron status of iron-deficient Guatemalan toddlers: a randomized intervention study. Am J Clin Nutr. 1997;66:168-76.	Country
97	Dewey,K.. Meeting protein needs at 6 to 24 months of age. Food Nutr Bull. 2013;34:240-1.	Study design
98	Diana,L. Culbertson Jamie L. Westcott Laurie Sherlock K. Michael Hambidge Nancy F. Krebs. Zinc (Zn) Intake from Different Complementary Feeding (CF) Regimens. Pediatric Academic Societies Annual Meeting. 2011.	Study design
99	Dickson,N.,Morison,I.. Iron deficiency in infants of Cambodian refugees. N Z Med J. 1992;105:83-4.	Study design, Country

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101	Domellof,M.,Cohen,R. J.,Dewey,K. G.,Hernell,O.,Rivera,L. L.,Lonnerdal,B.. Iron supplementation of breast-fed Honduran and Swedish infants from 4 to 9 months of age. J Pediatr. 2001;138:679-87.	Independent variable
102	Domellof,M.,Lonnerdal,B.,Abrams,S. A.,Hernell,O.. Iron absorption in breast-fed infants: effects of age, iron status, iron supplements, and complementary foods. Am J Clin Nutr. 2002;76:198-204.	Independent variable, Dependent variable
103	Domellof,M.,Lonnerdal,B.,Dewey,K. G.,Cohen,R. J.,Rivera,L. L.,Hernell,O.. Sex differences in iron status during infancy. Pediatrics. 2002;110:545-52.	Independent variable
104	Dong,C.,Ge,P.,Ren,X.,Wang,J.,Fan,H.,Yan,X.,Yin,S. A.. Prospective study on the effectiveness of complementary food supplements on improving status of elder infants and young children in the areas affected by Wenchuan earthquake. PLoS One. 2013;8:e72711.	Study design, Health Status
105	Dong,C.,Ge,P.,Ren,X.,Zhao,X.,Wang,J.,Fan,H.,Yin,S. A.. Growth and anaemia among infants and young children for two years after the Wenchuan earthquake. Asia Pac J Clin Nutr. 2014;23:445-51.	Study design, Health Status
106	Dorea,J. G.,Furumoto,R. A.. Infant feeding practices among poor families of an urban squatter community. Ann Nutr Metab. 1992;36:257-64.	Study design, Dependent variable
107	Doron,D.,Hershkop,K.,Granot,E.. Nutritional deficits resulting from an almond-based infant diet. Clin Nutr. 2001;20:259-61.	Study design
108	Du Plessis,L. M.,Kruger,H. S.,Sweet,L.. Complementary feeding: a critical window of opportunity from six months onwards. South African Journal of Clinical Nutrition. 2013;26:S129-40 1p.	Study design

	Citation	Rationale
109	Dube,K.,Schwartz,J.,Mueller,M. J.,Kalhoff,H.,Kersting,M.. Iron intake and iron status in breastfed infants during the first year of life. Clin Nutr. 2010;29:773-8.	Independent variable
110	Duggan,C.,Penny,M. E.,Hibberd,P.,Gil,A.,Huapaya,A.,Cooper,A.,Coletta,F.,Emenhiser,C.,Kleinman,R. E.. Oligofructose-supplemented infant cereal: 2 randomized, blinded, community-based trials in Peruvian infants. Am J Clin Nutr. 2003;77:937-42.	Independent variable
111	Dunne,A.. Nutrition in infancy: achieving nutrition needs for new mothers and children. Br J Community Nurs. 2012;Suppl:S22.	Study design
112	Durnin,J. V.,Aitchison,T. C.,Beckett,C.,Husaini,M.,Pollitt,E.. Nutritional intake of an undernourished infant population receiving an energy and micronutrient supplement in Indonesia. Eur J Clin Nutr. 2000;54 Suppl 2:S43-51.	Country, Health Status, Independent variable
113	Dutra-de-Oliveira,J. E.,Lamounier,J. A.,de Almeida,C. A.,Marchini,J. S.. Fortification of drinking water to control iron-deficiency anemia in preschool children. Food Nutr Bull. 2007;28:173-80.	Age, Independent variable
114	D'Vaz,N.,Meldrum,S. J.,Dunstan,J. A.,Martino,D.,McCarthy,S.,Metcalfe,J.,Tulic,M. K.,Mori,T. A.,Prescott,S. L.. Postnatal fish oil supplementation in high-risk infants to prevent allergy: randomized controlled trial. Pediatrics. 2012;130:674-82.	Independent variable
115	Ekbote,V. H.,Khadilkar,A. V.,Chiplonkar,S. A.,Hanumante,N. M.,Khadilkar,V. V.,Mughal,M. Z.. A pilot randomized controlled trial of oral calcium and vitamin D supplementation using fortified laddoos in underprivileged Indian toddlers. Eur J Clin Nutr. 2011;65:440-6.	Age
116	Elalfy,M. S.,Hamdy,A. M.,Maksoud,S. S.,Megeed,R. I.. Pattern of milk feeding and family size as risk factors for iron deficiency anemia among poor Egyptian infants 6 to 24 months old. Nutr Res. 2012;32:93-9.	Study design, Country
117	Emmett,P. M.,Jones,L. R.. Diet and growth in infancy: relationship to socioeconomic background and to health and development in the Avon Longitudinal Study of Parents and Children. Nutr Rev. 2014;72:483-506.	Study design, Independent variable, Dependent variable

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118	Eneroth,H.,El Arifeen,S.,Persson,L. A.,Kabir,I.,Lonnerdal,B.,Hossain,M. B.,Ekstrom,E. C.. Duration of exclusive breast-feeding and infant iron and zinc status in rural Bangladesh. J Nutr. 2009;139:1562-7.	Country, Independent variable
119	Eneroth,H.,El Arifeen,S.,Persson,L. A.,Lonnerdal,B.,Hossain,M. B.,Stephensen,C. B.,Ekstrom,E. C.. Maternal multiple micronutrient supplementation has limited impact on micronutrient status of Bangladeshi infants compared with standard iron and folic acid supplementation. J Nutr. 2010;140:618-24.	Country, Independent variable
120	Eneroth,H.,Persson,L. A.,El Arifeen,S.,Ekstrom,E. C.. Infant anaemia is associated with infection, low birthweight and iron deficiency in rural Bangladesh. Acta Paediatr. 2011;100:220-5.	Country, Independent variable
121	Engelmann,M. D.,Davidsson,L.,Sandstrom,B.,Walczyk,T.,Hurrell,R. F.,Michaelsen,K. F.. The influence of meat on nonheme iron absorption in infants. Pediatr Res.. 1998;43:768-73.	Independent variable, Dependent variable
122	Faber,M.,Benade,A. J.. Perceptions of infant cereals and dietary intakes of children aged 4-24 months in a rural South African community. Int J Food Sci Nutr. 2001;52:359-65.	Study design, Country, Dependent variable
123	Faber,M.,Kvalsvig,J. D.,Lombard,C. J.,Benade,A. J.. Effect of a fortified maize-meal porridge on anemia, micronutrient status, and motor development of infants. Am J Clin Nutr. 2005;82:1032-9.	Country, Health Status, Independent variable
124	Faber,M.. Dietary intake and anthropometric status differ for anaemic and non-anaemic rural South African infants aged 6-12 months. J Health Popul Nutr. 2007;25:285-93.	Study design, Country
125	Fahmida,U.,Kolopaking,R.,Santika,O.,Sriani,S.,Umar,J.,Htet,M. K.,Ferguson,E.. Effectiveness in improving knowledge, practices, and intakes of "key problem nutrients" of a complementary feeding intervention developed by using linear programming: experience in Lombok, Indonesia. Am J Clin Nutr. 2015;101:455-61.	Dependent variable
126	Fairweather-Tait,S. J.,Wharf,S. G.,Fox,T. E.. Zinc absorption in infants fed iron-fortified weaning food. Am J Clin Nutr. 1995;62:785-9.	Independent variable, Dependent variable

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127	Fairweather-Tait,S.,Fox,T.,Wharf,S. G.,Eagles,J.. The bioavailability of iron in different weaning foods and the enhancing effect of a fruit drink containing ascorbic acid. Pediatr Res. 1995;37:389-94.	Independent variable, Dependent variable
128	Fawzi,W. W.,Forman,M. R.,Levy,A.,Graubard,B. I.,Naggan,L.,Berendes,H. W.. Maternal anthropometry and infant feeding practices in Israel in relation to growth in infancy: the North African Infant Feeding Study. Am J Clin Nutr. 1997;65:1731-7.	Dependent variable
129	Fawzi,W. W.,Herrera,M. G.,Nestel,P.,el Amin,A.,Mohamed,K. A.. A longitudinal study of prolonged breastfeeding in relation to child undernutrition. Int J Epidemiol. 1998;27:255-60.	Country, Dependent variable
130	Ferrara,M.,Bertocco,F.,Ricciardi,A.,Ferrara,D.,Incarnato,L.,Capozzi,L.. Iron deficiency screening in the first three years of life: a three-decade-long retrospective case study. Hematology. 2014;19:239-43.	Study design
131	Ferraz,I. S.,Daneluzzi,J. C.,Vannucchi,H.. Vitamin A deficiency in children aged 6 to 24 months in Sao Paulo State, Brazil. Nutrition Research. 2000;20:757-768.	Independent variable, Dependent variable
132	Ferris,A. G.,Laus,M. J.,Hosmer,D. W.,Beal,V. A.. The effect of diet on weight gain in infancy. Am J Clin Nutr. 1980;33:2635-42.	Dependent variable
133	Fewtrell,M.. 2.4 Complementary foods. World Rev Nutr Diet. 2015;113:109-12.	Study design
134	Fildes,V.. Weaning: on the bottle again. Nurs Mirror. 1980;151:18-21.	Study design
135	Fomon,S. J.,Ziegler,E. E.,Nelson,S. E.,Edwards,B. B.. Cow milk feeding in infancy: gastrointestinal blood loss and iron nutritional status. J Pediatr. 1981;98:540-5.	Independent variable

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136	Fomon,S. J.. Bioavailability of supplemental iron in commercially prepared dry infant cereals. J Pediatr. 1987;110:660-1.	Study design, Dependent variable
137	Fomon,S. J.. Feeding normal infants: rationale for recommendations. J Am Diet Assoc. 2001;101:1002-5.	Study design
138	Forsyth,S.. Meeting nutrient needs in the first 1,000 days of life. Ann Nutr Metab. 2014;65:2-3.	Study design
139	Friel,J. K.,Andrews,W. L.,Simmons,B. S.,L'Abbe,M. R.,Mercer,C.,MacDonald,A.,McCloy,U. R.. Evaluation of full-term infants fed an evaporated milk formula. Acta Paediatr. 1997;86:448-53.	Independent variable
140	Frontela,C.,Scarino,M. L.,Ferruzza,S.,Ros,G.,Martinez,C.. Effect of dephytinization on bioavailability of iron, calcium and zinc from infant cereals assessed in the Caco-2 cell model. World J Gastroenterol. 2009;15:1977-84.	Study design, Health Status
141	Gallo,S.,Comeau,K.,Vanstone,C.,Agellon,S.,Sharma,A.,Jones,G.,L'Abbe,M.,Khamessan,A.,Rodd,C.,Weiler,H.. Effect of different dosages of oral vitamin D supplementation on vitamin D status in healthy, breastfed infants: a randomized trial. Jama. 2013;309:1785-92.	Independent variable
142	Gan,C. Y.,Chin,B.,Teoh,S. T.,Chan,M. K.. Nutritional status of Kadazan children in a rural district in Sabah, Malaysia. Southeast Asian J Trop Med Public Health. 1993;24:293-301.	Study design, Age
143	Garry,P. J.,Owen,G. M.,Hooper,E. M.,Gilbert,B. A.. Iron absorption from human milk and formula with and without iron supplementation. Pediatr Res. 1981;15:822-8.	Independent variable
144	Gibson,R. S.,Hotz,C.. The adequacy of micronutrients in complementary foods. Pediatrics. 2000;106:1298-9.	Study design

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145	Gibson,S.,Sidnell,A.. Nutrient adequacy and imbalance among young children aged 1-3 years in the UK. Nutrition Bulletin. 2013;39:172-180 9p.	Study design
146	Glinz,D.,Hurrell,R. F.,Ouattara,M.,Zimmermann,M. B.,Brittenham,G. M.,Adiossan,L. G.,Righetti,A. A.,Seifert,B.,Diakité,V. G.,Utzinger,J.,N'Goran,E. K.,Wegmüller,R.. The effect of iron-fortified complementary food and intermittent preventive treatment of malaria on anaemia in 12- to 36-month-old children: A cluster-randomised controlled trial. Malaria Journal. 2015;14.	Country, Independent variable
147	Godel,J. C.,Pabst,H. F.,Hodges,P. E.,Johnson,K. E.. Iron status and pregnancy in a northern Canadian population: relationship to diet and iron supplementation. Can J Public Health. 1992;83:339-43.	Independent variable
148	Gokcay,G.,Ozden,T.,Karakas,Z.,Karabayir,N.,Yildiz,I.,Abali,S.,Sahip,Y.. Effect of iron supplementation on development of iron deficiency anemia in breastfed infants. J Trop Pediatr. 2012;58:481-5.	Independent variable
149	Gondolf,U. H.,Tetens,I.,Michaelsen,K. F.,Trolle,E.. Iron supplementation is positively associated with increased serum ferritin levels in 9-month-old Danish infants. Br J Nutr. 2013;109:103-10.	Study design
150	Gopaldas,T.,John,C.. Evaluation of a controlled 6 months feeding trial on intake by infants and toddlers fed a high energy-low bulk gruel versus a high energy-high bulk gruel in addition to their habitual home diet. J Trop Pediatr. 1992;38:278-83.	Dependent variable
151	Gorczyca,D.,Prescha,A.,Szeremeta,K.,Jankowski,A.. Iron status and dietary iron intake of vegetarian children from Poland. Ann Nutr Metab. 2013;62:291-7.	Study design
152	Graham,E. A.,Carlson,T. H.,Sodergren,K. K.,Detter,J. C.,Labbe,R. F.. Delayed bottle weaning and iron deficiency in southeast Asian toddlers. West J Med. 1997;167:10-4.	Study design, Independent variable
153	Grant,C. C.,Wall,C. R.,Brunt,D.,Crengle,S.,Scragg,R.. Population prevalence and risk factors for iron deficiency in Auckland, New Zealand. J Paediatr Child Health. 2007;43:532-8.	Study design

	Citation	Rationale
154	Greer,F. R.,Marshall,S.. Bone mineral content, serum vitamin D metabolite concentrations, and ultraviolet B light exposure in infants fed human milk with and without vitamin D2 supplements. J Pediatr. 1989;114:204-12.	Independent variable
155	Greer,F. R.,Searcy,J. E.,Levin,R. S.,Steichen,J. J.,Steichen-Asche,P. S.,Tsang,R. C.. Bone mineral content and serum 25-hydroxyvitamin D concentrations in breast-fed infants with and without supplemental vitamin D: one-year follow-up. J Pediatr. 1982;100:919-22.	Independent variable
156	Guerin-Danan,C.,Chabanet,C.,Pedone,C.,Popot,F.,Vaissade,P.,Bouley,C.,Szylit,O.,Andrieux,C.. Milk fermented with yogurt cultures and Lactobacillus casei compared with yogurt and gelled milk: influence on intestinal microflora in healthy infants. Am J Clin Nutr. 1998;67:111-7.	Independent variable
157	Guldan,G. S.,Fan,H. C.,Ma,X.,Ni,Z. Z.,Xiang,X.,Tang,M. Z.. Culturally appropriate nutrition education improves infant feeding and growth in rural Sichuan, China. J Nutr. 2000;130:1204-11.	Independent variable
158	Gupta,S.,Venkateswaran,R.,Gorenflo,D. W.,Eyler,A. E.. Childhood iron deficiency anemia, maternal nutritional knowledge, and maternal feeding practices in a high-risk population. Prev Med. 1999;29:152-6.	Study design
159	Haider,R.,Islam,A.,Kabir,I.,Habte,D.. Early complementary feeding is associated with low nutritional status of young infants recovering from diarrhoea. J Trop Pediatr. 1996;42:170-2.	Health Status
160	Han,Y. H.,Yon,M.,Han,H. S.,Johnston,K. E.,Tamura,T.,Hyun,T.. Zinc status and growth of Korean infants fed human milk, casein-based, or soy-based formula: three-year longitudinal study. Nutr Res Pract. 2011;5:46-51.	Independent variable
161	Han,Y. H.,Yon,M.,Han,H. S.,Kim,K. Y.,Tamura,T.,Hyun,T. H.. Folate contents in human milk and casein-based and soya-based formulas, and folate status in Korean infants. Br J Nutr. 2009;101:1769-74.	Independent variable
162	Hanna,M. D.,Vogelgesang,S. A.,Carroll,N. L.,Murphy,K. K.. Dietary megaloblastic anemia in an infant. S D J Med. 1986;39:7-9.	Study design

	Citation	Rationale
163	Harahap,H.,Jahari,A. B.,Husaini,M. A.,Saco-Pollitt,C.,Pollitt,E.. Effects of an energy and micronutrient supplement on iron deficiency anemia, physical activity and motor and mental development in undernourished children in Indonesia. Eur J Clin Nutr. 2000;54 Suppl 2:S114-9.	Country, Independent variable
164	Harbild,H. L.,Harslof,L. B.,Christensen,J. H.,Kannass,K. N.,Lauritzen,L.. Fish oil-supplementation from 9 to 12 months of age affects infant attention in a free-play test and is related to change in blood pressure. Prostaglandins Leukot Essent Fatty Acids. 2013;89:327-33.	Independent variable
165	Harrington,M.,Hotz,C.,Zeder,C.,Polvo,G. O.,Villalpando,S.,Zimmermann,M. B.,Walczyk,T.,Rivera,J. A.,Hurrell,R. F.. A comparison of the bioavailability of ferrous fumarate and ferrous sulfate in non-anemic Mexican women and children consuming a sweetened maize and milk drink. Eur J Clin Nutr. 2011;65:20-5.	Study design, Independent variable
166	Hasan,J.,Ray,J.,Khan,Z.. Role of weaning in the nutritional status of infant--a longitudinal study in the rural area of Aligarh. J Indian Med Assoc. 1996;94:169, 215.	Study design, Country, Dependent variable
167	Hay,G.,Clausen,T.,Whitelaw,A.,Trygg,K.,Johnston,C.,Henriksen,T.,Refsum,H.. Maternal folate and cobalamin status predicts vitamin status in newborns and 6-month-old infants. J Nutr. 2010;140:557-64.	Independent variable
168	Hemalatha,P.,Bhaskaram,P.,Kumar,P. A.,Khan,M. M.,Islam,M. A.. Zinc status of breastfed and formula-fed infants of different gestational ages. J Trop Pediatr. 1997;43:52-4.	Study design, Independent variable
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171	Hoffman,D. R.,Birch,E. E.,Birch,D. G.,Uauy,R.,Castaneda,Y. S.,Lapus,M. G.,Wheaton,D. H.. Impact of early dietary intake and blood lipid composition of long-chain polyunsaturated fatty acids on later visual development. J Pediatr Gastroenterol Nutr. 2000;31:540-53.	Independent variable

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173	Holmes,S.. Infant feeding. The young vegetarian. Nurs Times. 1987;83:51-5.	Study design
174	Hop le,T.,Berger,J.. Multiple micronutrient supplementation improves anemia, micronutrient nutrient status, and growth of Vietnamese infants: double-blind, randomized, placebo-controlled trial. J Nutr. 2005;135:660s-665s.	Country, Independent variable
175	Hopkins,D.,Emmett,P.,Steer,C.,Rogers,I.,Noble,S.,Emond,A.. Infant feeding in the second 6 months of life related to iron status: an observational study. Arch Dis Child. 2007;92:850-4.	Independent variable
176	Hoyos,C.,Almqvist,C.,Garden,F.,Xuan,W.,Oddy,W. H.,Marks,G. B.,Webb,K. L.. Effect of omega 3 and omega 6 fatty acid intakes from diet and supplements on plasma fatty acid levels in the first 3 years of life. Asia Pac J Clin Nutr. 2008;17:552-7.	Independent variable
177	Huang,S. C.,Yang,Y. J.,Cheng,C. N.,Chen,J. S.,Lin,C. H.. The etiology and treatment outcome of iron deficiency and iron deficiency anemia in children. J Pediatr Hematol Oncol. 2010;32:282-5.	Study design
178	Hurrell,R. F.,Reddy,M. B.,Juillerat,M. A.,Cook,J. D.. Degradation of phytic acid in cereal porridges improves iron absorption by human subjects. Am J Clin Nutr. 2003;77:1213-9.	Study design, Age
179	Hurrell,R. F.. Iron fortification of infant cereals. Bibl Nutr Dieta. 1989:114-22.	Study design
180	Husaini,M. A.,Jahari,A. B.,Pollitt,E.. The effects of high energy and micronutrient supplementation on iron status in nutritionally at risk infants. Biomed Environ Sci. 1996;9:325-40.	Country, Health Status, Independent variable

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183	Iqbal Hossain,M.,Yasmin,R.,Kabir,I.. Nutritional and immunisation status, weaning practices and socio-economic conditions of under five children in three villages of Bangladesh. Indian J Public Health. 1999;43:37-41.	Study design, Country, Health Status
184	Isherwood,R. J.,Dimond,C.,Longhurst,S.. Breast feeding and weaning practices in relation to nutritional status of under-5 children in north Bangladesh. J Trop Pediatr. 1988;34:28-31.	Study design, Country
185	Islam,M. A.,Ahmed,T.,Faruque,A. S.,Rahman,S.,Das,S. K.,Ahmed,D.,Fattori,V.,Clarke,R.,Endtz,H. P.,Cravioto,A.. Microbiological quality of complementary foods and its association with diarrhoeal morbidity and nutritional status of Bangladeshi children. Eur J Clin Nutr. 2012;66:1242-6.	Study design, Dependent variable
186	Jaber,L.. Preventive intervention for iron deficiency anaemia in a high risk population. Int J Risk Saf Med. 2014;26:155-62.	Independent variable
187	Jain,V.,Klein,B. P.,Nash,M.,Chapman-Novakofski,K.. Two feasibility studies for introduction of multimicronutrient soy/whey-based supplements in rural homes in Honduras. Journal of Hunger and Environmental Nutrition. 2011;6:247-263.	Country, Independent variable
188	Jalla,S.,Westcott,J.,Steirn,M.,Miller,L. V.,Bell,M.,Krebs,N. F.. Zinc absorption and exchangeable zinc pool sizes in breast-fed infants fed meat or cereal as first complementary food. J Pediatr Gastroenterol Nutr. 2002;34:35-41.	Dependent variable
189	James,J.,Evans,J.,Male,P.,Pallister,C.,Hendrikz,J. K.,Oakhill,A.. Iron deficiency in inner city pre-school children: development of a general practice screening programme. J R Coll Gen Pract. 1988;38:250-2.	Study design, Age

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190	Jansen,G.R.,O'B Hourihane. The nutritional status of preschool children in Egypt. World Rev Nutr Diet. 1985;45:42-67.	Study design, Age
191	Jatanasen,A.,Sacholvicharn,V.,Ongkulna,P.. An evaluation of supplementary feedings of Thai infants in urban slum communities: effect on growth, health and nutritional status. J Med Assoc Thai. 1983;66 Suppl 1:20-9.	Health Status, Dependent variable
192	Johnson,E. J.,Goyea,H. S.,Ogbeide,M. I.. Nutritional status and weaning patterns of Benin City children. East Afr Med J. 1980;57:405-11.	Country
193	Jones,K. M.,Ramirez-Zea,M.,Zuleta,C.,Allen,L. H.. Prevalent vitamin B-12 deficiency in twelve-month-old Guatemalan infants is predicted by maternal B-12 deficiency and infant diet. J Nutr. 2007;137:1307-13.	Study design, Independent variable
194	Kallio,M. J.,Salmenpera,L.,Siimes,M. A.,Perheentupa,J.,Miettinen,T. A.. Exclusive breast-feeding and weaning: effect on serum cholesterol and lipoprotein concentrations in infants during the first year of life. Pediatrics. 1992;89:663-6.	Independent variable, Dependent variable
195	Karlsson Videhult,F.,Ohlund,I.,Stenlund,H.,Hernell,O.,West,C. E.. Probiotics during weaning: a follow-up study on effects on body composition and metabolic markers at school age. Eur J Nutr. 2015;54:355-63.	Age, Independent variable
196	Khokhar,A.,Singh,S.,Talwar,R.,Rasania,S. K.,Badhan,S. R.,Mehra,M.. A study of malnutrition among children aged 6 months to 2 years from a resettlement colony of Delhi. Indian J Med Sci. 2003;57:286-9.	Study design, Country, Health Status
197	Kim,M. J.,Na,B.,No,S. J.,Han,H. S.,Jeong,E. H.,Lee,W.,Han,Y.,Hyeun,T.. Nutritional status of vitamin D and the effect of vitamin D supplementation in Korean breast-fed infants. J Korean Med Sci. 2010;25:83-9.	Independent variable
198	Kohn,G.,Sawatzki,G.,van Biervliet,J. P.. Long-chain polyunsaturated fatty acids in infant nutrition. Eur J Clin Nutr. 1994;48 Suppl 2:S1-7.	Independent variable

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199	Krebs,N. F. Culbertson D. L. Westcott J. L. Sherlock L. Hambidge K. M.. Normal Iron Status in Breastfed Infants Consuming Meat as an Early Complementary Food. Pediatric Academic Societies Annual Meeting. 2011.	Study design
200	Krebs,N. F.,Hambidge,K. M.,Mazariegos,M.,Westcott,J.,Goco,N.,Wright,L. L.,Koso-Thomas,M.,Tshefu,A.,Bose,C.,Pasha,O.,Goldenberg,R.,Chomba,E.,Carlo,W.,Kindem,M.,Das,A.,Hartwell,T.,McClure,E.. Complementary feeding: a Global Network cluster randomized controlled trial. BMC Pediatr. 2011;11:4.	Study design, Country
201	Krebs,N. F.,Hambidge,K. M.,Westcott,J. E.,Miller,L. V.,Sian,L.,Bell,M.,Grunwald,G.. Exchangeable zinc pool size in infants is related to key variables of zinc homeostasis. J Nutr. 2003;133:1498s-501s.	Dependent variable
202	Krebs,N. F.,Mazariegos,M.,Chomba,E.,Sami,N.,Pasha,O.,Tshefu,A.,Carlo,W. A.,Goldenberg,R. L.,Bose,C. L.,Wright,L. L.,Koso-Thomas,M.,Goco,N.,Kindem,M.,McClure,E. M.,Westcott,J.,Garces,A.,Lokangaka,A.,Manasyan,A.,Imenda,E.,Hartwell,T. D.,Hambidge,K. M.. Randomized controlled trial of meat compared with multimicronutrient-fortified cereal in infants and toddlers with high stunting rates in diverse settings. Am J Clin Nutr. 2012;96:840-7.	Country
203	Krebs,N. F.,Reidinger,C. J.,Robertson,A. D.,Hambidge,K. M.. Growth and intakes of energy and zinc in infants fed human milk. J Pediatr. 1994;124:32-9.	Dependent variable
204	Kreiter,S. R.,Schwartz,R. P.,Kirkman,H. N.,Jr.,Charlton,P. A.,Calikoglu,A. S.,Davenport,M. L.. Nutritional rickets in African American breast-fed infants. J Pediatr. 2000;137:153-7.	Study design, Health Status
205	Kuipers,R. S.,Luxwolda,M. F.,Sango,W. S.,Kwesigabo,G.,Dijck-Brouwer,D. A.,Muskiet,F. A.. Postdelivery changes in maternal and infant erythrocyte fatty acids in 3 populations differing in fresh water fish intakes. Prostaglandins Leukot Essent Fatty Acids. 2011;85:387-97.	Independent variable
206	Ladhani,S.,Srinivasan,L.,Buchanan,C.,Allgrove,J.. Presentation of vitamin D deficiency. Arch Dis Child. 2004;89:781-4.	Study design, Health Status, Independent variable
207	Lampe,J. B.,Velez,N.. The effect of prolonged bottle feeding on cow's milk intake and iron stores at 18 months of age. Clin Pediatr (Phila). 1997;36:569-72.	Independent variable, Dependent variable

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209	Lartey,A.,Manu,A.,Brown,K. H.,Dewey,K. G.. Predictors of micronutrient status among six- to twelve-month-old breast-fed Ghanaian infants. J Nutr. 2000;130:199-207.	Country
210	Lartey,A.,Manu,A.,Brown,K. H.,Peerson,J. M.,Dewey,K. G.. A randomized, community-based trial of the effects of improved, centrally processed complementary foods on growth and micronutrient status of Ghanaian infants from 6 to 12 mo of age. Am J Clin Nutr. 1999;70:391-404.	Country
211	Lartey,A.,Manu,A.,Brown,K. H.,Peerson,J. M.,Dewey,K. G.. Predictors of growth from 1 to 18 months among breast-fed Ghanaian infants. Eur J Clin Nutr. 2000;54:41-9.	Country
212	Lauritzen,L.,Hoppe,C.,Straarup,E. M.,Michaelsen,K. F.. Maternal fish oil supplementation in lactation and growth during the first 2.5 years of life. Pediatr Res. 2005;58:235-42.	Independent variable
213	Lavon,B.,Tulchinsky,T. H.,Preger,M.,Said,R.,Kaufman,S.. Iron deficiency anemia among Jewish and Arab infants at 6 and 12 months of age in Hadera, Israel. Isr J Med Sci. 1985;21:107-12.	Study design, Independent variable
214	Lehmann,F.,Gray-Donald,K.,Mongeon,M.,Di Tommaso,S.. Iron deficiency anemia in 1-year-old children of disadvantaged families in Montreal. Cmaj. 1992;146:1571-7.	Study design
215	Lehtonen,E.,Ormisson,A.,Nucci,A.,Cuthbertson,D.,Sorkio,S.,Hyytinen,M.,Alahuhta,K.,Berseth,C.,Salonen,M.,Taback,S.,Franciscus,M.,Gonzalez-Frutos,T.,Korhonen,T. E.,Lawson,M. L.,Becker,D. J.,Krischer,J. P.,Knip,M.,Virtanen,S. M.. Use of vitamin D supplements during infancy in an international feeding trial. Public Health Nutr. 2014;17:810-22.	Independent variable, Dependent variable
216	Leung,S. S.,Davies,D. P.,Lui,S.,Lo,L.,Yuen,P.,Swaminathan,R.,Hom,B. L.. Iron status of Hong Kong babies at 18 months. J Singapore Paediatr Soc. 1987;29 Suppl 1:108-12.	Independent variable, Dependent variable

	Citation	Rationale
217	Leung,S. S.,Lui,S.,Swaminathan,R.. Vitamin D status of Hong Kong Chinese infants. Acta Paediatr Scand. 1989;78:303-6.	Study design, Independent variable
218	Lind,T.,Persson,L.,Lonnerdal,B.,Stenlund,H.,Hernell,O.. Effects of weaning cereals with different phytate content on growth, development and morbidity: a randomized intervention trial in infants from 6 to 12 months of age. Acta Paediatr. 2004;93:1575-82.	Dependent variable
219	Lioret,S.,McNaughton,S. A.,Spence,A. C.,Crawford,D.,Campbell,K. J.. Tracking of dietary intakes in early childhood: the Melbourne InFANT Program. Eur J Clin Nutr. 2013;67:275-81.	Dependent variable
220	Lönnerdal,B.,Hernell,O.. Under and over nutrition of iron in infancy and early childhood. Pakistan Paediatric Journal. 2014;38:132-133.	Study design
221	Lopez de Romana,G.,Cusirramos,S.,Lopez de Romana,D.,Gross,R.. Efficacy of multiple micronutrient supplementation for improving anemia, micronutrient status, growth, and morbidity of Peruvian infants. J Nutr. 2005;135:646s-652s.	Independent variable
222	Lozoff,B.,De Andraca,I.,Castillo,M.,Smith,J. B.,Walter,T.,Pino,P.. Behavioral and developmental effects of preventing iron-deficiency anemia in healthy full-term infants. Pediatrics. 2003;112:846-54.	Independent variable
223	Lozoff,B.,Kaciroti,N.,Walter,T.. Iron deficiency in infancy: applying a physiologic framework for prediction. Am J Clin Nutr. 2006;84:1412-21.	Independent variable
224	Lundeen,E.,Schueth,T.,Toktobaev,N.,Zlotkin,S.,Hyder,S. M.,Houser,R.. Daily use of Sprinkles micronutrient powder for 2 months reduces anemia among children 6 to 36 months of age in the Kyrgyz Republic: a cluster-randomized trial. Food Nutr Bull. 2010;31:446-60.	Country, Independent variable
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227	Luxwolda,M. F.,Kuipers,R. S.,Boersma,E. R.,van Goor,S. A.,Dijck-Brouwer,D. A.,Bos,A. F.,Muskiet,F. A.. DHA status is positively related to motor development in breastfed African and Dutch infants. Nutr Neurosci. 2014;17:97-103.	Country
228	Majid Molla,A.,Badawi,M. H.,al-Yaish,S.,Sharma,P.,el-Salam,R. S.,Molla,A. M.. Risk factors for nutritional rickets among children in Kuwait. Pediatr Int. 2000;42:280-4.	Dependent variable
229	Makrides,M.,Gould,J. F.,Gawlik,N. R.,Yelland,L. N.,Smithers,L. G.,Anderson,P. J.,Gibson,R. A.. Four-year follow-up of children born to women in a randomized trial of prenatal DHA supplementation. Jama. 2014;311:1802-4.	Independent variable
230	Mamabolo,R. L.,Alberts,M.,Levitt,N. S.,Delemarre-van de Waal,H. A.,Steyn,N. P.. Association between insulin-like growth factor-1, insulin-like growth factor-binding protein-1 and leptin levels with nutritional status in 1-3-year-old children, residing in the central region of Limpopo Province, South Africa. Br J Nutr. 2007;98:762-9.	Age, Country, Independent variable
231	Martínez Andrade,G. O.,Duque-López,M. X.,Cruz-González,M. B.,Martínez-Salgado,H.. The efect of diverse interventionist nutritional strategies aimed at diminishing anemia frequency and iron deficiency among childeren at Mexican Institute of Indigineous affairs boarding schools in the state of Hidalgo. Saludarte. 2001;2:7-21.	Age, Language
232	Martinez,C.,Fox,T.,Eagles,J.,Fairweather-Tait,S.. Evaluation of iron bioavailability in infant weaning foods fortified with haem concentrate. J Pediatr Gastroenterol Nutr. 1998;27:419-24.	Dependent variable
233	Matsuo,K.,Mukai,T.,Suzuki,S.,Fujieda,K.. Prevalence and risk factors of vitamin D deficiency rickets in Hokkaido, Japan. Pediatr Int. 2009;51:559-62.	Study design
234	Mazariegos,M.,Hambidge,K. M.,Westcott,J. E.,Solomons,N. W.,Raboy,V.,Das,A.,Goco,N.,Kindem,M.,Wright,L. L.,Krebs,N. F.. Neither a zinc supplement nor phytate-reduced maize nor their combination enhance growth of 6- to 12-month-old Guatemalan infants. J Nutr. 2010;140:1041-8.	Country, Independent variable

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235	McAllister,J. C.,Lane,A. T.,Buckingham,B. A.. Vitamin D deficiency in the San Francisco Bay Area. J Pediatr Endocrinol Metab. 2006;19:205-8.	Study design
236	Meldrum,S. J.,D'Vaz,N.,Casadio,Y.,Dunstan,J. A.,Niels Krogsgaard-Larsen,N.,Simmer,K.,Prescott,S. L.. Determinants of DHA levels in early infancy: differential effects of breast milk and direct fish oil supplementation. Prostaglandins Leukot Essent Fatty Acids. 2012;86:233-9.	Independent variable
237	Meldrum,S. J.,D'Vaz,N.,Simmer,K.,Dunstan,J. A.,Hird,K.,Prescott,S. L.. Effects of high-dose fish oil supplementation during early infancy on neurodevelopment and language: a randomised controlled trial. Br J Nutr. 2012;108:1443-54.	Independent variable, Dependent variable
238	Menon,P.,Bamezai,A.,Subandoro,A.,Ayoya,M. A.,Aguayo,V.. Age-appropriate infant and young child feeding practices are associated with child nutrition in India: insights from nationally representative data. Matern Child Nutr. 2015;11:73-87.	Study design, Country
239	Merewood,A.,Mehta,S. D.,Grossman,X.,Chen,T. C.,Mathieu,J.,Holick,M. F.,Bauchner,H.. Vitamin D status among 4-month-old infants in New England: a prospective cohort study. J Hum Lact. 2012;28:159-66.	Independent variable
240	Merhav,H.,Amitai,Y.,Palti,H.,Godfrey,S.. Tea drinking and microcytic anemia in infants. Am J Clin Nutr. 1985;41:1210-3.	Study design, Independent variable
241	Michaelsen,K. F.. Cows' milk in complementary feeding. Pediatrics. 2000;106:1302-3.	Study design
242	Michaelsen,K. F.. Nutrition and growth during infancy. The Copenhagen Cohort Study. Acta Paediatr Suppl. 1997;420:1-36.	Study design
243	Milankov,O.,Bjelica,M.,Savic,R.. What kind of milk can prevent infant's sideropenic anemia--comparative study. Med Pregl. 2014;67:167-71.	Study design, Health Status

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244	Mira,M.,Alperstein,G.,Karr,M.,Ranmuthugala,G.,Causer,J.,Niec,A.,Lilburne,A. M.. Haem iron intake in 12-36 month old children depleted in iron: case-control study. Bmj. 1996;312:881-3.	Independent variable
245	Mize,C. E.,Uauy,R.,Kramer,R.,Benser,M.,Allen,S.,Grundy,S. M.. Lipoprotein-cholesterol responses in healthy infants fed defined diets from ages 1 to 12 months: comparison of diets predominant in oleic acid versus linoleic acid, with parallel observations in infants fed a human milk-based diet. J Lipid Res. 1995;36:1178-87.	Independent variable, Dependent variable
246	Monajemzadeh,S. M.,Zarkesh,M. R.. Iron deficiency anemia in infants aged 12-15 months in Ahwaz, Iran. Indian J Pathol Microbiol. 2009;52:182-4.	Study design
247	Montalto,M. B.,Benson,J. D.,Martinez,G. A.. Nutrient intakes of formula-fed infants and infants fed cow's milk. Pediatrics. 1985;75:343-51.	Study design
248	Monterrosa,E. C.,Frongillo,E. A.,Vasquez-Garibay,E. M.,Romero-Velarde,E.,Casey,L. M.,Willows,N. D.. Predominant breast-feeding from birth to six months is associated with fewer gastrointestinal infections and increased risk for iron deficiency among infants. J Nutr. 2008;138:1499-504.	Independent variable
249	Morgan,J.,Taylor,A.,Fewtrell,M.. Meat consumption is positively associated with psychomotor outcome in children up to 24 months of age. J Pediatr Gastroenterol Nutr. 2004;39:493-8.	Dependent variable
250	Morin,K. H.. Update on what and how much infants and toddlers eat. MCN Am J Matern Child Nurs. 2006;31:269.	Study design
251	Morley,R.,Abbott,R.,Fairweather-Tait,S.,MacFadyen,U.,Stephenson,T.,Lucas,A.. Iron fortified follow on formula from 9 to 18 months improves iron status but not development or growth: a randomised trial. Arch Dis Child. 1999;81:247-52.	Independent variable
252	Mostert,D.,Steyn,N. P.,Temple,N. J.,Olwagen,R.. Dietary intake of pregnant women and their infants in a poor black South African community. Curationis. 2005;28:12-9.	Country, Dependent variable

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253	Moussalem,M.. Iron deficiency in newborns and infant. Revue Medicale Libanaise. 1999;11:12-16.	Language
254	Mughal,M. Z.,Salama,H.,Greenaway,T.,Laing,I.,Mawer,E. B.. Lesson of the week: florid rickets associated with prolonged breast feeding without vitamin D supplementation. Bmj. 1999;318:39-40.	Study design
255	Murphy,E.,Collins,M.,Gill,D.,Shortt,H.. Iron and nutritional status of toddlers. Ir Med J. 1992;85:33-4.	Study design, Age
256	Mushaphi,L. F.,Mbhenyane,X. G.,Khoza,L. B.,Amey,A. K. A.. Infant-feeding practices of mothers and the nutritional status of infants in the Vhembe District of Limpopo Province. South African Journal of Clinical Nutrition. 2008;21:36-41.	Study design, Country
257	Nagpal,J.,Sachdev,H. P.,Singh,T.,Mallika,V.. A randomized placebo-controlled trial of iron supplementation in breastfed young infants initiated on complementary feeding: effect on haematological status. J Health Popul Nutr. 2004;22:203-11.	Country, Independent variable
258	Navarro,J. I.,Sigulem,D. M.,Ferraro,A. A.,Polanco,J. J.,Barros,A. J.. The double task of preventing malnutrition and overweight: a quasi-experimental community-based trial. BMC Public Health. 2013;13:212.	Independent variable, Dependent variable
259	Nnanyelugo,D. O.. Nutritional practices and food intake measurements and their relationship to socio-economic grouping, location and their apparent nutritional adequacy in children. Appetite. 1982;3:229-41.	Study design, Country
260	Norgate,C.. Best practice in weaning. Nurs Times. 2001;97:56-7.	Study design
261	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.	Study design

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262	Nube,M.,Asenso-Okyere,W. K.. Large differences in nutritional status between fully weaned and partially breast fed children beyond the age of 12 months. Eur J Clin Nutr. 1996;50:171-7.	Study design, Country
263	Obatolu,V. A.. Growth pattern of infants fed with a mixture of extruded malted maize and cowpea. Nutrition. 2003;19:174-8.	Country, Independent variable
264	O'Donovan,S. M.,Murray,D. M.,Hourihane,J. O.,Kenny,L. C.,Irvine,A. D.,Kiely,M.. Cohort profile: The Cork BASELINE Birth Cohort Study: Babies after SCOPE: Evaluating the Longitudinal Impact on Neurological and Nutritional Endpoints. Int J Epidemiol. 2015;44:764-75.	Study design, Dependent variable
265	Oelofse,A.,Van Raaij,J. M.,Benade,A. J.,Dhansay,M. A.,Tolboom,J. J.,Hautvast,J. G.. The effect of a micronutrient-fortified complementary food on micronutrient status, growth and development of 6- to 12-month-old disadvantaged urban South African infants. Int J Food Sci Nutr. 2003;54:399-407.	Country
266	Oien,T.,Storro,O.,Johnsen,R.. Do early intake of fish and fish oil protect against eczema and doctor-diagnosed asthma at 2 years of age? A cohort study. J Epidemiol Community Health. 2010;64:124-9.	Dependent variable
267	Olmedo,S. I.,Valeggia,C.. The initiation of complementary feeding among Qom indigenous people. Arch Argent Pediatr. 2014;112:254-7.	Study design, Dependent variable
268	Osorio,M. M.,Lira,P. I.,Ashworth,A.. Factors associated with Hb concentration in children aged 6-59 months in the State of Pernambuco, Brazil. Br J Nutr. 2004;91:307-15.	Study design
269	Owino,V. O.,Kasonka,L. M.,Sinkala,M. M.,Wells,J. K.,Eaton,S.,Darch,T.,Coward,A.,Tomkins,A. M.,Filteau,S. M.. Fortified complementary foods with or without alpha-amylase treatment increase hemoglobin but do not reduce breast milk intake of 9-mo-old Zambian infants. Am J Clin Nutr. 2007;86:1094-103.	Study design, Country, Independent variable
270	Palti,H.. Anemia in infancy. Public Health Rev. 2000;28:89-92.	Study design

	Citation	Rationale
271	Paredes-Rojas,R. R.,Solomons,H. C.. Food for thought: impact of a supplemental nutritional program on low-income preschool children. Pediatr Nurs. 1982;8:315-7.	Age
272	Park,J. S.,Chang,J. Y.,Hong,J.,Ko,J. S.,Seo,J. K.,Shin,S.,Lee,E. H.. Nutritional zinc status in weaning infants: association with iron deficiency, age, and growth profile. Biol Trace Elem Res. 2012;150:91-102.	Study design
273	Pastel,R. A.,Howanitz,P. J.,Oski,F. A.. Iron sufficiency with prolonged exclusive breast-feeding in Peruvian infants. Clin Pediatr (Phila). 1981;20:625-6.	Study design
274	Peng,L. F.,Serwint,J. R.. A comparison of breastfed children with nutritional rickets who present during and after the first year of life. Clin Pediatr (Phila). 2003;42:711-7.	Study design
275	Persson,L. A.,Lundstrom,M.,Lonnerdal,B.,Hernell,O.. Are weaning foods causing impaired iron and zinc status in 1-year-old Swedish infants? A cohort study. Acta Paediatr. 1998;87:618-22.	Study design, Independent variable
276	Phu,P. V.,Hoan,N. V.,Salvignol,B.,Treche,S.,Wieringa,F. T.,Khan,N. C.,Tuong,P. D.,Berger,J.. Complementary foods fortified with micronutrients prevent iron deficiency and anemia in Vietnamese infants. J Nutr. 2010;140:2241-7.	Country
277	Pizarro,F.,Yip,R.,Dallman,P. R.,Olivares,M.,Hertrampf,E.,Walter,T.. Iron status with different infant feeding regimens: relevance to screening and prevention of iron deficiency. J Pediatr. 1991;118:687-92.	Study design
278	Pludowski,P.,Socha,P.,Karczmarewicz,E.,Zagorecka,E.,Lukaszkiewicz,J.,Stolarczyk,A.,Piotrowska-Jastrzebska,J.,Kryskiewicz,E.,Lorenc,R. S.,Socha,J.. Vitamin D supplementation and status in infants: a prospective cohort observational study. J Pediatr Gastroenterol Nutr. 2011;53:93-9.	Independent variable
279	Poh,Bee Koon,Ng,Boon Koon,Siti Haslinda,Mohd Din,Nik Shanita,Safii,Wong,Jyh Eiin,Budin,Siti Balkis,Ruzita,Abd Talib,Ng,Lai Oon,Khouw,Ilse,Norimah,A. Karim. Nutritional status and dietary intakes of children aged 6 months to 12 years: findings of the Nutrition Survey of Malaysian Children (SEANUTS Malaysia). British Journal of Nutrition. 2013;110:S21-35 1p.	Study design

	Citation	Rationale
280	Polat,T. B.,Saz,E. U.,Urganci,N.,Akyildiz,B.,Celmeli,F.. Evaluation of iron status in relation to feeding practices in early infancy. Macedonian Journal of Medical Sciences. 2011;4:70-74.	Independent variable
281	Pollitt,E.,Watkins,W. E.,Husaini,M. A.. Three-month nutritional supplementation in Indonesian infants and toddlers benefits memory function 8 y later. Am J Clin Nutr. 1997;66:1357-63.	Country, Dependent variable
282	Radhakrishna,K. V.,Hemalatha,R.,Geddam,J. J.,Kumar,P. A.,Balakrishna,N.,Shatrugna,V.. Effectiveness of zinc supplementation to full term normal infants: a community based double blind, randomized, controlled, clinical trial. PLoS One. 2013;8:e61486.	Independent variable
283	Rah,J. H.,Akhter,N.,Semba,R. D.,de Pee,S.,Bloem,M. W.,Campbell,A. A.,Moench-Pfanner,R.,Sun,K.,Badham,J.,Kraemer,K.. Low dietary diversity is a predictor of child stunting in rural Bangladesh. Eur J Clin Nutr. 2010;64:1393-8.	Study design, Country, Dependent variable
284	Rannan-Eliya,R. P.,Hossain,S. M.,Anuranga,C.,Wickramasinghe,R.,Jayatissa,R.,Abeykoon,A. T.. Trends and determinants of childhood stunting and underweight in Sri Lanka. Ceylon Med J. 2013;58:10-8.	Study design
285	Rao,S.,Rajpathak,V.. Breastfeeding and weaning practices in relation to nutritional status of infants. Indian Pediatr. 1992;29:1533-9.	Study design, Independent variable, Dependent variable
286	Reghu,A.,Hosdurga,S.,Sandhu,B.,Spray,C.. Vitamin B12 deficiency presenting as oedema in infants of vegetarian mothers. Eur J Pediatr. 2005;164:257-8.	Study design
287	Requejo,A. M.,Navia,B.,Ortega,R. M.,Lopez-Sobaler,A. M.,Quintas,E.,Gaspar,M. J.,Osorio,O.. The age at which meat is first included in the diet affects the incidence of iron deficiency and ferropenic anaemia in a group of pre-school children from Madrid. Int J Vitam Nutr Res. 1999;69:127-31.	Age
288	Reurings,M.,Vossenaar,M.,Doak,C. M.,Solomons,N. W.. Stunting rates in infants and toddlers born in metropolitan Quetzaltenango, Guatemala. Nutrition. 2013;29:655-60.	Study design, Health Status, Dependent variable

	Citation	Rationale
289	Rim,H.,Kim,S.,Sim,B.,Gang,H.,Kim,H.,Kim,Y.,Kim,R.,Yang,M.,Kim,S.. Effect of iron fortification of nursery complementary food on iron status of infants in the DPRKorea. Asia Pac J Clin Nutr. 2008;17:264-9.	Country
290	Rivera,J. A.,Habicht,J. P.. Effect of supplementary feeding on the prevention of mild-to-moderate wasting in conditions of endemic malnutrition in Guatemala. Bull World Health Organ. 2002;80:926-32.	Country, Health Status, Independent variable, Dependent variable
291	Rivera,J. A.,Ruel,M. T.,Santizo,M. C.,Lonnerdal,B.,Brown,K. H.. Zinc supplementation improves the growth of stunted rural Guatemalan infants. J Nutr. 1998;128:556-62.	Country, Health Status
292	Roche,M. L.,Creed-Kanashiro,H. M.,Tuesta,I.,Kuhnlein,H. V.. Infant and young child feeding in the Peruvian Amazon: the need to promote exclusive breastfeeding and nutrient-dense traditional complementary foods. Matern Child Nutr. 2011;7:284-94.	Study design, Dependent variable
293	Rojroongwasinkul,Nipa,Kijboonchoo,Kallaya,Wimonpeerapattana,Wanphen,Purttiponthanee,Sasiumphai,Yamborisut,Uruwan,Boonpraderm,Atitada,Kunapan,Petcharat,Thasanasuwan,Wiyada,Khouw,Ilse. SEANUTS: the nutritional status and dietary intakes of 0.5–12-year-old Thai children. British Journal of Nutrition. 2013;110:S36-44 1p.	Study design
294	Rosado,J. L.,Lopez,P.,Garcia,O. P.,Alatorre,J.,Alvarado,C.. Effectiveness of the nutritional supplement used in the Mexican Oportunidades programme on growth, anaemia, morbidity and cognitive development in children aged 12-24 months. Public Health Nutr. 2011;14:931-7.	Health Status, Independent variable, Dependent variable
295	Roy,S. K.,Jolly,S. P.,Shafique,S.,Fuchs,G. J.,Mahmud,Z.,Chakraborty,B.,Roy,S.. Prevention of malnutrition among young children in rural Bangladesh by a food-health-care educational intervention: a randomized, controlled trial. Food Nutr Bull. 2007;28:375-83.	Country, Independent variable
296	Ryan,A. S.,Martinez,G. A.,Krieger,F. W.. Feeding low-fat milk during infancy. Am J Phys Anthropol. 1987;73:539-48.	Independent variable, Dependent variable, Language
297	Sadowitz,P. D.,Oski,F. A.. Iron status and infant feeding practices in an urban ambulatory center. Pediatrics. 1983;72:33-6.	Study design

	Citation	Rationale
298	Salo,P.,Viikari,J.,Hamalainen,M.,Lapinleimu,H.,Routi,T.,Ronnemaa,T.,Seppanen,R.,Jokinen,E.,Valimaki,I.,Simell,O.. Serum cholesterol ester fatty acids in 7- and 13-month-old children in a prospective randomized trial of a low-saturated fat, low-cholesterol diet: the STRIP baby project. Special Turku coronary Risk factor Intervention Project for children. Acta Paediatr. 1999;88:505-12.	Independent variable
299	Salvioli,G. P.,Faldella,G.,Alessandroni,R.,Lanari,M.,Di Turi,R. P.. Iron nutrition and iron status changes in Italian infants in the last decade. Ann Ist Super Sanita. 1995;31:455-9.	Study design, Independent variable
300	Samadpour,K.,Long,K. Z.,Hayatbakhsh,R.,Marks,G. C.. Randomised comparison of the effects of Sprinkles and Foodlets with the currently recommended supplement (Drops) on micronutrient status and growth in Iranian children. Eur J Clin Nutr. 2011;65:1287-94.	Independent variable
301	Sant'Ana,L. F. D. R.,Cruz,A. C. R. F. D.,Franceschini,S. D. C. C.,Costa,N. M. B.. Effect of a multi-mixture in the nutritional status of preschool children regarding iron. Revista de Nutricao. 2006;19:445-454.	Age
302	Sazawal,S.,Dhingra,P.,Dhingra,U.,Gupta,S.,Iyengar,V.,Menon,V. P.,Sarkar,A.,Black,R. E.. Compliance with home-based fortification strategies for delivery of iron and zinc: its effect on haematological and growth markers among 6-24 months old children in north India. J Health Popul Nutr. 2014;32:217-26.	Country
303	Sazawal,S.,Dhingra,U.,Dhingra,P.,Hiremath,G.,Sarkar,A.,Dutta,A.,Menon,V. P.,Black,R. E.. Micronutrient fortified milk improves iron status, anemia and growth among children 1-4 years: a double masked, randomized, controlled trial. PLoS One. 2010;5:e12167.	Age
304	Scatliff,C. E.,Koski,K. G.,Scott,M. E.. Diarrhea and novel dietary factors emerge as predictors of serum vitamin B12 in Panamanian children. Food Nutr Bull. 2011;32:54-9.	Age
305	Schmidt,M. K.,Muslimatun,S.,West,C. E.,Schultink,W.,Gross,R.,Hautvast,J. G.. Nutritional status and linear growth of Indonesian infants in west java are determined more by prenatal environment than by postnatal factors. J Nutr. 2002;132:2202-7.	Country, Health Status, Dependent variable
306	Seal,A.,Kafwembe,E.,Kassim,I. A.,Hong,M.,Wesley,A.,Wood,J.,Abdalla,F.,van den Briel,T.. Maize meal fortification is associated with improved vitamin A and iron status in adolescents and reduced childhood anaemia in a food aid-dependent refugee population. Public Health Nutr. 2008;11:720-8.	Study design, Health Status

	Citation	Rationale
307	Shaikh,U.,Alpert,P. T.. Nutritional rickets in Las Vegas, Nevada. J Pediatr Endocrinol Metab. 2006;19:209-12.	Study design
308	Shamah-Levy,T.,Villalpando,S.,Rivera-Dommarco,J. A.,Mundo-Rosas,V.,Cuevas-Nasu,L.,Jimenez-Aguilar,A.. Ferrous gluconate and ferrous sulfate added to a complementary food distributed by the Mexican nutrition program Oportunidades have a comparable efficacy to reduce iron deficiency in toddlers. J Pediatr Gastroenterol Nutr. 2008;47:660-6.	Independent variable
309	Sheng,X.,Tong,M.,Zhao,D.,Leung,T. F.,Zhang,F.,Hays,N. P.,Ge,J.,Ho,W. M.,Northington,R.,Terry,D. L.,Yao,M.. Randomized controlled trial to compare growth parameters and nutrient adequacy in children with picky eating behaviors who received nutritional counseling with or without an oral nutritional supplement. Nutr Metab Insights. 2014;7:85-94.	Age, Independent variable
310	Shi,L.,Zhang,J.,Wang,Y.,Caulfield,L. E.,Guyer,B.. Effectiveness of an educational intervention on complementary feeding practices and growth in rural China: a cluster randomised controlled trial. Public Health Nutr. 2010;13:556-65.	Independent variable
311	Siega-Riz,A. M.,Estrada Del Campo,Y.,Kinlaw,A.,Reinhart,G. A.,Allen,L. H.,Shahab-Ferdows,S.,Heck,J.,Suchindran,C. M.,Bentley,M. E.. Effect of supplementation with a lipid-based nutrient supplement on the micronutrient status of children aged 6-18 months living in the rural region of Intibuca, Honduras. Paediatr Perinat Epidemiol. 2014;28:245-54.	Health Status, Independent variable
312	Siimes,M. A.,Salmenpera,L.,Perheentupa,J.. Exclusive breast-feeding for 9 months: risk of iron deficiency. J Pediatr. 1984;104:196-9.	Independent variable
313	Silva,A. P.,Vitolo,M. R.,Zara,L. F.,Castro,C. F.. Effects of zinc supplementation on 1- to 5-year old children. J Pediatr (Rio J). 2006;82:227-31.	Independent variable, Language
314	Simoes,E. A.,Pereira,S. M.. The growth of exclusively breastfed infants. Ann Trop Paediatr. 1986;6:17-21.	Dependent variable
315	Siti-Noor,A. S.,Wan-Maziah,W. M.,Narazah,M. Y.,Quah,B. S.. Prevalence and risk factors for iron deficiency in Kelantanese pre-school children. Singapore Med J. 2006;47:935-9.	Study design

	Citation	Rationale
316	Skau,J. K.,Touch,B.,Chhoun,C.,Chea,M.,Unni,U. S.,Makurat,J.,Filteau,S.,Wieringa,F. T.,Dijkhuizen,M. A.,Ritz,C.,Wells,J. C.,Berger,J.,Friis,H.,Michaelsen,K. F.,Roos,N.. Effects of animal source food and micronutrient fortification in complementary food products on body composition, iron status, and linear growth: a randomized trial in Cambodia. Am J Clin Nutr. 2015;101:742-51.	Country
317	Skinner,J. D.,Carruth,B. R.,Houck,K. S.,Coletta,F.,Cotter,R.,Ott,D.,McLeod,M.. Longitudinal study of nutrient and food intakes of infants aged 2 to 24 months. J Am Diet Assoc. 1997;97:496-504.	Dependent variable
318	Smith,A. M.,Picciano,M. F.,Deering,R. H.. Folate intake and blood concentrations of term infants. Am J Clin Nutr. 1985;41:590-8.	Independent variable
319	Smithers,L. G.,Golley,R. K.,Brazionis,L.,Emmett,P.,Northstone,K.,Lynch,J. W.. Dietary patterns of infants and toddlers are associated with nutrient intakes. Nutrients. 2012;4:935-48.	Dependent variable
320	Smuts,C. M.,Lombard,C. J.,Benade,A. J.,Dhansay,M. A.,Berger,J.,Hop le,T.,Lopez de Romana,G.,Untoro,J.,Karyadi,E.,Erhardt,J.,Gross,R.. Efficacy of a foodlet-based multiple micronutrient supplement for preventing growth faltering, anemia, and micronutrient deficiency of infants: the four country IRIS trial pooled data analysis. J Nutr. 2005;135:631s-638s.	Study design, Independent variable
321	Souganidis,E. S.,Sun,K.,de Pee,S.,Kraemer,K.,Rah,J. H.,Moench-Pfanner,R.,Sari,M.,Bloem,M. W.,Semba,R. D.. Determinants of anemia clustering among mothers and children in Indonesia. J Trop Pediatr. 2012;58:170-7.	Study design, Independent variable
322	Specker,B. L.,Ho,M. L.,Oestreich,A.,Yin,T. A.,Shui,Q. M.,Chen,X. C.,Tsang,R. C.. Prospective study of vitamin D supplementation and rickets in China. J Pediatr. 1992;120:733-9.	Study design, Independent variable
323	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.	Study design
324	Stang,J.. Improving the eating patterns of infants and toddlers. J Am Diet Assoc. 2006;106:S7-9.	Study design

	Citation	Rationale
325	Stekel,A.,Olivares,M.,Cayazzo,M.,Chadud,P.,Llaguno,S.,Pizarro,F.. Prevention of iron deficiency by milk fortification. II. A field trial with a full-fat acidified milk. Am J Clin Nutr. 1988;47:265-9.	Age, Independent variable
326	Sultan,A. N.,Zuberi,R. W.. Late weaning: the most significant risk factor in the development of iron deficiency anaemia at 1-2 years of age. J Ayub Med Coll Abbottabad. 2003;15:3-7.	Country
327	Tang,M.,Sheng,X. Y.,Krebs,N. F.,Hambidge,K. M.. Meat as complementary food for older breastfed infants and toddlers: a randomized, controlled trial in rural China. Food Nutr Bull. 2014;35:S188-92.	Dependent variable
328	Thakwalakwa,C. M.,Ashorn,P.,Phuka,J. C.,Cheung,Y. B.,Briend,A.,Maleta,K. M.. Impact of lipid-based nutrient supplements and corn-soy blend on energy and nutrient intake among moderately underweight 8-18-month-old children participating in a clinical trial. Matern Child Nutr. 2014.	Independent variable, Dependent variable
329	Thorsdottir,I.,Gunnarsson,B. S.. Dietary quality and adequacy of micronutrient intakes in children. Proc Nutr Soc. 2006;65:366-75.	Study design
330	Torrejon,C. S.,Castillo-Duran,C.,Hertrampf,E. D.,Ruz,M.. Zinc and iron nutrition in Chilean children fed fortified milk provided by the Complementary National Food Program. Nutrition. 2004;20:177-80.	Study design
331	Torsvik,I. K.,Markestad,T.,Ueland,P. M.,Nilsen,R. M.,Midttun,O.,Bjorke Monsen,A. L.. Evaluating iron status and the risk of anemia in young infants using erythrocyte parameters. Pediatr Res. 2013;73:214-20.	Independent variable
332	Truswell,A. S.. ABC of nutrition. Infant feeding. Br Med J (Clin Res Ed). 1985;291:333-7.	Study design
333	Tulchinsky,T. H.,el Ebweini,S.,Ginsberg,G. M.,Abed,Y.,Montano-Cuellar,D.,Schoenbaum,M.,Zansky,S. M.,Jacob,S.,el Tibbi,A. J.,Abu Sha'aban,D.,et al.. Growth and nutrition patterns of infants associated with a nutrition education and supplementation programme in Gaza, 1987-92. Bull World Health Organ. 1994;72:869-75.	Study design, Country

	Citation	Rationale
334	Tympa-Psirropoulou,E.,Vagenas,C.,Dafni,O.,Matala,A.,Skopouli,F.. Environmental risk factors for iron deficiency anemia in children 12-24 months old in the area of Thessalia in Greece. Hippokratia. 2008;12:240-50.	Study design
335	Ubaidullah,Masood,M. K.,Rafique,M.,Sultan,M. A.. Analysis of risk factors for vitamin D deficiency rickets in children below two years age. Pakistan Paediatric Journal. 2008;32:82-86.	Country
336	van den Hooven,E. H.,Gharsalli,M.,Heppe,D. H.,Raat,H.,Hofman,A.,Franco,O. H.,Rivadeneira,F.,Jaddoe,V. W.. Associations of breast-feeding patterns and introduction of solid foods with childhood bone mass: The Generation R Study. Br J Nutr. 2016;115:1024-32.	Dependent variable
337	van den Hooven,E. H.,Heppe,D. H.,Kiefte-de Jong,J. C.,Medina-Gomez,C.,Moll,H. A.,Hofman,A.,Jaddoe,V. W.,Rivadeneira,F.,Franco,O. H.. Infant dietary patterns and bone mass in childhood: the Generation R Study. Osteoporos Int. 2015;26:1595-604.	Dependent variable
338	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
339	Varea,A.,Malpeli,A.,Etchegoyen,G.,Vojkovic,M.,Disalvo,L.,Apezteguia,M.,Pereyras,S.,Pattin,J.,Ortale,S.,Carmuega,E.,Gonzalez,H. F.. Short-term evaluation of the impact of a food program on the micronutrient nutritional status of Argentinean children under the age of six. Biol Trace Elem Res. 2011;143:1337-48.	Study design, Independent variable
340	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.	Independent variable
341	Vazquez-Seoane,P.,Windom,R.,Pearson,H. A.. Disappearance of iron-deficiency anemia in a high-risk infant population given supplemental iron. N Engl J Med. 1985;313:1239-40.	Study design
342	Verma,R.,Khanna,P.,Gaur,D. R.,Meena,Prinja,S.. Assessment of nutritional status and dietary intake of pre-school children in an urban pocket. Internet Journal of Nutrition & Wellness. 2008;6:5p-5p 1p.	Study design, Age

	Citation	Rationale
343	Verma,R.,Meena,Khanna,P.,Varun. Prevalence of anemia and impact of weekly iron-folic acid supplementation on school children in Urban Slums of Haryana, India. Indian Journal of Public Health Research and Development. 2012;3:147-150.	Country, Independent variable
344	Viljakainen,H. T.,Korhonen,T.,Hytinantti,T.,Laitinen,E. K.,Andersson,S.,Makitie,O.,Lamberg-Allardt,C.. Maternal vitamin D status affects bone growth in early childhood--a prospective cohort study. Osteoporos Int. 2011;22:883-91.	Independent variable
345	Vir,S. C.,Kalita,A.,Mondal,S.,Malik,R.. Impact of community-based mitanin programme on undernutrition in rural Chhattisgarh State, India. Food Nutr Bull. 2014;35:83-91.	Independent variable, Dependent variable
346	Vitolo,M. R.,Bortolini,G. A.. Iron bioavailability as a protective factor against anemia among children aged 12 to 16 months. J Pediatr (Rio J). 2007;83:33-8.	Study design, Health Status, Independent variable, Language
347	Vobecky,J. S.,Vobecky,J.,Shapcott,D.,Demers,P. P.,Blanchard,R.,Fisch,C.. The vitamin status of infants in a free living population. Int J Vitam Nutr Res. 1985;55:205-16.	Independent variable
348	Vossenaar,M.,Solomons,N. W.. The concept of "critical nutrient density" in complementary feeding: the demands on the "family foods" for the nutrient adequacy of young Guatemalan children with continued breastfeeding. Am J Clin Nutr. 2012;95:859-66.	Dependent variable
349	Wachs,T. D.,Creed-Kanashiro,H.,Cueto,S.,Jacoby,E.. Maternal education and intelligence predict offspring diet and nutritional status. J Nutr. 2005;135:2179-86.	Independent variable, Dependent variable
350	Wall,C. R.,Grant,C. C.,Jones,I.. Vitamin D status of exclusively breastfed infants aged 2-3 months. Arch Dis Child. 2013;98:176-9.	Study design, Independent variable
351	Walravens,P. A.,Chakar,A.,Mokni,R.,Denise,J.,Lemonnier,D.. Zinc supplements in breastfed infants. Lancet. 1992;340:683-5.	Independent variable

	Citation	Rationale
352	Walter,T.,Pino,P.,Pizarro,F.,Lozoff,B.. Prevention of iron-deficiency anemia: comparison of high- and low-iron formulas in term healthy infants after six months of life. J Pediatr. 1998;132:635-40.	Independent variable
353	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.	Study design
354	Wang,Y. Y.,Chen,C. M.,Wang,F. Z.,Jia,M.,Wang,K. A.. Effects of nutrient fortified complementary food supplements on anemia of infants and young children in poor rural of Gansu. Biomed Environ Sci. 2009;22:194-200.	Study design, Independent variable
355	Wen,X.,Kong,K. L.,Eiden,R. D.,Sharma,N. N.,Xie,C.. Sociodemographic differences and infant dietary patterns. Pediatrics. 2014;134:e1387-98.	Dependent variable
356	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.	Study design
357	Whitehead,R. G.. Principles involved in assessing energy, protein and micronutrient needs during infancy. Proc Nutr Soc. 1986;45:361-7.	Study design
358	Wijaya-Erhardt,M.,Erhardt,J. G.,Untoro,J.,Karyadi,E.,Wibowo,L.,Gross,R.. Effect of daily or weekly multiple-micronutrient and iron foodlike tablets on body iron stores of Indonesian infants aged 6-12 mo: a double-blind, randomized, placebo-controlled trial. Am J Clin Nutr. 2007;86:1680-6.	Country, Independent variable
359	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.	Study design, Dependent variable
360	Winick,M.. Pediatric nutrition: introduction. Pediatr Ann. 1981;10:17-8.	Study design
361	Winkelstein,M. L.. Overfeeding in infancy: the early introduction of solid foods. Pediatr Nurs. 1984;10:205-8, 236.	Study design, Dependent variable

	Citation	Rationale
362	Yip,R.,Reeves,J. D.,Lonnerdal,B.,Keen,C. L.,Dallman,P. R.. Does iron supplementation compromise zinc nutrition in healthy infants?. Am J Clin Nutr. 1985;42:683-7.	Study design, Independent variable
363	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.	Dependent variable
364	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.	Independent variable
365	Ziegler,E. E.,Nelson,S. E.,Jeter,J. M.. Iron stores of breastfed infants during the first year of life. Nutrients. 2014;6:2023-34.	Independent variable
366	Ziegler,E. E.,Nelson,S. E.,Jeter,J. M.. Iron supplementation of breastfed infants from an early age. Am J Clin Nutr. 2009;89:525-32.	Independent variable
367	Ziegler,E. E.,Nelson,S. E.,Jeter,J. M.. Iron supplementation of breastfed infants. Nutr Rev. 2011;69 Suppl 1:S71-7.	Study design
368	Ziegler,E. E.. Milks and formulas for older infants. J Pediatr. 1990;117:S76-9.	Study design, Dependent variable