USDA
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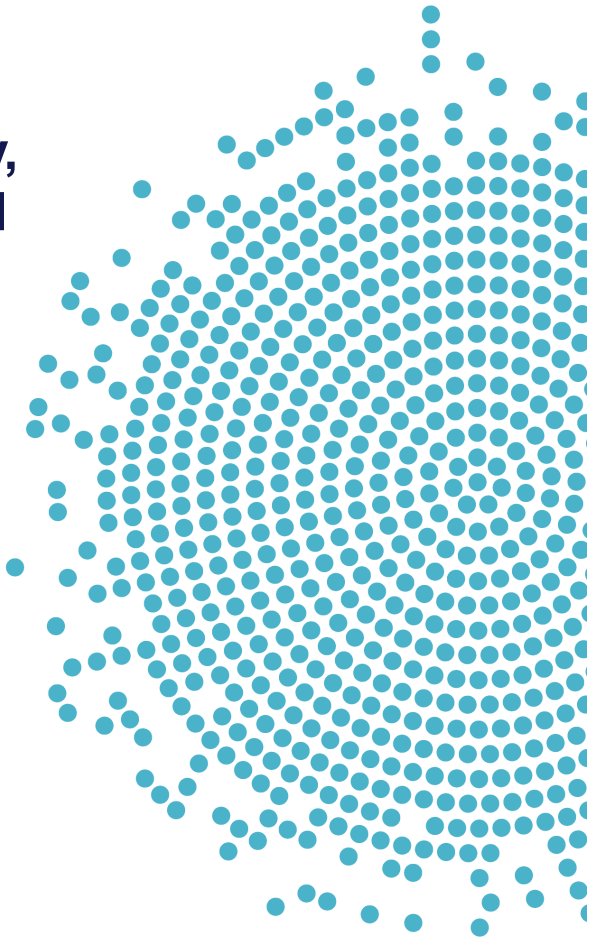
Types and Amounts of Complementary Foods and Beverages and Food Allergy, Atopic Dermatitis/Eczema, Asthma, and Allergic Rhinitis: A Systematic Review



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Related citations:

This systematic review has also been published in the *American Journal of Clinical Nutrition:* Obbagy JE, English LK, Wong YP, Butte NF, Dewey KG, Fleischer DM, Fox MK, Greer FR, Krebs NF, Scanlon KS, Stoody EE. Complementary feeding and food allergy, atopic dermatitis/eczema, asthma, and allergic rhinitis: a systematic review. *Am J Clin Nutr*. 2019;109(7):890S-934S. Available at: https://doi.org/10.1093/ajcn/nqy220.

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- P/B-24 Project overview: Stoody EE, Spahn JM, Casavale KO. The Pregnancy and Birth to 24 Months Project: a series of systematic reviews on diet and health. *Am J Clin Nutr*. 2019;109(7):685S–97S. Available at: https://doi.org/10.1093/ajcn/nqy372.
- P/B-24 Project systematic review methodology: Obbagy JE, Spahn JM, Wong YP, Psota TL, Spill MK, Dreibelbis C, Gungor DE, Nadaud P, Raghavan R, Callahan EH, English LK, Kingshipp BL, LaPergola CC, Shapiro MJ, Stoody EE. Systematic review methodols used in the Pregnancy and Birth to 24 Months Project. *Am J Clin Nutr.* 2019;109(7):698S–704S. Available at https://doi.org/10.1093/ajcn/nqy226.

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All TEC and NESR team members, Project leads, and FEG-TEC liaisons participated in establishing the research questions, analytic framework, and study inclusion and exclusion criteria. 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 (CFB) and food allergy, atopic dermatitis/eczema, asthma, and allergic rhinitis? 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 112, 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 112. In addition, the literature search plan that was used to identify studies included in this systematic review is found on page 112.

[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
CF	Complementary feeding
CFB	Complementary foods and beverages
FEG	Federal Expert Group
FF	Formula fed
HHS	Department of Health and Human Services
IgE	Immunoglobulin E
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
TEC	Technical Expert Collaborative
USDA	United States Department of Agriculture

WHAT IS THE RELATIONSHIP BETWEEN TYPES AND AMOUNTS OF INTRODUCTION OF COMPLEMENTARY FOODS AND BEVERAGES (CFB) AND FOOD ALLERGY, ATOPIC DERMATITIS/ECZEMA, ASTHMA, AND ALLERGIC RHINITIS?

PLAIN LANGUAGE SUMMARY

What is the question?

- The question is: What is the relationship between types and amounts of complementary foods/beverages and food allergy, atopic dermatitis/eczema, asthma, and allergic rhinitis?

What is the answer to the question?

- Peanut, tree nuts, seeds:
  - Strong evidence suggests that introducing peanut in the first year of life (after 4 months of age) may reduce risk of food allergy to peanuts. This evidence is strongest for introducing peanut in infants at the highest risk (with severe atopic dermatitis and/or egg allergy) to prevent peanut allergy, but is also applicable to infants at lower risk. However, the evidence for tree nuts and sesame seeds is limited.
  - Limited evidence also suggests that there is no relationship between consumption of peanut, tree nuts, or sesame seeds during the complementary feeding period and risk of atopic dermatitis/eczema and asthma.
  - There is not enough evidence to determine if there is a relationship between consuming peanut, tree nuts, or seeds as complementary foods and allergic rhinitis.
- Egg:
  - Moderate evidence suggests that introducing egg in the first year of life (after 4 months of age) may reduce risk of food allergy to egg.
  - Limited evidence suggests that there is no relationship between the age of introduction to egg and risk of atopic dermatitis/eczema and asthma.
  - There is not enough evidence to determine if there is a relationship between consuming egg as a complementary food and allergic rhinitis.
- Fish:
  - Limited evidence suggests that introducing fish in the first year of life (after 4 months of age) may reduce risk of atopic dermatitis/eczema.
  - There is not enough evidence to determine if there is a relationship between consuming fish as a complementary food and risk of allergy to fish or other foods, asthma, or allergic rhinitis. There is also not enough evidence to determine if there is a relationship between consuming shellfish as a complementary food and risk of food allergy, atopic dermatitis/eczema, asthma, or allergic rhinitis.
- Cow’s milk products:
  - Limited evidence suggests there is no relationship between age of introduction of cow’s milk products, such as cheese and yogurt, and risk

of food allergy and atopic dermatitis/eczema.
    - There is not enough evidence to determine if there is a relationship between consuming milk products during the complementary feeding period and risk of asthma or allergic rhinitis.
- Wheat:
    - There is not enough evidence to determine if there is a relationship between wheat consumption during the complementary feeding period and risk of food allergy, atopic dermatitis/eczema, asthma, or allergic rhinitis.
- Soy:
    - There is not enough evidence to determine if there is a relationship between soybean consumption during the complementary feeding period and risk of food allergy, atopic dermatitis/eczema, asthma, or allergic rhinitis.
- Foods and beverages that are not common allergens:
    - Limited evidence from observational studies suggests that introducing foods not commonly considered to be allergens, such as fruits, vegetables, and meat, in the first year of life (after 4 months of age) is not associated with risk of food allergy, atopic dermatitis/eczema, asthma, or allergic rhinitis.
- Diet diversity and dietary patterns:
    - There is not enough evidence to determine a relationship between diet diversity or dietary patterns and risk of food allergy, atopic dermatitis/eczema, asthma, or allergic rhinitis.

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 food allergy, atopic dermatitis/eczema, asthma, and allergic rhinitis examined through 18 years of age.

What evidence was found?

- This review includes studies that looked at a variety of complementary foods and beverages, including many that are major allergens:
    - Peanuts, tree nuts, or seeds (14 studies)
    - Eggs (28 studies)
    - Fish (24 studies)
    - Cow’s milk products, such as cheese and yogurt (16 studies)

  - Wheat or cereals (17 studies)
  - Soy (4 studies)
  - Diet diversity (12 studies)
  - Dietary patterns (2 studies)
- Several studies looked at foods not considered to be major allergens, such as fruits and vegetables)
- These studies looked at the age whether consuming a certain type of complementary food or beverage was related to risk of food allergy, atopic dermatitis/eczema, asthma, or allergic rhinitis.
- Complementary foods and beverages are foods and beverages other than human milk or infant formula provided to an infant or young child.
- There are limitations in the evidence as follows: use of less reliable methods to measure outcomes, only a few studies were done for some types of foods and/or outcomes, and other factors that may have had an impact on results were not always accounted for.

How up-to-date is this review?

This review includes literature from 1/1980 to 2/2017.

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 a team of Nutrition Evidence Systematic Review (NESR) staff 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/beverages and food allergy, atopic dermatitis/eczema, asthma, and allergic rhinitis?

Conclusion Statement and Grade

- Peanut, tree nuts, seeds:
    - Strong evidence suggests that introducing peanut in the first year of life (after 4 months of age) may reduce risk of food allergy to peanuts. This evidence is strongest for introducing peanut in infants at the highest risk (with severe atopic dermatitis and/or egg allergy) to prevent peanut allergy, but is also applicable to infants at lower risk. However, the evidence for tree nuts and sesame seeds is limited.
    - Limited evidence also suggests that there is no relationship between consumption of peanut, tree nuts, or sesame seeds during the complementary feeding period and risk of atopic dermatitis/eczema and asthma.
    - There is not enough evidence to determine if there is a relationship between consuming peanut, tree nuts, or seeds as complementary foods and allergic rhinitis.
- Egg:
    - Moderate evidence suggests that introducing egg in the first year of life (after 4 months of age) may reduce risk of food allergy to egg.
    - Limited evidence suggests that there is no relationship between the age of introduction to egg and risk of atopic dermatitis/eczema and asthma.
    - There is not enough evidence to determine if there is a relationship between consuming egg as a complementary food and allergic rhinitis.
- Fish:
    - Limited evidence suggests that introducing fish in the first year of life (after 4 months of age) may reduce risk of atopic dermatitis/eczema.
    - There is not enough evidence to determine if there is a relationship between consuming fish as a complementary food and risk of allergy to fish or other foods, asthma, or allergic rhinitis. There is also not enough evidence to determine if there is a relationship between consuming shellfish as a complementary food and risk of food allergy, atopic dermatitis/eczema, asthma, or allergic rhinitis.

- Cow's milk products:
    - Limited evidence suggests there is no relationship between age of introduction of cow's milk products, such as cheese and yogurt, and risk of food allergy and atopic dermatitis/eczema.
    - There is not enough evidence to determine if there is a relationship between consuming milk products during the complementary feeding period and risk of asthma or allergic rhinitis.
- Wheat:
    - There is not enough evidence to determine if there is a relationship between wheat consumption during the complementary feeding period and risk of food allergy, atopic dermatitis/eczema, asthma, or allergic rhinitis.
- Soy:
    - There is not enough evidence to determine if there is a relationship between soybean consumption during the complementary feeding period and risk of food allergy, atopic dermatitis/eczema, asthma, or allergic rhinitis.
- Foods and beverages that are not common allergens:
    - Limited evidence from observational studies suggests that introducing foods not commonly considered to be allergens, such as fruits, vegetables, and meat, in the first year of life (after 4 months of age) is not associated with risk of food allergy, atopic dermatitis/eczema, asthma, or allergic rhinitis.
- Diet diversity and dietary patterns:
    - There is not enough evidence to determine a relationship between diet diversity or dietary patterns and risk of food allergy, atopic dermatitis/eczema, asthma, or allergic rhinitis.

Grade: Strong – Peanut; Moderate - Egg; Limited – Fish, cow's milk products, tree nuts or seeds, foods and beverages that are not common allergens; Grade Not Assignable – Wheat, soy, diet diversity, dietary patterns

Methods

- This systematic review was conducted by a team of NESR staff 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 February 2017 that examined the types and/or amounts of complementary foods and beverages (CFB) consumed and food allergy, atopic dermatitis/eczema, asthma, and allergic rhinitis. CFB were defined as foods and beverages other than human milk or infant formula provided to an infant or young child. Outcomes included incidence and prevalence of food allergy, atopic dermatitis/eczema, asthma, and allergic rhinitis. 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, risk of bias was assessed. 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. Research recommendations were identified.

Summary of Evidence

- Thirty-nine studies included in this systematic review examined the relationship between consuming specific types of CFB (including amounts, and the age at which the specific CFB were introduced) and risk of food allergies, atopic dermatitis/eczema, asthma, and allergic rhinitis occurring during childhood through 18 years of age. An additional 12 studies examined diet diversity and two studies examined dietary patterns during the complementary feeding period in relation to these outcomes.
- A number of studies examined consumption of the most common allergenic foods during the complementary feeding period and risk of atopic disease.
    - Fourteen studies examined the consumption of peanuts, tree nuts, or seeds during the complementary feeding period in relation to risk of developing atopic disease, including two RCTs. Nine studies (two RCTs) examined food allergy, five studies examined atopic dermatitis/eczema, and two studies examined asthma; no studies were identified that examined risk of allergic rhinitis.
    - Twenty-eight studies examined the consumption of eggs as a complementary food in relation to risk of developing any atopic disease, including six RCTs. Thirteen studies (six RCTs) examined food allergies, fifteen studies (one RCT) examined atopic dermatitis/eczema, four studies examined asthma, and five studies examined allergic rhinitis.
    - Twenty-four studies examined the consumption of fish as a complementary food in relation to risk of developing atopic disease, including one RCT. Six studies (one RCT) examined food allergies, fifteen studies examined atopic dermatitis/eczema, seven studies examined asthma, and seven studies examined allergic rhinitis.
    - Sixteen studies examined the consumption of cow's milk products, such as cheese and yogurt, during the complementary feeding period in relation to risk of developing atopic disease, including one RCT. Four studies (one RCT) examined food allergies, nine studies examined atopic dermatitis/eczema, three studies examined asthma, and three studies examined allergic rhinitis.
    - Eighteen studies, including 1 RCT, 11 PCSs, 5 nested case-control studies, and 1 case-control study, examined the consumption of wheat or cereals (including, but not limited to, wheat cereal) during the complementary feeding period in relation to risk of developing atopic disease. Eight studies examined food allergies, 9 studies examined atopic dermatitis/eczema, 3 studies examined asthma, and 2 studies examined allergic rhinitis.
    - Four prospective cohort studies examined the relationship between age of introduction to soy and risk of developing atopic disease. One study examined food allergies, three studies examined atopic

dermatitis/eczema, and one study examined asthma.

- A number of observational studies also examined the relationship between other types of CFB, not considered to be major allergens (e.g., fruit, vegetables, meat), and atopic diseases.
- The studies that examined diet diversity or dietary patterns were all observational, including 11 prospective cohort studies (from six cohorts) and three case-control studies.
- Many of the studies included in this review exclusively enrolled or primarily enrolled subjects who were at greater risk of allergies and/or atopic disease than the general population on the basis of family history. However, despite the inclusion of higher risk populations in this body of evidence, the results are probably generalizable to infants and toddlers who are lower risk for atopic disease but the benefit of early introduction on preventing allergy may not be as great.
- In order to better understand how specific types of foods consumed during infancy and toddlerhood impact risk of developing atopic disease, more research is needed that a) uses randomized, controlled study designs, b) uses valid and reliable measures, c) uses consistent definitions of diet diversity and/or dietary patterns, and assesses these exposures at multiple time points across the complementary feeding period, d)adjusts for key confounders, e) takes into consideration the mechanisms by which specific types of foods may affect risk of developing atopic disease when determining which diet-health relationships to investigate, and what analyses are appropriate, and f) accounts for potential for reverse causality exists due to baseline atopic disease risk status impacting both complementary feeding behaviors and risk of developing atopic disease

FULL REVIEW

Systematic review question

What is the relationship between types and amounts of complementary foods and beverages (CFB) food allergy, atopic dermatitis/eczema, asthma, and allergic rhinitis?

Conclusion statement

Peanut, tree nuts, seeds:

- Strong evidence suggests that introducing peanut in the first year of life (after 4 months of age) may reduce risk of food allergy to peanuts. This evidence is strongest for introducing peanut in infants at the highest risk (with severe atopic dermatitis and/or egg allergy) to prevent peanut allergy, but is also applicable to infants at lower risk. However, the evidence for tree nuts and sesame seeds is limited.
- Limited evidence also suggests that there is no relationship between consumption of peanut, tree nuts, or sesame seeds during the complementary feeding period and risk of atopic dermatitis/eczema and asthma.
- There is not enough evidence to determine if there is a relationship between consuming peanut, tree nuts, or seeds as complementary foods and allergic rhinitis.

Egg:

- Moderate evidence suggests that introducing egg in the first year of life (after 4 months of age) may reduce risk of food allergy to egg.
- Limited evidence suggests that there is no relationship between the age of introduction to egg and risk of atopic dermatitis/eczema and asthma.
- There is not enough evidence to determine if there is a relationship between consuming egg as a complementary food and allergic rhinitis.

Fish:

- Limited evidence suggests that introducing fish in the first year of life (after 4 months of age) may reduce risk of atopic dermatitis/eczema.
- There is not enough evidence to determine if there is a relationship between consuming fish as a complementary food and risk of allergy to fish or other foods, asthma, or allergic rhinitis. There is also not enough evidence to determine if there is a relationship between consuming shellfish as a complementary food and risk of food allergy, atopic dermatitis/eczema, asthma, or allergic rhinitis.

Cow’s milk products:

- Limited evidence suggests there is no relationship between age of introduction of cow’s milk products, such as cheese and yogurt, and risk of food allergy and atopic dermatitis/eczema.
- There is not enough evidence to determine if there is a relationship between consuming milk products during the complementary feeding period and risk of asthma or allergic rhinitis.

Wheat:

- There is not enough evidence to determine if there is a relationship between wheat

consumption during the complementary feeding period and risk of food allergy, atopic dermatitis/eczema, asthma, or allergic rhinitis.

Soy:

- There is not enough evidence to determine if there is a relationship between soybean consumption during the complementary feeding period and risk of food allergy, atopic dermatitis/eczema, asthma, or allergic rhinitis.

Foods and beverages that are not common allergens:

- Limited evidence from observational studies suggests that introducing foods not commonly considered to be allergens, such as fruits, vegetables, and meat, in the first year of life (after 4 months of age) is not associated with risk of food allergy, atopic dermatitis/eczema, asthma, or allergic rhinitis.

Diet diversity and dietary patterns:

- There is not enough evidence to determine a relationship between diet diversity or dietary patterns and risk of food allergy, atopic dermatitis/eczema, asthma, or allergic rhinitis.

Grade

Grade: Strong – Peanut; Moderate - Egg; Limited – Fish, cow's milk products, tree nuts or seeds, foods and beverages that are not common allergens; Grade Not Assignable – Wheat, soy, diet diversity, dietary patterns

Summary

- Thirty-nine studies included in this systematic review examined the relationship between consuming specific types of CFB (including amounts, and the age at which the specific CFB were introduced) and risk of food allergies, atopic dermatitis/eczema, asthma, and allergic rhinitis occurring during childhood through 18 years of age. An additional 12 studies examined diet diversity and two studies examined dietary patterns during the complementary feeding period in relation to these outcomes.
- A number of studies examined consumption of the most common allergenic foods during the complementary feeding period and risk of atopic disease.
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fifteen studies examined atopic dermatitis/eczema, seven studies examined asthma, and seven studies examined allergic rhinitis.
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    - Eighteen studies, including 1 RCT, 11 PCSs, 5 nested case-control studies, and 1 case-control study, examined the consumption of wheat or cereals (including, but not limited to, wheat cereal) during the complementary feeding period in relation to risk of developing atopic disease. Eight studies examined food allergies, 9 studies examined atopic dermatitis/eczema, 3 studies examined asthma, and 2 studies examined allergic rhinitis.
    - Four prospective cohort studies examined the relationship between age of introduction to soy and risk of developing atopic disease. One study examined food allergies, three studies examined atopic dermatitis/eczema, and one study examined asthma.
- A number of observational studies also examined the relationship between other types of CFB, not considered to be major allergens (e.g., fruit, vegetables, meat), and atopic diseases.
- The studies that examined diet diversity or dietary patterns were all observational, including 11 prospective cohort studies (from six cohorts) and three case-control studies.
- Many of the studies included in this review exclusively enrolled or primarily enrolled subjects who were at greater risk of allergies and/or atopic disease than the general population on the basis of family history. However, despite the inclusion of higher risk populations in this body of evidence, the results are probably generalizable to infants and toddlers who are lower risk for atopic disease but the benefit of early introduction on preventing allergy may not be as great.
- In order to better understand how specific types of foods consumed during infancy and toddlerhood impact risk of developing atopic disease, more research is needed that a) uses randomized, controlled study designs, b) uses valid and reliable measures, c) uses consistent definitions of diet diversity and/or dietary patterns, and assesses these exposures at multiple time points across the complementary feeding period, d)adjusts for key confounders, e) takes into consideration the mechanisms by which specific types of foods may affect risk of developing atopic disease when determining which diet-health relationships to investigate, and what analyses are appropriate, and f) accounts for potential for reverse causality exists due to baseline atopic disease risk status impacting both complementary feeding behaviors and risk of developing atopic disease

Description of the evidence

Thirty-nine studies are included in the systematic review that examined the relationship between consumption of specific types and/or amounts of CFB and risk of food allergy,

atopic dermatitis, asthma, and allergic rhinitis occurring during childhood through 18 y of age (**Table 1**). The types of CFB examined in these studies focused primarily on the most common highly allergenic foods[iv], including peanut, tree nuts, seeds, eggs, fish, shellfish, cow's milk products, wheat, and soybeans. Nineteen studies examined other types of CFB, not considered to be major allergens, such as fruits, vegetables, grain products (not wheat), or meats (Table 1). In addition, 14 studies examined the relationship between diet diversity and dietary patterns during the CF period and risk of food allergy, atopic dermatitis, asthma, and allergic rhinitis occurring during childhood (**Table 2**).

Summary of findings

Peanut, tree nuts, and seeds

Fourteen studies examined the consumption of peanut, tree nuts, or seeds during the CF period in relation to risk of developing atopic disease, including 2 RCTs (1, 2), 6 prospective cohort studies (3-8), 4 nested case-control studies (9-12), and 2 case-control studies (13, 14) (**Table 3**). Two studies examined data from the Protection Against Allergy in Rural Environments Study cohort, conducted in Austria, Finland, France, Germany, Switzerland (5, 6), but examined different outcomes. Two studies used data from the Learning Early About Peanut Allergy Trial (LEAP) trial (1, 4), but examined different aspects of peanut consumption. Two studies examined data from the Prevalence of Infant Food Allergy, or EuroPrevall, cohort, but examined overall risk of food allergy at 2 y (10) and IgE vs non-IgE-mediated food allergy at 2 y (9).

Several studies included a subject population in which a large majority was considered to be high risk based on parental or family history of atopic disease (1, 2, 4-6, 8, 11). In addition, the population examined by Du Toit et al. (1) and Greenhawt et al. (4) was also high risk on the basis of a prior diagnosis of severe atopic dermatitis (89%) and/or egg allergy (62%). Perkin et al. (2) enrolled exclusively BF infants from the general population, and all other studies included a mix of BF, FF, or mixed-fed infants. Most of the studies adjusted for infant milk feeding practices in analyses, though a few did not (4, 12, 14).

The studies examined consumption of peanut, tree nuts or seeds in a variety of ways. Du Toit et al. randomized subjects to consume or avoid peanuts from 4 mo to 60 mo of age (1). Perkin et al. (2) randomized subjects to compare the effects of 'early' introduction (3 mo) of 6 allergenic foods, 2 of which were peanuts and sesame, to 'standard' introduction (6 mo). Most of the remaining studies examined age of introduction to peanut, tree nuts, or sesame (3-7, 9, 10, 12-14), or the amount of peanut consumed (2, 4). Two studies looked at the age of introduction of several major allergens combined, including peanut and/or tree nuts (8, 11). Kumar et al. (11) examined egg, peanut, tree nuts, shellfish, fish, and sesame, and Zutavern et al. (8) examined soy, nuts, and chocolate.

The studies also considered various atopic disease outcomes in relation to consuming peanut, tree nuts, and seeds during the CF period, including food allergy (1, 2, 4, 5, 9-12, 14), atopic dermatitis (3, 6-8, 13), and asthma (1, 5). No studies examined the

[iv] Food Allergen Labeling and Consumer Protection Act of 2004 (FALCPA). II, 2004.

relationship between intake of peanut, tree nuts or seeds and risk of developing allergic rhinitis.

Food allergy: Nine studies examined the relationship between peanut, tree nut, and/or seed consumption and risk of developing food allergy **(1, 2, 4, 5, 9-12, 14)**. Three studies assessed risk of peanut allergy specifically **(1, 2, 4)**, while the others examined risk of allergy to other foods associated with the intake of peanut.

Du Toit et al. (1) showed that the early peanut consumption group (at least 6 g of peanut protein per wk) vs. the avoidance group had a significantly reduced risk of peanut allergy, both for those who had a negative or positive (1-4mm) baseline skin prick test. Greenhawt et al. (4) further analyzed data from a subgroup of the peanut consumption group, and reported that later peanut introduction during the first year of life (6-11 vs. 4-6 mo) was significantly associated with a reduced risk of peanut allergy at 5 y.

Results from the Perkin et al. (2) intention to treat analyses showed no significant differences between the standard and early introduction groups in risk of developing any food allergy from 1-3 y. However, overall adherence was poor, and only 43% of subjects complied with protocol of consuming all 6 major allergens in the specified amounts in the early introduction group. The per protocol analyses (compliers, adjusted for multiple comparisons) showed that the early introduction group had significantly lower risk of 1 or more food allergy or peanut allergy from 1-3 y. In further dose-response analyses from the early introduction group, consuming a higher weekly amount of peanut (2 g/wk vs. <2 g/wk) from 3 to 6 mo was significantly associated with a lower risk of peanut allergy from 1-3 y.

Most of the associations reported in the remaining observational studies were not significant, all of which examined risk of any food allergy in relation to age of peanut or tree nuts introduction (5, 9, 10, 12, 14). However, Grimshaw et al. (10) did report a trend for more food-allergic infants vs. controls to have consumed peanut and sesame before 52 wk, suggesting that the study may have been underpowered. In addition, Kumar et al. (11) found that later peanut, tree nut, and sesame introduction (>6 vs. <6 mo) was significantly associated with lower risk of food allergy at 6-7 y; however, this was no longer significant when timing was categorized by <1 vs >1 y. In addition, in children without atopic dermatitis, age of peanut, tree nut, and sesame introduction (<6 vs >6 mo) was not associated with risk of food allergy; however, when categorized by >1 vs. <1 y, later introduction was significantly associated with lower risk of allergy at 6-7 y. Finally, in children with atopic dermatitis, age of peanut, tree nut, and sesame introduction was not significantly associated with risk of food allergy at 6-7 y. Taken together, these results may suggest potential reverse causality, whereby children at higher risk were introduced to allergenic foods later.

Atopic dermatitis: Five studies examined the relationship between age of tree nut and/or peanut introduction and risk of developing atopic dermatitis (3, 6-8, 13). Filipiak et al. (3) found that later introduction of peanut and tree nuts (>6 vs. <6 mo) was associated with lower risk of atopic dermatitis at 4 y. Roduit et al. (6) reported that earlier nut introduction (nut was not defined by the study authors) (3-12 vs. >12 mo) was significantly associated with decreased risk of atopic dermatitis and “atopic dermatitis with no itchy rash by 6 mo” at 1 y. Finally, Tromp et al. (7) found no significant association between age of peanut or tree nut introduction and risk of atopic

dermatitis at 2, 3, and 4 y, and Turati et al. (13) found no significant differences between atopic dermatitis cases and controls (ages 3-24 mo) in the age of introduction to peanut, tree nuts, or cacao/chocolate. Zutavern et al. (8) found no significant associations between the age of introduction to peanut or tree nuts and risk of atopic dermatitis at 2 y of age.

Asthma: Two studies examined the impact of tree nut/peanut consumption during the CF period and risk of asthma (1, 5), both reporting no significant associations. Du Toit et al. (1) found no differences in risk of asthma at 5 y between infants who were randomly assigned either to consume peanut (6 g/wk) or to avoid consuming peanut from 4 mo to 60 mo of age. Roduit et al. (5) found that age of nut introduction (nut was not defined by the study authors) was not associated with asthma at 6 y in a cohort study.

Egg

Twenty-eight studies examined the consumption of egg as a CFB in relation to risk of developing any atopic disease, including 6 RCTs (2, 15-19), 15 prospective cohort studies (3, 5-8, 20-29), 5 nested case-control studies (9-12, 30), and 2 case-control studies (13, 14) (**Table 4**). Two studies examined subjects from the same cohort (Prevalence of Infant Food Allergy EuroPrevall) (9, 10). Both of these studies examined the association between age of egg introduction and food allergy risk at 2 y, but 1 reported overall risk of food allergy (10), and the other reported risk of IgE-mediated food hypersensitivity (9).

A number of studies exclusively enrolled subjects who were considered to be at higher risk of atopic disease based on a prior history of atopic dermatitis earlier in infancy (16, 17), or because of parental or family history of atopic disease (18, 19, 21, 25). Eight additional studies included a subject population in which a majority was considered to be at higher risk based on family history of atopic disease (2, 5, 6, 8, 11, 15, 23, 29), though in most of these studies, subjects were not recruited on the basis of their risk status, and therefore are representative of risk status among the general population. Perkin et al. (2) enrolled subjects from the general population who were exclusively BF at baseline. The remaining studies included a mix of BF, FF, or mixed-fed infants. Also, most of the studies accounted for infant milk feeding practices as a potential confounder in analyses, though a few did not (12, 22).

The RCTs examined egg exposure in a variety of ways, and in relation to a number of different outcomes. Several RCTs compared the risk of egg allergy (15-19), among infants who were introduced to egg (at 6-12mo of age) vs. placebo during infancy. Wei-Liang Tan et al. (19) also looked at the relationship of egg introduction and atopic dermatitis. Perkin et al. (2) compared the effect of early introduction (3 mo) of 6 allergenic foods, 1 of which was egg, to standard introduction (6 mo). Most of the infants in the egg groups received whole-egg powder daily, either cooked (2, 16) or raw (17-19). In Bellach et al. (15) infants in the egg group received uncooked egg-white powder 3 times a week. In 4 of the RCTs, the placebo group received rice powder (15, 17-19), while 1 study fed the placebo group squash powder, (16) and infants in another remained exclusively BF (2). It is also important to note that several of these RCTs were terminated early due to concerns about safety (15-17) or funding

constraints (18).

Twenty observational studies examined the age at which egg was first consumed, and 1 examined the amount of egg consumed (22). One observational study specified that hen's egg was the exposure of interest (10), while others examined introduction of any type of egg, whether they were raw, cooked, or baked. One observational study examined several allergenic foods combined, including shellfish and fish. Kumar et al. (11) examined the age of introduction to egg, peanut, tree nuts, fish, shellfish, and sesame.

Food allergy: Six RCTs and 7 observational studies examined the relationship between consumption of egg and risk of developing food allergy (2, 5, 9-12, 14-19, 24).

Four of the RCTs reported no significant effect of consuming egg vs. placebo during infancy on risk of developing egg allergy at 1y of age (15, 17-19). Three of these studies were discontinued early due to safety concerns related to high rates of egg sensitization (15, 17) or funding constraints (18), and therefore did not enroll as many subjects as anticipated and may have been underpowered to detect a difference. Results from the other RCTs showed egg intake to be protective against development of egg allergy. Natsume et al. (16) reported that risk of hen's egg allergy at 1 y of age was significantly higher in the placebo vs egg group (fed egg from 6-12mo of age), after which the study was terminated early due to these significant differences identified at planned interim analyses. As reported previously, Perkins et al. (2) intention to treat analyses showed no significant differences between the standard and early introduction (43% compliance) groups in risk of developing food allergy from 1-3 y. The per protocol analyses showed that the early introduction group (who were fed egg in addition to 5 other allergenic foods) had significantly lower risk of 1 or more food allergies and egg allergy from 1-3 y. In further dose-response analyses from the early introduction group, consuming more egg protein (4 g/wk vs. <4 g/wk) from 3 to 6 mo was significantly associated with a lower risk of egg allergy from 1-3 y.

Results of the 8 observational studies were mixed and focused on egg introduction and the development of any food allergy, and did not specifically examine risk of egg allergy. Yu et al. (14) found that food allergy cases vs controls (ages 14-18 y) were significantly more likely to be introduced to egg earlier (<12 vs. 13-24, 25-36, >36 mo). However, Yu et al. (14) did not adjust for any potential confounders, and based diagnosis of food allergy on student or parent report. Grimshaw et al. (9) found that later egg introduction (analyzed based on median age in months) was significantly associated with increased risk of any IgE-mediated food allergy at 2 y; cases with IgE-mediated food allergy were introduced to egg at a mean of 52 vs 35 wk for control infants. However, Grimshaw et al. (10), using data from the same population, reported that age of hen's egg introduction (analyzed based on median in weeks) was not significantly associated with food allergy at 2 y of age. Kumar et al. (11) found that later egg, peanut, tree nut, shellfish, fish, and sesame introduction (>6 vs. <6 mo) was significantly associated with lower risk of food allergy at ~6 y; however, this was no longer significant when timing was categorized by <1 vs >1 y. In addition, in children without atopic dermatitis, age of egg, peanut, tree nut, shellfish, fish, and sesame introduction (<6 vs >6 mo) was not significantly associated with risk of food allergy; however, when categorized by >1 vs. <1 y, later introduction was significantly

associated with lower risk of allergy at ~6 y. Finally, in children with atopic dermatitis, age of egg, peanut, tree nut, shellfish, fish, and sesame introduction was not significantly associated with risk of food allergy at ~6 y. Taken together, these results may suggest potential reverse causality, whereby children at higher risk were introduced to allergenic foods later.

In addition, Hesselmar et al. (24) and Roduit et al. (5) found no significant associations between age of egg introduction and risk of any food allergy at 18 mo or 6 y, respectively. Venter et al. (12) also reported no significant differences in age of egg introduction between food allergy cases and controls at 1 y of age.

Atopic dermatitis: One RCT (19) and 14 observational studies examined the relationship between age of introduction of egg and risk of atopic dermatitis (3, 6-8, 21-27, 29, 30). One observational study also examined the amount of egg consumed in relation to atopic dermatitis (22). Most studies reported no significant associations.

One RCT, Wei-Liang Tan et al. (19) found no significant differences in prevalence or severity of atopic dermatitis at 8 mo or 12 mo between subjects randomized to consume raw egg powder vs. rice powder from 4 mo to 8 mo of age.

Eleven of the 14 observational studies reported no significant associations between age of introduction to egg and risk of developing atopic dermatitis at ages ranging from 18 mo to 10 y (7, 8, 13, 21-27, 30).

All 3 studies that reported significant findings suggested that introducing egg later in infancy was associated with increased risk of atopic dermatitis in childhood. It is unclear whether these results may reflect reverse causality, as children with atopic dermatitis may be more likely to receive allergenic foods, like egg, later. Filipiak et al. (3) found that later egg introduction (>12 vs. <12 mo) was associated with higher risk of doctor-diagnosed atopic dermatitis at 4 y. Roduit et al. (6) found that earlier egg introduction (3-12 vs. >12 mo) was associated with decreased risk of atopic dermatitis at 1 y. Zutavern et al. (29) found that later egg introduction (>8 vs. <8 mo) increased the risk of atopic dermatitis at 5 y.

Finally, Fergusson et al. (22) found no significant association between the amount of egg consumed at 4 mo of age and risk of atopic dermatitis at 2 y.

Asthma: Four observational studies examined the relationship between age of egg introduction and risk of asthma, which was determined based on parent-report of doctor diagnosis (5, 23, 27, 28). Three of these studies found no significant associations between age of introduction to egg and risk of asthma (5, 23, 28). However, Nwaru et al. (27) reported that earlier egg introduction (<8 or 8-11 vs. >11 mo) was significantly associated with reduced risk of asthma at 5 y, specifically atopic asthma.

Allergic rhinitis: Five observational studies examined the relationship between age of egg introduction and risk of allergic rhinitis (20, 23, 26-28). Four of the studies found no significant associations between age of introduction to egg and risk of developing allergic rhinitis (20, 23, 26, 28). However, Nwaru et al. (27) reported that earlier introduction of egg (<8 or 8-11 vs >11 mo) was significantly associated with reduced risk of allergic rhinitis at 5 y.

Fish

Twenty-four studies examined the consumption of fish as a CFB in relation to risk of developing atopic disease, including 1 RCT (2),18 prospective cohort studies (3, 5, 6, 8, 20, 21, 23-29, 31-35), 3 nested case-control studies (10, 11, 30), and 2 case-control studies (13, 14) (**Table 5**). Three studies analyzed data from the Infants of Western Sweden cohort (20, 31, 32), but examined different outcomes or age of outcomes in relation to fish consumption. Two studies examined data from the Protection Against Allergy in Rural Environments Study cohort (5, 6), also examining different outcomes.

Two studies exclusively enrolled subjects who were considered to be at high risk based on parental or family history of atopic disease (21, 25). Eight studies included a subject population where a large majority was at high risk (2, 5, 6, 8, 11, 23, 29, 32). Perkin et al. (2) enrolled subjects from the general population who were exclusively BF at baseline. The remaining studies included a mix of BF, FF, or mixed-fed infants, and all adjusted for infant milk feeding practices in analyses.

Fish consumption was examined in a variety of ways. Perkin et al. (2) compared the effect of early introduction (3 mo) of 6 allergenic foods, 1 of which was whitefish, to standard introduction (6 mo). Most of the observational studies examined age of fish introduction (2, 3, 5, 6, 8, 10, 13, 14, 20, 21, 23-34), while others considered frequency of fish consumption (20, 31, 33, 35) or the types of fish consumed (20, 31) during the CF period. One observational study examined several allergenic foods combined, including shellfish and fish. Kumar et al. (11) examined the age of introduction to egg, peanut, tree nuts, shellfish, fish, and sesame.

Food allergy: One RCT (2) and 5 observational studies examined the relationship between age of fish introduction and risk of food allergy (5, 10, 11, 14, 24). Three of the 6 studies found no significant associations between age of introduction and risk of any food allergy (5, 10, 14). Most of these studies examined risk of any kind of food allergy, and did not focus on risk of fish or shellfish allergy specifically.

As has been described, while Perkins' et al. (2) intention to treat analyses showed no differences between the standard and early introduction groups in risk of developing food allergy from 1-3 y, the per protocol analyses showed that the early introduction group (who were fed fish in addition to 5 other allergenic foods) had significantly lower risk of 1 or more food allergies from 1-3 y, but no significant differences between groups in risk of developing fish allergy.

Kumar et al. (11) found that later egg, peanut, tree nut, shellfish, fish, and sesame introduction (>6 vs. <6 mo) was significantly associated with lower risk of any food allergy at ~6 y; however, this was no longer significant when timing was categorized by <1 vs >1 y. In addition, in children without atopic dermatitis, age of egg, peanut, tree nut, shellfish, fish, and sesame introduction (<6 vs >6 mo) was not significantly associated with risk of food allergy; however, when categorized by >1 vs. <1 y, later introduction was significantly associated with lower risk of allergy at ~6 y. Finally, in children with atopic dermatitis, age of egg, peanut, tree nut, shellfish, fish, and sesame introduction was not significantly associated with risk of food allergy at ~6 y. Taken together, these results may suggest potential reverse causality, whereby children at higher risk were introduced to allergenic foods later.

Finally, Hesselmar et al. (24) reported that earlier fish introduction (9 vs. 13 mo of age)

was significantly associated with decreased risk of any food allergy at 18 mo.

Atopic dermatitis: Fifteen observational studies examined the relationship between age of introduction to fish and risk of atopic dermatitis (3, 6, 8, 13, 21, 23-27, 29-31, 33, 34). Three studies examined frequency of fish consumption (31, 33, 35) and 2 examined types of fish consumed (31, 35) in relation to risk of atopic dermatitis.

Ten of the 15 studies found no significant associations between the age at which fish was first introduced and risk of developing atopic dermatitis (3, 8, 13, 21, 23, 25-27, 29, 30). In these studies with null findings, the ages when atopic dermatitis were assessed ranged between 0-4 y up to 10 y of age; most studies assessed outcomes at 4 y of age or older.

The remaining 5 studies all reported that earlier introduction of fish was significantly associated with a decreased risk of atopic dermatitis and assessed outcomes at 4 y of age or younger. Alm et al. (31) found that earlier fish introduction was associated with lower risk of atopic dermatitis at 12 mo (<9 vs. >9 mo; 3-5 vs. 9-12 mo; 6-8 vs. 9-12 mo). Hesselmar et al. (24) reported that earlier fish introduction was associated with decreased risk of atopic dermatitis at 18 mo (8 vs. 11 mo and 4-5/6-7 vs. 8-9 mo, 10-11 mo, >12 mo). Kull et al. (33) found that earlier fish introduction (3-8 vs. >9 mo) was associated with reduced risk of atopic dermatitis at 4 y. Results from Nafstad et al. (34) showed that earlier fish introduction (<12 vs. >12 mo) was associated with lower risk of atopic dermatitis at 4 y. Finally, Roduit et al. (6) reported that earlier fish introduction (3-12 vs. >12 mo) was associated with decreased risk of atopic dermatitis and “atopic dermatitis with no itchy rash by 6 mo” at 1 y of age. However, the potential for reverse causality exists, as infants at higher risk for or with symptoms of atopic dermatitis may have been introduced to allergenic foods, including fish, at older ages.

There were also a number of significant results related to frequency and/or type of fish consumed during the CF period. All 3 studies that measured frequency of fish consumption found that higher frequency of intake was significantly associated with reduced risk of atopic dermatitis in childhood between 1-4 y of age, with greatest risk reduction occurring when fish was consumed 1 or more times per week. Alm et al. (31) found that decreased frequency of fish consumption (Never vs. 3+/wk) was significantly associated with increased risk of atopic dermatitis at 12 mo. Kull et al. (33) reported that increased frequency of fish consumption at 1 y was significantly associated with reduced risk of atopic dermatitis at 4 y (never vs. 1/mo, 2-3/mo, 1/wk, and ≥1/wk). Oien et al. (35) found that higher frequency of fish consumption (>1/wk vs <1/wk and 0/wk) was significantly associated with lower risk of atopic dermatitis at 2 y, which persisted when early onset atopic dermatitis (<1 y) children were excluded.

In addition, Alm et al. (31) also reported that eating lean fish (e.g., cod, haddock) vs. other fish (e.g., salmon, flatfish, mackerel, and herring) was significantly associated with decreased risk of atopic dermatitis at 12 mo. While Oien et al. (35) did not make direct comparison between types of fish, results from the study showed that higher frequency of intake of both oily (redfish, halibut, salmon, trout, herring, mackerel) and lean fish (cod, coalfish) was significantly associated with lower risk of atopic dermatitis at 2 y of age, but there were no significant findings when cod liver oil consumption was examined. Specifically, consuming oily fish more frequently (>1 vs <1/wk, 0/wk) was significantly associated with lower risk of atopic dermatitis at 2 y, which persisted when early onset atopic dermatitis (<1 y) children were excluded. Higher frequency of lean

fish consumption (>1 vs <1/wk, 0/wk) was significantly associated with lower risk of atopic dermatitis at 2 y; however, this was no longer significant when early onset atopic dermatitis (<1 y) children were excluded, which may suggest potential reverse causality.

Asthma: Seven studies examined the relationship between age of fish introduction and risk of developing asthma (5, 23, 27, 28, 32-34), while 3 examined the relationship between frequency or type of fish consumed and asthma (32, 33, 35). Results from these studies are mixed, and caution is used in interpreting results that may have the potential for reverse causality.

Three studies found that earlier introduction of fish, particularly when introduced before 9 mo of age, was associated with reduced risk of asthma between 4-8 y of age. Goksor et al. (32) found that earlier fish introduction (<9 vs. >9 mo) was significantly associated with decreased risk of asthma and atopic asthma at 8 y; but not non-atopic asthma. Kull et al. (33) also reported that earlier fish introduction (3-8 vs. >9 mo) was significantly associated with reduced risk of asthma at 4 y. Finally, Roduit et al. (5) found that earlier fish introduction (3-12 vs. >12 mo) was significantly associated with decreased risk of asthma at 6 y.

Four studies reported no significant associations between age of fish introduction and risk of asthma (23, 27, 28, 34).

There were also mixed results related to frequency and/or type of fish consumed during the CF period and risk of asthma. Goksor et al. (32) reported that frequency of fish consumption was not significantly associated with risk of asthma, atopic asthma, or non-atopic asthma at 8y. Oien et al. (35) reported that frequency of cod liver oil, fish, oily fish, or lean fish consumption was not significantly associated with risk of asthma at 2 y. However, Kull et al. (33) found that increased frequency of fish consumption at 1 y was associated with reduced risk of asthma at 4 y (never vs. 1/mo, 2-3/mo, 1/wk, and ≥1/wk).

Allergic rhinitis: Seven studies examined the relationship between age of fish introduction and risk of developing allergic rhinitis (20, 23, 26-28, 33, 34), 2 of which also examined frequency and/or types of fish consumed in relation to allergic rhinitis risk (20, 33).

Five studies reported that earlier introduction of fish, particularly before 9 mo of age, was significantly associated with decreased risk of allergic rhinitis at ~4-5 y of age. Alm et al. (20) found that earlier introduction to fish (<9 vs. >9 mo) was significantly associated with lower risk of allergic rhinitis at 4.5 y. Kull et al. (33) showed that earlier introduction of fish (3-8 vs. >9 mo) was significantly associated with reduced risk of allergic rhinitis at 4 y. Nafstad et al. (34) reported that earlier fish introduction (<12 vs >12 mo) was significantly associated with reduced risk of allergic rhinitis at 4 y, particularly among those BF >6 mo, with atopic dermatitis before 6 mo, and without respiratory infection <12 mo. Results from Nwaru et al. (27) showed that earlier introduction of fish (6, 6-9 vs >9 mo) was significantly associated with reduced risk of allergic rhinitis at 5 y, with similar results when age of introduction was analyzed as a continuous variable. Finally, Virtanen et al. (28) found that earlier introduction of fish was significantly associated with decreased risk of allergic rhinitis at 5 y (<6 vs. >8.5mo; 6.1-8.5 vs. >8.5 mo). However, caution should be used in interpreting the

findings from all these studies, as there is potential for reverse causality.

Two studies reported no association between age of fish introduction and allergic rhinitis (23, 26).

The results related to frequency or types of fish consumption were mixed. Alm et al. (20) found no significant association between the frequency of either fish consumption or types of fish consumed from 0-12 mo and risk of allergic rhinitis at 4.5 y. However, the results from Kull et al. (33) showed that increased frequency of fish consumption at 1 y was significantly associated with reduced risk of allergic rhinitis at 4 y (never vs. 1/mo, 2-3/mo, 1/wk, and ≥1/wk).

Atopy: One study (33) examined the relationship between frequency of fish consumption during the CF period and overall risk of atopic disease, or having been diagnosed with any of the following atopic diseases: asthma, atopic dermatitis, and/or allergic rhinitis. Results showed that increased frequency of fish consumption at 1 y was significantly associated with reduced risk of any allergic disease at 4 y (never vs. 1/mo, 2-3/mo, 1/wk, and ≥1/wk).

Cow's milk products

Sixteen studies examined the consumption of milk products during the CF period in relation to risk of developing atopic disease, including 1 RCT (2), 11 prospective cohort studies (3, 5, 6, 8, 20, 22, 26, 28, 29, 31, 32), 2 nested case-control studies (10, 30), and 2 case-control studies (13, 14) (**Table 6**). Three studies analyzed data from the Infants of Western Sweden cohort (20, 31, 32), but examined different outcomes or age of outcomes in relation to milk product consumption. Two studies examined data from the Protection Against Allergy in Rural Environments Study cohort (5, 6), but also examined different outcomes.

Six studies included a subject population where a large majority was considered high risk based on parental or family history of atopic disease (2, 5, 6, 8, 29, 32).

Perkin et al. (2) enrolled subjects from the general population who were exclusively BF. The remaining studies included a mix of BF, FF, or mixed-fed infants. And, most of the studies adjusted for infant milk feeding practices in analyses, though 1 did not (22).

Per the scope of this review, cow's milk infant formula or fluid cow's milk consumed during the first year of life were not considered to be CFB, and therefore, data related to infants' exposure to cow's milk through these products was not included. Considered below is exposure to milk products, such as cheese and yogurt. Perkin et al. (2) compared the early introduction (3 mo) of 6 allergenic foods, 1 of which was cow's milk yogurt, to standard introduction (6 mo). Most observational studies examined age of introduction to any milk product and/or a specific type of milk product (3, 5, 6, 8, 10, 13, 14, 20, 22, 26, 28-30). A few studies examined the type of spread used on breads (dairy vs. margarine) (20, 31, 32) and 1 examined the amount of milk products consumed (22).

Food allergy: Four studies examined the relationship between milk product consumption and risk of food allergy (2, 5, 10, 14). Perkin et al. (2) intention to treat analyses showed no differences between the standard and early introduction groups in risk of developing food allergy from 1-3 y, but showed that the early introduction group

(who were fed yogurt in addition to 5 other allergenic foods) had significantly lower risk of 1 or more food allergies from 1-3 y, but no significant group difference in risk of cow's milk allergy. Yu et al. (14) found that earlier introduction of dairy (<12 vs. 13-24, 25-36, and >36 mo) was significantly associated with reduced risk of food allergy at 14-18 y. Conversely, Grimshaw et al. (10) found that food allergy cases were introduced to cow's milk significantly earlier than controls without food allergy (22 vs. 26 wk). However, results for age of introduction to cow's milk dairy products in any form were null. In addition, Roduit et al. (5) found that age of yogurt, other milk products, margarine, and butter introduction was not significantly associated with food allergy at 6 y.

Atopic dermatitis: Nine studies examined the relationship between milk product intake and risk of atopic dermatitis (3, 6, 8, 13, 22, 26, 29-31). Most studies found no significant associations between the age of introduction to any milk products and atopic dermatitis (3, 6, 8, 13, 22, 26, 29, 30). Age of introduction to cheese (13, 30), or margarine or butter (6) was also found not to be significantly associated with atopic dermatitis. In addition, amount of dairy products consumed was not associated with atopic dermatitis at 2 y (22). However, Alm et al. (31) found that consuming margarine on bread vs. dairy spread was significantly associated with increased risk of atopic dermatitis at 12 mo., and Roduit et al. (6) reported that earlier yogurt introduction (3-12 vs. >12 mo) was significantly associated with decreased risk of atopic dermatitis at 1 y.

Asthma: Three studies examined milk product consumption and risk of asthma (5, 28, 32). Goksor et al. (32) found that toddlers (at 1 y) who consumed margarine or no spread vs. butter were significantly more likely to not be diagnosed with asthma at 8 y. However, Roduit et al. (5) reported no significant associations between age of yogurt, other milk product, margarine, and butter introduction and asthma at 6 y, while Virtanen et al. (28) found no significant association between age of milk product introduction and asthma at 5 y.

Allergic rhinitis: Three studies reported no significant associations between type of spread (butter vs. margarine) used (31), or age of milk product introduction (26, 28), and risk of allergic rhinitis.

Wheat

Eighteen studies examined the consumption of wheat during the CF period in relation to risk of developing atopic disease, including 1 RCT (2), 11 prospective cohort studies (3, 5-8, 22, 25, 27-29, 36), 5 nested case-control studies (9-12, 30), and 1 case-control study (14) (**Table 7**). Two studies examined data from the Protection Against Allergy in Rural Environments Study cohort (5, 6), but examined different outcomes. Two studies examined data from the Prevalence of Infant Food Allergy, or EuroPrevall, cohort, but examined overall risk of food allergy at 2 y (10) and IgE vs non-IgE-mediated food allergy at 2 y (9).

One study exclusively enrolled subjects who were considered to be at high risk because of parental or family history of atopic disease (25). Eight additional studies included a subject population where a large majority was high risk (5, 6, 8-11, 29, 36). Perkin et al. (2) enrolled subjects who were exclusively BF. The remaining studies included a mix of BF, FF, or mixed-fed infants. Almost all of the studies adjusted for

infant milk feeding practices in analyses, though a few did not (12, 14, 22).

Perkin et al. (2) compared the early introduction (3 mo) of 6 allergenic foods, 1 of which was wheat, to standard introduction (6 mo). All of the observational studies examined the age at which wheat was first consumed, including cereal (3, 5, 6, 8, 13, 22, 25, 29, 30, 36) or wheat or gluten (7, 9, 10, 12, 14). In addition, 1 cohort study also examined the amount of cereal consumed at 4 mo of age (22).

Food allergy: One RCT and 7 observational studies examined the relationship between consumption of wheat and risk of developing food allergy, with only two examining risk of wheat allergy specifically (2, 36).

Perkin et al. (2) intention to treat analyses showed no differences between the standard and early introduction groups in risk of developing food allergy from 1-3 y, but showed that the early introduction group (who were fed wheat in addition to 5 other allergenic foods) had significantly lower risk of 1 or more food allergies from 1-3 y, but no significant group difference in risk of wheat allergy.

Results of the observational studies were mixed. Four studies found no significant associations between age of introduction to wheat or cereals and risk of food allergy. Grimshaw et al. (10) reported that age of wheat introduction was not associated with food allergy at 2 y, and Grimshaw et al. (9) found no significant differences in age of wheat introduction between either IgE-mediated food allergy or non-IgE-mediated food allergy cases and non-allergic controls. Venter et al. (12) found no significant differences in age of wheat introduction between food allergy cases and controls at 1 y of age. In addition, Roduit et al. (5) found no significant association between age of cereal or bread introduction and risk of food allergy at 6 y.

Three studies found that earlier introduction to wheat was protective against development of food allergy. Poole et al. (36) reported that later introduction of cereal grains (>7 vs. 0-6 mo) was significantly associated with increased risk of wheat allergy at 4 y. Yu et al. (14) found that non-allergic controls (ages 14-18 y) were significantly more likely to be introduced to wheat/gluten earlier than cases who were diagnosed with any food allergy (<12 vs. 13-24, 25-36, and >36 mo). However, reverse causality cannot be ruled out in these studies. Roduit et al. (5) reported that earlier introduction of cake (3-12 vs. >12 mo) was significantly associated with decreased risk of food allergy at 6 y.

Finally, Kumar et al. (11) found that later introduction of rice and wheat cereal (>6 vs. <6 mo) was significantly associated with lower risk of food allergy at 6-7 y.

Atopic dermatitis: Nine observational studies examined the relationship between consumption of wheat and risk of developing atopic dermatitis (3, 6-8, 22, 25, 27, 29, 30).

Most studies found no significant associations between the age of introduction to wheat, cereals, biscuits, bread, or cake (3, 6-8, 22, 25, 27, 29, 30) or amount of cereal consumed (22) and risk of atopic dermatitis. Nwaru et al. (26) found that later introduction of biscuits/bread (≥6 vs. <6 mo) was significantly associated with increased risk of atopic dermatitis at 10 y in children without atopic dermatitis by 6 mo and in children without family history of atopy.

Asthma: Three observational studies examined the relationship between age of

introduction to grains or grain products and risk of developing asthma (5, 27, 28). Nwaru et al. (27) found that earlier wheat cereal introduction (<5, 5-5.5 vs. >5.5 mo) was significantly associated with a lower risk of asthma at 5 y. However, Roduit et al. (5) found no significant association between age of cereal, bread, or cake introduction and asthma at 6 y, and Virtanen et al. (28) reported no significant association between age of introduction to wheat and asthma at 5 y.

Allergic rhinitis: Two observational studies examined the relationship between age of introduction to grains or grain products and risk of developing allergic rhinitis (27, 28). Nwaru et al. (27) found that earlier introduction of wheat, rye, oat, and barley cereals (<5, 5-5.5 vs. >5.5 mo) was significantly associated with reduced risk of allergic rhinitis at 5 y, but no significant association with age of biscuit/bread introduction. Virtanen et al. (28) found no significant association between age of introduction to wheat and risk of allergic rhinitis at 10 y or 5 y, respectively.

Soy

Four prospective cohort studies examined the relationship between age of introduction to soy and risk of developing atopic disease (5-8) (**Table 8**). All 4 studies included a subject population where the majority of subjects were considered to be at high risk of atopic disease based on parental atopy history. In addition, all 4 studies included a mix of BF, FF, or mixed-fed infants and adjusted for infant milk feeding practices in analyses. Three studies examined risk of atopic dermatitis (6-8) and 1 examined risk of food allergy and asthma (5). None of the studies reported any significant associations between the age when soy was introduced and risk of developing any of the atopic diseases assessed.

CFB that are not common allergens

A number of observational studies examined the relationship between other types of CFB, not considered to be major allergens, and atopic diseases (**Table 9**). Most of the studies examined age of introduction to various types of CFB, including grains other than wheat, fruits and/or vegetables, meat, chocolate, fruit syrup, orange juice, water, vitamins, and honey. In addition, 1 study examined the amount of fruit, vegetables, or meat consumed (22), and 1 examined the frequency of fermented food consumption (32).

Several studies included a subject population in which the majority of subjects were considered to be at high risk of atopic disease based on parental atopy history (5, 6, 8, 25, 29, 32). In addition, all studies included a mix of BF, FF, or mixed-fed infants, and most adjusted for infant milk feeding practices in analyses, though a few did not (22, 37).

Grains: Seven observational studies examined the age of introduction to grains, other than wheat, and risk of atopic disease (13, 26-29, 36, 38).

One studies examined the age of introduction to grains and risk of food allergy (5, 36). Poole et al. (36) found no significant associations between age of introduction to rice cereal and risk of wheat allergy at 4 y.

Five observational studies examined the relationship between consumption of grains other than wheat and risk of developing atopic dermatitis (6, 13, 26, 27, 29, 38). Most studies found no significant associations between the age of introduction to various grains (6, 13, 26, 29, 30) and risk of atopic dermatitis. Nwaru et al. (27) found that earlier introduction of maize, rice, millet, and buckwheat cereal (<4.5, 4.5-5.5 vs. >5.5 mo) was significantly associated with increased risk of atopic dermatitis at 5 y. Harris et al. (38) reported that earlier rice introduction (<12 vs. >12 mo) was significantly associated with higher risk of visible dermatitis at 2 y.

Two observational studies examined the relationship between age of introduction to grains other than wheat and risk of developing asthma (5, 27, 28). Nwaru et al. (27) found that earlier rye, oat, and barley cereal introduction (<5, 5-5.5 vs. >5.5 mo), and Virtanen et al. (28) found that earlier oat introduction (<5 vs. >5.5mo; 5-5.5 vs >5.5 mo) were significantly associated with a lower risk of asthma at 5 y. However, Virtanen et al. (28) reported no significant association between age of introduction to rye, barley, and other cereal (maize, rice, millet and buckwheat) and asthma at 5 y.

Two observational studies examined the relationship between age of introduction to grains other than wheat and risk of developing allergic rhinitis (27, 28). Nwaru et al. (27) found that earlier introduction of rye, oat, and barley cereals (<5, 5-5.5 vs. >5.5 mo) was significantly associated with reduced risk of allergic rhinitis at 5 y. However, the other study found no significant association between barley, rye and oat; and other cereal (maize, rice, millet and buckwheat) (28) and risk of allergic rhinitis at 10 y or 5 y, respectively.

Fruits and/or vegetables: Fifteen observational studies examined the age of introduction to fruits and/or vegetables and risk of atopic disease (3, 5, 6, 8, 13, 22, 24-30, 35, 37), 1 of which also examined the amount of fruits and/or vegetables consumed (22).

Two studies examined age of introduction to fruits and/or vegetables and risk of IgE-mediated food allergy, and neither reported significant findings. Hesselmar et al. (24) found that age of fruit introduction was not significantly associated with food allergy at 18 mo, and Roduit et al. (5) found that age of vegetable or fruit introduction was not significantly associated with food allergy at 6 y.

Twelve studies examined fruits and/or vegetables consumption and risk of atopic dermatitis. A number of studies found no significant associations between age of introduction to fruit (3, 6, 8, 22, 24-27, 29, 30) or vegetables (3, 6, 22, 25-27, 30) and risk of atopic dermatitis. In addition, Fergusson et al. (22) found no significant association between the amount of vegetable or fruit consumed at 4 mo of age, and Oien et al. (35) found no significant association between frequency of vegetable consumption, and risk of atopic dermatitis at 2 y. However, a few studies reported mixed findings in terms of which fruits and vegetables and outcomes were examined. Sariachvili et al. (30) found that atopic dermatitis cases vs. controls (0-4 y) were significantly less often introduced to fruit juice early (<4 vs. >4 mo). Turati et al. (13) found that earlier introduction (<4 vs. >4 mo) of vegetables, legumes, roots, and fruit was significantly associated with decreased risk of atopic dermatitis through 24 mo. And, Zutavern et al. (8) reported that later vegetable introduction (>6 vs. 5-6 mo) was significantly associated with increased risk of doctor-diagnosed atopic dermatitis and early skin or allergic symptom atopic dermatitis at 5 y.

Four studies examined age of introduction to fruits and/or vegetables and risk of asthma, all of which reported no significant associations (5, 27, 28, 37). One additional study reported no significant association between frequency of vegetable consumption and risk of asthma at 2 y (35).

Three studies examined age of introduction to fruits and/or vegetables and risk of allergic rhinitis, all of which reported no significant associations at either 5 y (27, 28) or 10 y (26).

Meat: Twelve observational studies examined the age of introduction to meat and risk of atopic disease (3, 5, 6, 8, 13, 22, 25-30), 1 of which also examined the amount of meat consumed (22).

One study examined age of meat introduction and risk of food allergy at 6 y and reported no significant association (5).

Ten studies examined meat consumption and risk of atopic dermatitis, most of which found no significant associations between age of introduction to meat (6, 13, 22, 25-27, 29, 30) and risk of atopic dermatitis. In addition, Fergusson et al. (22) found no significant association between the amount of meat consumed at 4 mo of age and risk of atopic dermatitis at 2 y. However, 2 studies reported that meat introduction >6 mo was significantly associated with increased risk at ~4-5 y. Filipiak et al. (3) found that later meat introduction (>6 vs. <6 mo) was significantly associated with increased risk of doctor-diagnosed atopic dermatitis at 4 y, and Zutavern et al. (8) found that later meat introduction (>6 vs. 5-6 mo) was significantly associated with increased risk of doctor-diagnosed atopic dermatitis at 5 y.

Three studies examined age of introduction to meat and risk of asthma at either 5 or 6 y, all of which reported no significant associations (5, 27, 28). And, 3 studies examined age of introduction to meat and risk of allergic rhinitis at either 5 or 10 y, all of which reported no significant associations (26-28).

Other miscellaneous CFB: A few other foods and/or beverages were considered in relation to risk of developing atopic disease, the results of which are described below.

Three studies examined the age of introduction to chocolate and/or cacao, with 2 reporting that earlier introduction (3-12 vs. >12 mo) was significantly associated with decreased risk of atopic dermatitis at 1 y (6) and food allergy at 6 y (5). However, Roduit et al. (5) did not find any significant associations between age of introduction to chocolate and risk of asthma at 6 y. Also, Zutavern et al. (8) found no significant associations between the age of introduction to soy, peanuts and tree nuts, and chocolate and risk of atopic dermatitis at 2 y of age.

Strassburger et al. (37) found no significant associations between age of introduction to salty pureed foods and risk of asthma at 3-4 y of age. Andreasyan et al. (39) found no significant associations between age of fruit syrup, orange juice, water, vitamins, and honey introduction and risk of atopic dermatitis, asthma, or hay fever at 8 y of age. Finally, Goksor et al. (32) reported that higher frequency of fermented food consumption (1+ vs. 0 time/mo by age 1 y) was significantly associated with reduced risk of asthma at 8 y, but did not adjust for any potential confounders in the analysis.

Diet diversity

Twelve studies, including 11 prospective cohort studies and 1 case-control study, examined diet diversity (**Table 10**). Several of these studies analyzed data from the same cohorts of subjects: the Christchurch Health and Development Study (22, 40-42), the Protection Against Allergy–Study in Rural Environments Study (5, 6), and the Lifestyle-Related Factors on the Immune System, the Development of Allergy in Childhood Study in (8, 43), and the German Intervention Nutritional Intervention Program (3, 44). The 2 remaining studies analyzed a unique data set (13, 45).

Diet diversity was measured using different approaches. While all of the studies determined diet diversity by summing the total number of food groups introduced by a certain age, the studies differed in terms of which food groups were considered, how diet was assessed, the categorical variables that were created, and the age at which diet diversity was assessed. Most studies examined diet diversity at 4 mo of age (3, 8, 13, 22, 40-43, 45), while others examined it at 3 mo (45), 5 mo (13), 6 mo (3, 8, 44, 45), and 12 mo (45), In addition, 2 studies used dietary assessments taken from 3 mo to 12 mo to measure cumulative diet diversity during the first year of life (5, 6).

In addition, studies examined several different outcomes at a range of ages (from infancy through 18 y), using varied diagnostic methods. Most studies examined atopic dermatitis (3, 6, 8, 13, 22, 40-45), with fewer examining asthma (5, 43, 45), allergic rhinitis (5, 43, 45), or food allergy (5). Results regarding the relationship between diet diversity during the CF period and risk of atopic disease were inconsistent.

Fergusson et al. (22, 40-42) reported results from the same cohort of infants (the Christchurch Health and Development Study), looking at diet diversity at 4 mo and risk of developing atopic dermatitis later in childhood. These studies showed that greater diet diversity at 4 mo of age was associated with increased risk of atopic dermatitis later in childhood. Fergusson et al. (22, 42) found that greater diet diversity at 4 mo was significantly associated with increased risk of atopic dermatitis at 2 y and 3 y. Fergusson et al. (40) and Fergusson et al. (41) both reported atopic dermatitis results at 10 y of age, but used different analytic methods. Fergusson et al. (40) found that greater diet diversity was significantly associated with increased risk of recurrent/chronic atopic dermatitis at 10 y using a proportional hazard model, while Fergusson et al. (41) reported a similar significant association in terms of atopic dermatitis rates per 100 subjects. All 4 studies by Fergusson et al.(22, 40-42) examined diet diversity at a single time point early in the CF period, 4 mo of age, which may not have been reflective of the diversity of the diet over the course of the CF period. In addition, risk of atopic dermatitis was based mainly on maternal report of symptoms, with few diagnoses validated by a physician. Finally, these studies did not account for a number of key confounders that could have impacted results, and were conducted in a population with rates of breastfeeding that are lower than current rates in the US.

Schoetzau et al. (44) and Filipiak et al. (3) also looked at the relationship between diet diversity and atopic dermatitis, using data from subjects enrolled in the German Infant Nutritional Intervention Program. The studies differed in terms of how diet diversity was analyzed and age at which outcomes were assessed. Schoetzau et al. (44) examined diet diversity as a continuous variable at 24 wk of age, and examined risk of atopic dermatitis at 1 y of age as diagnosed by a physician. Filipiak et al. (3) examined diet diversity as a categorical variable at 4 mo and 6 mo of age, and examined risk of

atopic dermatitis at 4 y as reported by parents. Both studies reported no significant associations between diet diversity and risk of atopic dermatitis. However, subjects in these studies were originally part of an RCT designed to investigate the effect of different infant formulas on risk of allergy in a high risk population compared with a non-intervention control, who were primarily at low risk of atopic disease, and it is unclear whether their risk status or varied exposure to human milk, different infant formulas, or cow's milk could have impacted outcomes.

Nwaru et al. (45) examined the relationship between diet diversity at 3, 4, 6, and 12 mo and a number of atopic disease outcomes at 5 y of age, including atopic dermatitis, asthma (any asthma, atopic asthma, nonatopic asthma), and allergic rhinitis. These outcomes were assessed by parent report of symptoms and/or physician diagnosis. Results showed no significant associations between diet diversity at any time point and risk of atopic dermatitis or any type of asthma (i.e., atopic and nonatopic asthma combined) at 5 y. However, when types of asthma were considered separately, greater diet diversity at 4 mo was significantly associated with decreased risk of nonatopic asthma at 5 y, while lower diet diversity at 12 mo was significantly associated with increased risk of atopic asthma at 5 y. In addition, while diet diversity at 3 mo and 4 mo were not significantly associated with allergic rhinitis at 5 y, lower diet diversity at 6 mo and 12 mo was significantly associated with increased risk of allergic rhinitis at 5 y. However, interpretation of these results is limited due to lack of adjustment for key confounders, use of non-validated methods for assessing outcomes, and the possibility of reserve causation, particularly among at-risk children who exhibited atopic symptoms in early infancy or those with parental allergic history.

Roduit et al. (5, 6) examined the association of cumulative diet diversity from 3 to 12 mo of age with risk of atopic dermatitis at 1 y and 4 y (6) and risk of food allergy, asthma (any asthma, atopic asthma, non-atopic asthma), and allergic rhinitis (5). Results showed that lower diet diversity during the first year of life was significantly associated with increased risk of atopic dermatitis (6), and food allergy and asthma at 6 y (5). However, diet diversity was not significantly associated with risk of allergic rhinitis at 6 y (5). As with the previously discussed studies, interpretation of these results is limited due to lack of adjustment for key confounders, use of non-validated methods (e.g., parent report) for assessing outcomes, and the possibility of reserve causation, particularly among at-risk children who had parental allergic history and had allergenic food items introduced later than low risk children.

Zutavern et al. (8, 43) examined diet diversity at 4 and 6 mo in relation to risk of atopic dermatitis at 2 y (8) and diet diversity at 4 mo in relation to risk of atopic dermatitis, asthma, and allergic rhinitis at 6 y (43). All outcomes were determined based on parent report of symptoms and/or physician diagnosis. Zutavern et al. (8) found no significant association between diet diversity at 4 mo and atopic dermatitis. However, greater diet diversity at 6 mo was significantly associated with decreased risk of atopic dermatitis at 2 y. In addition, Zutavern et al. (43) found no significant associations between diet diversity at 4 mo with asthma or allergic rhinitis at 6 y, but did report that greater diet diversity at 4 mo was significantly associated with increased risk of atopic dermatitis at 6 y in children without early skin or allergic symptoms. These studies are also subject to methodological limitations, particularly the lack of adjustment for key confounders and use of non-validated methods for assessing outcomes.

Finally, Turati et al. (13) examined diet diversity at 4 mo and 5 mo in relation to atopic dermatitis risk in a case-control study. Controls, without atopic dermatitis, had significantly greater diet diversity at 4 mo and 5 mo compared to cases (who were diagnosed with atopic dermatitis by a physician). A key limitation of this study is that the case control design introduces the possibility of recall bias, as mothers recalled infant dietary intake retrospectively.

Dietary patterns

Two studies examined dietary patterns, both of which were nested case-control studies that used data from the Prevalence of Infant Food Allergy EuroPrevall Study conducted in the United Kingdom (9, 46) (**Table 10**). Both studies examined the association between dietary patterns during the CF period and risk of food allergy at 2 y (9, 46). Dietary patterns were identified using principal component analysis. Grimshaw et al. (46) identified 3 dietary patterns, while Grimshaw et al. (9) identified only 1 pattern for analysis. Food allergy cases were first identified based on parental report of clinical history, blood IgE levels ≥0.35, and/or skin prick test wheal ≥3mm. Infants were then placed on an exclusion diet, and those who experienced improved symptoms were then given a double-blind, placebo-controlled oral food challenge (DBPCFC) (including delayed reactions up to 48 hr after the challenge) to determine presence of food allergy.

In both studies, consuming the “healthy dietary pattern” (high scores for 'healthy' foods (commercial baby food, toddler snacks, carrots, potatoes, bananas, lentils, broccoli) and low scores for adult foods (potato products, ready meals, sauces)) was associated with decreased risk of food allergy at 2 y. Grimshaw et al. (46) found that control infants without food allergy had significantly higher 'Infant guidelines' pattern scores than cases diagnosed with food allergy. Grimshaw et al. (9) reported that lower "healthy infant pattern" score was significantly associated with increased total risk of food allergy, IgE-mediated food allergy, and non-IgE-mediated food allergy. Grimshaw et al. (46) did not find any significant associations between the other dietary patterns identified and risk of food allergy.

Evidence synthesis

Overall, there is evidence to suggest that introducing allergenic foods in the first year of life (after 4 mo) does not increase risk of food allergy or atopic dermatitis, but may prevent peanut and egg allergy. The strength of the evidence depends on the specific type of CFB being considered, as well as the outcome of interest.

Strong evidence suggests that introducing peanut in the first year of life (after 4 mo of age) may reduce risk of food allergy to peanut. This evidence is strongest for introducing peanut in infants at the highest risk (with severe atopic dermatitis and/or egg allergy) to prevent peanut allergy, but is also applicable to infants at lower risk. However, the evidence for tree nuts and sesame seeds in relation to food allergy risk is limited. In addition, limited evidence also suggests that there is no relationship between consumption of peanut, tree nuts, or sesame seeds during the complementary feeding period and risk of atopic dermatitis and asthma. Finally, there

is not enough evidence to determine if there is a relationship between consuming peanut, tree nuts, or seeds as complementary foods and allergic rhinitis.

Moderate evidence suggests that introducing egg in the first year of life (after 4 months of age) may reduce risk of food allergy to egg. Limited evidence suggests that there is no relationship between the age of introduction to egg and risk of atopic dermatitis and asthma. But, there is not enough evidence to determine if there is a relationship between consuming egg as a complementary food and allergic rhinitis. In addition, there is controversy over the forms of egg studied. Introduction of raw forms of egg (including ingestion of raw, pasteurized, dehydrated, egg white or whole-egg powder) is not recommended, as these forms may be associated with infection risk (e.g., Salmonella) and a higher risk of reactivity compared to cooked forms of egg, such as hard-boiled, scrambled, or baked. Raw forms of egg can induce more allergic reactions and more severe ones, as compared to baked and cooked forms; heating/cooking denature the egg protein, making it less allergenic than the raw form. While study subjects may not tolerate raw egg products, a majority of even egg-allergic patients can tolerate extensively heated (i.e., baked) egg-containing products (determination of baked egg tolerance in an egg-allergic patient should be done by a medical provider). The protective effects seen in the Natsume et al. (55) trial may also have been related to the smaller initial dose of 50 mg cooked egg given first, followed by the larger dose of 250 mg, resulting in a gradual desensitization to the increased egg protein over time.

Limited evidence suggests that introducing fish in the first year of life (after 4 mo of age) may reduce risk of atopic dermatitis. However, there is not enough evidence to determine if there is a relationship between consuming fish as a complementary food and risk of allergy to fish or other foods, asthma, or allergic rhinitis. There is also not enough evidence to determine if there is a relationship between consuming shellfish (i.e., crustaceans and mollusks) as a complementary food and risk of food allergy, atopic dermatitis, asthma, or allergic rhinitis.

Limited evidence also suggests there is no relationship between age of introduction of cow’s milk products, such as cheese and yogurt, and risk of food allergy and atopic dermatitis. But, there is not enough evidence to determine if there is a relationship between consuming milk products during the CF period and risk of asthma or allergic rhinitis.

A number of observational studies also examined the relationship between other types of CFB, not considered to be major allergens (e.g., fruit, vegetables, meat). Though this evidence was limited, it suggests that introducing foods not commonly considered to be allergens in the first year of life (after 4 mo of age) is not associated with risk of food allergy, atopic dermatitis, asthma, or allergic rhinitis.

Finally, there is not enough evidence to determine if there is a relationship between wheat or soy consumption, as well as diet diversity and dietary patterns, during the CF period and risk of food allergy, atopic dermatitis, asthma, or allergic rhinitis.

Overall, the strongest conclusions were drawn for CFB and atopic disease relationships that were examined in a larger number of studies with stronger designs. Stronger conslusions were not drawn in a number of cases due to a lack of high quality evidence available to address the relationship, as the evidence was entirely, or almost

entirely, observational in nature, including several case-controlled studies, which are prone to recall bias. In addition, many studies reported analyses that were done using data from the same cohort of subjects, or were done in small samples of individuals, or may not have been adequately powered.

The ability to draw stronger conclusions about the relationship between specific types of CFB, diet diversity, and dietary patterns and atopic disease was also restricted by a number of key methodological limitations. For example, different dietary assessment methods were used to determine what infants were consuming, and the studies considered different aspects of CFB (i.e., timing of introduction, different types consumed, the amount consumed) and examined dietary intake at different ages. In addition, studies employed different definitions of diet diversity, and typically assessed diet diversity at a single point in time, usually early in the CF period (as early as 3 to 4 months of age), and may not have reflected diversity of the diet over the entire period of complementary feeding. The 2 studies that examined dietary patterns examined the same dietary pattern in the same cohort of subjects, and it is not clear whether or not those patterns could be replicated in or are generalizable to other populations. In addition, per the scope of this review, studies that examined consumption of fluid cow's milk by infants less than 12 months (mo) of age were not included and reviewed, and only cow's milk products, such as cheese and yogurt, were considered as CFB. Future work should address this gap by systematically reviewing studies that examined fluid cow's milk prior during the first year of life in relation to health outcomes.

Furthermore, many studies used non-validated or unreliable measures to assess risk of atopic disease, such as parent report of a physician diagnosis or the child's symptoms. Few studies based outcome assessment on a diagnosis made by a study physician using established criteria. The age at which outcomes were assessed also varied. In several studies, outcomes were measured later in childhood, when some atopic diseases, such as atopic dermatitis, may have already resolved. In other studies, outcomes were assessed early in childhood, before some diseases may have occurred.

While subjects in the studies are generalizable to the U.S. population, important confounders known to be associated with atopic disease outcomes were not always accounted for in analyses, such as consumption of human milk and/or human milk substitutes (e.g., cow's milk formula, hydrolyzed infant formula, or fluid cow's milk), parental smoking, and exposure to household pets. In addition, the potential for reverse causality also exists in this body of evidence, as baseline atopic disease risk status, based on family history or symptoms occurring in early infancy, can impact the timing and types and amounts of CFB that are introduced, as well as risk of developing various atopic diseases in early childhood. Despite a number of studies in this body of evidence that included only high-risk infants and toddlers, the results are likely applicable to lower risk populations, though potential benefits related to allergy prevention may not be as great.

Research recommendations

In order to better assess the relationship between complementary feeding and risk of

atopic disease, additional research is needed that:

- Includes well-designed, targeted RCTs that address specific knowledge gaps
- Uses valid and reliable methods to assess infants' dietary intake and established criteria, testing, and/or biomarkers to diagnose atopic disease at ages appropriate to the typical presentation of the disease
- Adjusts for key confounders, including infant milk feeding practices (e.g., human milk, cow's milk formula, hydrolyzed infant formula, or fluid cow's milk), parental smoking, exposure to household pets, and the types of CFB introduced
- Accounts for potential reverse causality by considering subjects' baseline risk status for atopic disease
- Uses standard, consistent definitions of diet diversity, both in terms of the numbers and types of foods and food groups considered
- Considers the mechanisms by which specific types of foods, diet diversity, and dietary patterns may affect risk of developing atopic disease when determining which diet-health relationships to investigate, and what analyses are appropriate

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Table 1. Description of studies that examined the relationship between consumption of specific types of complementary foods and beverages (CFB) and risk of atopic disease

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Alm, 2009 Prospective Cohort Study; Sweden (Infants of Western Sweden) Sample Size: Baseline N: 5605 Analytic N: 4921 Attrition: 14% Sample Size Calculation: NR Sex: 48% Female Race/Ethnicity: NR Atopic Disease Risk Status: Eczema: 14% at 6mo, 21% at 12mo; Food allergy: 5% at 12mo Background Diet: EBF: 33% at 16wk, 10% at 6mo; Partially BF: 80% at 16wk, 66% at 6mo Age of introduction to CFB-18wk, Cow's milk - 9wk, Cereal - 22wk, Fish - 7mo, Eggs - 9mo	Intervention/Exposure: Fish (age, frequency, type) Milk products (type) Assessment Methods: FFQ Outcomes: Eczema Age: 12mo Assessment Methods: Eczema: Parent report of doctor diagnosis	Confounders: The following confounders were taken into account: Education, Socioeconomic status (SES), Sex, Feeding practices, Birth size, Gestational age, Smoking, Atopy risk status, Pets, urban area, sleep trouble, number siblings, dampness in home, lifestyle, alcohol, neonatal antibiotics, temperament, colic Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors were not blinded Did not adjust for key confounders (race/ethnicity)
Alm, 2011 Prospective Cohort Study; Sweden (Infants of Western Sweden) Sample Size: Baseline N: 5398 Analytic N: 4496 Attrition: 17% Sample Size Calculation: NR	Intervention/Exposure: Egg (age) Fish (age, frequency, type) Milk products (type) Assessment Methods: FFQ Outcomes:	Confounders: The following confounders were taken into account: Education, Sex, Feeding practices, Birth size, Gestational age, Smoking, Atopy risk status, Antibiotic use, pets, urban/rural Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors were not blinded

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Sex: 48% Female Race/Ethnicity: NR Atopic Disease Risk Status: NR Background Diet: FF at 1wk: 22% Fish consumption: 85% more than 1x/mo 0-1y of life	Allergic rhinitis Age: 4.5y Assessment Methods: Allergic rhinitis: Parent report of symptoms in last 12mo or doctor diagnosis	Attrition and sample size unclear Did not adjust for key confounders (race/ethnicity, SES)
Andreasyan, 2007 Prospective Cohort Study; Tasmania (Tasmanian Infant Health Survey; Childhood Allergy and Respiratory Health Survey) Sample Size: Baseline N: 596 Analytic N: 499 Attrition: 16% Sample Size Calculation: >80% power to detect OR >2 at P<0.05 Sex: NR Race/Ethnicity: NR Atopic Disease Risk Status: NR Background Diet: NR	Intervention/Exposure: Other (fruit syrup, orange juice, water, vitamins, and honey; age) Assessment Methods: Maternal interview Outcomes: Eczema, Asthma, Hay fever (allergic rhinitis) Age: 8y Assessment Methods: Eczema: Parent report of ever having eczema in the bends of elbows, wrists, or knees Asthma: Parent report of whistling/wheezing in last 12mo Hay fever (allergic rhinitis): Parent report of sneezing, running or blocked nose, sometimes with itchy eyes or nose	Confounders: The following confounders were taken into account: Education, Sex, Feeding practices, Birth size, Gestational age, Cat/dog ownership, mold in home Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors were not blinded Attrition and sample size unclear Did not adjust for key confounders (SES, race/ethnicity, smoking, atopy risk status)
Bellach, 2016 Randomized Controlled Trial; Germany (Hen's Egg Allergy Prevention Study (HEAP)) Sample Size: Egg Group Baseline N: 184	Intervention/Exposure: Egg (Egg vs. placebo from 4-6 to 12mo) Assessment Methods: NA Outcomes:	Confounders: N/A Limitations: Impact of high attrition rate not assessed Adherence was lower in the egg vs. rice group

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Rice Group Baseline N: 199 Egg Group Analytic N: 124 Rice Group Analytic N: 152 Attrition: 27% Sample Size Calculation: n=788 total (a=0.05, B=0.20) to determine a 50% reduction in sensitization to egg by 12mo Sex: 57% Female Race/Ethnicity: 94% White Atopic Disease Risk Status: Parental allergy: 66% Background Diet: EBF: 35%; Partially BF: 94%	Food allergy (egg) Age: 12mo Assessment Methods: Food allergy: DBPCFC for egg (all subjects had hen's egg-specific IgE <0.35 kU/L at baseline)	Due to concerns about safety, the trial was discontinued early Study may have been underpowered
Bisgaard, 2009 Prospective Cohort Study; Denmark (Copenhagen Study on Asthma in Childhood) Sample Size: Baseline N: 411 Analytic N: 356 Attrition: 13% Sample Size Calculation: NR Sex: 51% Female Race/Ethnicity: NR Atopic Disease Risk Status: Maternal asthma: 100% Background Diet: NR	Intervention/Exposure: Egg (age) Fish (age) Assessment Methods: NR Outcomes: Eczema Age: 3y Assessment Methods: Eczema: Physician diagnosis; severity based on SCORAD	Confounders: The following confounders were taken into account: Education, SES, Sex, Feeding practices, Birth size, Smoking, Atopy risk status, Antibiotics, delivery mode Limitations: Cannot determine whether groups were similar at baseline on key characteristics Did not adjust for key confounders (race/ethnicity, gestational age, pets) All subjects at high risk (maternal asthma)
Du Toit, 2015 Randomized Controlled Trial; United Kingdom (Learning Early About Peanut Allergy Trial (LEAP))	Intervention/Exposure: Peanuts, tree nuts, or seeds (Peanut consumption vs avoidance from 4 to 6mo)	Confounders: N/A Limitations:

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Sample Size: Peanut Avoidance Group Baseline N: 321 Peanut Consumption Group Baseline N: 319 Peanut Avoidance Group Analytic N: 295 Peanut Consumption Group Analytic N: 294 Attrition: 3% Power Calculation: Negative SPT, power to determine a difference of 9% in avoidance vs. 2% in consumption group was 89%; Positive SPT, power to determine a difference of 50% in avoidance vs. 20% in consumption group was 80% Sex: 40% female Race/Ethnicity: 73% White, 8% Black, 14% Mixed, 4% Asian, 1% Chinese/Mid-East/ other Atopic Disease Risk Status: Eczema, severe: 89%; Egg allergy: 62% Background Diet: NR	Assessment Methods: NA Outcomes: Food allergy (peanut), Asthma Age: 12mo, 30mo, 5y (60mo) Assessment Methods: Food allergy: OFC for peanut in subjects in whom peanut allergy was unlikely (no wheal after a SPT at 30, 60mo, no history of allergic symptoms after peanut ingestion, no diagnosis or suspicion of allergies to sesame or tree nut, and no history of anaphylaxis in response to any food), or a DBPCFC for peanut in subjects with possible peanut allergy Asthma: NR; categorized mild, moderate, or severe	Cannot determine whether groups were similar at baseline on key characteristics Outcomes at 5y may have been driven by sustained avoidance or sustained consumption beyond scope of CF period Study may have been underpowered All subjects were high risk (eczema or egg allergy)
Fergusson, 1981 Prospective Cohort Study; New Zealand (Christchurch Health and Development Study) Sample Size: Baseline N: 1262 Analytic N: 1156 Attrition: 8% Sample Size Calculation: NR Sex: NR	Intervention/Exposure: Egg (age, amount) Milk products (age, amount) Grain products (age, amount) Other (fruits, vegetables, meat; age, amount) Assessment Methods: Parent interview, food diary at 4mo Outcomes:	Confounders: The following confounders were taken into account: Atopy risk status Limitations: Cannot determine whether groups were similar at baseline on key characteristics Cannot determine recruitment methods, baseline characteristics, confounding factors, or blinding methods Outcome assessors were not blinded

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Race/Ethnicity: NR Atopic Disease Risk Status: Parental atopy: 24% Background Diet: EBF: 19%	Eczema Age: 2y Assessment Methods: Eczema: Maternal report, with some cases validated by doctor diagnosis	Did not adjust for key confounders (education, SES, sex, race/ethnicity, feeding practices, birth size, gestational age, smoking, pets)
Filipiak, 2007 Prospective Cohort Study; Germany (German Infant Nutritional Intervention Program) Sample Size: Baseline N: 5991 Analytic N: 4753 Attrition: 21% Sample Size Calculation: NR Sex: NR Race/Ethnicity: NR Atopic Disease Risk Status: Familial eczema: 40% intervention, 10% control Background Diet: EBF: 51% Introduction to CFB: Later, less diversity at 6mo in the intervention vs. control group	Intervention/Exposure: Egg (age) Fish (age) Milk products (age) Grain products (age) Peanuts, tree nuts, or seeds (age) Other (fruit, vegetables, meat, age) Assessment Methods: Parent questionnaire Outcomes: Eczema Age: 4y Assessment Methods: Eczema: Parent report of doctor diagnosis or recurrent symptoms lasting for 6mo at 1y and 2wk at 2-4y	Confounders: The following confounders were taken into account: Intervention group, Education, Sex, Feeding practices, Birth size, Smoking, Atopy risk status, Sex, study region, siblings, education, smoking, birth weight Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors (parent report) were not blinded Outcomes were not assessed using valid measures (parent report of physician diagnosis) Cannot determine attrition rates based on sample sizes presented in text/tables Did not adjust for key confounders (SES, race/ethnicity, gestational age, pets) Sample size calculations not reported
Goksor, 2013 Prospective Cohort Study; Sweden (Infants of Western Sweden) Sample Size:	Intervention/Exposure: Fish (age, frequency) Milk products (type) Other (fermented food; frequency)	Confounders: The following confounders were taken into account: Education, SES, Sex, Feeding practices, Birth size, Gestational age, Smoking, Atopy risk status, Rural living, antibiotics at 1wk, outdoor activity, pets in home

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Baseline N: 5044 Analytic N: 4051 Attrition: 20% Sample Size Calculation: NR Sex: 48% Female Race/Ethnicity: NR Atopic Disease Risk Status: Familial atopy: 60%; Food allergy: 4%; Eczema: 19% Background Diet: BF: 80% >4mo Fish consumption: 72% <9mo, 85% ≥1/mo at <1y; Fermented foods: 83% ≥1/mo+ at <1y	Assessment Methods: FFQ Outcomes: Asthma, Atopic asthma, Non-atopic asthma Age: 8y Assessment Methods: Asthma: Parent report of doctor diagnosis, current wheeze, or use of asthma medication Atopic asthma: Asthma with parent report of allergic sensitization and/or doctor diagnosed rhinoconjunctivitis, food allergy, or eczema	Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors were not blinded Outcome measures used were not valid/reliable Did not adjust for key confounders (race/ethnicity)
Greenhawt, 2016 Prospective Cohort Study; United Kingdom (Learning Early About Peanut Allergy Trial (LEAP)) Sample Size: Peanut Avoidance Group Baseline N: 321 Peanut Consumption Group Baseline N: 319 Peanut Avoidance Group Analytic N: 295 Peanut Consumption Group Analytic N: 294 Attrition: 3% Power Calculation: Negative SPT, power to determine a difference of 9% in avoidance vs. 2% in consumption group was 89%; Positive SPT, power to determine a difference of 50% in avoidance vs. 20% in consumption group was 80% Sex: 40% Female	Intervention/Exposure: Peanuts, tree nuts, or seeds (age) Assessment Methods: FFQ; peanut frequency questionnaire Outcomes: Food allergy (peanuts) Age: 60mo (5y) Assessment Methods: Food allergy: for peanut in subjects in whom peanut allergy was unlikely (no wheal after a SPT at 30, 60mo, no history of allergic symptoms after peanut ingestion, no diagnosis or suspicion of allergies to sesame or tree nut, and no history of anaphylaxis in	Confounders: No confounders were accounted for Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors were not blinded Did not adjust for key confounders (education, SES, sex, race/ethnicity, feeding practices, birth size, gestational age, smoking, atopy risk status, pets) Did not adequately report statistical analyses, P-values, or data reported in figures All subjects were high risk (eczema or egg allergy)

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Race/Ethnicity: 73% White, 8% Black, 14% Mixed, 4% Asian, 1% Chinese/Mid-East/ other Atopic Disease Risk Status: Eczema, severe: 89%; Egg allergy: 62% Background Diet: NR	response to any food), or a DBPCFC for peanut in subjects with possible peanut allergy	
Grimshaw, 2013 Nested Case-Control Study; United Kingdom (Prevalence of Infant Food Allergy EuroPrevall) Sample Size: Food Allergy Cases: 41 Controls: 82 Attrition: NA Sample Size Calculation: NR Sex: 46% Female Race/Ethnicity: 95% Caucasian Atopic Disease Risk Status: Maternal asthma: 27% cases, 13% controls; Maternal allergy: 54% cases, 38% controls Background Diet: BF: 94% initiated, 7wk EBF duration, 22wk duration	Intervention/Exposure: Egg (age) Fish (age) Milk products (age) Grain products (age) Peanuts, tree nuts, or seeds (age) Assessment Methods: Food diary Outcomes: Food allergy Age: 2y Assessment Methods: Food allergy: Parent report with clinical history, IgE≥0.35 and/or SPT wheal ≥3mm; exclusion diet with improved symptoms; and DBPCFC (including delayed reactions up to 48hr after the challenge)	Confounders: The following confounders were taken into account: Education, Sex, Feeding practices, Smoking, Atopy risk status, Pet ownership, maternal age, single birth Limitations: Cannot determine whether participants were similar at baseline on key characteristics Did not adjust for key confounders (SES, race/ethnicity, birth size, gestational age) Small sample size, potentially underpowered
Grimshaw, 2016 Nested Case-Control Study; United Kingdom (Prevalence of Infant Food Allergy EuroPrevall) Sample Size:	Intervention/Exposure: Egg (age) Assessment Methods: Food diary	Confounders: The following confounders were taken into account: Education, Sex, Race/ethnicity, Feeding practices, Birth size, Gestational age, Smoking, Atopy risk status, Pets in home, urban

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Food Allergy Cases: 41 Controls: 82 Attrition: NA Sample Size Calculation: NR Sex: 49 % Female Race/Ethnicity: 96% Caucasian Atopic Disease Risk Status: Maternal atopy: 67%; Paternal atopy: 54%; Maternal food allergy: 22%; Paternal food allergy: 12% Background Diet: BF: 91% initiated, 2.25wk EBF duration, 16wk BF duration	Outcomes: Food allergy Age: 2y Assessment Methods: Food allergy: Parent report with clinical history, IgE≥0.35 and/or SPT wheal ≥3mm; exclusion diet with imrpoved symptoms; and DBPCFC (including delayed reactions up to 48hr after the challenge)	Limitations: Cannot determine whether participants were similar at baseline on key characteristics Did not account for high loss to follow-up Did not adjust for key confounders (SES, feeding practices) Due to concerns about reverse causality, age of egg introduction was not included in multivariate analyses Small sample size, potentially underpowered
Gustafsson, 2000 Prospective Cohort Study; Sweden Sample Size: Baseline N: 100 Analytic N: 94 Attrition: 6% Sample Size Calculation: NR Sex: NR Race/Ethnicity: NR Atopic Disease Risk Status: Familial atopy: 69%; Familial atopic dermatitis: 58% Background Diet: BF: 53% <6mo; FF: 44% <4mo Hen's egg: 69% <12mo; Fish: 35% <7mo	Intervention/Exposure: Egg (age) Fish (age) Assessment Methods: Parent questionnaire Outcomes: Atopic dermatitis, Asthma, Allergic rhinitis Age: 4mo-8y Assessment Methods: Atopic dermatitis: Parent report and clinical exam; pruritic, chronic, or chronically relapsing dermatitis Asthma: Parent report of ≥3 episodes of bronchial obstruction diagnosed by doctor	Confounders: The following confounders were taken into account: Feeding practices, Smoking, Atopy risk status, Pets in home, fever, febrile episodes Limitations: Cannot determine whether participants were similar at baseline on key characteristics Cannot determine validity/reliability of measures Cannot determine whether outcome assessors were blinded Did not adjust for key confounders (education, SES, sex, race/ethnicity, birth size, gestational age) All subjects were high risk (familial atopy)

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
	Allergic rhinitis: Parent report of ≥2 episodes of rhinitis and conjunctivitis after exposure to a particular allergen, unrelated to infection	
Harris, 2001 Prospective Cohort Study; United Kingdom Sample Size: Baseline N: 667 Analytic N: 624 Attrition: 3% Sample Size Calculation: NR Sex: 46% Female Race/Ethnicity: NR Atopic Disease Risk Status: Familial atopy, eczema, hay fever, asthma: 26%-38% Background Diet: BF: 62%	Intervention/Exposure: Grain products (age) Assessment Methods: Parent questionnaire Outcomes: Atopic eczema Age: 2y Assessment Methods: Atopic eczema: Parent report and clinical examination; itchy skin in the past 12mo plus ≥3 of following: a history of flexural involvement, history of a generally dry skin, history of allergic disease in parents or siblings and visible dermatitis as per photographic protocol	Confounders: The following confounders were taken into account: Education, SES, Sex, Feeding practices, Atopy risk status, House dust mites, crowding Limitations: Cannot determine whether participants were similar at baseline on key characteristics Cannot determine validity/reliability of measures Did not adjust for key confounders (race/ethnicity, birth size, gestational age, smoking, pets)
Hesselmar, 2010 Prospective Cohort Study; Sweden (ALLERGY-FLORA) Sample Size: Baseline N: 207 Analytic N: 184 Attrition: 11% Sample Size Calculation: NR Sex: 50% Female Race/Ethnicity: NR	Intervention/Exposure: Egg (age) Fish (age) Other (fruit, age) Assessment Methods: Food diary Outcomes: Food allergy, Eczema Age: 18mo	Confounders: The following confounders were taken into account: Feeding practices, Gestational age, Atopy risk status Limitations: Cannot determine whether participants were similar at baseline on key characteristics Cannot determine whether outcome assessors were blinded

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Atopic Disease Risk Status: Familial atopy: 49% maternal, 41% paternal Background Diet: BF: 88% initiated, 76% BF at 6mo, 4mo EBF duration, 7.5mo BF duration Age of CFB introduction: Solids - 4mo, Fruit - 5mo, Hen's egg - 12mo	Assessment Methods: Food allergy: Symptoms (immediate or late-onset reaction) after food ingestion, with OFC, and/or food-specific IgE, SPT wheal ≥3mm, and/or GI biopsy/multi-organ reactions Eczema: Doctor diagnosis	Did not adjust for key confounders (education, SES, race/ethnicity, birth size, smoking, pets)
Kull, 2006 Prospective Cohort Study; Sweden Sample Size: Baseline N: 4089 Analytic N: 3619 Attrition: 12% Sample Size Calculation: NR Sex: 49% Female Race/Ethnicity: NR Atopic Disease Risk Status: Familial atopy: 37% any parent, 9% both parents; Recurrent wheeze: 4% at 1y; Eczema: 15% at 1y Background Diet: BF: 20% <4mo Fish consumption at 1y: 10% never, 10% <1/mo, 35% 1/wk, 26% >1/wk, 80% 2-3/mo+	Intervention/Exposure: Fish (age, frequency) Assessment Methods: Parent questionnaire Outcomes: Eczema, Asthma, Allergic rhinitis, Atopy Age: 1y, 2y, 4y Assessment Methods: Asthma: Parent report of 4 episodes of wheeze in the past 12mo or 1 episode+steroid Eczema: Parent report of dry skin and itchy rash for >2wk in last 12mo or doctor diagnosis Allergic rhinitis: Parent report of sneezing, running nose, red itchy eyes after exposure in the past 24mo Atopy: Parent report of 2+ of asthma, eczema, a/o allergic rhinitis at age 4y	Confounders: The following confounders were taken into account: Feeding practices, Smoking, Atopy risk status, Maternal age Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors were not blinded Did not adjust for key confounders (education, SES, sex, race/ethnicity, birth size, gestational age, pets)
Kumar, 2010 Nested Case-Control Study; United States Sample Size: Food Allergy Cases: 411	Intervention/Exposure: Grain products (age) Combined allergens (egg, fish, shellfish, peanut, tree nut, sesame; age)	Confounders: The following confounders were taken into account: SES, Sex, Race/ethnicity, Feeding practices, Atopy risk status, Delivery mode, day care, birth order, pets

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Asymptomatic Sensitized Cases: 171 Controls: 378 Attrition: NA Sample Size Calculation: NR Sex: 44% Female Race/Ethnicity: 86% Caucasian Atopic Disease Risk Status: Familial eczema: 36%; Familial food allergy: 16%; Familial atopy: 88% Background Diet: BF: 88% initiated, 24% EBF	Assessment Methods: Parent questionnaire Outcomes: Food allergy Age: 6-7y Assessment Methods: Food allergy: Serum IgE>0.35 kUA/L; SPT, wheal ≥3mm with typical symptoms of an allergic reaction within 2hrs of ingestion for egg, white, sesame, peanut, soy, milk, shrimp, walnut, cod fish, or wheat	Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors were not blinded Did not adjust for key confounders (education, birth size, gestational age, smoking) Study may have been underpowered
Nafstad, 2003 Prospective Cohort Study; Norway (Oslo Birth Cohort) Sample Size: Baseline N: 3754 Analytic N: 2531 Attrition: 34% Sample Size Calculation: NR Sex: NR Race/Ethnicity: NR Atopic Disease Risk Status: NR Background Diet: NR	Intervention/Exposure: Fish (age) Assessment Methods: Parent questionnaire Outcomes: Atopic dermatitis, Asthma, Allergic rhinitis Age: 4y Assessment Methods: Atopic dermatitis: Parent report of doctor diagnosis, symptoms experienced in previous 12mo Asthma: Parent report of doctor diagnosis, symptoms experienced in previous 12mo Allergic rhinitis: Parent report of doctor diagnosis, symptoms experienced in previous 12mo	Confounders: The following confounders were taken into account: Education, SES, Sex, Feeding practices, Birth size, Smoking, Atopy risk status, Eczema at 6mo, parity, maternal age, birth order, pregnancy complications, pets, respiratory infections from 0-12mo Limitations: Cannot determine whether groups were similar at baseline on key characteristics Did not use valid/reliable measures, particularly for assessing outcomes Outcome assessors were not blinded Did not account for high loss to follow-up Did not adjust for key confounders (race/ethnicity, gestational age) Study may have been underpowered

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Natsume, 2017 Randomized Controlled Trial; Japan (Prevention of Egg Allergy with Tiny Amount Intake Study) Sample Size: Egg Group Baseline N: 74 Placebo Group Baseline N: 73 Egg Group Analytic N: 74 Placebo Group Analytic N: 73 Attrition: 18% Sample Size Calculation: N=92/group to detect relative reduction of egg allergy of 65% Sex: 35% Female Race/Ethnicity: NR Atopic Disease Risk Status: Atopic dermatitis: 100%; No food allergy or history of reaction to hen's egg Background Diet: BF: 94% at 6mo, 70% at 12mo Age of CFB introduction: 5.6mo	Intervention/Exposure: Egg (egg vs. placebo from 6 to 12mo) Assessment Methods: NA Outcomes: Food allergy Age: 1y Assessment Methods: Food allergy: OFC with immediate reactions for egg	Confounders: The following confounders were taken into account: Feeding practices, Gestational age, Atopy risk status Limitations: Study was terminated early because of an unexpectedly large group difference at the planned interim analysis All subjects were high risk (atopic dermatitis)
Niinivirta, 2014 Prospective Cohort Study; Finland Sample Size: Baseline N: 238 Analytic N: 223 at 6mo; 211 at 12mo; 185 at 24mo; 129 at 48mo Attrition: 7% at 6mo, 11% at 12mo, 22% at 24mo, 46% at 48mo Sample Size Calculation: NR	Intervention/Exposure: Egg (age) Fish (age) Grain products (age) Other (fruit, vegetables, meat; age) Assessment Methods: Food diary Outcomes:	Confounders: The following confounders were taken into account: Sex, Feeding practices, Gestational age, Atopy risk status, Parity, animals at home, method of birth Limitations: Cannot determine whether groups were similar at baseline on key characteristics Cannot determine whether outcome assessors were blinded

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Sex: 48% Female Race/Ethnicity: NR Atopic Disease Risk Status: Familial atopy: 100% Background Diet: BF: 73% >6mo, 3.4mo EBF duration, 8.3mo BF duration	Atopic eczema Age: 6mo, 1y, 2y, 4y Assessment Methods: Atopic eczema: Doctor diagnosed eczema, based on confirmation with pruritus, facial and/or extensor involvement and chronic course (>1mo); SPT wheal >3mm for cow's milk, raw hen's egg white, wheat and rice flour, gliadin, cod, soya bean, birch, six grasses, cat, dog, Dermatophagoides pteronyssimus allergen, latex, and potato, carrot and banana	Did not account for high loss to follow-up Did not adjust for key confounders (education, SES, race/ethnicity, birth size, smoking) Only reported cumulative incidence at 4y, and not incidence at other time points measured (6mo, 1y, or 2y) All subjects were high risk (familial atopy)
Nwaru, 2013a Prospective Cohort Study; Finland (Finnish Type 1 Diabetes Prediction and Prevention Study) Sample Size: Baseline N: 4075 Analytic N: 3781 Attrition: 7% Sample Size Calculation: NR Sex: 47% Female Race/Ethnicity: NR Atopic Disease Risk Status: Parental asthma: 13%; Parental allergic rhinitis: 52% Background Diet: BF: 1.4mo EBF duration, 7mo BF duration	Intervention/Exposure: Egg (age) Fish (age) Grain products (age) Other (fruit, vegetables, meat; age) Assessment Methods: Parent questionnaire Outcomes: Atopic eczema, Asthma, Allergic rhinitis Age: 5y Assessment Methods: Atopic eczema: Parent report of doctor diagnosis Asthma: Parent report of doctor diagnosis, with any wheezing symptom or use of asthma medication during last 12mo	Confounders: The following confounders were taken into account: Education, Sex, Feeding practices, Birth size, Gestational age, Smoking, Atopy risk status, Number of siblings, hospital of birth, season of birth, maternal age, pets at home, mode of delivery Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors were not blinded Did not adjust for key confounders (SES, race/ethnicity) Did not show adjusted data, or data when CFB were analyzed as continuous variables

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
CFB introduction: Cow's milk at 1.8mo, followed by roots, fruits and berries, oats, wheat, rye, barley, meat, fish, and egg	Allergic rhinitis: Parent report of sneezing, nasal congestion, or rhinitis other than with respiratory tract infections accompanied by itching of the eye and tearing during last 12mo	
Nwaru, 2013b Prospective Cohort Study; United Kingdom (Study of Eczema and Asthma To Observe the Influence of Nutrition) Sample Size: Baseline N: 1924 Analytic N: 934 Attrition: 51% Sample Size Calculation: NR Sex: 50% Female Race/Ethnicity: NR Atopic Disease Risk Status: Maternal atopy: 41% Background Diet: BF: 31% <2.25mo, 51% EBF <3.75mo; FF: 81%	Intervention/Exposure: Egg (age) Fish (age) Milk products (age) Grain products (age) Other (fruit, vegetables, meat; age) Assessment Methods: Maternal questionnaire Outcomes: Eczema, Hay fever (allergic rhinitis) Age: 10y Assessment Methods: Eczema: Parent report of doctor diagnosis Hay fever (allergic rhinitis): Parent report of doctor diagnosis	Confounders: The following confounders were taken into account: Education, SES, Sex, Feeding practices, Birth size, Gestational age, Smoking, Atopy risk status, Birth order, maternal age, use if antibiotics by 1y Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors were not blinded Did not adjust for key confounders (race/ethnicity, pets) Did not use valid/reliable measures (parent report of outcomes) Did not account for high loss to follow-up
Oien, 2010 Prospective Cohort Study; Norway (Prevention of Allergy Among Children in Trondheim Study) Sample Size: Baseline N: 5171 Analytic N: 3086 Attrition: 40%	Intervention/Exposure: Fish (frequency/type) Other (vegetables; frequency) Assessment Methods: FFQ Outcomes:	Confounders: The following confounders were taken into account: SES, Sex, Feeding practices, Birth size, Smoking, Atopy risk status Limitations: Groups differed at baseline in terms of maternal education, but this was not adjusted for in analyses

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Sample Size Calculation: NR Sex: 51% Female Race/Ethnicity: NR Atopic Disease Risk Status: Familial atopy: 35% (one family member), 26% (two), 6% (three) Background Diet: BF: 74% EBF >4mo	Eczema, Asthma Age: 2y Assessment Methods: Eczema: Parent report of ever having eczema or itchy rash for at least 6mo Asthma: Parent report of doctor diagnosis	Outcome assessors were not blinded Did not adjust for key confounders (education, race/ethnicity, gestational age, pets) Did not use valid/reliable measures (parent report of outcomes) Did not account for high loss to follow-up Only conducted multivariate analyses for variables that were significant with univariate analyses
Palmer, 2013 Randomized Controlled Trial; Australia Sample Size: Egg Group Baseline N: 49 Rice Group Baseline N: 37 Egg group Analytic N: 42 Rice Group Analytic N: 35 Attrition: 10% Sample Size Calculation: N=103/group to detect a 20% risk reduction Sex: 34% Female Race/Ethnicity: 79% White (maternal race) Atopic Disease Risk Status: Eczema, moderate to severe: 100%; Familial atopy: >90% Background Diet: BF: 99% initiated, 84% at 4mo No CFB introduction (<4mo) or experience ingesting egg	Intervention/Exposure: Egg (Egg vs. placebo from 4-6 to 10mo) Assessment Methods: NA Outcomes: Food allergy (egg) Age: 8mo, 12mo Assessment Methods: Food allergy: OFC and positive SPT for egg	Confounders: N/A Limitations: 78% and 64% of subjects did not follow advice to consume an egg-free diet (no difference between groups) Due to concerns about safety, the trial was discontinued early Study may have been underpowered All subjects were high risk (eczema)

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Palmer, 2016 Randomized Controlled Trial; Australia (Starting Time of Egg Protein Trial (STEP)) Sample Size: Egg Group Baseline N: 407 Egg-free Group Baseline N: 413 Egg Group Analytic N: 371 Egg-free Group Analytic N: 377 Attrition: 9% Sample Size Calculation: N=597/group to detect a 50% risk reduction; final sample size provided 68% power to detect a 50% risk reduction Sex: 51% Female Race/Ethnicity: 89% White (maternal race) Atopic Disease Risk Status: Maternal atopy: 100%; Eczema: 0% Background Diet: BF: 99% initiated, 66% at 4mo No CFB introduction (<4mo) or experience ingesting egg	Intervention/Exposure: Egg (Egg vs. placebo from 4-6 to 10mo) Assessment Methods: NA Outcomes: Food allergy (egg) Age: 12mo Assessment Methods: Food allergy: OFC and positive SPT for egg	Confounders: The following confounders were taken into account: Sex, Feeding practices, Birth size, Gestational age, Atopy risk status, City Limitations: Subjects could introduce eggs beginning at 10mo, but outcomes weren't assessed until 12mo (and egg intake from 10 to 12mo was not reported or accounted for) Study was underpowered (68% power; study recruitment ended due to funding constraints) All subjects were high risk (maternal atopy)
Perkin, 2016 Randomized Controlled Trial and Prospective Cohort Study; United Kingdom (Enquiring about Tolerance Trial (EAT)) Sample Size: Standard Introduction Group Baseline N: 651 Early Introduction Group Baseline N: 652 Standard Introduction Group Analytic N: 595	Intervention/Exposure: Egg (amount) Peanuts, tree nuts, or seeds (amount) Combined allergens (Early introduction (3mo) of cow's milk (yogurt), peanut, cooked (boiled) hen's egg, sesame, and whitefish, and wheat vs late (6mo)) Assessment Methods: NA	Confounders: N/A Limitations: C-section rate differed between groups at baseline, and was not adjusted for Adherence to the study protocol was lower in the early introduction group Participants were not blinded to their intervention group; Cannot determine whether investigators were blinded

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Early Introduction Group Analytic N: 567 Attrition: 11% Sample Size Calculation:80% power at the 5% significance level to detect 50% reduction in prevalence of food allergy Sex: 49% Female Race/Ethnicity: 85% White, 3% Black, 2% Asian, 1% Chinese, 9% Mixed Atopic Disease Risk Status: Parental atopy: 82%; Eczema: 24% Background Diet: BF: 100% EBF	Outcomes: Food allergy (cow's milk, peanut, egg, sesame, fish, or wheat) Age: 1-3y Assessment Methods: Food allergy: Positive SPT and DBPCFC for cow's milk, peanut, egg, sesame, fish, or wheat	
Poole, 2006 Prospective Cohort Study; United States (Diabetes Autoimmunity Study in the Young) Sample Size: Baseline N: 1819 Analytic N: 1612 Attrition: 11% Sample Size Calculation: NR Sex: 31% Female Race/Ethnicity: 70% non-Hispanic White, 23% Hispanic, 4% Biracial, 2% Black Atopic Disease Risk Status: Familial atopy: 63% Background Diet: BF: 10.3mo duration CFB introduction: 75% introduced to cereal grains >7mo, 75% introduced to rice <6mo	Intervention/Exposure: Grain products (age) Assessment Methods: Parent questionnaire Outcomes: Food allergy (wheat) Age: 3, 6, 9, 12, 15mo, 2y, 3y, 4y Assessment Methods: Food allergy: Parent report of doctor diagnosis of wheat allergy	Confounders: The following confounders were taken into account: Feeding practices, Atopy risk status Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors were not blinded Did not adjust for key confounders (SES, sex, education, race/ethnicity, birth size, gestational age, smoking, pets) Did not use valid/reliable measures (parent report of outcomes)

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Roduit, 2012 Prospective Cohort Study; Austria, Finland, France, Germany, Switzerland (Protection Against Allergy in Rural Environments Study) Sample Size: Baseline N: 1133 Analytic N: 1041 Attrition: 8% Sample Size Calculation: NR Sex: NR Race/Ethnicity: NR Atopic Disease Risk Status: Parental allergy: 54% Background Diet: BF: 66% EBF at 2mo, 46% >6mo CFB introduction: 2% received no CFB by 12mo; Among children with allergic parents, dairy products, egg, nut, and soy were introduced later	Intervention/Exposure: Egg (age) Fish (age) Milk products (age) Grain products (age) Peanuts, tree nuts, or seeds (age) Soybeans (age) Other (fruit, vegetables, meat, chocolate; age) Assessment Methods: Food diary Outcomes: Atopic dermatitis Age: 1y, 4y Assessment Methods: Atopic dermatitis: Parent report of doctor diagnosis at least once between 12mo and 4y, or medical exam with positive SCORAD scores (>0) assessed at 1y, or both	Confounders: The following confounders were taken into account: Education, Feeding practices, Smoking, Atopy risk status, Study center, farming Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors were not blinded Did not use valid/reliable measures (parent reported outcomes) Did not adjust for key confounders (SES, sex, race/ethnicity, birth size, gestational age, pets) Did not report statistical results of analyses shown in figures
Roduit, 2014 Prospective Cohort Study; Austria, Finland, France, Germany, Switzerland (Protection Against Allergy in Rural Environments Study) Sample Size: Baseline N: 1133 Analytic N: 856 Attrition: 24%	Intervention/Exposure: Egg (age) Fish (age) Milk products (age) Grain products (age) Peanuts, tree nuts, or seeds (age) Soybeans (age)	Confounders: The following confounders were taken into account: Education, Sex, Feeding practices, Smoking, Atopy risk status, Study center, farmer, number of siblings Limitations: Cannot determine whether groups were similar at baseline on key characteristics

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Sample Size Calculation: NR Sex: 50% Female Race/Ethnicity: NR Atopic Disease Risk Status: Parental allergy: 54% Background Diet: BF: 91% initiated, 26% >10mo	Other (fruit, vegetables, meat, chocolate; age) Assessment Methods: Food diary Outcomes: Food allergy, Asthma Age: 6y Assessment Methods: Food allergy: Parent report of doctor diagnosis Asthma: Parents report of doctor diagnosis or at least 2 doctor-diagnosed episodes of obstructive bronchitis in the last 12 mo Allergic rhinitis: Parent report of itchy, runny, or blocked nose without a cold and associated with red itchy eyes, or doctor diagnosis	Outcome assessors were not blinded Did not use valid/reliable measures (parent reported outcomes) Did not adjust for key confounders (SES, race/ethnicity, birth size, gestational age, pets) Did not report statistical results of analyses shown in figures
Sariachvili, 2010 Nested Case-Control Study; Belgium (Influence of Perinatal Factors on the Occurrence of Asthma and Allergies Study) Sample Size: Eczema cases: 252 Controls: 305 Attrition: NA Sample Size Calculation: NR Sex: 50% Female Race/Ethnicity: NR	Intervention/Exposure: Egg (age) Fish (age) Milk products (age) Grain products (age) Other (fruit, vegetables, meat; age) Assessment Methods: Parent questionnaire Outcomes: Eczema Age: 0-4y	Confounders: The following confounders were taken into account: Education, Sex, Feeding practices, Birth size, Smoking, Atopy risk status, Birth order, maternal age Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors were not blinded Did not use valid/reliable measures (parent reported outcomes) Did not adjust for key confounders (SES, race/ethnicity, gestational age, pets)

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Atopic Disease Risk Status: Parental allergy: 63% cases, 46% controls Background Diet: BF: 46% >4mo; FF: 70% <4mo CFB introduction: 45% <4mo	Assessment Methods: Eczema: Parent report of 1+ episode	Did not report statistical results of analyses shown in figures, or adjusted results for timing of introduction of individual food items
Strassburger, 2010 Prospective Cohort Study; Brazil Sample Size: Baseline N: 397 Analytic N: 354 Attrition: 12% Sample Size Calculation: NR Sex: 44% Female Race/Ethnicity: NR Atopic Disease Risk Status: Maternal asthma: 13%; Paternal asthma: 8% Background Diet: BF: 36% EBF for >4mo, 12% EBF for >6mo Cow's milk: 40% <4mo	Intervention/Exposure: Other (fruit, salty pureed food; age) Assessment Methods: Parent questionnaire Outcomes: Asthma Age: 3-4y Assessment Methods: Asthma: Parent report	Confounders: The following confounders were taken into account: SES, Sex, Birth size, Gestational age, RCT group Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors were not blinded Did not use valid/reliable measures (parent reported outcomes) Cannot determine whether key confounders were adjusted for as the confounders included in adjusted analyses were not described
Tromp, 2011 Prospective Cohort Study; The Netherlands (Generation R Study) Sample Size: Baseline N: 7893 Analytic N: 6905 Attrition: 13%	Intervention/Exposure: Egg (age) Grain products (age) Peanuts, tree nuts, or seeds (age) Soybeans (age) Assessment Methods: Parent questionnaire; FFQ	Confounders: The following confounders were taken into account: Education, SES, Sex, Race/ethnicity, Feeding practices, Birth size, Gestational age, Smoking, Atopy risk status, Parity, child medication us, day care attendance Limitations: Cannot determine whether groups were similar at baseline on key characteristics

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Sample Size Calculation: NR Sex: 49% Female Race/Ethnicity: 63% Dutch/ Western, 37% non-Western Atopic Disease Risk Status: Parental atopy: 47% Background Diet: BF: 89% initiated, 5% EBF for 6mo	Outcomes: Eczema Age: 2y, 3y, 4y Assessment Methods: Eczema: Parent report	Outcome assessors were not blinded Did not use valid/reliable measures (parent reported outcomes) Did not adjust for key confounders (pets)
Turati, 2016 Case-Control Study; Italy Sample Size: Atopic Dermatitis Cases: 451 Controls: 451 Attrition: NA Sample Size Calculation: NR Sex: 33% Female Race/Ethnicity: NR Atopic Disease Risk Status: NR Background Diet: NR	Intervention/Exposure: Egg (age) Fish (age) Milk products (age) Grain products (age) Peanuts, tree nuts, or seeds (age) Other (fruit, vegetables, meat; age) Assessment Methods: Parent questionnaire Outcomes: Atopic dermatitis Age: 3-24mo Assessment Methods: Atopic dermatitis: Physician diagnosis based on the following eight mandatory conditions: ‘no previous diagnosis of AD’, ‘first symptoms occurring no longer than 5 months before AD diagnosis’, ‘symptoms occurring also in the last 4 weeks’, ‘the child is suffering from itching’, ‘the child has eczematous lesions’, ‘age-specific affected areas’, ‘flexural	Confounders: The following confounders were taken into account: Education, Sex, Race/ethnicity, Feeding practices, Gestational age, Smoking, Atopy risk status, Center, age, period of enrollment, maternal age, number of siblings, type of delivery, vitamin D supplementation Limitations: Inclusion and exclusion criteria not described, so cannot determine whether they were the same between cases/controls Cannot determine whether groups were similar at baseline on key characteristics Did not use valid/reliable measures (to assess dietary intake) Did not adjust for key confounders (SES, birth size, smoking, pets))

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
	involvement', and 'the groin and armpits areas are not affected, unless a diagnosis of inverted psoriasis'	
Venter, 2016 Nested Case-Control Study; United Kingdom (Food Allergy and Intolerance Research Cohort) Sample Size: Food Allergy Cases: 39 Controls: 78 Attrition: NA Sample Size Calculation: N=96 cases and 192 controls Sex: 35% Female Race/Ethnicity: Predominantly Caucasian Atopic Disease Risk Status: Maternal allergy: 23%; Maternal hay fever: 35%; Maternal eczema: 27%; Maternal food allergy: 20% Background Diet: BF: EBF for 1mo Age of CFB introduction: 112d	Intervention/Exposure: Egg (age) Grain products (age) Peanuts, tree nuts, or seeds (age) Assessment Methods: Parent questionnaire Outcomes: Food allergy Age: 1y Assessment Methods: Food allergy: SPT wheal >3mm and DBPCFC for milk, egg, wheat, cod, peanut, or sesame	Confounders: No confounders were accounted for Limitations: Cannot determine whether groups were similar at baseline on key characteristics Cannot determine whether outcome assessors were blinded Did not adjust for any key confounders (Education, SES, sex, race/ethnicity, feeding practices, birth size, gestational age, smoking, atopy risk status, pets))
Virtanen, 2010 Prospective Cohort Study; Finland (Diabetes Prediction and Prevention Study) Sample Size: Baseline N: 1374 Analytic N: 1288 Attrition: 6% Sample Size Calculation: NR	Intervention/Exposure: Egg (age) Fish (age) Milk products (age) Grain products (age) Other (fruit, vegetables, meat; age) Assessment Methods: Parent questionnaire	Confounders: The following confounders were taken into account: Sex, Feeding practices, Gestational age, Smoking, Atopy risk status, Maternal age, delivery mode, study area, siblings, pets Limitations: Cannot determine whether groups were similar at baseline on key characteristics

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Sex: 48% Female Race/Ethnicity: NR Atopic Disease Risk Status: Parental asthma: 14%; Parental allergic rhinitis: 60%; Parental atopic eczema: 48% Background Diet: NR	Outcomes: Asthma, Allergic rhinitis Age: 5y Assessment Methods: Asthma: Parent report of doctor diagnosis with either wheezing or asthma medication use during the previous 12mo Allergic rhinitis: Parent report of sneezing, nasal congestion or rhinitis other than with respiratory infection with the symptoms of rhinitis eye itching and tearing	Cannot determine whether outcome assessors were blinded Did not use valid/reliable measures (to assess outcomes) Did not adjust for any key confounders (Education, SES, race/ethnicity, birth size)
Wei-Liang Tan, 2016 Randomized Controlled Trial; Australia (Beating Egg Allergy Trial (BEAT)) Sample Size: Egg Group Baseline N: 165 Rice Group Baseline N: 154 Egg Group Analytic N: 130 Rice Group Analytic N: 124 Attrition: 20% Sample Size Calculation: N=160/group had 80% power at a 2-sided 5% a value to detect a difference in sensitization from 15% in the control group to 5% in the egg group Sex: 48% Female Race/Ethnicity: NR Atopic Disease Risk Status: Familial atopy: 100%; No response to a SPT to commercial egg white at 4mo	Intervention/Exposure: Egg (Egg vs. placebo from 4 to 8mo) Assessment Methods: NA Outcomes: Food allergy (egg), Atopic eczema Age: 4mo, 8mo, 12mo Assessment Methods: Food allergy: OFC, reaction to egg at dietary introduction after 8mo, and/or an egg-white SPT wheal >3mm at 12mo; probable egg allergy defined as reaction to egg with IgE-mediated symptoms within 1hr of ingestion and SPT response >3 mm OR reaction to egg OFC OR SPT response >5 mm Atopic eczema: Physical exam, with severity scores using SCORAD	Confounders: N/A Limitations: All subjects were high risk (familial atopy)

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Background Diet: BF: 45% EBF at 4mo		
Yu, 2011 Case-Control Study; United States Sample Size: Allergic Cases: 67 Non-Allergic Controls: 191 Attrition: NA Sample Size Calculation: NR Sex: NR Race/Ethnicity: NR Atopic Disease Risk Status: NR Background Diet: NR	Intervention/Exposure: Egg (age) Fish (age) Milk products (age) Grain products (age) Peanuts, tree nuts, or seeds (age) Assessment Methods: Parent questionnaire Outcomes: Food allergy Age: 14-18y Assessment Methods: Food allergy: Student/parent report of food allergies and whether those allergies had been confirmed via IgE, SPT, and/or other confirmation by a health care professional	Confounders: No confounders were accounted for Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors were not blinded Did not use valid/reliable measures (to assess outcomes) Did not adjust for any key confounders (Education, SES, sex, race/ethnicity, feeding practices, birth size, gestational age, smoking, atopy risk status, pets) Small sample size, potentially underpowered
Zutavern, 2004 Prospective Cohort Study; United Kingdom Sample Size: Baseline N: 642 Analytic N: 552 Attrition: 14% Sample Size Calculation: NR Sex: 47% Female	Intervention/Exposure: Egg (age) Fish (age) Milk products (age) Grain products (age) Other (fruit, vegetables, meat; age) Assessment Methods: Parent questionnaire	Confounders: The following confounders were taken into account: Education, SES, Sex, Feeding practices, Birth size, Smoking, Atopy risk status, Number of rooms in house, birth order, number of siblings, maternal age Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors were not blinded

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
Race/Ethnicity: NR Atopic Disease Risk Status: Parental atopy: 63%; Parental asthma: 25% Background Diet: BF: 63% initiated CFB introduction: 45% introduced to solids >3mo	Outcomes: Eczema Age: 5y Assessment Methods: Eczema: Parent report of doctor diagnosis	Did not use valid/reliable measures (to assess outcomes) Did not adjust for any key confounders (race/ethnicity, gestational age, pets))
Zutavern, 2006 Prospective Cohort Study; Germany (Lifestyle-Related Factors on the Immune System and the Development of Allergies in Childhood Study) Sample Size: Baseline N: 3097 Analytic N: 2612 Attrition: 16% Sample Size Calculation: NR Sex: 48% Female Race/Ethnicity: NR Atopic Disease Risk Status: Parental atopy: 53% Background Diet: NR	Intervention/Exposure: Egg (age) Fish (age) Milk products (age) Grain products (age) Combined allergens (soybean, nut, cacao, and chocolate; age) Other (fruit, vegetables, meat; age) Assessment Methods: Parent questionnaire Outcomes: Atopic dermatitis Age: 2y Assessment Methods: Atopic dermatitis: Parent report of doctor diagnosis in last 6mo ("doctor-diagnosed"); parent reported of itching eczema within the last 6mo that was either recurrent or lasted for 2wk and that affected the skin creases, face, neck, extremities, hands, feet, or trunk (not under diaper) ("active AD"); or parent report of doctor diagnosis or eczema related to food	Confounders: The following confounders were taken into account: Education, Sex, Feeding practices, Birth size, Smoking, Atopy risk status, Study center Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors were not blinded Did not use valid/reliable measures (to assess outcomes) Did not adjust for any key confounders (SES, race/ethnicity, gestational age, pets))

Subject Characteristics (Sample Size, Sex, Race/Ethicity, Atopic Disease Risk Status; Background Diet)	Independent Variable/Exposure, Outcomes	Confounders, Limitations
	intolerance by 6mo of age ("early skin or allergic symptoms")	

Table 2. Summary of studies examining the relationship between diet diversity or dietary patterns during the complementary feeding period and food allergy, atopic dermatitis/eczema, asthma, and allergic rhinitis

Reference; Sample Size; Subject Characteristics	Intervention/Exposure; Outcomes	Confounders; Limitations
Diet Diversity		
Fergusson, 1981 Prospective Cohort Study; New Zealand (Christchurch Health and Development Study) Sample Size: Baseline N: 1262 Analytic N: 1156 Attrition: 8% Sample Size Calculation: NR Sex: NR Race/Ethnicity: NR Atopic Disease Risk Status: ~24% had parental atopy history Background Diet: ~19% received "breast milk only" at 4 months (mo)	Intervention/Exposure: Diet diversity at 4mo: 0, 1-2, 3-4, 5+ food groups Food groups: cereals, vegetables, dairy products, meat, fruits, egg or related products, other solid foods Assessment Methods: Parent interview and food diary Outcomes: Eczema Age: 2y Assessment Methods: Eczema: Maternal report; some with physician follow-up	Confounders: The following confounders were taken into account: Atopy risk status Limitations: Cannot determine whether groups were similar at baseline on key characteristics Cannot determine recruitment methods, baseline characteristics, confounding factors, or blinding methods Outcome assessors were not blinded Did not use valid/reliable measures to assess outcomes (maternal report of eczema) Did not adjust for key confounders (education, SES, sex, race/ethnicity, feeding practices, birth size, gestational age, smoking, pets) Examined diet diversity at a single time point early in the CF period (4mo) when few subjects were introduced to CFB A small percentage of infants (19%) were EBF at 4mo, which may not be representative of current infant feeding practices, and could have impact eczema risk
Fergusson, 1982 Prospective Cohort Study; New Zealand (Christchurch Health and Development Study) Sample Size:	Intervention/Exposure: Diet diversity at 4mo: 0, 1-3, 4+ food groups Food groups: cereals, vegetables, dairy products, meat products, fruits, egg	Confounders: The following confounders were taken into account: Feeding practices Limitations:

Reference; Sample Size; Subject Characteristics	Intervention/Exposure; Outcomes	Confounders; Limitations
Baseline N: 1265 Analytic N: 1143 Attrition: 10% Sample Size Calculation: NR Sex: NR Race/Ethnicity: NR Atopic Disease Risk Status: ~24% had parental atopy history Background Diet: NR	Assessment Methods: Parent interview and food diary Outcomes: Eczema Age: 3y Assessment Methods: Eczema: Cumulative rates based on maternal report; some with physician follow-up	Cannot determine whether groups were similar at baseline on key characteristics Cannot determine recruitment methods, baseline characteristics, confounding factors, or blinding methods Outcome assessors were not blinded Did not use valid/reliable measures to assess outcomes (maternal report of eczema) Did not adjust for key confounders (education, SES, sex, race/ethnicity, birth size, gestational age, smoking, atopy risk status, pets) Examined diet diversity at a single time point early in the CF period (4mo) when few subjects were introduced to CFB
Fergusson,1990 Prospective Cohort Study; New Zealand (Christchurch Health and Development Study) Sample Size: Baseline N: 1265 Analytic N: 1067 Attrition: 15.6% Sample Size Calculation: NR Sex: NR Race/Ethnicity: NR Atopic Disease Risk Status: 44% of eczema cases had 1 or both parents with eczema; 57% of eczema cases parents had history of asthma or allergic rhinitis Background Diet: NR	Intervention/Exposure: Diet diversity at 4mo: 0, 1-3, 4+ food groups Food groups: cow's milk, cereals, vegetables, dairy products, meat, fruit, egg/related products, other foods Assessment Methods: Parent interview and food diary Outcomes: Eczema Age: 10y Assessment Methods: Eczema: Chronic, recurrent based on maternal report; some with physician follow-up	Confounders: The following confounders were taken into account: Education, SES, Sex, Race/ethnicity, Feeding practicies, Atopy risk status, Birth order Limitations: Cannot determine recruitment methods, baseline characteristics, confounding factors, or blinding methods Outcome assessors were not blinded Did not use valid/reliable measures to assess outcomes (maternal report of eczema) Did not adjust for key confounders (birth size, gestational age, smoking, pets) Examined diet diversity at a single time point early in the CF period (4mo) when few subjects were introduced to CFB

Reference; Sample Size; Subject Characteristics	Intervention/Exposure; Outcomes	Confounders; Limitations
		The period of follow-up (10y) may have missed the timeframe during which outcomes were expected to be seen
Fergusson, 1994 Prospective Cohort Study; New Zealand (Christchurch Health and Development Study) Sample Size: Baseline N: 1262 Analytic N: 1141 Attrition: 9.6% Sample Size Calculation: NR Sex: NR Race/Ethnicity: NR Atopic Disease Risk Status: Of those who had severe eczema, 65% had a history of asthma or allergic rhinitis; 22% food allergy Background Diet: NR	Intervention/Exposure: Diet diversity at 4mo: 0, 1-3, 4+ food groups Food groups: cows milk, cereals, eggs, vegetables, fruit, meat, dairy products, other foods Assessment Methods: Parent interview and food diary Outcomes: Eczema Age: 10y Assessment Methods: Eczema: Maternal report; some with physician follow-up	Confounders: The following confounders were taken into account: Education, SES, Sex, Feeding pracrtices, Atopy risk status Limitations: Cannot determine whether groups were similar at baseline on key characteristics Cannot determine recruitment methods, baseline characteristics, confounding factors, or blinding methods Outcome assessors were not blinded Did not use valid/reliable measures to assess outcomes (maternal report of eczema) Did not adjust for key confounders (race/ethnicity, birth size, gestational age, smoking, pets) Examined diet diversity at a single time point early in the CF period (4mo) when few subjects were introduced to CFB The period of follow-up (10y) may have missed the timeframe during which outcomes were expected to be seen
Filipiak, 2007 Prospective Cohort Study; Germany (German Infant Nutritional Intervention Program) Sample Size: Baseline N: 5991 (N=2252 in intervention, N=3739 in non-intervention groups)	Intervention/Exposure: Diet diversity at 4mo: 0, 1-2, 3-8 food groups Diet diversity at 6mo: 0, 1-2, 3-4, 5-8 food groups Food groups: vegetables, cereal, fruit, meat, dairy, egg, fish, other (nuts/cocoa/chocolate/ soybean)	Confounders: The following confounders were taken into account: Feeding practices, Atopy risk status, Sex, Study region, Siblings, Education, Smoking, Birth weight, Pets Limitations:

Reference; Sample Size; Subject Characteristics	Intervention/Exposure; Outcomes	Confounders; Limitations
Analytic N: 4753 Attrition: 21% Sample Size Calculation: NR Sex: NR Race/Ethnicity: NR Atopic Disease Risk Status: Familial history of eczema: intervention 39.9%, non-intervention 9.8%; 100% of subjects in the intervention group had family history of atopic disease Background Diet: ~50% EBF for 4mo	Assessment Methods: Parent questionnaire Outcomes: Eczema Age: 4y Assessment Methods: Eczema: Parent report of doctor diagnosis or recurrent symptoms lasting for 6mo up to age 1y and for 2wk at age 2-4y	Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors (parent report) were not blinded Did not use valid/reliable measures to assess outcomes (parent report of physician diagnosed eczema) Did not adjust for key confounders (SES, race/ethnicity, gestational age, pets) Multi-component intervention may have confounded outcome (randomization to four different formulas+ recommendations) Sample size calculations not reported
Nwaru, 2014 Prospective Cohort Study; Finland (Finnish Type 1 Diabetes Prediction and Prevention Study) Sample Size: Baseline N: 4,075 Analytic N: 3,142 Attrition: 22.9% Sample Size Calculation: NR Sex: 48% Female Race/Ethnicity: NR Atopic Disease Risk Status: 16% with parental asthma; 62% with parental allergic rhinitis Background Diet: NR	Intervention/Exposure: Diet diversity at 3mo: 0, 1-2, 2+ food groups Diet diversity at 4mo: 0, 1-2, 3-4, 4+ food groups Diet diversity at 6mo: 0-4, 5-6, 7-8, 8+ food groups Diet diversity at 12mo: 0-7, 8-9, 10-11, 11+ food groups Food groups: cow's milk and infant formula; potatoes; carrots; turnip; fruits and berries (as a combined variable); cereals (rye, wheat, oats, and barley as a combined variable); other cereals (maize, rice, millet, and buckwheat as a combined variable), meat; fish; egg; cabbage; spinach; and lettuce Assessment Methods: Parent questionnaire Outcomes: Asthma, atopic asthma, nonatopic asthma (asthma not asssociated with any other atopic disease), allergic rhinitis, atopic eczema	Confounders: The following confounders were taken into account: Education, Sex, Birth size, Gestational age, Smoking, Atopy risk status, Number of siblings, Delivery hospital, Season of birth, Maternal age, Pets at home, Delivery mode Limitations: Cannot determine whether groups were similar at baseline on key characteristics Did not use valid/reliable measures for all outcomes Did not adjust for key confounders (SES, race/ethnicity, feeding practices) Multiple comparisons could increase risk of type 1 error Cannot determine whether the associations reported are due to any diversity of food intake, or if certain food groups contributed more than others

Reference; Sample Size; Subject Characteristics	Intervention/Exposure; Outcomes	Confounders; Limitations
	Age: 5y Assessment Methods: Asthma: Parent report of doctor-diagnosed asthma plus either any wheezing symptom or use of asthma medication during last 12mo (validated) Allergic rhinitis: Parent report of sneezing, nasal congestion, or rhinitis other than with respiratory tract infections accompanied by itching of the eye and tearing during last 12mo Atopic eczema: Parent report of ever diagnosed by doctor	Cannot rule out potential for reverse causality, where children with early symptoms (e.g. wheezing) may have received restricted diets
Roduit, 2012 Prospective Cohort Study; Austria, Finland, France, Germany, Switzerland (Protection Against Allergy–Study in Rural Environments Study) Sample Size: Baseline N: 1,133 Analytic N: 1,041 Attrition: 8.1% Sample Size Calculation: NR Sex: NR Race/Ethnicity: NR Atopic Disease Risk Status: 53.6% had at least 1 allergic parent Background Diet: At 2mo, 66% were EBF; 46.4% BF for >6mo; 1.7% received no CFB by 12mo	Intervention/Exposure: Diet diversity from 3-12mo: 0-3, 4-5, 6 food groups Food groups: vegetables or fruits, cereals, bread, meat, cake, and yogurt (food items introduced in the diet of 80% of the children by 12 mo) Assessment Methods: Food diary Outcomes: Atopic dermatitis Age: 1y, 4y Assessment Methods: Atopic dermatitis: Parent report that the child had atopic dermatitis diagnosed by a doctor at least once between 12mo and 4y, positive SCORAD scores (>0) assessed at the age of 1y during medical examination, or both	Confounders: The following confounders were taken into account: Education, Feeding practices, Smoking, Atopy risk status, Study center, Farming Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors were not blinded Did not use valid/reliable measures to assess outcomes (parent reported atopic dermatitis) Did not adjust for key confounders (SES, sex, race/ethnicity, birth size, gestational age, pets) Did not report statistical results of analyses shown in figures

Reference; Sample Size; Subject Characteristics	Intervention/Exposure; Outcomes	Confounders; Limitations
Among children with allergic parents, allergenic food items, such as dairy products, egg, nut, and soy, were introduced later		
Roduit, 2014 Prospective Cohort Study; Austria, Finland, France, Germany, Switzerland (Protection Against Allergy–Study in Rural Environments Study) Sample Size: Baseline N: 1,133 Analytic N: 856 Attrition: 24.4% Sample Size Calculation: NR Sex: 49.5% Female Race/Ethnicity: NR Atopic Disease Risk Status: 53.6% had at least 1 allergic parent Background Diet: 9.4% never BF, 26.4% BF >10mo Among children with allergic parents, allergenic food items, such as dairy products, egg, nut, and soy, were introduced later	Intervention/Exposure: Diet diversity from 3-12mo: 0-3, 4-5, 6 food groups Food groups: vegetables or fruits, cereals, bread, meat, cake, and yogurt (food items introduced in the diet of 80% of the children by 12 mo) Assessment Methods: Food diary Outcomes: Food allergy, asthma (any asthma, atopic asthma, non-atopic asthma), allergic rhinitis Age: 6y Assessment Methods: Food allergy: Parents reported up to age 6y that the child had at least once been given a diagnosis of food allergy by a doctor Asthma: Parents reported at least once that the child had either doctor-diagnosed asthma or at least 2 doctor-diagnosed episodes of obstructive bronchitis in the last 12 mo Allergic rhinitis: Parent reported presence of symptoms (itchy, runny, or blocked nose without a cold and associated with red itchy eyes) or doctor-diagnosed allergic rhinitis	Confounders: The following confounders were taken into account: Education, Sex, Feeding practices, Smoking, Atopy risk status, Study center, Farmer, Number of siblings Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors were not blinded Did not use valid/reliable measures (parent reported outcomes) Did not adjust for key confounders (SES, race/ethnicity, birth size, gestational age, pets) Did not report statistical results of analyses shown in figures
Schoetzau, 2002 Prospective Cohort Study; Germany (German Infant Nutritional Intervention Program)	Intervention/Exposure: Diet diversity at 24wk: Continuous, total number of food groups consumed	Confounders: The following confounders were taken into account: Education, Sex, Race/ethnicity, Feeding practices, Gestational age, Smoking, Atopy risk status, Pets

Reference; Sample Size; Subject Characteristics	Intervention/Exposure; Outcomes	Confounders; Limitations
Sample Size: Baseline N: 2,252 Analytic N: 1,121 Attrition: CD Sample Size Calculation: NR Sex: 49% Female Race/Ethnicity: NR Atopic Disease Risk Status: 42% with 1+ core family members with atopic dermatitis Background Diet: 77% BF, 23% fed cow's milk (excluded FF infants from the original studt)	Food groups: dairy products, egg, cereals, legumes, vegetables, fruits, nuts, meat products, fish, and other foods Assessment Methods: Food diary Outcomes: Atopic dermatitis Age: 1y Assessment Methods: Atopic dermatitis: Physician diagnosis defined by a combination of diagnostic criteria, including typical morphology and distribution of skin lesions (face, neck and scalp, flexural folds, hands and extensor sides of extremities); pruritus (signs of scratching); and a tendency towards chronicity (duration of least 14d and/or relapsing)	Limitations: Cannot determine whether groups were similar at baseline on key characteristics Did not adjust for key confounders (SES, birth size) Cannot rule out reverse causality
Turati, 2016 Case-control study; Italy Sample Size: Cases: 451 Controls: 451 Attrition: NA Sample Size Calculation: NR Sex: 33% Female Race/Ethnicity: NR Atopic Disease Risk Status: NR Background Diet: All infants were weaned by 6mo	Intervention/Exposure: Diet diversity at 4mo: 0, 1-2, 3-22 food groups Diet diversity at 5mo: 0, 1-7, 8-22 food groups Food groups: vegetables, legumes, or roots (potatoes, carrots, tomatoes, and beans), fruit (apples, pears, peaches, apricots, plums, citrus fruits, red fruits), cereals (maize/tapioca, rice, pasta, and gluten-free pasta), meat (poultry, pork, and beef), dairy products (cheese, and other dairies), fish, eggs, and nuts/cacao/chocolate Assessment Methods: Parent questionnaire Outcomes: Atopic dermatitis Age: 3-24mo	Confounders: The following confounders were taken into account: Education, Sex, Race/ethnicity, Feeding practices, Gestational age, Atopy risk status, Center, Age, Nutrient intake, Period of enrollment, Maternal age, Number of siblings, Type of delivery Limitations: Inclusion and exclusion criteria not described, so cannot determine whether they were the same between cases/controls Cannot determine whether groups were similar at baseline on key characteristics Did not use valid/reliable measures to assess dietary intake

Reference; Sample Size; Subject Characteristics	Intervention/Exposure; Outcomes	Confounders; Limitations
	Assessment Methods: Atopic dermatitis: Physician diagnosed based on the following eight mandatory conditions: 'no previous diagnosis of AD', 'first symptoms occurring no longer than 5 months before AD diagnosis', 'symptoms occurring also in the last 4 weeks', 'the child is suffering from itching', 'the child has eczematous lesions', 'age-specific affected areas', 'flexural involvement', and 'the groin and armpits areas are not affected, unless a diagnosis of inverted psoriasis'	Did not adjust for key confounders (SES, birth size, smoking, pets)
Zutavern, 2006 Prospective Cohort Study; Germany (Lifestyle-Related Factors on the Immune System and the Development of Allergies in Childhood) Sample Size: Baseline N: 3097 Analytic N: 2612 Attrition: 15.7% Sample Size Calculation: NR Sex: 48% Female Race/Ethnicity: NR Atopic Disease Risk Status: 53% with parental history of atopy Background Diet: 59% EBF at 4mo, 35.7% mixed fed, 5.2% formula fed	Intervention/Exposure: Diet diversity at 4mo: 0, 1-2, 3-8 food groups Diet diversity at 6mo: 0, 1-2, 3-4, 5-8 food groups Food groups: vegetables, cereal, fruit, meat, dairy products (milk), egg, fish, others (soybean, nuts, cacao, chocolate) (from 48 single food items) Assessment Methods: Parent questionnaire Outcomes: Atopic dermatitis Age: 2y Assessment Methods: Doctor-diagnosed atopic dermatitis: when parents reported a physician's diagnosis of atopic dermatitis in the last 6mo Symptomatic atopic dermatitis: when parents reported an itching eczema within the last 6mo that was either recurrent or lasted for 2wk and that affected the skin creases, face, neck, extremities, hands, feet, or trunk (not underneath the diaper)	Confounders: The following confounders were taken into account: Education, Sex, Feeding practices, Birth size, Smoking, Atopic risk status, Study center, Number of siblings Limitations: Cannot determine whether groups were similar at baseline on some key characteristics Outcome assessors were not blinded Did not use valid/reliable measures (to assess outcomes) Did not adjust for any key confounders (SES, race/ethnicity, gestational age, pets) The period of follow-up (6y) may have missed the timeframe during which outcomes were expected to be seen

Reference; Sample Size; Subject Characteristics	Intervention/Exposure; Outcomes	Confounders; Limitations
	Early skin or allergic symptoms: when parents gave an affirmative response to the question, “Has a doctor diagnosed your child with 1 of the following conditions within the first 6mo of life: atopic dermatitis; allergic or atopic eczema; food allergy, hives, urticaria, or allergic edema; milk crust or seborrheic eczema; eczema without further specification?” or when parents reported an increase of eczema as a result of food intolerance within the first 6mo of their child’s life	
Zutavern, 2008 Prospective Cohort Study; Germany (Lifestyle-Related Factors on the Immune System and the Development of Allergies in Childhood) Sample Size: Baseline N: 3097 Analytic N: 2073 Attrition: 33.1% Sample Size Calculation: NR Sex: 49.2% Female Race/Ethnicity: NR Atopic Disease Risk Status: 53% with parental history of atopy Background Diet: 59% EBF at 4mo, 35.7% mixed fed, 5.2% formula fed	Intervention/Exposure: Diet diversity at 4mo: 0, 1-2, 3-8 food groups Food groups: vegetables, cereal, fruit, meat, dairy products (milk), egg, fish, others (egg, soybean, nuts, cacao, chocolate) (from 48 single food items) Assessment Methods: Parent questionnaire Outcomes: Atopic dermatitis, asthma, allergic rhinitis Age: 6y Assessment Methods: Atopic dermatitis: Parent report of doctor diagnosis, or report of itching eczema within the last 6mo that was recurrent or lasted for 2wk and that affected the skin creases, face, neck, extremities, hands, feet, or trunk (not underneath the diaper) Asthma: Parent report of doctor diagnosis of asthma or reported the child’s wheezing or intake of asthma medication Allergic rhinitis: Parent report of doctor diagnosis of allergic rhinitis, or reported sneezing or a blocked or running nose of the child without having a cold	Confounders: The following confounders were taken into account: Education, Sex, Birth weight, Feeding practicies, Smoking, Atopic risk status, Study center, Number of older siblings, Maternal age Limitations: Cannot determine whether groups were similar at baseline on key characteristics Outcome assessors were not blinded Did not use valid/reliable measures (to assess outcomes) Did not adjust for any key confounders (SES, race/ethnicity, gestational age, pets)

Reference; Sample Size; Subject Characteristics	Intervention/Exposure; Outcomes	Confounders; Limitations
Dietary Patterns		
Grimshaw, 2014 Nested Case-Control Study; United Kingdom (Prevalence of Infant Food Allergy EuroPrevall) Sample Size: Food Allergy Cases: 41 Controls: 82 Attrition: NA Sample Size Calculation: NR Sex: 46% Female Race/Ethnicity: ~95% Caucasian Atopic Disease Risk Status: Maternal atopy: 88% cases, 63% controls; Paternal atopy: 58% cases, 61% controls; Maternal asthma: 27% cases, 13% controls; Maternal allergy: 54% cases, 38% controls Background Diet: NR	Intervention/Exposure: Adherence to dietary patterns from 0-12 mo, identified using principal component analysis: 'Infant guidelines' pattern: high scores for 'healthy' foods [commercial baby food, toddler snacks, carrots, potatoes, bananas, lentils, broccoli) and low scores for adult foods (potato products, ready meals, sauces) 'Finger food' pattern: high scores for healthy finger foods and low scores for unhealthy finger foods and pureed baby food 'Adult food pattern': high scores for adult foods and low scores for 'healthy' foods Assessment Methods: Food diary Outcomes: Food allergy Age: 2y Assessment Methods: Food allergy: Parent report with clinical history, IgE≥0.35 and/or SPT wheal ≥3mm; exclusion diet with improved symptoms; and DBPCFC (including delayed reactions up to 48hr after the challenge)	Confounders: The following confounders were taken into account: Education, Sex, Feeding practices, Smoking, Atopy risk status, Pet ownership, Siblings, Maternal Age Limitations: Cannot determine whether outcome assessors were blinded Cannot determine whether participants were similar at baseline on key characteristics Did not adjust for key confounders (SES, race/ethnicity, birth size, gestational age) Potentially underpowered due to small number of cases included
Grimshaw, 2016 Nested Case-Control Study; United Kingdom (Prevalence of Infant Food Allergy EuroPrevall) Sample Size: Food Allergy Cases: 41	Intervention/Exposure: Adherence to a dietary pattern from 0-12mo, identified using principal component analysis: ‘Healthy dietary' pattern: high scores for 'healthy' foods [commercial baby food, toddler snacks, carrots, potatoes,	Confounders: The following confounders were taken into account: Gestational age, Atopy risk status, Age, Dog at home, Received skin creams, powders, lotions, No nut/peanut intake during pregnancy, Reduced soy intake during BF

Reference; Sample Size; Subject Characteristics	Intervention/Exposure; Outcomes	Confounders; Limitations
Controls: 82 Attrition: NA Sample Size Calculation: NR Sex: 46% Female Race/Ethnicity: 95.8% Caucasian Atopic Disease Risk Status: Maternal atopy: 88% cases, 63% controls; Paternal atopy: 58% cases, 61% controls; Maternal asthma: 27% cases, 13% controls; Maternal allergy: 54% cases, 38% controls Background Diet: NR	bananas, lentils, broccoli) and low scores for adult foods (potato products, ready meals, sauces)) Assessment Methods: Food diary Outcomes: Food allergy Age: 2y Assessment Methods: Food allergy: Parent report with clinical history, IgE≥0.35 and/or SPT wheal ≥3mm; exclusion diet with improved symptoms; and DBPCFC (including delayed reactions up to 48hr after the challenge)	Limitations: Cannot determine whether participants were similar at baseline on key characteristics Did not account for high rate of attrition Did not adjust for key confounders (SES, feeding practices, smoking, pets) Potentially underpowered due to small number of cases included

Table 3. Results of studies that examined the relationship between peanut, tree nut, and/or seed product consumption during the complementary feeding period and risk of atopic disease.

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
Du Toit, 2015 (1); Randomized Controlled Trial (Learning Early About Peanut Allergy Trial (LEAP)); UK; Peanut avoidance group: 295, Peanut consumption group: 294	Peanut consumption group: Peanuts (at least 6 g/wk via 3+ meals) from 4 to 60mo	Peanut allergy at 5y, subjects with a negative baseline skin prick test: 1.9% v. 13.7%; P<0.001); absolute risk: 11.8% points, 95% CI: 3.4, 20.3, or 86% risk reduction
	Peanut avoidance group: Avoided peanuts until 60mo	Peanut allergy at 5y, subjects with a positive baseline skin prick test: 10.6% vs. 35.3%; P=0.004; absolute risk: 24.7% points, 95%CI: 4.9, 43.3, or 70% risk reduction
		Asthma at 5y: No significant group differences
Filipiak, 2007 (3); Prospective Cohort Study (German Infant Nutritional Intervention Program); Germany; N: 4753	Age of nuts/cocoa introduction: >6 vs. <6mo	Atopic dermatitis (doctor-diagnosed) at 4y: OR=0.71. 95% CI: 0.50, 1.00
		Atopic dermatitis (sympomatic) at 4y: OR=0.70, 95% CI: 0.50, 0.99
Greenhawt, 2016 (4); Prospective Cohort Study (using RCT data from the LEAP trial); UK; Peanut Avoidance Group = 295, Peanut Consumption Group = 294	Age of peanut introduction: 6-11 vs 4-6mo	Peanut allergy at 5y: Reduced risk for 6-11 vs. 4-6mo, data not provided
Grimshaw, 2013 (10); Nested Case-Control Study (Prevalence of Infant Food Allergy EuroPrevall); UK; Food Allergy Cases: 41, Controls: 82	Age of peanut, tree nut, and/or sesame (combined) introduction: Food allergy cases vs. controls consuming by 52wk	Food allergy at 2y: No significant associations
	Age of peanut introduction: Number of consuming infants by 52wk	Food allergy at 2y: 12.2% vs. 7.3%; P=0.055
	Age of sesame introduction: Number of consuming infants by 52wk	Food allergy at 2y: 12.2% vs. 9.8%; P=0.051
Grimshaw, 2015 (9); Nested Case-Control Study (Prevalence of Infant Food Allergy	Age of peanut introduction: Median in weeks, food allergy cases vs. controls	Food allergy (IgE and non-IgE-mediated) cases at 2y: No significant associations

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
EuroPrevall); UK; Food Allergy Cases: 41 (21 IgE-mediated), Controls: 82		
Kumar, 2010 (11); Nested Case-Control Study; US; Food Allergy Cases: 411, Asymptomatic Sensitized Cases: 171, Controls: 378	Age of egg, peanut, tree nut, shellfish, fish, and sesame (combined) introduction: >6 vs. <6mo	Food allergy at ~6y: OR=0.8, 95% CI: 0.4, 1.6; P<0.05)
		Food allergy at ~6y, children without atopic dermatitis: No significant associations
		Food allergy at ~6y, children with atopic dermatitis: No significant associations
	Age of egg, peanut, tree nut, shellfish, fish, and sesame (combined) introduction: >1 vs. <1y	Food allergy at ~6y: No significant associations
		Food allergy at ~6y, children without atopic dermatitis: OR=0.5, 95% CI: 0.3, 0.95; P<0.05
		Food allergy at ~6y, children with atopic dermatitis: No significant associations
Perkin, 2016 (2); Randomized Controlled Trial (Enquiring about Tolerance Trial (EAT); UK; Standard Introduction Group: 595, Early Introduction Group: 567	Early introduction group: Introduction to allergenic foods at 3mo (cow's milk (yogurt) first, then (in random order) peanut, cooked (boiled) hen's egg, sesame, and whitefish, and wheat last)	Food allergy from 1-3y, intention to treat analyses: No significant group differences based on intention to treat analyses
	Standard introduction group: Introduction to allergenic foods at 6mo according to parental discretion	Food allergy from 1-3y, per protocol analyses: 2.4% vs. 6.4%; P=0.03
		Peanut allergy from 1-3y, per protocol analyses: 0% vs. 2.5%; P=0.003
		Sesame allergy from 1-3y, per protocol analyses: No significant group differences
	Amount of peanut consumed: 2g/wk vs. <2g/wk from 3 to 6mo (early introduction group only)	Peanut allergy from 1-3y: Reduced risk with 2g/wk vs. <2g/wk; P<0.05

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
Roduit, 2012 (6); Prospective Cohort Study (Protection Against Allergy in Rural Environments Study); Austria, Finland, France, Germany, Switzerland; N: 1041	Age of nut introduction: 3-12 vs. >12mo	Atopic dermatitis at 1y: OR=0.54, 95% CI: 0.33, 0.90; P<0.05 Atopic dermatitis (asymptomatic) at 1y: OR=0.51, 95% CI: 0.26, 0.99; P<0.05 Atopic Dermatitis at 4y: No significant associations
Roduit, 2014 (5); Prospective Cohort Study (Protection Against Allergy in Rural Environments Study); Austria, Finland, France, Germany, Switzerland: N: 856	Age of nuts introduction: <12mo vs. Never	Food allergy at 6y: No significant associations Ashma at 6y: No significant associations
Tromp, 2011 (7); Prospective Cohort Study (Generation R Study); The Netherlands; N: 6905	Age of peanut or tree nut introduction: Not defined	Atopic dermatitis at 2, 3, and 4: No significant associations
Turati, 2016 (13); Case-Control Study; Italy; Atopic Dermatitis Cases: 451, Controls: 451	Age of nut/cacao/chocolate introduction: <7 vs. >7mo	Atopic dermatitis at 24mo: No significant associations
Venter, 2016 (12); Nested Case-Control Study (Food Allergy and Intolerance Research Cohort); UK; Food Allergy Cases: 39, Controls: 78	Age of peanut introduction: <3, 3-6, 6-9, vs. 9-12 mo	Food allergy at 1y: No significant associations
Yu, 2011 (14); Case-Control Study; US; Allergic Cases: 67, Non-Allergic Controls: 191	Age of common nut introduction: 0-12, 13-24, 25-36, vs. >36mo	Food allergy at 14-18y: No significant associations
Zutavern, 2006 (8); Prospective Cohort Study (Lifestyle-Related Factors on the Immune System and the Development of Allergies in Childhood Study); Germany; N: 2612	Age of soybean/nut/cacao/chocolate introduction: 0-4, 5-6, vs. >6mo	Atopic dermatitis at 2y: No significant associations

Table 4. Results of studies that examined the relationship between egg consumption during the complementary feeding period and risk of atopic disease.

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
Randomized Controlled Trials		
Bellach, 2016 (15); Randomized Controlled Trial (Hen's Egg Allergy Prevention Study (HEAP); Germany; Egg-powder Group: 124, Rice-powder Group: 152	Egg group: Pasteurized (uncooked) egg-white powder (~1/3 egg, 3 times/wk) from 4-6mo to 12mo Rice group: Rice powder and an egg-free diet from 4-6mo to 12mo	Egg allergy at 12mo: No significant group differences
Natsume, 2017 (16); Randomized Controlled Trial (Prevention of Egg Allergy with Tiny Amount Intake Study); Japan; Egg Group: 74, Placebo Group: 73	Egg group: Cooked whole egg powder (0.2-1.1g/d egg) from 6 to 12mo Placebo group: Squash powder and an egg-free diet from 6 to 12mo	Egg allergy at 1y: 8% vs. 38%; RR=0.221, 95% CI: 0.090, 0.543; P=0.0001
Palmer, 2013 (17); Randomized Controlled Trial; Australia; Egg group: 42, Rice Group: 35	Egg group: Pasteurized raw whole egg powder (~1/6 egg/d) from 4-6 to 10mo Rice group: Rice flour powder and egg-free diet from 4-6 to 10mo	Egg allergy at 8mo and 12mo: No significant group differences
Palmer, 2016 (18); Randomized Controlled Trial (Starting Time of Egg Protein Trial (STEP); Australia; Egg Group: 371, Egg-free Group: 377	Egg group: Received 0.9g/d pasteurized raw whole egg powder (0.4g/d egg protein, ~1/2 egg/wk) from 4-6 to 10mo Control group: Rice powder and egg-free diet from 4-6 to 10mo	Egg allergy at 12mo: No significant group differences
Perkin, 2016 (2); Randomized Controlled Trial (Enquiring about Tolerance Trial (EAT); UK; Standard Introduction Group: 595, Early Introduction Group: 567	Early introduction group: Introduction to allergenic foods at 3mo (cow's milk (yogurt) first, then (in random order) peanut, cooked	Food allergy from 1-3y, intention to treat analyses: No significant group differences based on intention to treat analyses

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
	(boiled) hen's egg, sesame, and whitefish, and wheat last)	
	Standard introduction group: Introduction to allergenic foods at 6mo according to parental discretion	Food allergy from 1-3y, per protocol analyses: 2.4% vs. 6.4%; P=0.03
		Egg allergy from 1-3y, per protocol analyses: 1.4% vs. 5.2%; P=0.02
	Amount of egg consumed: 4 vs. <4g/wk from 3 to 6mo (early introduction group only)	Egg allergy from 1-3y: Reduced risk with 4g/wk vs. <4g/wk; P<0.05
Wei-Liang Tan, 2016 (19); Randomized Controlled Trial (Beating Egg Allergy Trial (BEAT); Australia; Egg Group: 130, Rice Group: 124	Egg powder: Pasteurized whole egg (raw) powder (350mg/d) from 4 to 8mo	Egg allergy at 12mo: No significant group differences
	Rice powder: Rice powder and egg-free diet from 4 to 8mo	Atopic dermatitis at 12mo: No significant group differences
Observational Studies		
Alm, 2011 (20); Prospective Cohort Study (Infants of Western Sweden); Sweden; N: 4496	Early egg introduction: Not defined (univariate analyses)	Allergic rhinitis at 4.5y: No significant associations
Bisgaard, 2009 (21); Prospective Cohort Study; Denmark (Copenhagen Study on Asthma in Childhood); Denmark; N:356	Age of egg introduction: Duration in days (continuous)	Atopic dermatitis at 3y: No significant associations
Fergusson, 1981 (22); Prospective Cohort Study (Christchurch Health and Development Study); New Zealand; N: 1156	Consumption of egg: Presence vs. absence at 4mo;	Atopic dermatitis at 2y: No significant associations
	Amount of egg consumed: Teaspoonful/d at 4mo	Atopic dermatitis at 2y: No significant associations
Filipiak, 2007 (3); Prospective Cohort Study (German Infant Nutritional Intervention Program); Germany; N: 4753	Age of egg introduction: >12 vs. <12mo	Atopic dermatitis, doctor-diagnosed, at 4y: OR=1.80, 95% CI: 1.23, 2.64; P<0.05

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
		Atopic dermatitis, symptomatic, at 4y: No significant associations
Grimshaw, 2013 (10); Nested Case-Control Study (Prevalence of Infant Food Allergy EuroPrevall); UK; Food Allergy Cases: 41, Controls: 82	Age of hen's egg introduction: Median in wk	Food allergy at 2y: No significant associations
Grimshaw, 2015 (9); Nested Case-Control Study (Prevalence of Infant Food Allergy EuroPrevall); UK; Food Allergy Cases: 41, Controls: 82	Age of egg introduction: Median in mo	Food allergy, IgE-mediated, at 2y: OR=1.05, 95% CI: 1.00, 1.11; P=0.026
Gustafsson, 2000 (23); Prospective Cohort Study; Sweden; N:94	Age of hen's egg introduction: <12 vs. >12mo	Atopic dermatitis through 8y: No significant associations Asthma through 8y: No significant associations Allergic rhinitis through 8y: No significant associations
Hesselmar, 2010 (24); Prospective Cohort Study (ALLERGY-FLORA); Sweden; N: 184	Age of hen's egg introduction: Months, continuous	Food allergy at 18mo: No significant associations Atopic dermatitis at 18mo: No significant associations
Kumar, 2010 (11); Nested Case-Control Study; US; Food Allergy Cases: 411, Asymptomatic Sensitized Cases: 171, Controls: 378	Age of egg, peanut, tree nut, shellfish, fish, and sesame (combined) introduction: >6 vs. <6mo	Food allergy at ~6y: OR=0.8, 95% CI: 0.4, 1.6; P<0.05) Food allergy at ~6y, children without atopic dermatitis: No significant associations Food allergy at ~6y, children with atopic dermatitis: No significant associations
	Age of egg, peanut, tree nut, shellfish, fish, and sesame (combined) introduction: >1 vs. <1y	Food allergy at ~6y: No significant associations

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
		Food allergy at ~6y, children without atopic dermatitis: OR=0.5, 95% CI: 0.3, 0.95; P<0.05 Food allergy at ~6y, children with atopic dermatitis: No significant associations
Niinivirta, 2014 (25); Prospective Cohort Study; Finland; N: 223 at 6mo; 211 at 12mo; 185 at 24mo; 129 at 48mo	Age of egg introduction: 6 vs. ≥7mo	Atopic dermatitis through 4y: No significant associations
Nwaru, 2013 (27); Prospective Cohort Study; Finland (Finnish Type 1 Diabetes Prediction and Prevention Study); Finland; N: 3781	Age of egg introduction: 8, 8-11 vs. >11mo	Atopic dermatitis at 5y: No significant associations Asthma, total, at 5y: HR=0.61, 95% CI: 0.39, 0.94; HR=0.55, 95% CI: 0.38, 0.81; P=0.005 Asthma, atopic, at 5y: HR=0.46, 95% CI: 0.25, 0.84; HR=0.55, 95% CI: 0.34, 0.91; P<0..001 Allergic rhinitis at 5y: HR=0.73, 95% CI: 0.52, 1.02; HR=0.72, 95% CI: 0.55, 0.94; P=0.04
Nwaru, 2013 (26); Prospective Cohort Study (Study of Atopic dermatitis and Asthma To Observe the Influence of Nutrition); UK; N: 934	Age of egg introduction: <5 vs. >5mo	Atopic dermatitis at 10y: No significant associations Allergic rhinitis at 10y: No significant associations
Roduit, 2012 (6); Prospective Cohort Study (Protection Against Allergy in Rural Environments Study); Austria, Finland, France, Germany, Switzerland; N: 1041	Age of egg introduction: 3-12 vs. >12mo	Atopic dermatitis at 1y: OR=0.55, 95% CI: 0.38, 0.80; P<0.05
Roduit, 2014 (5); Prospective Cohort Study (Protection Against Allergy in Rural Environments Study); Austria, Finland, France, Germany, Switzerland; N: 856	Age of egg introduction: <12mo vs. Never	Food allergy at 6y: No significant associations Asthma at 6y: No significant associations

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
Sariachvili, 2010 (30); Nested Case-Control Study (Influence of Perinatal Factors on the Occurrence of Asthma and Allergy Study); Belgium; atopic dermatitis cases: 252, Controls: 305	Age of egg introduction: <4 vs. >4mo	Atopic dermatitis: No significant associations
Tromp, 2011 (7); Prospective Cohort Study (Generation R Study); The Netherlands; N: 6905	Age of hen's egg introduction: Not defined	Atopic dermatitis at 2, 3, and 4y: No significant associations
Turati, 2016 (13); Case-Control Study; Italy; Atopic Dermatitis Cases: 451, Controls: 451	Age of egg introduction: <8 vs. >8mo	Atopic dermatitis at 24mo: No significant associations
Venter, 2016 (12); Nested Case-Control Study (Food Allergy and Intolerance Research Cohort); UK; Food Allergy Cases: 39. Controls: 78	Age of egg introduction: <3, 3-6, 6-9, vs. 9-12mo	Food allergy at 1y: No significant associations
Virtanen, 2010 (28); Prospective Cohort Study (Diabetes Prediction and Prevention Study); Finland; N: 1288	Age of egg introduction: <8, 8.5-11, >11mo	Asthma at 5y: No significant associations Allergic rhinitis at 5y: No significant associations
Yu, 2011 (14); Case-Control Study; US; Allergic Cases: 67, Non-Allergic Controls: 191	Age of egg introduction: 0-12, 13-24, 25-36, vs. >36mo	Food allergy at 14-18y: OR=0.15, 95% CI: 0.18, 0.27; P<0.01
Zutavern, 2004 (29); Prospective Cohort Study; UK; N: 552	Age of egg introduction: >8 vs. <8mo	Atopic dermatitis at 5y: OR=1.6, 95% CI: 1.1, 2.4; P<0.05
Zutavern, 2006 (8); Prospective Cohort Study (Lifestyle-Related Factors on the Immune System and the Development of Allergies in Childhood Study); Germany; N:2612	Age of egg introduction: 0-4, 5-6, vs. >6mo	Atopic dermatitis at 5y: No significant associations

Table 5. Results of studies that examined the relationship between fish and/or shellfish consumption during the complementary feeding period and risk of atopic disease.

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
Alm, 2009 (31); Prospective Cohort Study (Infants of Western Sweden); Sweden; N: 4921	Age of fish introduction: <9 vs. >9mo (multivariate analyses); 0-2, 3-5, or 6-8 vs .9-12mo (univariate analyses)	Atopic dermatitis at 12mo: OR=0.76, 95% CI: 0.62, 0.94; P=0.009 Atopic dermatitis at 12mo: 3-5 vs 9-12mo: OR=0.7, 95% CI: 0.6, 0.9; P=0.003; 6-8 vs 912mo: OR=0.6, 95% CI: 0.5, 0.7; P<0.001
	Frequency of fish consumption: Never, a few times a year, 1-3/mo, 1-3/wk, vs. 3+/wk (univariate analyses)	Atopic dermatitis at 12mo: Never vs. 3+/wk: OR=2.73, 95% CI: 1.80, 4.13; P<0.001
	Type of fish consumed: lean fish (cod, haddock) vs. other fish (salmon, flatfish, mackerel, herring) (univariate analyses)	Atopic dermatitis at 12mo: OR=0.81, 95% CI: 0.68, 0.97; P=0.025
Alm, 2011 (20); Prospective Cohort Study (Infants of Western Sweden); Sweden; N: 4496	Age of fish introduction: <9 vs. >9mo	Allergic rhinitis at 4.5y: OR=0.49, 95% CI: 0.29, 0.82; P=0.007
	Frequency of fish consumption from 0-12mo: >1x/mo vs. <1x/mo	Allergic rhinitis at 4.5y: No significant associations
	Type of fish consumed: lean fish, fatty fish; not defined	Allergic rhinitis at 4.5y: No significant associations
Bisgaard, 2009 (21); Prospective Cohort Study (Copenhagen Study on Asthma in Childhood); Denmark; N: 356	Age of fish introduction: Duration in days	Atopic dermatitis at 3y: No significant associations
Filipiak, 2007 (3); Prospective Cohort Study (German Infant Nutritional Intervention Program); Germany; N: 4753	Age of fish introduction: 1-4, 5-6, vs. 7-12mo	Atopic dermatitis at 4y: No significant associations
Goksor, 2013 (32); Prospective Cohort Study (Infants of Western Sweden); Sweden; N: 4051	Age of fish introduction: <9 vs. >9mo	Asthma at 8y: OR=0.6, 95% CI: 0.4, 0.96; P<.05

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
		Atopic asthma at 8y: OR=0.5, 95% CI: 0.3, 0.8; P<0.95 at 8y Non-atopic asthma at 8y: No significant associations
	Frequency of fish consumption: 1+ time/mo vs. 0 time/mo at 1y	Asthma (total, atopic, non-atopic) at 8y: No significant associations
Grimshaw, 2013 (10); Nested Case-Control Study (Prevalence of Infant Food Allergy EuroPrevall); UK; Food Allergy Cases: 41, Controls: 82	Age of fish introduction: Median in wk	Food allergy at 2y: No significant associations
Gustafsson, 2000 (23); Prospective Cohort Study; Sweden; N: 94	Age of fish introduction: <7 vs. >7mo	Atopic dermatitis from 4mo-8y: No significant associations Asthma from 4mo-8y: No significant associations Allergic rhinitis from 4mo-8y: No significant associations
Hesselmar, 2010 (24); Prospective Cohort Study (ALLERGY-FLORA); Sweden; N: 184	Age of fish introduction: Median mo for no diagnosis vs. diagnosed	Food allergy at 18mo: 9 vs. 13mo; P=0.01 Atopic dermatitis at 18mo: 8 vs. 11mo; P=0.004
Kumar, 2010 (11); Nested Case-Control Study; US; Food Allergy Cases: 411, Asymptomatic Sensitized Cases: 171, Controls: 378	Age of egg, peanut, tree nut, shellfish, fish, and sesame (combined) introduction: >6 vs. <6mo	Food allergy at ~6y: OR=0.8, 95% CI: 0.4, 1.6; P<0.05) Food allergy at ~6y, children without atopic dermatitis: No significant associations Food allergy at ~6y, children with atopic dermatitis: No significant associations
	Age of egg, peanut, tree nut, shellfish, fish, and sesame (combined) introduction: >1 vs. <1y	Food allergy at ~6y: No significant associations

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
		Food allergy at ~6y, children without atopic dermatitis: OR=0.5, 95% CI: 0.3, 0.95; P<0.05 Food allergy at ~6y, children with atopic dermatitis: No significant associations
Kull, 2006 (33); Prospective Cohort Study; Sweden; N: 3619	Age of fish introduction: 3-8 vs. >9mo	Atopic dermatitis at 4y: OR=0.77, 95% CI: 0.64, 0.92; P<0.001 Asthma at 4y: OR=0.73, 95% CI: 0.55, 0.97; P<0.001 Allergic rhinitis at 4y: OR=0.77, 95% CI: 0.60, 0.97; P<0.001
	Frequency of fish consumption: 1/mo, 2-3/mo, 1/wk, ≥1/wk vs. Never	Atopic dermatitis at 4y: 1/mo: OR=0.72, 95% CI: 0.51, 1.00; 2-3/mo: OR=0.71, 95% CI: 0.53, 0.95; 1/wk: OR=0.54, 95% CI: 0.41, 0.70; ≥1/wk: OR=0.57, 95% CI: 0.43, 0.76; P<0.001 Asthma at 4y: 1/mo: OR=0.94, 95% CI: 0.57, 1.56; 2-3/mo: OR=0.82, 95% CI: 0.54, 1.29; 1/wk: OR=0.66, 95% CI: 0.43, 1.01; ≥1/wk: OR=0.55, 95% CI: 0.34, 0.87; P<0.001 Allergic rhinitis at 4y: 1/mo: OR=0.52, 95% CI: 0.34, 0.79; 2-3/mo: OR=0.51, 95% CI: 0.35, 0.73; 1/wk: OR=0.47, 95% CI: 0.32, 0.62; ≥1/wk: OR=0.34, 95% CI: 0.24, 0.49; P<0.001 Atopy at 4y: 1/mo: OR=0.61, 95% CI: 0.45, 0.84; 2-3/mo: OR=0.58, 95% CI: 0.45, 0.76; 1/wk: OR=0.50, 95% CI: 0.39, 0.64; ≥1/wk: OR=0.46; , 95% CI: 0.35, 0.60; P<0.001
Nafstad, 2003 (34); Prospective Cohort Study; (Oslo Birth Cohort); Norway; N: 2531	Age of fish introduction: <12 vs. >12mo	Atopic dermatitis at 4y: OR=0.66, 95% CI: 0.52, 0.84; P=0.001 Asthma at 4y: No significant associations Allergic rhinitis at 4y: OR=0.45, 95% CI: 0.28, 0.74

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
		Allergic rhinitis at 4y, in those BF>6mo: OR=0.28, 95% CI: 0.15, 0.52
		Allergic rhinitis at 4y, in those with atopic dermatitis <6mo: OR=0.32, 95% CI: 0.15, 0.69
		Allergic rhinitis at 4y, in those without respiratory infection <12mo: OR=0.39, 95% CI: 0.24, 0.66
Niinivirta, 2014 (25); Prospective Cohort Study; Finland; N: 223 at 6mo; 211 at 12mo; 185 at 24mo; 129 at 48mo	Age of fish introduction: 6 vs. ≥7mo	Atopic dermatitis from 6mo-4y: No significant association
Nwaru, 2013 (27); Prospective Cohort Study (Finnish Type 1 Diabetes Prediction and Prevention Study); Finland; N: 3781	Age of fish introduction: 6, 6-9 vs >9mo	Atopic dermatitis at 5y: No significant associations
		Asthma at 5y: No significant associations
		Allergic rhinitis at 5y: No significant associations
Nwaru, 2013 (26); Prospective Cohort Study (Study of Eczema and Asthma To Observe the Influence of Nutrition); UK; N: 934	Age of fish introduction: Categorized by tertiles, based on month of introduction	Atopic dermatitis at 10y: No significant associations
		Allergic rhinitis at 10y: No significant associations
Perkin, 2016 (2); Randomized Controlled Trial (Enquiring about Tolerance Trial (EAT); UK; Standard Introduction Group: 595, Early Introduction Group: 567	Early introduction group: Introduction to allergenic foods at 3mo (cow's milk (yogurt) first, then (in random order) peanut, cooked (boiled) hen's egg, sesame, and whitefish, and wheat last)	Food allergy from 1-3y, intention to treat analyses: No significant group differences based on intention to treat analyses
	Standard introduction group: Introduction to allergenic foods at 6mo according to parental discretion	Food allergy from 1-3y, per protocol analyses: 2.4% vs. 6.4%; P=0.03
		Fish allergy from 1-3y, per protocol analyses: No significant group differences

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
Oien, 2010 (35); Prospective Cohort Study (Prevention of Allergy Among Children in Trondheim Study); Norway; N: 3086	Frequency of fish consumption: >1 time/wk vs. <1 time/wk, Never	Atopic dermatitis at 2y: OR=0.66, 95% CI: 0.53, 0.81, P<0.001, which persisted when early onset Atopic dermatitis (<1y) children were excluded (P=0.02) Asthma at 2y: No significant associations
	Frequency of oily fish (redfish, halibut, salmon, trout, herring, mackerel) consumption: Never, >1 time/wk	Atopic dermatitis at 2y: OR=0.57, 95% CI: 0.35, 0.94, P=0.03, which persisted when early onset atopic dermatitis (<1y) children were excluded (P=0.03) Asthma at 2y: No significant associations
	Frequency of lean fish (cod, coalfish) consumption: Never, >1 time/wk	Atopic dermatitis at 2y: OR=0.66, 95% CI: 0.50, 0.86, P<0.001, though, this was no longer significant when early onset atopic dermatitis (<1y) children were excluded (NS) Atopic dermatitis at 2y, without early onset atopic dermatitis (<1y) children: No significant associations Asthma at 2y: No significant associations
	Frequency of cod liver oil consumption: Never, <3, >4 times/w	Atopic dermatitis at 2y: No significant associations Asthma at 2y: No significant associations
Roduit, 2012 (6); Prospective Cohort Study (Protection Against Allergy in Rural Environments Study); Austria, Finland, France, Germany, Switzerland; N: 1041	Age of fish introduction: 3-12 vs. >12mo	Atopic dermatitis at 4y: OR=0.52; 0.35, 0.77; P<0.05 Atopic dermatitis at 4y, with no itchy rash by 6mo: OR=0.51, 95% CI: 0.30, 0.87; P<0.05
Roduit, 2014 (5); Prospective Cohort Study (Protection Against Allergy in Rural Environments Study); Austria, Finland, France, Germany, Switzerland; N: 856	Age of fish introduction: <12mo vs. Never	Food allergy at 6y: No significant associations

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
		Asthma at 6y: OR=0.41, 95% CI: 0.19, 0.88; P<0.05
Sariachvili, 2010 (30); Nested Case-Control Study (Influence of Perinatal Factors on the Occurrence of Asthma and Allergies Study); Belgium; atopic dermatitis cases: 252, Controls: 305	Age of fish introduction: <4 vs. >4mo	Atopic dermatitis from 0-4y: No significant associations
Turati, 2016 (13); Case-Control Study; Italy; Atopic Dermatitis Cases: 451, Controls: 451	Age of fish introduction: <7 vs. >7mo	Atopic dermatitis at 24mo: No significant associations
Virtanen, 2010 (28); Prospective Cohort Study (Diabetes Prediction and Prevention Study); Finland; N: 1288	Age of fish introduction:: Categorized by tertiles, based on month of introduction	Asthma at 5y: No significant association Allergic rhinitis at 5y: <6 vs. >8.5mo: OR=0.49, 95% CI: 0.29, 0.84; 6.1-8.5 vs. >8.5mo: OR=0.91, 95% CI: 0.56, 1.48; P=0.032)
Yu, 2011 (14); Case-Control Study; US; Allergic Cases: 67, Non-Allergic Controls: 191	Age of shellfish introduction: 0-12, 13-24, 25-36, vs. >36mo	Food allergy at 14-18y: No significant associations
Zutavern, 2004 (29); Prospective Cohort Study; UK; N: 552	Age of fish introduction: <6 vs. >6mo	Atopic dermatitis at 5y: No significant associations
Zutavern, 2006 (8); Prospective Cohort Study (Lifestyle-Related Factors on the Immune System and the Development of Allergies in Childhood Study); Germanyy; N: 2612	Age of fish introduction: 0-4, 5-6, vs. >6mo	Atopic dermatitis at 2y: No significant associations

Table 6. Results of studies that examined the relationship between milk product consumption during the complementary feeding period and risk of atopic disease.

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
Alm, 2009 (31); Prospective Cohort Study (Infants of Western Sweden); Sweden; N: 4921	Type of fat on bread: Margarine vs. Dairy	Atopic dermatitis at 12mo: OR=1.32, 95% CI: 1.13, 1.55; P=0.001
Alm, 2011 (20); Prospective Cohort Study (Infants of Western Sweden); Sweden; N: 4496	Type of spread: Dairy vs. margarine	Allergic rhinitis at 4.5y: No significant associations
Fergusson, 1981 (22); Prospective Cohort Study (Christchurch Health and Development Study); New Zealand; N: 1156	Consumption of dairy products: Presence vs. absence at 4mo	Atopic dermatitis at 2y: No significant associations
	Amount of dairy products consumed: Teaspoonful/d at 4mo	Atopic dermatitis at 2y: No significant associations
Filipiak, 2007 (3); Prospective Cohort Study (German Infant Nutritional Intervention Program); Germany; N: 4753	Age of dairy product introduction: 1-4, 5-6, vs. 7-12mo	Atopic dermatitis at 4y: No significant associations
Goksor, 2013 (32); Prospective Cohort Study (Infants of Western Sweden); Sweden; N: 4051	Type of spread: Margarine, or no spread vs. butter at 1y	Asthma at 8y: OR=1.7, 95% CI: 1.2, 2.3; OR=1.2, 95% CI: 0.7, 2.3; both P<0.01
Grimshaw, 2013 (10); Nested Case-Control Study (Prevalence of Infant Food Allergy EuroPrevall); UK; Food Allergy Cases: 41, Controls: 82	Age of cow's milk (as an ingredient) introduction: Median in wk for cases vs. controls	Food allergy at 2y, cases vs. controls: 22wk vs. 26wk, P=0.049
Nwaru, 2013 (26); Prospective Cohort Study (Study of Eczema and Asthma To Observe the Influence of Nutrition); UK; N: 934	Age of milk product introduction: Categorized by tertiles, based on month of introduction	Atopic dermatitis at 10y: No significant associations
		Allergic rhinitis at 10y: No significant associations
Perkin, 2016 (2); Randomized Controlled Trial (Enquiring about Tolerance Trial (EAT);	Early introduction group: Introduction to allergenic foods at 3mo (cow's milk (yogurt) first, then (in random order) peanut, cooked	Food allergy from 1-3y, intention to treat analyses: No significant group differences based on intention to treat analyses

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
UK; Standard Introduction Group: 595, Early Introduction Group: 567	(boiled) hen's egg, sesame, and whitefish, and wheat last)	
	Standard introduction group: Introduction to allergenic foods at 6mo according to parental discretion	Food allergy from 1-3y, per protocol analyses: 2.4% vs. 6.4%; P=0.03
		Milk allergy from 1-3y, per protocol analyses: No significant group differences
Roduit, 2012 (6); Prospective Cohort Study (Protection Against Allergy in Rural Environments Study); Austria, Finland, France, Germany, Switzerland; N: 1041	Age of yogurt, other milk products, margarine, and butter introduction: 3-12 vs. >12mo	Atopic dermatitis at 1y: OR for yogurt = 0.41, 95% CI: 0.23, 0.73; P<0.05
		Atopic dermatitis at 1y: No significant associations with age of other milk product, margarine, and butter introduction
Roduit, 2014 (5); Prospective Cohort Study (Protection Against Allergy in Rural Environments Study); Austria, Finland, France, Germany, Switzerland; N: 856	Age of yogurt, other milk products, margarine, and butter introduction: <12mo vs. Never	Food allergy at 6y: No significant associations
		Asthma at 6y: No significant associations
Sariachvili, 2010 (30); Nested Case-Control Study (Influence of Perinatal Factors on the Occurrence of Asthma and Allergy Study); Belgium; Atopic dermatitis cases: 252, Controls: 305	Age of dairy product or cheese introduction: <4 vs. >4mo	Atopic dermatitis cases and controls (0-4y): No significant associations
Turati, 2016 (13); Case-Control Study; Italy; Atopic Dermatitis Cases: 451, Controls: 451	Age of dairy product (cheese, and other dairies) introduction: <4 vs. >4mo	Atopic dermatitis at 24mo: No significant associations
Virtanen, 2010 (28); Prospective Cohort Study (Diabetes Prediction and Prevention Study); Finland; N: 1288	Age of milk product introduction: Categorized by tertiles, based on month of introduction	Asthma at 5y: No significant associations
		Allergic rhinitis at 5y: No significant associations

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
Yu, 2011 (14); Case-Control Study; US; Allergic Cases: 67, Non-Allergic Controls: 191	Age of dairy introduction: 0-12, 13-24, 25-36, vs. >36mo	Food allergy at 14-18y: OR=0.32, 95% CI: 0.18, 0.57; P<0.01
Zutavern, 2004 (29); Prospective Cohort Study; UK; N: 552	Age of milk product introduction: <6 vs. >6mo	Atopic dermatitis at 5y: No significant associations
Zutavern, 2006 (8); Prospective Cohort Study (Lifestyle-Related Factors on the Immune System and the Development of Allergies in Childhood Study); Germany; N: 2612	Age of dairy product introduction: 0-4, 5-6, vs. >6mo	Atopic dermatitis at 2y: No significant associations

Table 7. Results of studies that examined the relationship between wheat consumption during the complementary feeding period and risk of atopic disease.

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
Fergusson, 1981 (22); Prospective Cohort Study (Christchurch Health and Development Study); New Zealand; N: 1156	Consumption of cereal: Presence vs. absence at 4mo	Atopic dermatitis at 2y: No significant associations
	Amount of cereals consumed: Teaspoonful/d at 4mo	Atopic dermatitis at 2y: No significant associations
Filipiak, 2007 (3); Prospective Cohort Study (German Infant Nutritional Intervention Program); Germany; N: 4753	Age of cereal introduction: 1-4, 5-6, vs. 7-12mo	Atopic dermatitis at 4y: No significant associations
Grimshaw, 2013 (10); Nested Case-Control Study (Prevalence of Infant Food Allergy EuroPrevall); UK; Food Allergy Cases: 41, Controls: 82	Age of wheat introduction: Median in wk	Food allergy at 2y: No significant associations
Grimshaw, 2015 (9); Nested Case-Control Study (Prevalence of Infant Food Allergy EuroPrevall); UK; Food Allergy Cases: 41 (21 IgE-mediated), Controls: 82	Age of wheat introduction: Median in wk	Food allergy (IgE- and non-IgE-mediated): No significant associations
Kumar, 2010 (11); Nested Case-Control Study; US; Food Allergy Cases: 411, Asymptomatic Sensitized Cases: 171, Controls: 378	Age of rice/wheat cereal introduction: >6 vs. <6mo	Food allergy at 6-7y: OR=0.6, 95% CI: 0.4, 0.996; P<0.05
Perkin, 2016 (2); Randomized Controlled Trial (Enquiring about Tolerance Trial (EAT); UK; Standard Introduction Group: 595, Early Introduction Group: 567	Early introduction group: Introduction to allergenic foods at 3mo (cow's milk (yogurt) first, then (in random order) peanut, cooked (boiled) hen's egg, sesame, and whitefish, and wheat last)	Food allergy from 1-3y, intention to treat analyses: No significant group differences based on intention to treat analyses
	Standard introduction group: Introduction to allergenic foods at 6mo according to parental discretion	Food allergy from 1-3y, per protocol analyses: 2.4% vs. 6.4%; P=0.03
		Wheat allergy from 1-3y, per protocol analyses: No significant group differences

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
Niinivirta, 2014 (25); Prospective Cohort Study; Finland; N: 223 at 6mo; 211 at 12mo; 185 at 24mo; 129 at 48mo	Age of cereal introduction: 6 vs. ≥7mo	Atopic dermatitis at 4y: No significant associations
Nwaru, 2013 (27); Prospective Cohort Study (Finnish Type 1 Diabetes Prediction and Prevention Study); Finland; N: 3781	Age of wheat introduction: <5, 5-5.5 vs. >5.5mo	Atopic dermatitis at 5y: No significant associations Asthma at 5y: Reduced risk for <5, 5-5.5 vs. >5.5mo (data not shown); P<0.01 Allergic rhinitis at 5y: Reduced risk for <5, 5-5.5 vs. >5.5mo (data not shown); P<0.01
	Age of biscuits/bread introduction: ≥6 vs. <6mo	Atopic dermatitis at 10y, all subjects: No significant associations Atopic dermatitis at 10y, children without atopic dermatitis by 6mo: OR=1.51, 95% CI: 1.14, 2.01; P=0.005 Atopic dermatitis at 10y, children without family atopy history: OR=1.58, 95% CI: 1.01, 2.46; P=0.045 Allergic rhinitis at 10y: No significant associations
Poole, 2006 (36); Prospective Cohort Study (Diabetes Autoimmunity Study in the Young); US; N: 1612	Age of cereal grains (wheat, barley, rye oats) introduction: >7 vs. 0-6mo	Wheat allergy at 4y: OR=3.8, 95% CI: 1.18, 12.28; P=0.025
Roduit, 2012 (6); Prospective Cohort Study (Protection Against Allergy in Rural Environments Study); Austria, Finland, France, Germany, Switzerland; N: 1041	Age of cereal introduction: 3-12 vs. >12mo	Atopic dermatitis at 4y: No significant associations
	Age of bread introduction: 3-12 vs. >12mo	Atopic dermatitis at 4y: No significant associations
	Age of cake introduction: 3-12 vs. >12mo	Atopic dermatitis at 4y: No significant associations

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
Roduit, 2014 (5); Prospective Cohort Study (Protection Against Allergy in Rural Environments Study); Austria, Finland, France, Germany, Switzerland; N: 856	Age of cereal introduction: <12mo vs. Never	Food allergy at 6y: No significant associations Asthma at 6y: No significant associations
	Age of bread introduction: 3-12 vs. >12mo	Food allergy at 6y: No significant associations Asthma at 6y: No significant associations
	Age of cake introduction: 3-12 vs. >12mo	Food allergy at 6y: OR=0.31, 95% CI: 0.15, 0.64; P<0.05 Asthma at 6y: No significant associations
Sariachvili, 2010 (30); Nested Case-Control Study (Influence of Perinatal Factors on the Occurrence of Asthma and Allergies Study); Belgium; Atopic dermatitis cases: 252, Controls: 305	Age of cereal introduction: <4 vs. >4mo	Atopic dermatitis at 0-4y: No significant associations
Tromp, 2011 (7); Prospective Cohort Study (Generation R Study); The Netherlands; N: 6905	Age of gluten introduction: Not defined	Atopic dermatitis at 2, 3, and 4y: No significant associations
Venter, 2016 (12); Nested Case-Control Study (Food Allergy and Intolerance Research Cohort); UK; Food Allergy Cases: 39. Controls: 78	Age of wheat introduction: <3, 3-6, 6-9, vs. 9-12mo	Food allergy at 1y: No significant associations
Virtanen, 2010 (28); Prospective Cohort Study (Diabetes Prediction and Prevention Study); Finland; N: 1288	Age of wheat introduction: Categorized by tertiles, based on month of introduction	Asthma at 5y: No significant associations Allergic rhinitis at 5y: No significant associations
Yu, 2011 (14); Case-Control Study; US; Allergic Cases: 67, Non-Allergic Controls: 191	Age of wheat/gluten introduction: 0-12 vs. 13-24, 25-36, >36mo	Food allergy at 14-18y: OR=0.18, 95% CI: 0.10, 0.33; P<0.01

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
Zutavern, 2004 (29); Prospective Cohort Study; UK; N: 552	Age of cereal introduction:<4 vs. >4mo	Atopic dermatitis at 5y: No significant associations
Zutavern, 2006 (8); Prospective Cohort Study (Lifestyle-Related Factors on the Immune System and the Development of Allergies in Childhood Study); Germany; N: 2612	Age of cereal introduction: 0-4, 5-6, vs. >6mo	Atopic dermatitis at 2y: No significant associations

Table 8. Results of studies that examined the relationship between soybean consumption during the complementary feeding period and risk of atopic disease.

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
Roduit, 2012 (6); Prospective Cohort Study (Protection Against Allergy in Rural Environments Study); Austria, Finland, France, Germany, Switzerland N: 1041	Age of soy introduction: 3-12 vs. >12mo	Atopic dermatitis at 4y: No significant associations
Roduit, 2014 (5); Prospective Cohort Study (Protection Against Allergy in Rural Environments Study); Austria, Finland, France, Germany, Switzerland ;N: 856	Age of soy introduction: <12mo vs. Never	Food allergy at 6y: No significant associations Asthma at 6y: No significant associations
Tromp, 2011 (7); Prospective Cohort Study (Generation R Study); The Netherlands; N: 6905	Age of soy introduction: Not defined	Atopic dermatitis at 2, 3,4 and 4y: No significant associations
Zutavern, 2006 (8); Prospective Cohort Study (Lifestyle-Related Factors on the Immune System and the Development of Allergies in Childhood Study); Germany; N: 2612	Age of soybean/nut/cacao/chocolate introduction: 0-4, 5-6, vs. >6mo	Atopic dermatitis at 2y: No significant associations

Table 9. Results of studies that examined the relationship between consumption of complementary foods and beverages not considered to be major allergens and risk of atopic disease.

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
Andreasyan, 2007 (39); Prospective Cohort Study (Tasmanian Infant Health Survey; Childhood Allergy and Respiratory Health Survey); Tasmania; N: 499	Age of fruit syrup, orange juice, water, vitamins, and honey introduction: <5 vs. >5wk	Atopic dermatitis at 8y: No significant associations
		Asthma at 8y: No significant associations
		Allergic rhinitis at 8y: No significant associations
Fergusson, 1981 (22); Prospective Cohort Study (Christchurch Health and Development Study); New Zealand; N: 1156	Consumption of fruit: Presence vs. absence at 4mo	Atopic dermatitis at 2y: No significant associations
	Amount of fruit consumed: Teaspoonful (Tsp)/d at 4mo	Atopic dermatitis at 2y: No significant associations
	Consumption of vegetables: Presence vs. absence at 4mo	Atopic dermatitis at 2y: No significant associations
	Amount of vegetables consumed: Tsp/d at 4mo	Atopic dermatitis at 2y: No significant associations
	Consumption of meat: Presence vs. absence at 4mo	Atopic dermatitis at 2y: No significant associations
	Amount of meat consumed: Tsp/d at 4mo	Atopic dermatitis at 2y: No significant associations
Filipiak, 2007 (3); Prospective Cohort Study (German Infant Nutritional Intervention Program); Germany; N: 4753	Age of fruit introduction: >6 vs. <6mo	Atopic dermatitis at 4y: No significant associations
	Age of vegetable introduction: >6 vs. <6mo	Atopic dermatitis at 2y: No significant associations
	Age of meat introduction: >6 vs. <6mo	Atopic dermatitis at 2y, intervention subjects: OR=1.57, 95% CI: 0.82, 2.95

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
		Atopic dermatitis at 2y, intervention subjects: OR=1.42, 95% CI: 1.11, 1.81
Goksor, 2013 (32); Prospective Cohort Study (Infants of Western Sweden); Sweden; N: 4051	Frequency of fermented food consumption: 1+ vs. 0 time/mo at 1y	Asthma at 8y: OR=0.5, 95% CI: 0.3, 0.7; P<0.10;
Harris, 2001 (38); Prospective Cohort Study; UK; N: 624	Age of rice introduction: <12 vs. >12mo	Atopic dermatitis (visible) at 2y: 12% vs. 2%; P=0.02
Hesselmar, 2010 (24); Prospective Cohort Study (ALLERGY-FLORA); Sweden; N: 184	Age of fruit introduction: Months, continuous	Food allergy at 18mo: No significant associations Atopic dermatitis at 18mo: No significant associations
Niinivirta, 2014 (25); Prospective Cohort Study; Finland; N: 223 at 6mo; 211 at 12mo; 185 at 24mo; 129 at 48mo	Age of fruit/berry introduction: <4, 4–6, vs. ≥7mo	Atopic dermatitis at 4y: No significant associations
	Age of vegetable introduction: 4 vs. ≥4mo	Atopic dermatitis at 4y: No significant associations
	Age of meat (red/white) introduction: 6 vs. ≥7mo	Atopic dermatitis at 4y: No significant associations
Nwaru, 2013 (27); Prospective Cohort Study (Finnish Type 1 Diabetes Prediction and Prevention Study); Finland; N: 3781	Age of rye, oats, and barley introduction: <5, 5-5.5 vs. >5.5mo	Atopic dermatitis at 5y: No significant associations Asthma at 5y: Reduced risk with earlier introduction (data not shown); P<0.01 Allergic rhinitis at 5y: Reduced risk with earlier introduction (data not shown); P<0.001
	Age of maize, rice, millet, and buckwheat introduction: <4.5, 4.5-5.5 vs. >5.5mo	Atopic Atopic dermatitis at 5y: Increased risk with earlier introduction (data not shown); P<0.01 Asthma at 5y: No significant associations Allergic rhinitis at 5y: No significant associations

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
	Age of fruit/berry introduction: Categorized by tertiles, based on month of introduction	Atopic dermatitis at 5y: No significant associations
		Asthma at 5y: No significant associations
		Allergic rhinitis at 5y: No significant associations
	Age of root (potatoes, carrot, and turnip) introduction: Categorized by tertiles, based on month of introduction	Atopic dermatitis at 5y: No significant associations
		Asthma at 5y: No significant associations
		Allergic rhinitis at 5y: No significant associations
		Allergic rhinitis at 5y: No significant associations
	Age of meat introduction: Categorized by tertiles, based on month of introduction	Atopic dermatitis at 5y: No significant associations
		Asthma at 5y: No significant associations
		Allergic rhinitis at 5y: No significant associations
Nwaru, 2013 (26); Prospective Cohort Study (Study of Eczema and Asthma To Observe the Influence of Nutrition); UK; N: 934	Age of rice/cereal introduction: Categorized by tertiles, based on month of introduction	Atopic dermatitis at 10y: No significant associations
		Allergic rhinitis at 10y: No significant associations
	Age of fruit juice and fruit introduction: Categorized by tertiles, based on month of introduction	Atopic dermatitis at 10y: : No significant associations
		Allergic rhinitis at 10y: No significant associations
	Age of vegetable introduction: Categorized by tertiles, based on month of introduction	Atopic dermatitis at 10y: : No significant associations
		Allergic rhinitis at 10y: No significant associations

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
	Age of meat introduction: Categorized by tertiles, based on month of introduction	Atopic dermatitis at 10y: : No significant associations Allergic rhinitis at 10y: No significant associations
Oien, 2010 (35); Prospective Cohort Study (Prevention of Allergy Among Children in Trondheim Study); Norway; N: 3086	Frequency of vegetable consumption: 1 time/wk or less, 2-5 times/wk, almost daily	Atopic dermatitis at 2y: No significant associations Asthma at 2y: No significant associations
Poole, 2006 (36); Prospective Cohort Study (Diabetes Autoimmunity Study in the Young); US: N: 1612	Age of rice cereal introduction: 0-6 vs. >7mo	Food allergy at 4y: No significant associations
Roduit, 2012 (6); Prospective Cohort Study (Protection Against Allergy in Rural Environments Study); Austria, Finland, France, Germany, Switzerland; N: 1041	Age of fruit and vegetable introduction: 3-12 vs. >12mo	Atopic dermatitis at 4y: No significant associations
	Age of meat introduction: 3-12 vs. >12mo	Atopic dermatitis at 4y: No significant associations
	Age of chocolate introduction: 3-12 vs. >12mo	Atopic dermatitis at 4y: OR=0.66, 95% CI: 0.45, 0.98; P<0.05
Roduit, 2014 (5); Prospective Cohort Study (Protection Against Allergy in Rural Environments Study); Austria, Finland, France, Germany, Switzerland; N: 856	Age of fruit/vegetable introduction: 3-12 vs. >12mo	Food allergy at 6y: No significant associations Asthma at 6y: No significant associations
	Age of meat introduction: 3-12 vs. >12mo	Food allergy at 6y: No significant associations Asthma at 6y: OR=0.43, 95% CI: 0.20, 0.93; P<0.05
	Age of chocolate introduction: 3-12 vs. >12mo	Food allergy at 6y: OR=0.36, 95% CI: 0.19, 0.70; P<0.05

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
Sariachvili, 2010 (30); Nested Case-Control Study (Influence of Perinatal Factors on the Occurrence of Asthma and Allergies Study); Belgium; Atopic dermatitis cases: 252, Controls: 305	Age of fruit juice introduction: <4 vs. >4mo	Atopic dermatitis at 0-4y: OR=0.64, 95% CI: 045, 0.93; P=0.02
	Age of fruit introduction: <4 vs. >4mo	Atopic dermatitis at 0-4y: No significant associations
	Age of vegetable introduction: <4 vs. >4mo	Atopic dermatitis at 0-4y: No significant associations
	Age of meat introduction: <4 vs. >4mo	Atopic dermatitis at 0-4y: No significant associations
Strassburger, 2010 (37); Prospective Cohort Study; Brazil; N: 354	Age of fruit and fruit juice introduction: <4 vs. >4mo	Asthma at 3-4y: No significant associations
	Age of salty pureed food introduction: <4 vs. >4mo	Asthma at 3-4y: No significant associations
Turati, 2016 (13); Case-Control Study; Italy; Atopic Dermatitis Cases: 451, Controls: 451	Age of cereal (maize/tapioca, rice, pasta, gluten-free pasta) introduction: <4 vs. >4mo	Atopic dermatitis at 24mo: No significant associations
	Age of fruit introduction: <4 vs. >4mo	Atopic dermatitis at 24mo: Reduced risk with earlier introduction (data not shown); P=0.02
	Age of vegetable, legume and root introduction: <4 vs. >4mo	Atopic dermatitis at 24mo: Trend for reduced risk with earlier introduction; P=0.06
	Age of meat (poultry, pork, beef) introduction: <4 vs. >4mo	Atopic dermatitis at 24mo: No significant associations
Virtanen, 2010 (28); Prospective Cohort Study (Diabetes Prediction and Prevention Study); Finland; N: 1288	Age of oat introduction: <5 vs. >5.5mo, 5-5.5 vs. >5.5mo	Asthma at 5y: OR=0.31, 95% CI: 0.10, 0.97; OR=0.39, 95% CI: 0.21, 0.72; P=0.005 Allergic rhinitis at 5y: No significant associations
	Age of barley, rye introduction: Categorized by tertiles, based on month of introduction	Asthma at 5y: No significant associations

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
		Allergic rhinitis at 5y: No significant associations
	Age of maize, rice, millet and buckwheat introduction: Categorized by tertiles, based on month of introduction	Asthma at 5y: No significant associations
		Allergic rhinitis at 5y: No significant associations
	Age of fruit/berry introduction: Categorized by tertiles, based on month of introduction	Asthma at 5y: No significant associations
		Allergic rhinitis at 5y: No significant associations
	Age of root (potato, carrot, turnip and swede) introduction: Categorized by tertiles, based on month of introduction	Asthma at 5y: No significant associations
		Allergic rhinitis at 5y: No significant associations
	Age of cabbage (cauliflower, broccoli, kale and Chinese, red and turnip cabbage) introduction: Categorized by tertiles, based on month of introduction	Asthma at 5y: No significant associations
		Allergic rhinitis at 5y: No significant associations
	Age of meat (pork, beef, chicken and other meat) introduction: Categorized by tertiles, based on month of introduction	Asthma at 5y: No significant associations
		Allergic rhinitis at 5y: No significant associations
Zutavern, 2004 (29); Prospective Cohort Study; UK; N: 552	Age of rice introduction: <3 vs. >3mo	Atopic dermatitis at 5y: No significant associations
	Age of fruit or vegetable introduction: <4 vs. >4mo	Atopic dermatitis at 5y: No significant associations
	Age of meat introduction: <5 vs. >5mo	Atopic dermatitis at 5y: No significant associations
Zutavern, 2006 (8); Prospective Cohort Study (Lifestyle-Related Factors on the	Age of fruit introduction: >6 vs. 0-4, 5-6mo	Atopic dermatitis at 2y: No significant associations

Reference; Study design (Study or cohort name); Country; Sample size	Intervention or exposure	Results
Immune System and the Development of Allergies in Childhood Study); Germany; N: 2612		
	Age of vegetable introduction: >6 vs. 0-4, 5-6mo	Atopic dermatitis (doctor-diagnosed) at 2y: OR=1.49, 95% CI: 1.06, 2.10; P<0.05 Atopic dermatitis (with early skin or allergic symptoms) at 2y: OR=1.64, 95% CI: 1.01, 2.65; P<0.05
	Age of meat introduction: >6 vs. 0-4, 5-6mo	Atopic dermatitis (doctor-diagnosed) at 2y: OR=1.63, 95% CI: 1.00, 2.65; P<0.05
	Age of soybean, nut, and cacao/chocolate introduction: >6 vs. 0-4, 5-6mo	Atopic dermatitis at 2y: No significant associations

Table 10. Results of studies examining the relationship between diet diversity and dietary patterns during the complementary feeding period and food allergy, atopic dermatitis, asthma, and allergic rhinitis.

Reference; Study Design (Study or Cohort Name); Country; Sample Size	Intervention/Exposure	Results
Diet Diversity		
Fergusson, 1981 (22); Prospective Cohort Study (Christchurch Health and Development Study); v New Zealand; N: 1156	Diet diversity at 4mo: 0, 1-2, 3-4, 5+ food groups	Atopic dermatitis at 2y: 0 food groups: 13%; 1-2 food groups: 17%; 3-4 food groups: 17%; 5+food groups: 33%; P<0.05)
Fergusson, 1982 (42); Prospective Cohort Study (Christchurch Health and Development Study); New Zealand; N: 1143	Diet diversity at 4mo: 0, 1-3, 4+ food groups	Atopic dermatitis at 3y: 0 food groups: 16.6% vs. 4+ food groups: 25%; P<0.01)
Fergusson,1990 (40); Prospective Cohort Study (Christchurch Health and Development Study); New Zealand; N: 1067	Diet diversity at 4mo: 0, 1-3, 4+ food groups	Atopic dermatitis at 10y: 0 food groups: β=1, 1-3 food groups: β=1.69, 4+ food groups: β=2.87; P<0.01
Fergusson, 1994 (41); Prospective Cohort Study (Christchurch Health and Development Study); New Zealand; N: 1141	Diet diversity at 4mo: 0, 1-3, 4+ food groups	Atopic dermatitis at 10y: 0 food groups: 4.9%; 1-3 food groups: 8.2%; 4+ food groups: 13.4%; P<0.01
Filipiak, 2007 (3); Prospective Cohort Study (German Infant Nutritional Intervention Program); Germany; N: 4753	Diet diversity at 4mo: 0, 1-2, 3-8 food groups	Atopic dermatitis at 4y (doctor-diagnosed, symptomatic): No significant associations
	Diet diversity at 6mo: 0, 1-2, 3-4, 5-8 food groups	
Nwaru, 2014 (45); Prospective Cohort Study (Finnish Type 1 Diabetes Prediction and Prevention Study); Finland; N: 3,142	Diet diversity at 3mo: 0, 1-2, 2+ food groups	Atopic dermatitis, asthma (any, atopic, non-atopic), allergic rhinitis at 5y: No significant associations
	Diet diversity at 4mo: 0, 1-2, 3-4, 4+ food groups	Asthma (non-atopic) at 5y: 1-2 vs. >4 food groups at 4mo: HR=0.26, 95% CI: 0.09, 0,75; P=0.03

Reference; Study Design (Study or Cohort Name); Country; Sample Size	Intervention/Exposure	Results
		Atopic dermatitis/, asthma (any, atopic), allergic rhinitis at 5y: No significant associations
	Diet diversity at 6mo: 0-4, 5-6, 7-8, 8+ food groups	Asthma (atopic) at 5y: 0-4 vs. >8 food groups: HR=2.52, 95% CI: 1.01, 6.29; 5-6 vs. >8 food groups: HR=2.43, 95% CI: 1.23, 4.82; P=0.04 Allergic rhinitis at 5y: 0-4 vs. >8 food groups: HR=2.16, 95% CI: 1.20, 3.89; 5-6 vs. >8 food groups: HR=1.91, 95% CI: 1.24, 2.95; P=0.02 Atopic dermatitis, asthma (any, non-atopic) at 5y: No significant associations
	Diet diversity at 12mo: 0-7, 8-9, 10-11, 11+ food groups	Asthma (any) at 5y: 0-7 vs. >11 food groups: HR=4.19, 95% CI: 2.31, 7.58; 8-9 vs. >11 food groups: HR=1.87, 95% CI: 1.17, 2.98; P<0.001 Asthma (atopic) at 5y: 0-7 vs. >11 food groups: HR=5.17, 95% CI: 2.34, 11.42; 8-9 vs. >11 food groups: HR=2.93, 95% CI: 1.60, 5.37; P<0.001 Allergic rhinitis at 5y: 0-7 vs. >11 food groups: HR=3.10, 95% CI: 1.66, 5.78; 8-9 vs. >11 food groups: HR=2.43, 95% CI: 1.63, 3.63; P<0.001 Atopic dermatitis, asthma (non-atopic) at 5y: No significant associations
Roduit, 2012 (6); Prospective Cohort Study (Protection Against Allergy–Study in Rural Environments Study); Austria, Finland, France, Germany, Switzerland; N: 1,041	Diet diversity from 3-12mo: 0-3, 4-5, 6 food groups	Atopic dermatitis at 1y: 6 vs. 4-5 food groups: OR=1.72; 95% CI: 1.06, 2.8, P=0.03; 6 vs. 0-3 groups: OR=2.87; 95% CI: 1.26, 6.56, P=0.01; Per food group introduced: OR=0.75, 95% CI: 0.62, 0.91, P=0.003 Atopic dermatitis at 1y with no symptoms by 6mo: 0-1 vs. >3 food groups: OR=2.12, 95% CI: 1.12, 4.03; P=0.02
Roduit, 2014 (5); Prospective Cohort Study (Protection Against Allergy–Study in Rural Environments Study); Austria,	Diet diversity from 3-12mo: 0-3, 4-5, 6 food groups	Food allergy at 6y: 6 vs 4-5 food groups: OR=1.85; 95% CI: 1.02, 3.35; 6 vs 0-3 food groups: OR=4.43,

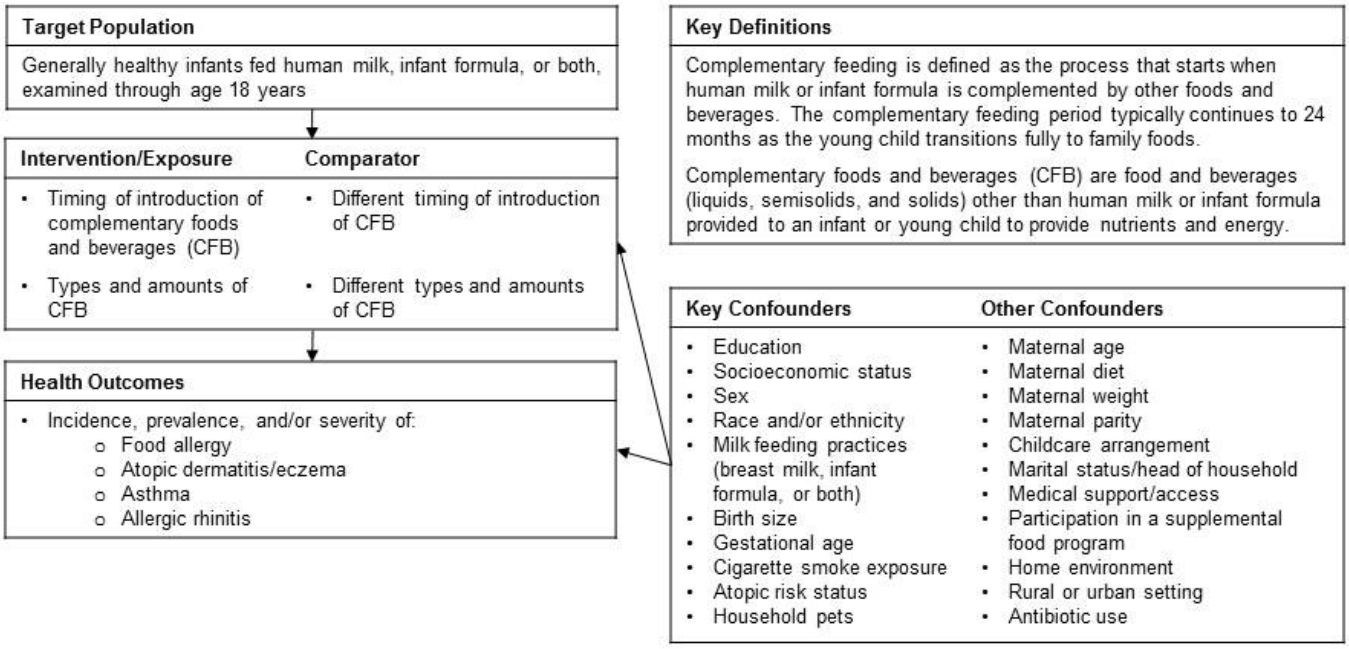
Reference; Study Design (Study or Cohort Name); Country; Sample Size	Intervention/Exposure	Results
Finland, France, Germany, Switzerland; N: 856		95% CI: 1.62, 12.1; Per food group introduced: OR=0.70, 95% CI: 0.57, 0.86; all P<0.05 Asthma (any, atopic, non-atopic) at 6y: 6 vs 0-3 food groups: OR=3.77, 95% CI: 1.23, 11.53; Per food group introduced: OR=0.76, 95% CI: 0.60, 0.96; both P<0.05 Allergic rhinitis at 6y: No significant associations
Schoetzau, 2002 (44); Prospective Cohort Study (German Infant Nutritional Intervention Program); Germany; N: 1,121	Diet diversity at 24wk: Continuous, total number of food groups consumed	Atopic dermatitis at 1y: No significant associations
Turati, 2016 (13); Case-control study; Italy; Atopic Dermatitis Cases: 451, Controls: 451	Diet diversity at 4mo: 0, 1-2, 3-22 food groups	Atopic dermatitis from 3-24mo: 0 vs. 3-22 food groups: OR=0.30, 95% CI: 0.11, 0.81; P=0.017
	Diet diversity at 5mo: 0, 1-7, 8-22 food groups	Atopic dermatitis from 3-24mo: 0 vs. 8-22 food groups: OR=0.44, 95% CI: 0.21, 0.91; P=0.025
Zutavern, 2006 (8); Prospective Cohort Study (Lifestyle-Related Factors on the Immune System and the Development of Allergies in Childhood); Germany; N: 2612	Diet diversity at 4mo: 0, 1-2, 3-8 food groups	Atopic dermatitis at 2y: No significant associations
	Diet diversity at 6mo: 0, 1-2, 3-4, 5-8 food groups	Atopic dermatitis (doctor-diagnosed) at 2y: 3-4 vs. 5-8 food groups, OR=0.66, 95% CI: 0.46, 0.94; P<0.05 Atopic dermatitis (early skin or allergic symptoms) at 2y: 3-4 vs, 5-8 food groups: OR=0.47, 95% CI: 0.28, 0.77; P<0.05)
Zutavern, 2008 (43); Prospective Cohort Study (Lifestyle-Related Factors on the Immune System and the Development of Allergies in Childhood); Germany; N: 2073	Diet diversity at 4mo: 0, 1-2, 3-8 food groups	Atopic dermatitis at 6y in children without early skin or allergic symptoms: 0 vs. 1-2 food groups: OR=1.00, 95% CI: 0.45, 2.20; 0 vs. 3-8 food groups: 2.72, 95% CI: 1.24, 5.99 Asthma at 6y: No significant associations

Reference; Study Design (Study or Cohort Name); Country; Sample Size	Intervention/Exposure	Results
		Allergic rhinitis at 6y: No significant associations
Dietary Patterns		
Grimshaw, 2014 (46); Nested Case-Control Study (Prevalence of Infant Food Allergy EuroPrevall); UK; Food Allergy Cases: 41, Controls: 82	Infant guidelines pattern: High scores for 'healthy' foods [commercial baby food, toddler snacks, carrots, potatoes, bananas, lentils, broccoli) and low scores for adult foods (potato products, ready meals, sauces); adherence scores from 0-12mo	Food allergy at 2y: OR=2.136, 95% CI: 1.233, 3.700, P<0.05
	Finger food pattern: High scores for healthy finger foods and low scores for unhealthy finger foods and pureed baby food; adherence scores from 0-12mo	Food allergy at 2y: No significant associations
	Adult food pattern: High scores for adult foods and low scores for 'healthy' foods; adherence scores from 0-12mo	Food allergy at 2y: No significant associations
Grimshaw, 2015 (9); Nested Case-Control Study (Prevalence of Infant Food Allergy EuroPrevall); UK; Food Allergy Cases: 41, Controls: 82	Healthy dietary pattern: High scores for 'healthy' foods (commercial baby food, toddler snacks, carrots, potatoes, bananas, lentils, broccoli) and low scores for adult foods (potato products, ready meals, sauces); adherence scores from 0-12mo	Food allergy at 2y: OR=0.155, 95% CI: 0.028, 0.868; P=0.034
		Food allergy (IgE-mediated) at 2y: OR=0.32, 95% CI: 0.16, 0.66; P=0.012
		Food allergy (non-IgE-mediated) at 2y: OR=0.28, 95% CI: 0.09, 0.87; P=0.028

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. The analytic framework in Figure 1 is for systematic reviews conducted to examine the relationship between complementary feeding and food allergy, atopic dermatitis/eczema, asthma, and allergic rhinitis

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(s): What is the relationship between timing of introduction of complementary foods/beverages or types and amounts of complementary foods/beverages and food allergy, atopic dermatitis/eczema, asthma, and allergic rhinitis?

Table 11. Inclusion and exclusion criteria

Category	Inclusion Criteria	Exclusion Criteria
Study design	Randomized controlled trials	Cross-sectional studies

Category	Inclusion Criteria	Exclusion Criteria
	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)	Timing of introduction to complementary foods and beverages (CFB) (i.e., foods and beverages (liquids, semisolids, and solids) other than human milk or infant formula provided to an infant or young child to provide nutrients and energy)	Consumption of fluid cow's milk before 12 months of age
	Types or amounts of CFB	
Comparator	Different timing of introduction of CFB	
	Different types and amounts of CFB	
Dependent variables (outcomes)	Incidence, prevalence, and/or severity of: food allergy, atopic dermatitis/eczema, asthma, and/or allergic rhinitis	Food allergy when diagnosis was based solely on food allergen sensitization (i.e., skin prick test, or serum IgE measure)
		Asthma when diagnosis was based solely on report of wheeze
Date range	January 1980 – February 2017	
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; food allergy, atopic dermatitis, allergic rhinitis); Toddlers (12-24mo; food allergy, atopic dermatitis, allergic rhinitis); Child (2-5 years (y)); Child (6-12y); Adolescents (13-18y)	Age at outcome: Infants (0-12 months) (asthma); Toddlers (12-24 months) (asthma); 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

Category	Inclusion Criteria	Exclusion Criteria
	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. (32)

[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 CFB typically consumed, a decision was made to exclude "Medium" countries in October 2017.

[3] When a country was not included in the Human Development Report 2014, country classification from the World Bank was used instead. (33)

Search terms and electronic databases used

PubMed, US National Library of Medicine (1966 to 8 February 2017):
Date(s) Searched: 2/8/2017
Search Terms:
Date range searched: 1980-2/8/17

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

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

OR
"infant food"[mesh] OR infant feed* OR Bottle feeding[mh] OR bottle feeding*[tiab] OR bottle feeding OR bottle-feeding*[tiab] OR bottle-feedings OR bottle-fed[tiab] OR "bottle fed"[tiab] OR solid food*

AND

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

("Study Characteristics" [Publication Type] OR “clinical trial”[ptyp] OR "Epidemiologic Studies"[Mesh] OR "Support of Research"[ptyp] OR cohort[tiab] OR observational[tiab] OR retrospective[tiab] OR longitudinal[tiab] OR trial[tiab] OR trials[tiab] OR case control*[tiab] OR case-control*[tiab] OR before-after stud*[tiab] OR before after stud*[tiab]

(includes age filter: Filters: Infant: birth-23 months and preschool child 2-5 yrs)

OR ((Solid food*) OR solids))

AND

(("Allergy and Immunology"[Mesh:NoExp] OR allergy[tiab] OR allergies[tiab] OR allergic[tiab] OR Hypersensitivit*[tiab]) AND (food OR peanut* OR nut OR nuts OR egg OR eggs OR milk OR shellfish OR wheat)) OR "Food Hypersensitivity"[Mesh] OR asthma OR "Rhinitis, Allergic"[Mesh] OR (allergic[tiab] AND Rhiniti*[tiab]) OR "Dermatitis, Atopic"[Mesh] OR ((Dermatiti*[tiab] OR eczema[tiab]) AND Atopic[tiab]) OR (Infant* AND Eczema) OR "Immunoglobulin E"[Mesh] OR "Immunoglobulin E"[tiab] OR IgE[tiab]

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

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 year*[tiab] OR pre-k[tiab] OR pre-primary[tiab] OR under five*[ti] OR young child*[ti] OR prekindergarten[tiab] OR pre-kindergarten[tiab] OR weanling* OR “first two years” OR “first 2 years”

Embase, Elsevier (1947 to February 2017):

Date(s) Searched: 2/2017
Search Terms:

'complementary feeding'/exp OR

(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 'infant feeding'/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*)

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

AND
(infant*:ti,ab OR infant/exp) OR (baby OR babies OR toddler* OR newborn* OR nurser*):ti,ab OR 'newborn'/exp OR 'newborn care'/exp OR preschool*:ti,ab OR pre-school:ti,ab OR 'preschool child'/exp OR 'infancy'/exp OR “early childhood”:ti,ab OR “early years” OR pre-k:ti,ab OR 'nursery'/exp OR 'nursery school'/exp OR prekindergarten:ti,ab OR pre-kindergarten:ti,ab OR weanling* (includes limits below) OR ([newborn]/lim OR [infant]/lim OR [child]/lim OR [preschool]/lim)

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

Limit to humans:

AND

'allergic asthma'/exp OR 'food allergy'/exp OR 'allergic rhinitis'/exp OR 'dermatitis'/exp OR 'eczema'/exp OR 'skin allergy'/exp OR ((allerg* OR hypersensitivity*) NEAR/3 (food OR peanut* OR nut OR nuts OR egg OR milk OR shellfish OR wheat)) OR 'immunoglobulin E'/exp OR 'immunoglobulin E':ti,ab OR 'atopy'/exp OR atopy:ti,ab OR atopic:ti,ab OR IgE:ti,ab

Cochrane Central Register of Controlled Trials, John Wiley & Sons in the Cochrane Library (searched 9 February 2017):
Date(s) Searched: 2/9/17
Search Terms:

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

OR

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

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

AND

[mh ^"Allergy and Immunology"] OR ((allerg*:ti,ab OR Hypersensitivit*:ti,ab) AND (food OR peanut OR nut OR nuts OR egg OR milk OR shellfish OR wheat)) OR [mh "Food Hypersensitivity"] OR asthma* OR [mh" Rhinitis, Allergic"] OR (allerg* NEAR/5 Rhiniti*) OR [mh "Dermatitis, Atopic"] OR ((Dermatiti* OR eczema) NEAR/5 Atopic) OR (Infant* NEAR/5 Eczema) OR [mh "Immunoglobulin E"] OR "Immunoglobulin E”:ti,ab OR IgE:ti,ab

CINAHL Plus with Full Text, EBSCO (Cumulative Index to Nursing and Allied Health Literature; 1937 to 9 February 2017):
Date(s) Searched: 2/9/17
Search Terms:
209; selected 26 for downloading

(MH "Food Hypersensitivity+") OR (MH "Milk Hypersensitivity") OR (MH "Pollen-Food Allergy") OR (MH "Rhinitis, Atrophic") OR "Immunoglobulin e" OR (MH "Eczema") OR (MH "Dermatitis, Atopic")

AND

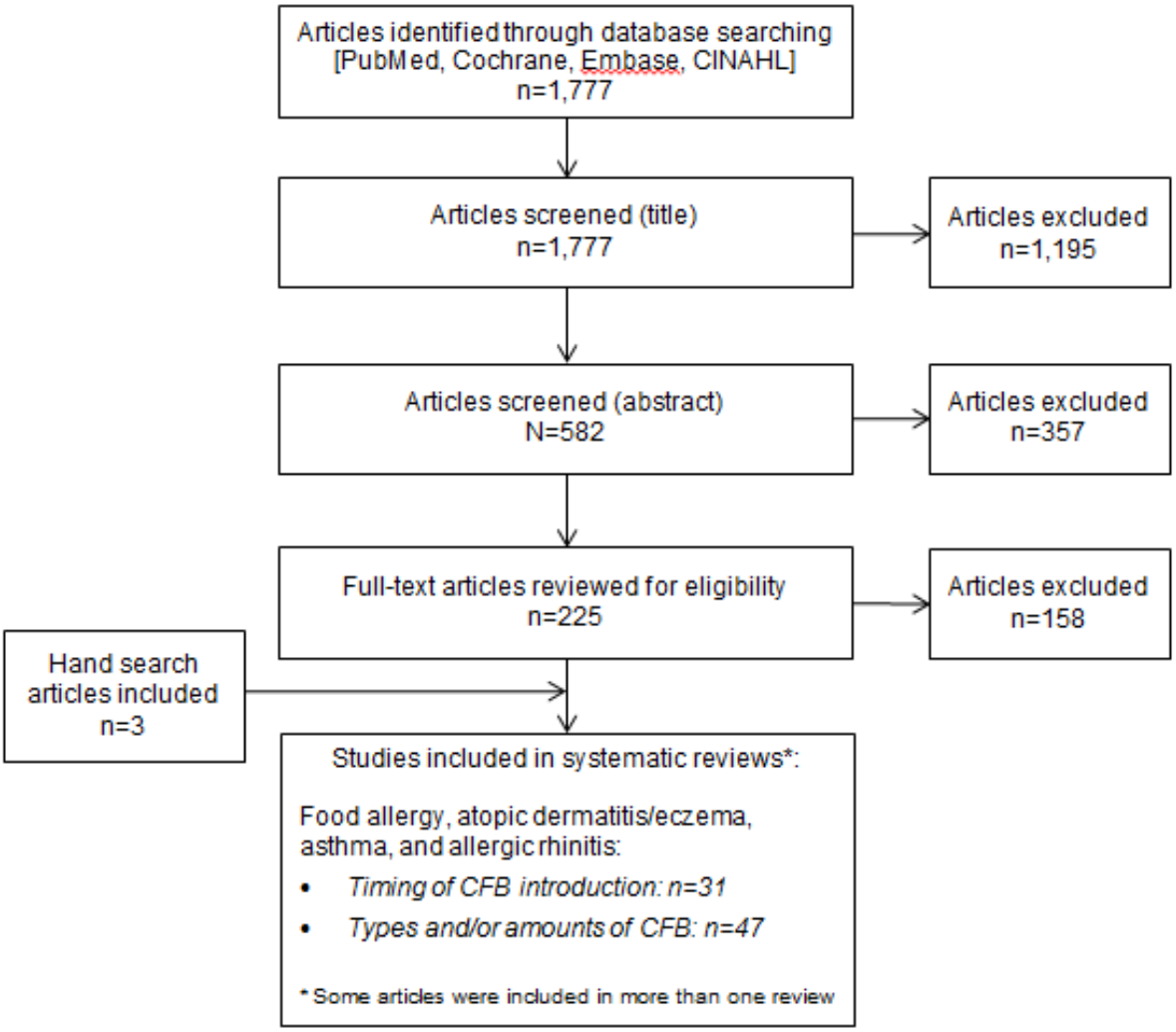
(MH "Food and Beverages+") OR (MH "Food") OR (MH "Diet") OR (MH "Eating") OR (MH "Eating Behavior") OR (MH "Taste") OR (MH "Taste Buds") OR (MH "Cereals") OR (MH "Dairy Products") OR (MH "Yogurt") OR (MH "Cheese") OR (MH "Milk") OR (MH "Eggs") OR (MH "Fruit") OR (MH "Fruit Juices") OR (MH "Meat") OR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

OR
(‘whole grain’ OR ‘whole grains’ OR dairy OR egg OR eggs OR meat OR poultry OR seafood OR fruit* OR milk OR fish* OR poultry OR vegetables* OR pea OR peas OR nut OR nuts OR cereal OR beverage* OR bread* OR seafood OR yog*urt* OR cheese* OR juice*) N5 (Complementary OR supplementa* OR wean* OR transition*

OR introduc* OR family)

OR (Infant* OR baby OR babies) N3 food*

Figure 2: Flow chart of literature search and screening results



This flow chart illustrates the literature search and screening results for articles examining the relationship between complementary feeding and food allergy, atopic dermatitis/eczema, asthma, and allergic rhinitis. The results of the electronic database searches were screened independently by two NESR analysts in a 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 CFB introduction included 31 articles, and the systematic review on on types and amounts of CFB consumed included 47 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 12. Excluded articles

	Citation	Reasons for Exclusion
1	Children's peanut allergies arising at younger ages. AORN Journal. 2008;87:624-624.	Study design
2	Infants with food protein allergy tolerate soy milk earlier than cow's. Community Practitioner. 2009;82:41-41.	Study design
3	Significance of food hypersensitivity in children with atopic dermatitis. Pediatr Dermatol. 1986;3:161-74.	Study design
4	Aberg, N.,Engstrom, I.,Lindberg, U.. Allergic diseases in Swedish school children. Acta Paediatr Scand. 1989;78:246-52.	Study design
5	Abrams, E. M.,Becker, A. B.. Introducing solid food: age of introduction and its effect on risk of food allergy and other atopic diseases. Can Fam Physician. 2013;59:721-2.	Study design
6	Alper, Z.,Sapan, N.,Ercan, I.,Canitez, Y.,Bilgel, N.. Risk factors for wheezing in primary school children in Bursa, Turkey. Am J Rhinol. 2006;20:53-63.	Study design
7	Armentia, A.,Rodriguez, R.,Callejo, A.,Martin-Esteban, M.,Martin-Santos, J. M.,Salcedo, G.,Pascual, C.,Sanchez-Monge, R.,Pardo, M.. Allergy after ingestion or inhalation of cereals involves similar allergens in different ages. Clin Exp Allergy. 2002;32:1216-22.	Health Status, Independent Variable
8	Arshad, S. H.,Matthews, S.,Gant, C.,Hide, D. W.. Effect of allergen avoidance on development of allergic disorders in infancy. Lancet. 1992;339:1493-7.	Independent Variable
9	Bardara, M.,Varin, E.,Zani, G.. Response to diet in 130 children affected with atopic dermatitis. Allergy. 1989:147-50.	Study design
10	Bardare, M.,Vaccari, A.,Allievi, E.,Brunelli, L.,Coco, F.,de Gaspari, G. C.,Flauto, U.. Influence of dietary manipulation on incidence of atopic disease in infants at risk. Ann Allergy. 1993;71:366-71.	Independent Variable
11	Becker, A.,Watson, W.,Ferguson, A.,Dimich-Ward, H.,Chan-Yeung, M.. The Canadian asthma primary prevention study: outcomes at 2 years of age. J Allergy Clin Immunol. 2004;113:650-6.	Study design, Independent Variable
12	Benn, C. S.,Wohlfahrt, J.,Aaby, P.,Westergaard, T.,Benfeldt, E.,Michaelsen, K. F.,Bjorksten, B.,Melbye, M.. Breastfeeding and risk of atopic dermatitis, by parental history of allergy, during the first 18 months of life. Am J Epidemiol. 2004;160:217-23.	Independent Variable
13	Berg, Av,Kramer, U.,Link, E.,Bollrath, C.,Heinrich, J.,Brockow, I.,Koletzko, S.,Grubl, A.,Filipiak-Pittroff, B.,Wichmann, H. E.,Bauer, C. P.,Reinhardt, D.,Berdel, D.. Impact of early feeding on childhood eczema:	Independent Variable

	Citation	Reasons for Exclusion
	development after nutritional intervention compared with the natural course - the GINIplus study up to the age of 6 years. Clin Exp Allergy. 2010;40:627-36.	
14	Bergmann, R. L.,Bergmann, K. E.,Lau-Schadensdorf, S.,Luck, W.,Dannemann, A.,Bauer, C. P.,Dorsch, W.,Forster, J.,Schmidt, E.,Schulz, J.,et, al. Atopic diseases in infancy. The German multicenter atopy study (MAS-90). Pediatr Allergy Immunol. 1994;5:19-25.	Independent Variable
15	Bilenko, N.,Ghosh, R.,Levy, A.,Deckelbaum, R. J.,Fraser, D.. Partial breastfeeding protects Bedouin infants from infection and morbidity: prospective cohort study. Asia Pac J Clin Nutr. 2008;17:243-9.	Independent Variable
16	Bion, V.,Lockett, G. A.,Soto-Ramírez, N.,Zhang, H.,Venter, C.,Karmaus, W.,Holloway, J. W.,Arshad, S. H.. Evaluating the efficacy of breastfeeding guidelines on long-term outcomes for allergic disease. Allergy: European Journal of Allergy and Clinical Immunology. 2016;71:661-670.	Independent Variable
17	Birkbeck, J. A.. Goat milk in infant nutrition. N Z Med J. 1984;97:413-4.	Study design
18	Blumberg, S.. Infant feeding: can we spice it up a bit?. J Am Diet Assoc. 2006;106:504-5.	Study design
19	Bruno, G.,Milita, O.,Ferrara, M.,Nisini, R.,Cantani, A.,Businco, L.. Prevention of atopic diseases in high risk babies (long-term follow-up). Allergy Proc. 1993;14.	Independent Variable
20	Burks, K.,Jones, S.. The Canadian asthma primary prevention study: Outcomes at 2 years of age. Pediatrics. 2005;116:537-4005.	Study design
21	Burr, M. L.,Limb, E. S.,Maguire, M. J.,Amarah, L.,Eldridge, B. A.,Layzell, J. C.,Merrett, T. G.. Infant feeding, wheezing, and allergy: a prospective study. Arch Dis Child. 1993;68:724-8.	Independent Variable
22	Burr, M. L.,Merrett, T. G.,Dunstan, F. D.,Maguire, M. J.. The development of allergy in high-risk children. Clin Exp Allergy. 1997;27:1247-53.	Independent Variable
23	Calamaro, C. J.. Infant nutrition in the first year of life: tradition or science?. Pediatr Nurs. 2000;26:211-5.	Study design
24	Cant, A. J.,Bailes, J. A.. How should we feed the potentially allergic infant?. Hum Nutr Appl Nutr. 1984;38:474-6.	Study design
25	Challacombe, D. N.. Allergies and infant feeding. Midwife Health Visit Community Nurse. 1986;22:164-6.	Study design
26	Chandra, R. K.. Role of maternal diet and mode of infant feeding in prevention of atopic dermatitis in high risk infants. Allergy. 1989:135-9.	Study design
27	Chiu, C. Y.,Liao, S. L.,Su, K. W.,Tsai, M. H.,Hua, M. C.,Lai, S. H.,Chen, L. C.,Yao, T. C.,Yeh, K. W.,Huang, J. L.. Exclusive or Partial Breastfeeding for 6 Months Is Associated with Reduced Milk Sensitization and Risk of Eczema in Early Childhood. Medicine (United States). 2016;95.	Independent Variable
28	Cho, H. N.,Hong, S.,Lee, S. H.,Yum, H. Y.. Nutritional status according to sensitized food allergens in children with atopic dermatitis. Allergy Asthma Immunol Res. 2011;3:53-7.	Study design

	Citation	Reasons for Exclusion
29	Cudowska, B.,Marcinkiewicz, S.,Kaczmarski, M.. Sensitization to cereal allergens in children with atopic dermatitis. Postepy Dermatologii i Alergologii. 2011;28:181-186.	Study design, Health Status
30	de Looy, A. E.. Infant nutrition. Nursing (Lond). 1986;3:446-9.	Study design
31	del-Rio Camacho, G.,Martinez Jimenez, V.,Fernandez-Cantalejo Padial, J.. Absence of clinical symptoms upon introduction of egg into the diet of milk-allergic infants not previously sensitised to egg. Allergol Immunopathol (Madr). 2012;40:374-8.	Health Status, Independent Variable
32	Dieguez, M. C.,Cerecedo, I.,Muriel, A.,Zamora, J.,Sanchez-Cano, M.,De la Hoz, B.. Skin prick test predictive value on the outcome of a first known egg exposure in milk-allergic children. Pediatr Allergy Immunol. 2008;19:319-24.	Health Status, Independent Variable
33	Du Toit, G.,Katz, Y.,Sasieni, P.,Mesher, D.,Maleki, S. J.,Fisher, H. R.,Fox, A. T.,Turcanu, V.,Amir, T.,Zadik-Mnuhin, G.,Cohen, A.,Livne, I.,Lack, G.. Early consumption of peanuts in infancy is associated with a low prevalence of peanut allergy. J Allergy Clin Immunol. 2008;122:984-91.	Study design, Dependent Variable
34	Dubakiene, R.,Rudzeviciene, O.,Butiene, I.,Sezaite, I.,Petronyte, M.,Vaicekauskaite, D.,Zvirbliene, A.. Studies on early allergic sensitization in the Lithuanian birth cohort. ScientificWorldJournal. 2012;2012:909524.	Independent Variable
35	Duczmal, E.,Breborowicz, A.,Duczmal, T.. The influence of specific factors on the prevalence of allergic diseases in a birth cohort study [polish]. Alergia Astma Immunologia. 2011;16:96-104.	Language
36	Dunlop, A. L.,Reichrtova, E.,Palcovicova, L.,Ciznar, P.,Adamcakova-Dodd, A.,Smith, S. J.,McNabb, S. J.. Environmental and dietary risk factors for infantile atopic eczema among a Slovak birth cohort. Pediatr Allergy Immunol. 2006;17:103-11.	Study design
37	Early peanut consumption may prevent allergy. Nurse Prescribing. 2008;6:509-509.	Study design
38	Exl, B. M.,Deland, U.,Secretin, M. C.,Preysch, U.,Wall, M.,Shmerling, D. H.. Improved general health status in an unselected infant population following an allergen-reduced dietary intervention programme: the ZUFF-STUDY-PROGRAMME. Part II: infant growth and health status to age 6 months. ZUg-FrauenFeld. Eur J Nutr. 2000;39:145-56.	Independent Variable
39	Fadeeva, T.,Asin, J. L.,Horrillo, M. L.,Baraut, T. G.,Vela, R. F.,Conde, S. L.,Hontoria, O. E.,Valero, C. B.,Molina, A. M.. Results of the oral egg-challenge test performed on two different groups of children. One group with a history, suggestive of allergic reaction with egg intake and the other group sensitised to hen's egg without previous egg intake. Allergol Immunopathol (Madr). 2010;38:233-40.	Independent Variable
40	Filipiak, B.,Zutavern, A.,Koletzko, S.,Von Berg, A.,Brockow, I.,Grübl, A.,Berdel, D.,Reinhardt, D.,Bauer, C. P.,Wichmann, H. E.,Heinrich, J.. Early solid food introduction and development of eczema in the first 4 years. Results from the GINI birth cohort. Allergo Journal. 2008;17:82-83.	Language
41	Fiocchi, A.,Verga, M. C.. Early allergenic-food introduction does not reduce subsequent food allergy development. J Pediatr. 2016;178:305-306.	Study design

	Citation	Reasons for Exclusion
42	Flohr, C.,Nagel, G.,Weinmayr, G.,Kleiner, A.,Strachan, D. P.,Williams, H. C.. Lack of evidence for a protective effect of prolonged breastfeeding on childhood eczema: lessons from the International Study of Asthma and Allergies in Childhood (ISAAC) Phase Two. Br J Dermatol. 2011;165:1280-9.	Study design
43	Frank, L.,Marian, A.,Visser, M.,Weinberg, E.,Potter, P. C.. Exposure to peanuts in utero and in infancy and the development of sensitization to peanut allergens in young children. Pediatr Allergy Immunol. 1999;10:27-32.	Country
44	Gabet, S.,Just, J.,Couderc, R.,Seta, N.,Momas, I.. Allergic sensitisation in early childhood: Patterns and related factors in PARIS birth cohort. Int J Hyg Environ Health. 2016;219:792-800.	Dependent Variable
45	Geller-Bernstein, G.,Kenett, R.,Weisglass, L.,Tsur, S.,Lahav, M.,Levin, S.. Atopic babies with wheezy bronchitis. Follow-up study relating prognosis to sequential IgE values, type of early infant feeding, exposure to parental smoking and incidence of lower respiratory tract infections. Allergy. 1987;42:85-91.	Health Status, Independent Variable
46	Ghaderi, R.,Makhmalbaf, Z.. Effect of breast-feeding on the development of atopic dermatitis. Iranian Journal of Allergy, Asthma and Immunology. 2005;4:129-132.	Independent Variable
47	Ghadi, A.,Dutau, G.,Rancé, F.. A sensitization study of atopic children in Marrakech. A prospective study of 160 children between 2002 and 2005 [french]. Revue Francaise d'Allergologie et d'Immunologie Clinique. 2007;47:409-415.	Language
48	Gray, C. L.,Levin, M. E.,du Toit, G.. Patterns of introduction of solids in South African children with atopic dermatitis: Do they affect allergy rates?. Current Allergy and Clinical Immunology. 2014;27:334-336.	Study design, Health Status
49	Greenhawt, M.,Venter, C.. Having your cake and EATing it too: early timing of multiple allergen introduction does not increase the risk of developing food allergy in standard risk, breastfed infants. Evid Based Med. 2017.	Study design
50	Greenhawt, M.. Early Allergen Introduction for Preventing Development of Food Allergy [editorial]. Jama. 2016;316:1157-1159.	Study design
51	Greenhawt, M.. Early Allergen Introduction for Preventing Development of Food Allergy. Jama. 2016;316:1157-1159.	Study design
52	Guilbert, T. W.,Stern, D. A.,Morgan, W. J.,Martinez, F. D.,Wright, A. L.. Effect of breastfeeding on lung function in childhood and modulation by maternal asthma and atopy. Am J Respir Crit Care Med. 2007;176:843-8.	Independent Variable
53	Gupta, R. S.,Walkner, M. M.,Greenhawt, M.,Lau, C. H.,Caruso, D.,Wang, X.,Pongracic, J. A.,Smith, B.. Food Allergy Sensitization and Presentation in Siblings of Food Allergic Children. Journal of Allergy and Clinical Immunology: In Practice. 2016;4:956-962.	Health Status, Independent Variable
54	Halken, S.,Host, A.,Hansen, L. G.,Osterballe, O.. Effect of an allergy prevention programme on incidence of atopic symptoms in infancy. A prospective study of 159 "high-risk" infants. Allergy. 1992;47:545-53.	Independent Variable
55	Halken, S.. What causes allergy and asthma? The role of dietary factors. Pediatr Pulmonol Suppl. 2004;26:223-4.	Study design

	Citation	Reasons for Exclusion
56	Hartman, H.,Dodd, C.,Rao, M.,DeBlasio, D.,Labowsky, C.,D'Souza, S.,Lenkauskas, S.,Roeser, E.,Heffernan, A.,Assa'ad, A.. Parental timing of allergenic food introduction in urban and suburban populations. Ann Allergy Asthma Immunol. 2016;117.	Dependent Variable
57	Hill, D. J.,Hosking, C. S.. Preventing childhood allergy. Med J Aust. 1993;158:367-9.	Study design
58	Holmes, S.. Planning for the best start in life. A guide to infant feeding. Prof Nurse. 1991;6:200-5.	Study design
59	Hon, K. L. E.,Tsang, Y. C.,Poon, T. C. W.,Pong, N. H. H.,Luk, N. M.,Leung, T. N. H.,Chow, C. M.,Leung, T. F.. Dairy and nondairy beverage consumption for childhood atopic eczema: What health advice to give?. Clinical and Experimental Dermatology. 2016;41:129-137.	Study design, Age
60	Horwitz, A. A.,Hossain, J.,Yousef, E.. Correlates of outcome for atopic dermatitis. Ann Allergy Asthma Immunol. 2009;103:146-51.	Study design, Health Status
61	Howie, P. W.,Forsyth, J. S.,Ogston, S. A.,Clark, A.,Florey, C. D.. Protective effect of breast feeding against infection. Bmj. 1990;300:11-6.	Independent Variable
62	Hua, M. C.,Chen, C. C.,Liao, S. L.,Yao, T. C.,Tsai, M. H.,Lai, S. H.,Chiu, C. Y.,Yeh, K. W.,Huang, J. L.. Faecal eosinophil cationic protein and serum immunoglobulin E in relation to infant feeding practices. Ann Clin Biochem. 2016.	Dependent Variable
63	Ito, J.,Fujiwara, T.. Breastfeeding and risk of atopic dermatitis up to the age 42 months: a birth cohort study in Japan. Ann Epidemiol. 2014;24:267-72.	Independent Variable
64	Juto, P.,Bjorksten, B.. Serum IgE in infants and influence of type of feeding. Clin Allergy. 1980;10:593-600.	Independent Variable
65	Juto, P.,Moller, C.,Engberg, S.,Bjorksten, B.. Influence of type of feeding on lymphocyte function and development of infantile allergy. Clin Allergy. 1982;12:409-16.	Independent Variable
66	Kajosaari, M.. Atopy prophylaxis in high-risk infants. Prospective 5-year follow-up study of children with six months exclusive breastfeeding and solid food elimination (not peer review). Adv Exp Med Biol. 1991;310:453-8.	Study design
67	Kaufman, H. S.,Frick, O. L.. Prevention of asthma. Clin Allergy. 1981;11:549-53.	Independent Variable
68	Khoo, P.,Boyce, S.. Does early introduction of allergenic foods decrease the risk of food allergies?. J Paediatr Child Health. 2016;52:850.	Study design
69	Kiefte-de Jong, J. C.,de Vries, J. H.,Franco, O. H.,Jaddoe, V. W.,Hofman, A.,Raat, H.,de Jongste, J. C.,Moll, H. A.. Fish consumption in infancy and asthma-like symptoms at preschool age. Pediatrics. 2012;130:1060-8.	Dependent Variable
70	Kiefte-de Jong, J. C.,Escher, J. C.,Arends, L. R.,Jaddoe, V. W.,Hofman, A.,Raat, H.,Moll, H. A.. Infant nutritional factors and functional constipation in childhood: the Generation R study. Am J Gastroenterol. 2010;105:940-5.	Dependent Variable

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71	Kim, J.,Chung, Y.,Han, Y.,Ahn, K.,Lee, S. I.. The natural history and prognostic factors of egg allergy in Korean infants with atopic dermatitis. Asian Pac J Allergy Immunol. 2009;27:107-14.	Health Status
72	Kmietowicz, Zosia. Risk of peanut allergy can be reduced by 80% by including peanuts in infant diets. BMJ: British Medical Journal. 2015;350.	Study design
73	Koletzko, B.. Complementary foods and the development of food allergy. Pediatrics. 2000;106:1285.	Study design
74	Koletzko, S.. 2.5 Allergy Prevention through Early Nutrition. World Rev Nutr Diet. 2015;113:113-7.	Study design
75	Koplin, J. J.,Osborne, N. J.,Wake, M.,Martin, P. E.,Gurrin, L. C.,Robinson, M. N.,Tey, D.,Slaa, M.,Thiele, L.,Miles, L.,Anderson, D.,Tan, T.,Dang, T. D.,Hill, D. J.,Lowe, A. J.,Matheson, M. C.,Ponsonby, A. L.,Tang, M. L.,Dharmage, S. C.,Allen, K. J.. Can early introduction of egg prevent egg allergy in infants? A population-based study. J Allergy Clin Immunol. 2010;126:807-13.	Study design, Independent Variable
76	Koplin, J.,Dharmage, S. C.,Gurrin, L.,Osborne, N.,Tang, M. L.,Lowe, A. J.,Hosking, C.,Hill, D.,Allen, K. J.. Soy consumption is not a risk factor for peanut sensitization. J Allergy Clin Immunol. 2008;121:1455-9.	Study design, Independent Variable
77	Kramer, B.,Raczynska, J.,Kaczmarek, J.,Lukamowicz, J.,Pasowska, R.,Puchala, B.. Genetic and environmental conditions involved in assessment of the immunological state in children with atopic dermatitis. Rocz Akad Med Bialymst. 1995;40:439-47.	Study design, Independent Variable
78	Kramer, M. S.,Chalmers, B.,Hodnett, E. D.,Sevkovskaya, Z.,Dzikovich, I.,Shapiro, S.,Collet, J. P.,Vanilovich, I.,Mezen, I.,Ducruet, T.,Shishko, G.,Zubovich, V.,Mknuik, D.,Gluchanina, E.,Dombrovskiy, V.,Ustinovitch, A.,Kot, T.,Bogdanovich, N.,Ovchinikova, L.,Helsing, E.. Promotion of Breastfeeding Intervention Trial (PROBIT): a randomized trial in the Republic of Belarus. Jama. 2001;285:413-20.	Independent Variable
79	Kramer, M. S.,Moroz, B.. Do breast-feeding and delayed introduction of solid foods protect against subsequent atopic eczema?. J Pediatr. 1981;98:546-50.	Independent Variable
80	Krogulska, A.,Wąsowska-Królikowska, K.,Dynowski, J.. Usefulness of atopy patch tests with food allergens in diagnosis of food allergy in children with dermatitis atopica. Przeglad Pediatryczny. 2007;37:245-249.	Health Status, Independent Variable, Language
81	Kucukosmanoglu, E.,Yazi, D.,Yesil, O.,Akkoc, T.,Gezer, M.,Bakirci, N.,Bahceciler, N. N.,Barlan, I. B.. Prevalence of egg sensitization in Turkish infants based on skin prick test. Allergol Immunopathol (Madr). 2008;36:141-4.	Study design
82	Kummeling, I.,Thijs, C.,Huber, M.,van de Vijver, L. P.,Snijders, B. E.,Penders, J.,Stelma, F.,van Ree, R.,van den Brandt, P. A.,Dagnelie, P. C.. Consumption of organic foods and risk of atopic disease during the first 2 years of life in the Netherlands. Br J Nutr. 2008;99:598-605.	Study design
83	Laubereau, B.,Brockow, I.,Zirngibl, A.,Koletzko, S.,Gruebl, A.,von Berg, A.,Filipiak-Pittroff, B.,Berdel, D.,Bauer, C. P.,Reinhardt, D.,Heinrich, J.,Wichmann, H. E.. Effect of breast-feeding on the development of atopic dermatitis during the first 3 years of life--results from the GINI-birth cohort study. J Pediatr. 2004;144:602-7.	Independent Variable

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84	Lee, J. M.,Neher, J. O.,Kelsberg, G.,Safranek, S.. Atopic Eczema and Early Introduction of Solid Foods. Am Fam Physician. 2015;92:523-4.	Study design
85	Levin, M.,Goga, A.,Doherty, T.,Coovadia, H.,Sanders, D.,Green, R. J.,Kling, S.. Allergy and infant feeding guidelines in the context of resource-constrained settings. J Allergy Clin Immunol. 2016.	Study design
86	Luoma, R.. Environmental allergens and morbidity in atopic and non-atopic families. Acta Paediatr Scand. 1984;73:448-53.	Independent Variable
87	Majeed, R.,Rajar, U. D.,Shaikh, N.,Majeed, F.,Arain, A. A.. Risk factors associated with childhood asthma. J Coll Physicians Surg Pak. 2008;18:299-302.	Independent Variable
88	Mauro-Martín, I. S.,Bodega-Villanueva, P.,Romero-Caamaño, E.,Micó-Moreno, V.,Garicano-Vilar, E.. Association between timing of food introduction in on first year old and the prevalence of allergies [spanish]. Revista Espanola de Nutricion Humana y Dietetica. 2014;18:145-154.	Language
89	Mavale-Manuel, S.,Alexandre, F.,Duarte, N.,Albuquerque, O.,Scheinmann, P.,Poisson-Salomon, A. S.,de Blic, J.. Risk factors for asthma among children in Maputo (Mozambique). Allergy. 2004;59:388-93.	Independent Variable
90	McKean, M.,Caughey, A. B.,Leong, R. E.,Wong, A.,Cabana, M. D.. The Timing of Infant Food Introduction in Families With a History of Atopy. Clin Pediatr (Phila). 2015;54:745-51.	Dependent Variable
91	Metcalfe, J. R.,D'Vaz, N.,Makrides, M.,Gold, M. S.,Quinn, P.,West, C. E.,Loh, R.,Prescott, S. L.,Palmer, D. J.. Elevated IL-5 and IL-13 responses to egg proteins predate the introduction of egg in solid foods in infants with eczema. Clin Exp Allergy. 2016;46:308-16.	Health Status, Dependent Variable
92	Midwinter, R. E.,Morris, A. F.,Colley, J. R.. Infant feeding and atopy. Arch Dis Child. 1987;62:965-7.	Study design, Independent Variable
93	Mihrshahi, S.,Webb, K.,Almqvist, C.,Kemp, A. S.. Adherence to allergy prevention recommendations in children with a family history of asthma. Pediatr Allergy Immunol. 2008;19:355-62.	Dependent Variable
94	Milner, J. D.,Stein, D. M.,McCarter, R.,Moon, R. Y.. Early infant multivitamin supplementation is associated with increased risk for food allergy and asthma. Pediatrics. 2004;114:27-32.	Independent Variable
95	Miyake, Y.,Yura, A.,Iki, M.. Breastfeeding and the prevalence of symptoms of allergic disorders in Japanese adolescents. Clin Exp Allergy. 2003;33:312-6.	Study design
96	Moore, W. J.,Midwinter, R. E.,Morris, A. F.,Colley, J. R.,Soothill, J. F.. Infant feeding and subsequent risk of atopic eczema. Arch Dis Child. 1985;60:722-6.	Independent Variable
97	Morgan, J. B.,Lucas, A.,Fewtrell, M. S.. Does weaning influence growth and health up to 18 months?. Archives of Disease in Childhood: Education and Practice Edition. 2004;89:728-733.	Study design

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98	Morin, K. H.. Food Allergies: New Evidence for Peanut Introduction. MCN Am J Matern Child Nurs. 2016;41:188.	Study design
99	Nakamura, Y.,Oki, I.,Tanihara, S.,Ojima, T.,Ito, Y.,Yamazaki, O.,Iwama, M.,Tabata, Y.,Katsuyama, K.,Sasai, Y.,Nakagawa, M.,Matsushita, A.,Hossaka, K.,Sato, J.,Hidaka, Y.,Uda, H.,Nakamata, K.,Yanagawa, H.. Relationship between breast milk feeding and atopic dermatitis in children. J Epidemiol. 2000;10:74-8.	Study design, Independent Variable
100		Language
101	Natsume, O.,Kabashima, S.,Nakasato, J.,Yamamoto-Hanada, K.,Narita, M.,Kondo, M.. Early introduction of egg for infants with atopic dermatitis to prevent egg allergy: A double-blind placebo-controlled randomized clinical trial[abstract only]. Journal of Allergy and Clinical Immunology. 2016;137.	Study design
102	Neild, V.. Diet and atopic eczema. Mod Midwife. 1994;4:22.	Study design
103	Nwaru, B. I.,Erkkola, M.,Ahonen, S.,Kaila, M.,Haapala, A. M.,Kronberg-Kippila, C.,Salmelin, R.,Veijola, R.,Ilonen, J.,Simell, O.,Knip, M.,Virtanen, S. M.. Age at the introduction of solid foods during the first year and allergic sensitization at age 5 years. Pediatrics. 2010;125:50-9.	Dependent Variable
104	Nwaru, B. I.,Takkinen, H. M.,Niemela, O.,Kaila, M.,Erkkola, M.,Ahonen, S.,Tuomi, H.,Haapala, A. M.,Kenward, M. G.,Pekkanen, J.,Lahesmaa, R.,Kere, J.,Simell, O.,Veijola, R.,Ilonen, J.,Hyoty, H.,Knip, M.,Virtanen, S. M.. Introduction of complementary foods in infancy and atopic sensitization at the age of 5 years: timing and food diversity in a Finnish birth cohort. Allergy. 2013;68:507-16.	Dependent Variable
105	Oddy, W. H.,Sherriff, J. L.. Breastfeeding, body mass index, asthma and atopy in children. Asia Pac J Public Health. 2003.	Independent Variable
106	Oddy, W. H.. Breastfeeding and asthma in children: findings from a West Australian study. Breastfeed Rev. 2000;8:5-11.	Independent Variable
107	Oehling, A.. Importance of food allergy in childhood asthma. Allergol Immunopathol (Madr). 1981:71-3.	Study design
108	Ogbuanu, I. U.,Karmaus, W.,Arshad, S. H.,Kurukulaaratchy, R. J.,Ewart, S.. Effect of breastfeeding duration on lung function at age 10 years: a prospective birth cohort study. Thorax. 2009;64:62-6.	Independent Variable
109	Ozmert, E. N.,Kale-Cekinmez, E.,Yurdakok, K.,Sekerel, B. E.. Determinants of allergic signs and symptoms in 24-48-month-old Turkish children. Turk J Pediatr. 2009;51:103-9.	Study design
110	Parihar, H.,Kumar, L.,Puri, R.,Kumar, V.. The incidence of allergic diseases and feeding patterns in children upto 2 years of age. Indian J Pediatr. 1984;51:7-12.	Study design
111	Paton, J.,Kljakovic, M.,Ciszek, K.,Ding, P.. Infant Feeding Practices and Nut Allergy over Time in Australian School Entrant Children. Int J Pediatr. 2012;2012:675724.	Study design, Age

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112	Pesonen, M.,Kallio, M. J.,Ranki, A.,Siimes, M. A.. Prolonged exclusive breastfeeding is associated with increased atopic dermatitis: a prospective follow-up study of unselected healthy newborns from birth to age 20 years. Clin Exp Allergy. 2006;36:1011-8.	Independent Variable
113	Peters, R. L.,Allen, K. J.,Dharmage, S. C.,Lodge, C. J.,Koplin, J. J.,Ponsonby, A. L.,Wake, M.,Lowe, A. J.,Tang, M. L.,Matheson, M. C.,Gurrin, L. C.. Differential factors associated with challenge-proven food allergy phenotypes in a population cohort of infants: a latent class analysis. Clin Exp Allergy. 2015;45:953-63.	Study design
114	Peters, T. J.,Golding, J.. The epidemiology of childhood eczema: II. Statistical analyses to identify independent early predictors. Paediatr Perinat Epidemiol. 1987;1:80-94.	Independent Variable
115	Pitt, Tj,Watson, W.,Ferguson, A.,Dimich-Ward, H.,Dybuncio, A.,Kozyrskyj, Al. Delay In The Introduction Of Allergenic Foods Is Not Associated With An Increased Risk For Sensitization In A High Risk Cohort [Abstract]. Journal of allergy and clinical immunology. 2010;125.	Study design
116	Pohl, C. A.. Timing of cereal introduction to the infant diet. Patient Care for the Nurse Practitioner. 2006;9.	Study design
117	Pohlabeln, H.. Effect modification by familial predisposition when analyzing the influence of breastfeeding and pet keeping on the development of allergic diseases in children [german]. Allergologie. 2012;35:44-53.	Language
118	Poongadan, M. N.,Gupta, N.,Kumar, R.. Dietary pattern and asthma in India. Pneumonol Alergol Pol. 2016;84:160-7.	Age
119	Poysa, L.,Pulkkinen, A.,Korppi, M.,Remes, K.,Juntunen-Backman, K.. Diet in infancy and bronchial hyperreactivity later in childhood. Pediatr Pulmonol. 1992;13:215-21.	Independent Variable
120	Poysa, L.. Atopy in children with and without a family history of atopy. II. Skin reactivity. Acta Paediatr Scand. 1989;78:902-6.	Independent Variable
121	Prasad, S.,Rana, R. K.,Sheth, R.,Mauskar, A. V.. A Hospital Based Study to Establish the Correlation between Recurrent Wheeze and Vitamin D Deficiency Among Children of Age Group Less than 3 Years in Indian Scenario. J Clin Diagn Res. 2016;10.	Independent Variable, Dependent Variable
122	Pratt, H. F.. Breastfeeding and eczema. Early Hum Dev. 1984;9:283-90.	Independent Variable
123	Pugh, R. J.. Infant feeding in perspective. Practitioner. 1982;226:1917-25.	Study design
124	Quah, P. L.,Loo, E. X.,Lee, G. N.,Kuo, I. C.,Gerez, I.,Llanora, G. V.,Chan, Y. H.,Aw, M.,Shek, L. P.,Lee, B. W.. Clinical phenotype and allergen sensitization in the first 2 years as predictors of atopic disorders at age 5 years. World Allergy Organ J. 2015;8:33.	Independent Variable
125	Rosenberg, K.. Early Introduction Reduces Risk of Some Food Allergies. Am J Nurs. 2017;117:65-66.	Study design

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126	Roslan, K.,Szczepanski, M.,Kaczmarski, M.,Zapolska, B.,Uscinowicz, M.,Wasilewska, J.,Solarz, E.. Environmental and constitutional conditions and food hypersensitivity in children. Rocz Akad Med Bialymst. 1995;40:448-51.	Study design, Health Status
127	Satwani, H.,Rehman, A.,Ashraf, S.,Hassan, A.. Is serum total IgE levels a good predictor of allergies in children?. J Pak Med Assoc. 2009;59:698-702.	Study design
128	Sausenthaler, S.,Heinrich, J.,Koletzko, S.. Early diet and the risk of allergy: What can we learn from the prospective birth cohort studies GINIplus and LISAplus?. American Journal of Clinical Nutrition. 2011;94.	Study design
129	Sherriff, A.,Peters, T. J.,Henderson, J.,Strachan, D.. Risk factor associations with wheezing patterns in children followed longitudinally from birth to 3(1/2) years. Int J Epidemiol. 2001;30:1473-84.	Independent Variable
130	Shohet, L.,Shahar, E.,Davidson, S.. Breast feeding as prophylaxis for atopic eczema: a controlled study of 368 cases. Acta Paediatr Hung. 1985;26:35-9.	Independent Variable
131	Siltanen, M.,Kajosaari, M.,Poussa, T.,Saarinen, K. M.,Savilahti, E.. A dual long-term effect of breastfeeding on atopy in relation to heredity in children at 4 years of age. Allergy. 2003;58:524-30.	Independent Variable
132	Silvers, K. M.,Frampton, C. M.,Wickens, K.,Pattemore, P. K.,Ingham, T.,Fishwick, D.,Crane, J.,Town, G. I.,Epton, M. J.. Breastfeeding protects against current asthma up to 6 years of age. J Pediatr. 2012;160.	Independent Variable
133	Smith, P.. Dietary prevention of food allergies in infants. Australian Journal of Pharmacy. 2012;93:80-83.	Study design
134	Sybilski, A. J.,Doboszyńska, A.,Samoliński, B.. Influence of selected risk factors on the development of allergy during the first year of life [polish]. Przeglad Pediatryczny. 2008;38:13-19.	Independent Variable, Language
135	Ta, V.,Laubach, S.. Introduction of complementary foods and the relationship to food allergy. Pediatrics. 2014.	Study design
136	Taitz, L.. Feeding children in the first year of life. Community Nurse. 1990;26:81-84.	Study design
137	Takemura, Y.,Sakurai, Y.,Honjo, S.,Kusakari, A.,Hara, T.,Gibo, M.,Tokimatsu, A.,Kugai, N.. Relation between breastfeeding and the prevalence of asthma : the Tokorozawa Childhood Asthma and Pollinosis Study. Am J Epidemiol. 2001;154:115-9.	Independent Variable
138	Tan, Jw- L.,Valerio, C.,Barnes, E. H.,Asperen, P. P.,Kakakios, A. M.,Campbell, D. E.. Early introduction of dietary egg reduces egg sensitization at 12 months of age in infants at risk of allergic disease [abstract only]. Journal of Allergy and Clinical Immunology. 2016;137.	Study design
139	Taylor, B.. Infant feeding and allergy: fact and fiction. Midwife Health Visit Community Nurse. 1984;20:354-60.	Study design
140	Tromp,, II,Briede, S.,Kiefte-de Jong, J. C.,Renders, C. M.,Jaddoe, V. W.,Franco, O. H.,Hofman, A.,Raat, H.,Moll, H. A.. Factors associated with the timing of introduction of complementary feeding: the Generation R Study. Eur J Clin Nutr. 2013;67:625-30.	Dependent Variable

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141	van Odijk, J.,Hulthen, L.,Ahlstedt, S.,Borres, M. P.. Introduction of food during the infant's first year: a study with emphasis on introduction of gluten and of egg, fish and peanut in allergy-risk families. Acta Paediatr. 2004;93:464-70.	Study design, Dependent Variable
142	Ventura, A.,De Seta, L.,Martelossi, S.,Florean, P.,Maggiore, G.,Salvatore, C. M.,Berzioli, M.,Guidobaldi, G.,Lorenzini, G.,Peressini, P.,Pesenti, P.,Rollo, G.,Sacher, B.,Santoro, L.,Stanzione, V.,Stranamore, D.,Zannerio, E.. Soy allergy and DSCG in atopic eczema: "much ado about nothing"?. Pediatr Med Chir. 1996;18:283-8.	Health Status, Independent Variable
143	Verduci, E.,Banderali, G.,Peroni, D.,Lassandro, C.,Radaelli, G.. Duration of exclusive breastfeeding and wheezing in the first year of life: A longitudinal study. Allergol Immunopathol (Madr). 2016.	Independent Variable
144	Visser, H. K.. Dietary influences on infection and allergy in infants: introduction. J Nutr. 2008;138.	Study design
145	Waddell, L.. Introduction of solids in babies at risk of allergies. J Fam Health Care. 2014;24:22-7.	Study design
146	Waidyatillake, N. T.,Simpson, J. A.,Allen, K. J.,Lodge, C. J.,Dharmage, S. C.,Abramson, M. J.,De Livera, A. M.,Matheson, M. C.,Erbas, B.,Hill, D. J.,Lowe, A. J.. The effect of breastfeeding on lung function at 12 and 18 years: A prospective cohort study. European Respiratory Journal. 2016;48:125-132.	Independent Variable
147	Wegienka, G.,Ownby, D. R.,Havstad, S.,Williams, L. K.,Johnson, C. C.. Breastfeeding history and childhood allergic status in a prospective birth cohort. Ann Allergy Asthma Immunol. 2006;97:78-83.	Independent Variable
148	West, C. E.,Hammarstrom, M. L.,Hernell, O.. Probiotics during weaning reduce the incidence of eczema. Pediatr Allergy Immunol. 2009;20:430-7.	Independent Variable
149	White, J. M.,McFadden, J. P.. Contact allergens in food ingredients and additives: atopy and the hapten-atopy hypothesis. Contact Dermatitis. 2008;58:245-6.	Study design, Dependent Variable
150	Woicka-Kolejwa, K.,Zaczeniuk, M.,Majak, P.,Pawlowska-Iwanicka, K.,Kopka, M.,Stelmach, W.,Jerzynska, J.,Stelmach, I.. Food allergy is associated with recurrent respiratory tract infections during childhood. Postepy Dermatol Alergol. 2016;33:109-13.	Study design, Dependent Variable
151	Woś, H.,Cholewa, Z.,Brozek, G.. The influence of breast-feeding on the rate of occurrence of bronchial asthma in children at the younger school age. Pediatria Wspolczesna. 2003;5:21-27.	Independent Variable, Language
152	Wright, A. L.,Holberg, C. J.,Martinez, F. D.,Halonen, M.,Morgan, W.,Taussig, L. M.. Epidemiology of physician-diagnosed allergic rhinitis in childhood. Pediatrics. 1994;94:895-901.	Dependent Variable
153	Wright, A. L.,Holberg, C. J.,Taussig, L. M.,Martinez, F. D.. Factors influencing the relation of infant feeding to asthma and recurrent wheeze in childhood. Thorax. 2001;56:192-7.	Independent Variable
154	Wright, A. L.,Holberg, C. J.,Taussig, L. M.,Martinez, F.. Maternal asthma status alters relation of infant feeding to asthma in childhood [not peer rev jl). Adv Exp Med Biol. 2000;478:131-7.	Study design

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155	Xu, M.,Wang, Y.,Dai, Z.,Zhang, Y.,Li, Y.,Wang, J.. Comparison of growth and nutritional status in infants receiving goat milk-based formula and cow milk-based formula: A randomized, double-blind study. Food and Nutrition Research. 2015;59.	Independent Variable, Dependent Variable
156	Yamakawa, M.,Yorifuji, T.,Kato, T.,Yamauchi, Y.,Doi, H.. Breast-feeding and hospitalization for asthma in early childhood: a nationwide longitudinal survey in Japan. Public Health Nutr. 2015;18:1756-61.	Independent Variable
157	Young, H. B.,Buckley, A. E.,Hamza, B.,Mandarano, C.. Milk and lactation: some social and developmental correlates among 1,000 infants. Pediatrics. 1982;69:169-75.	Study design, Independent Variable
158	Zeiger, R. S.,Heller, S.,Mellon, M. H.,Forsythe, A. B.,O'Connor, R. D.,Hamburger, R. N.,Schatz, M.. Effect of combined maternal and infant food-allergen avoidance on development of atopy in early infancy: a randomized study. J Allergy Clin Immunol. 1989;84:72-89.	Independent Variable