2020 Dietary Guidelines Advisory Committee: Pregnancy and Lactation Subcommittee

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Topics and Questions Under Review

Dietary Patterns

Outcomes	Status
Human milk composition	Meeting 4 (Jan 2020) – evidence & draft conclusions
Hypertensive disorders Gestational diabetes Gestational age at birth Birth weight	Meeting 4 (Jan 2020) – conclusions from P/B24 existing reviews
Gestational weight gain **Postpartum weight loss** **Neurocognitive development**	**Meeting 5 (March 2020) – evidence & draft conclusions**

Maternal Diet

Outcomes	Status
Food allergies and atopic diseases	**Meeting 5 (March 2020) – evidence & draft conclusions**

Topics and Questions Under Review (continued)

Nutrients from Supplements and Fortified Foods

Nutrient	Outcomes	Status
Folic Acid	• Human milk composition • Gestational diabetes	Meeting 3 (Oct 2019) – evidence & draft conclusions
Folic Acid	• Hypertensive disorders • Neurocognitive development • Micronutrient status	Meeting 4 (Jan 2020) – evidence & draft conclusions
Omega-3	• **Neurocognitive development**	**Meeting 5 (March 2020) – evidence**

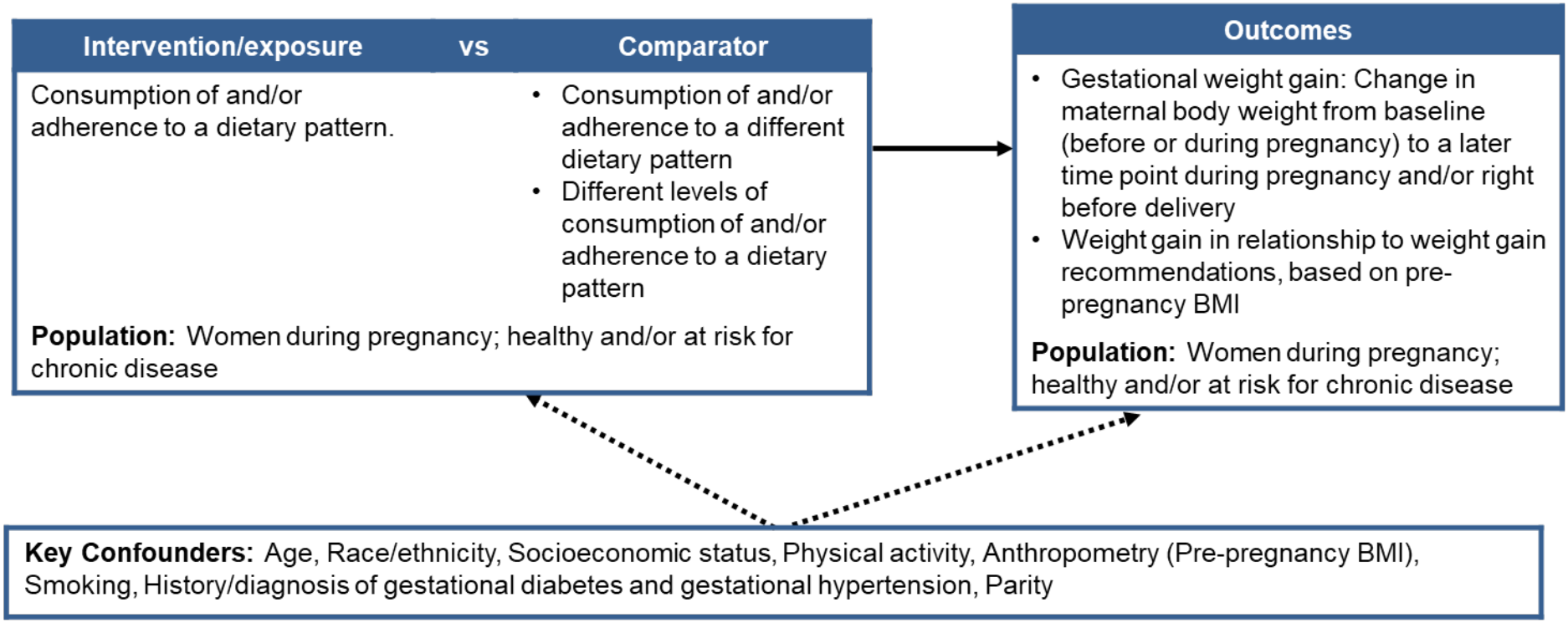
Question

What is the relationship between **dietary patterns** consumed during pregnancy and **gestational weight gain**?

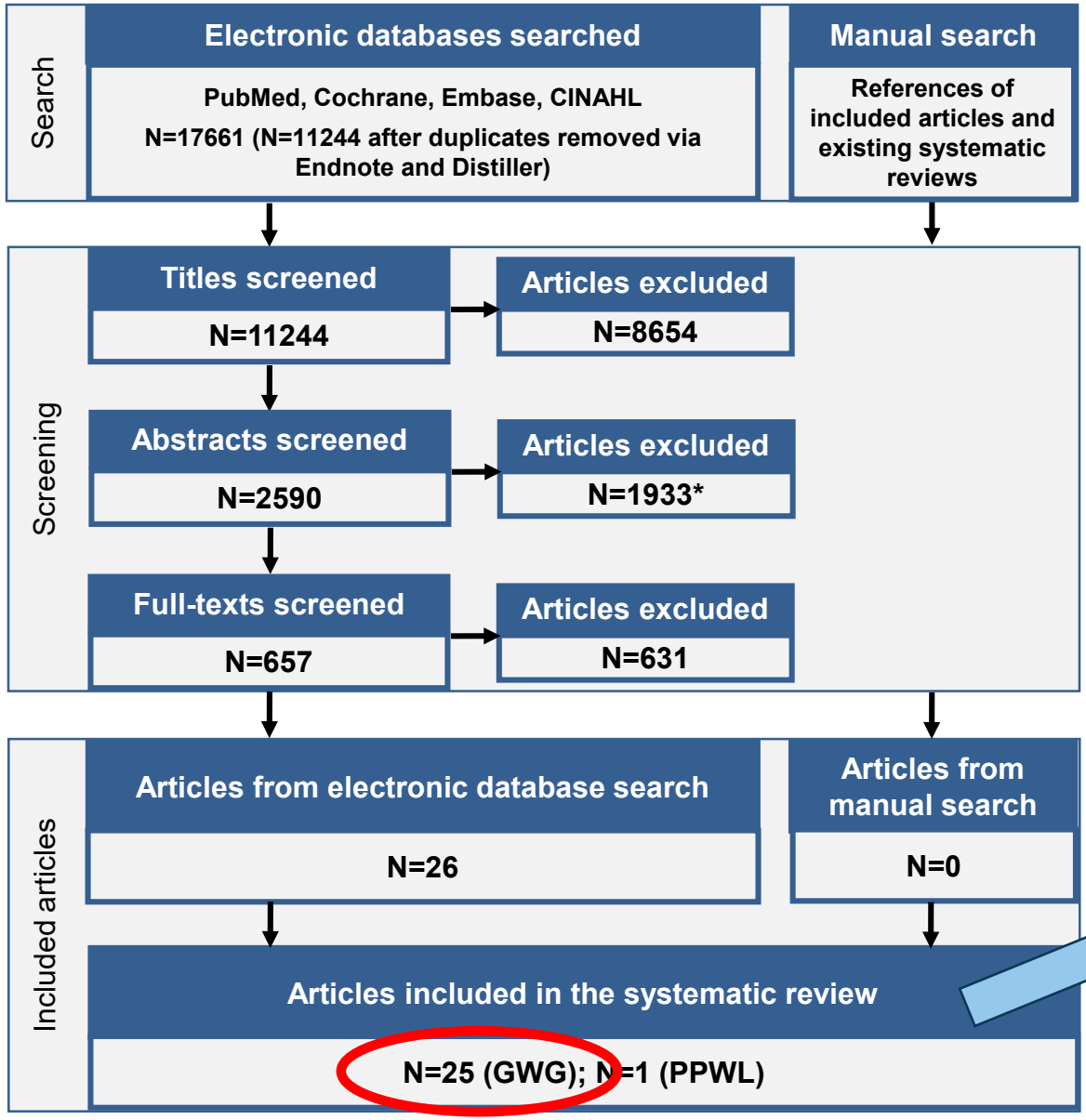
Approach to Answer Question: NESR Systematic Review

Analytic Framework

Systematic review question: What is the relationship between **dietary patterns** consumed during pregnancy and **gestational weight gain (GWG)**?



Literature Search and Screening Results



25 included articles:
- 4 RCTs
- 19 PCS (21 articles)

25 articles addressed the question - what is the relationship between **dietary patterns** consumed during pregnancy and **gestational weight gain**?

**The number of articles excluded during the abstract screening was corrected after Committee discussion*

Description of the Evidence

- **Sample characteristics**
  - n=35 to 66,597/study
  - Conducted in the U.S., Spain, the U.K., Norway, Japan, Mexico, Italy, Poland, Iceland, Finland, the Netherlands, China, and Malaysia
  - ~18-45y, majority white or race/ethnicity NR, mid-high SES
- **Interventions/Exposures**
  - DP indices/scores (N=15), factor analysis or principal component analysis (N=5), experimental diets (N=3), reduced rank regression (N=1), and macronutrient proportions (N=2)
- **Outcomes**
  - GWG reported as: GWG adequacy (N=13), total GWG (N=10), GWG rate (N=6), and GWG for a specified time period (N=2) or trimester (N=1)

Summary of the Evidence Synthesis: RCTs

- 3 RCTs assessed effect of the MED diet
  - 2 of the 3 RCTs showed that the intervention group had significantly lower GWG when compared to the control group
- Limitations include:
  - Researchers not blinded
  - Unclear outcome assessment methods
  - Deviations from intended interventions
  - No pre-registered data analysis plan
  - Limited consistency, directness, precision, and generalizability

Summary of the Evidence Synthesis: PCS

- 13 of 19 cohort studies (21 articles) showed an association between maternal DP and GWG:
  - Greater adherence to a DP (identified as beneficial by the study) associated with lower GWG (N=6)
  - Greater adherence to a DP (identified as detrimental by the study) associated with higher GWG (N=3)
  - Greater adherence to a "beneficial" DP (i.e. DASH, DASH OMNI, Mediterranean Diet, HEI) associated with higher GWG (N=3)
  - Greater adherence to DP arrived at by reduced rank regression associated with higher GWG (N=1)
- Limitations include:
  - Confounding, selection bias, exposure misclassification, deviation from intended exposures, missing data, self-reported outcomes, no preregistered protocol with analysis plan, limited consistency, directness, precision, and generalizability

DRAFT Conclusion Statement and Grade

Conclusion statement

Limited evidence suggests that certain dietary patterns during pregnancy are associated with a lower risk of excessive gestational weight gain during pregnancy. These patterns are:

- higher in vegetables, fruits, nuts, legumes, fish
- lower in added sugar and red and processed meat

Grade: Limited

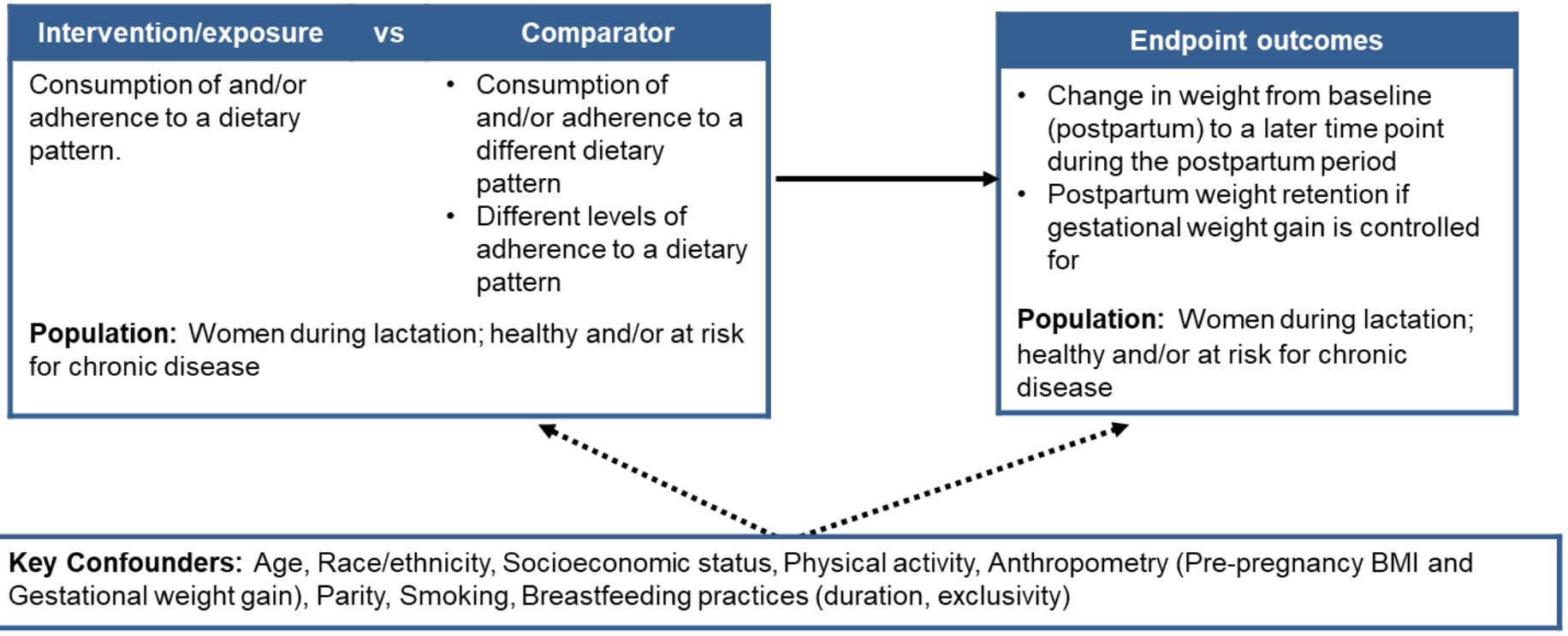
Question: dietary patterns and PPWL

What is the relationship between **dietary patterns** consumed during lactation and **postpartum weight loss**?

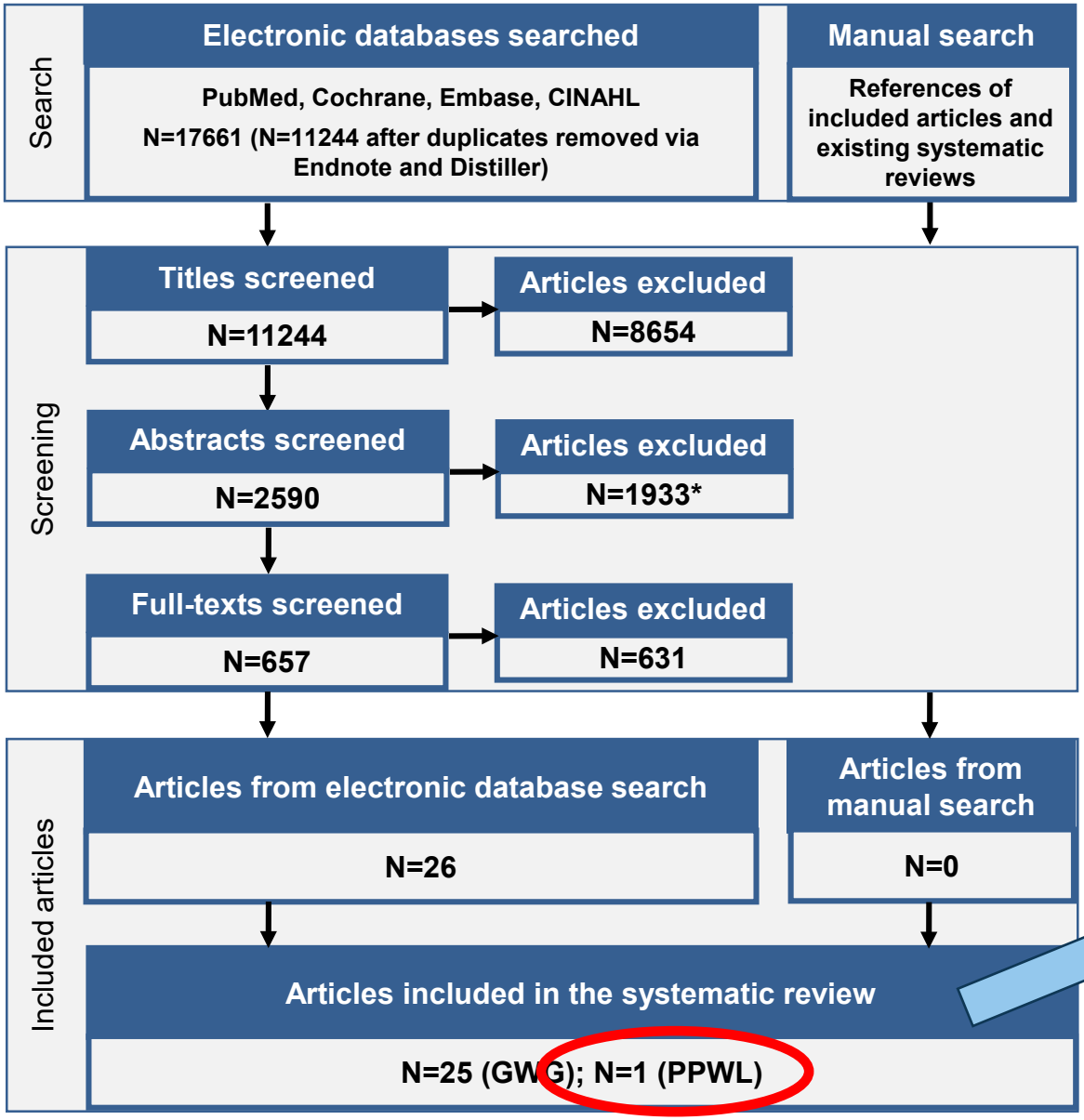
Approach to Answer Question: NESR Systematic Review

Analytic Framework

Systematic review question: What is the relationship between **dietary patterns** consumed during lactation and **postpartum weight loss**?



Literature Search and Screening Results: PPWL



Included article:
- 1 RCT

1 article addressed the question - what is the relationship between **dietary patterns** consumed during lactation and **postpartum weight loss**?

**The number of articles excluded during the abstract screening was corrected after Committee discussion*

Description of the Evidence: PPWL

- **Sample characteristics**
  - n=129
  - U.S.-based RCT
  - 100% lactating, mean age of ~30y, predominantly non-Hispanic white (~75%), well-educated
- **Interventions/Exposures**
  - Mediterranean (MED) diet vs. USDA's MyPyramid diet
  - Initiation: ~17.5 wk postpartum
  - Duration: 4 mo
- **Outcomes**
  - PPWL reported as weight change from baseline to 4mo

Summary of the Evidence Synthesis

- One RCT, conducted in the U.S., compared postpartum weight loss between lactating women who were randomized to a Mediterranean-style diet vs. USDA's MyPyramid diet
- There were no statistically significant differences in postpartum weight loss between the two groups
- Notable limitations:
  - Lack of blinding of participants and investigators
  - High attrition (~21%)
  - Issues with implementing the intervention
  - Concerns about adherence

DRAFT Conclusion Statement and Grade: PPWL

Conclusion statement

Insufficient evidence is available to determine the relationship between dietary patterns consumed during lactation and postpartum weight loss.

Grade: Grade Not Assignable

Question:
dietary patterns and neurocognitive development

What is the relationship between **dietary patterns** consumed during lactation and **developmental milestones, including neurocognitive development**?

Approach to Answer Question: NESR Systematic Review

Analytic Framework:
dietary patterns and neurocognitive development

Systematic review question: What is the relationship between **dietary patterns** consumed during lactation and infant **developmental milestones, including neurocognitive development**?

Intervention/exposure	vs	Comparator
Consumption of and/or adherence to a dietary pattern.		• Consumption of and/or adherence to a different dietary pattern • Different levels of consumption of and/or adherence to a dietary pattern

Population: Women during lactation; healthy and/or at risk for chronic disease

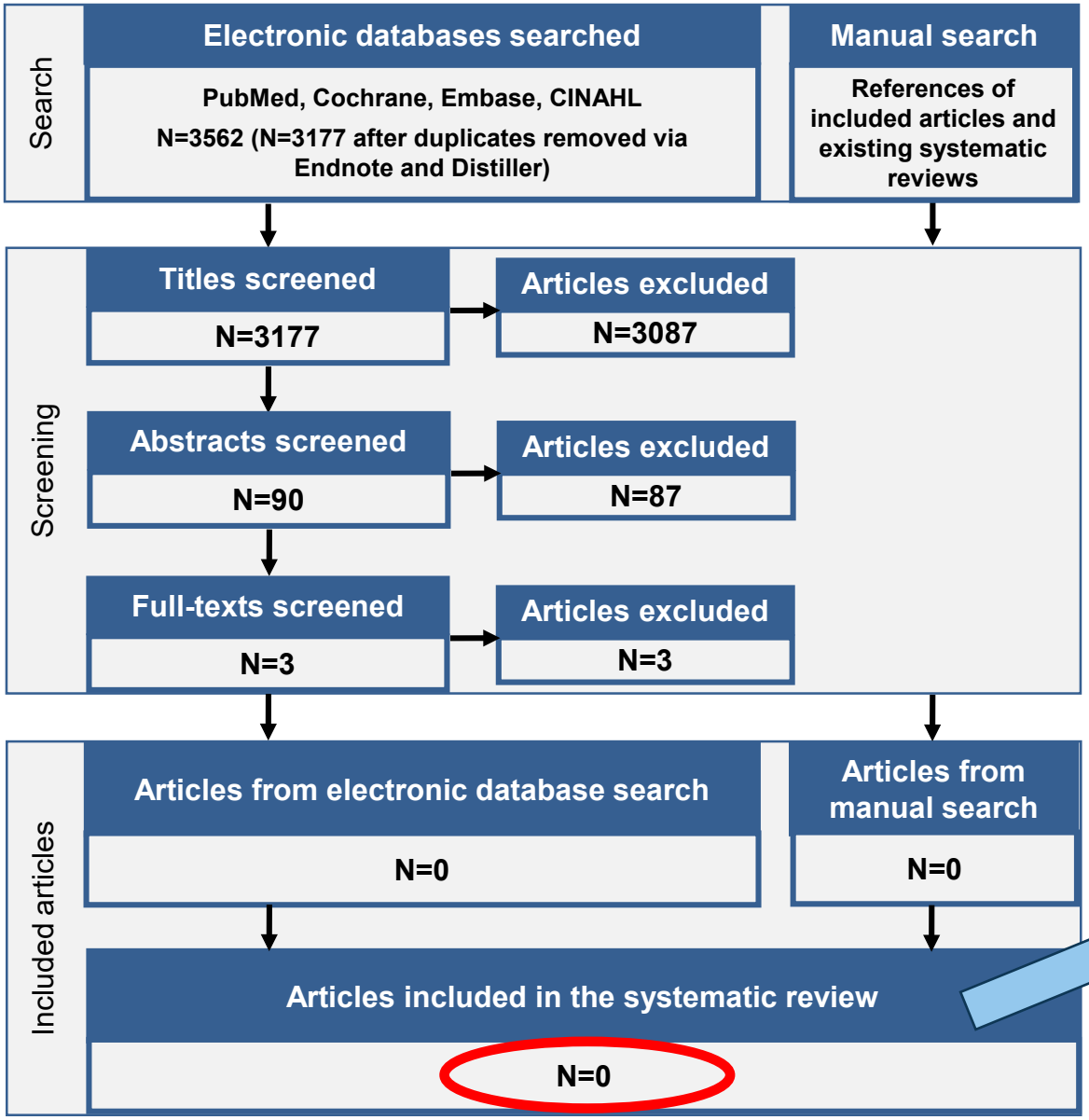
Outcomes

- Developmental domains, examined via milestone achievement and/or scales/indices, including:
  - Cognitive,
  - Language/communication,
  - Movement/physical,
  - Social-emotional
- Academic performance
- Attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD)
- Anxiety
- Depression
- Autism spectrum disorder (ASD)

Population: Infants and toddlers (birth to 24 months), children and adolescents (ages 2-18 years)

Key Confounders: Maternal age, Race/ethnicity, Socioeconomic status, Smoking, Anthropometry (obesity status during lactation, gestational weight gain), Parity, Child sex, Gestational age at birth, Breastfeeding practices (duration, exclusivity)
Other factors to be considered: Maternal substance use (alcohol, drug use), Family history/diagnosis of neurocognitive disorders, complementary feeding

Literature Search and Screening Results: dietary patterns and neurocognitive development



0 included articles

0 articles addressed the question - what is the relationship between **dietary patterns** consumed during lactation and **developmental milestones, including neurocognitive development?**

DRAFT Conclusion Statement and Grade: dietary patterns and neurocognitive development

Conclusion statement

No evidence is available to determine the relationship between the maternal dietary patterns consumed during lactation and developmental outcomes including neurocognitive development.

Grade: Grade Not Assignable

Question: maternal diet and allergy

What is the relationship between **maternal diet** during pregnancy and lactation and risk of **infant and child food allergies and atopic allergic diseases**?

Approach to Answer Question: NESR Systematic Review

Analytic Framework: maternal diet and allergy

Systematic review question: What is the relationship between **maternal diet** during pregnancy and lactation and risk of **infant and child food allergies and atopic allergic diseases**?

Intervention/exposure	vs	Comparator
Dietary intake of a food(s) or food group(s)		No food or different amount of dietary intake of the same food(s) or food group(s)

Population: Women during pregnancy and/or during lactation; healthy and/or at risk for chronic disease

Outcomes

- Food allergies
- Food sensitization
- Allergic rhinitis
- Atopic dermatitis

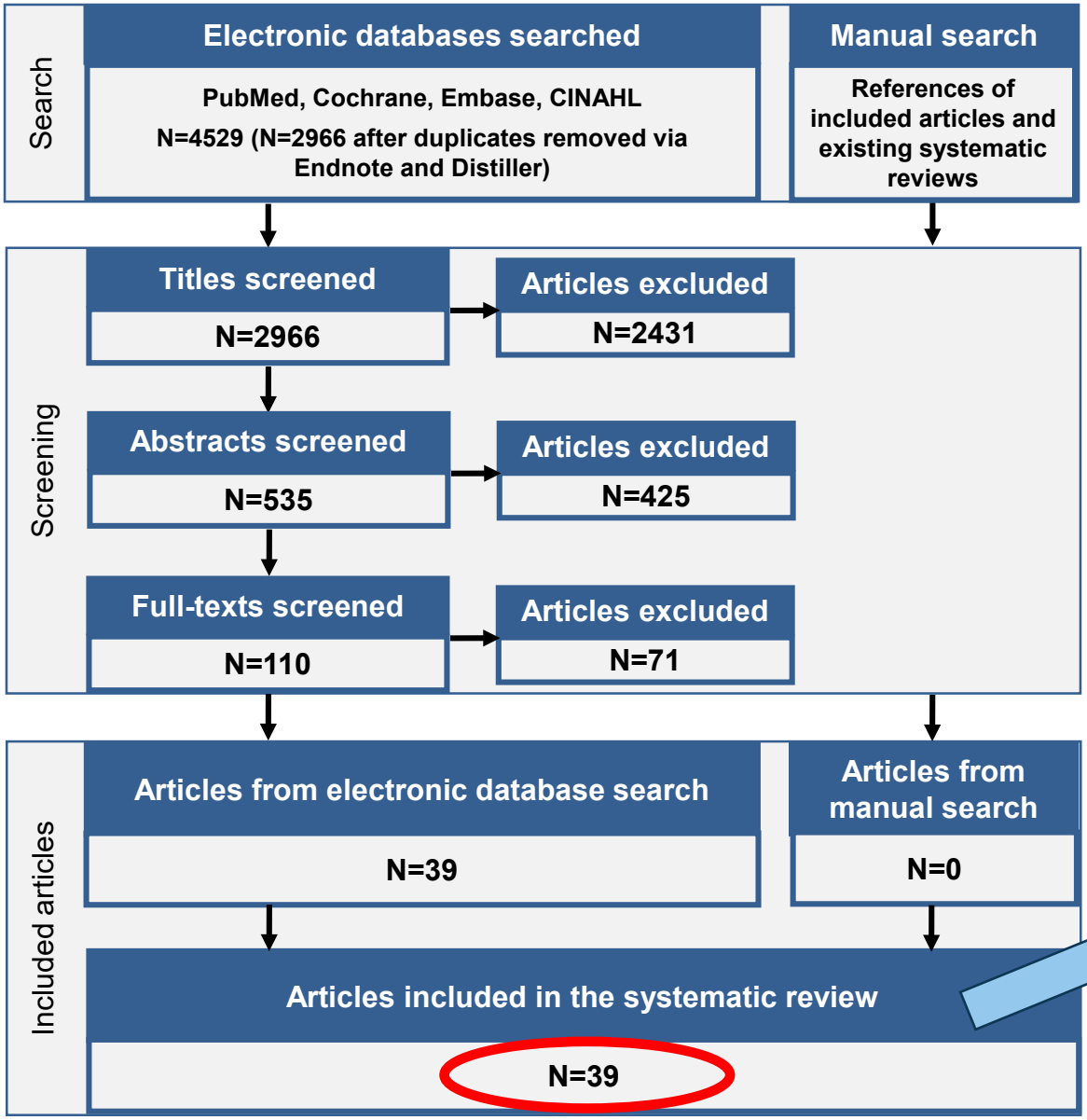
Population: Infants and toddlers (birth to 24 months), children and adolescents (ages 2-18 years)

- Asthma

Population: Children and adolescents (ages 2-18 years)

Key Confounders: Maternal age, Race/ethnicity, Socioeconomic status, Smoking, Family history of atopic allergic diseases, Gestational age at birth, Birth weight, Mode of delivery, Breastfeeding practices (intensity, duration), Timing of introduction of complementary foods and beverages (CFB), Types of CFB, Urban/rural environment, Animals/pets/farming exposure; **Other factors to be considered:** Sex, Maternal substance use (alcohol, drug use), Indoor and outdoor environment

Literature Search and Screening Results: maternal diet and allergy



39 included articles
- 6 RCTs (8 articles)
- 1 NRCT
- 14 PCS (31 articles)

39 articles addressed the question - what is the relationship between **maternal diet** during pregnancy and lactation and risk of **infant and child food allergies and atopic allergic diseases**?

Description of the Evidence: maternal diet and allergy

- **Sample characteristics**
  - n=62 to 61,909/study
  - Conducted in Japan, the U.K. the U.S., Denmark, Sweden, the Netherlands, Ireland, Poland, Greece, Thailand, Germany, Singapore, Norway, Finland
  - ~30y, majority white or race/ethnicity NR, mid-high SES
- **Interventions/Exposures**
  - Food/beverage consumption levels (N=23), Avoidance diet (N=9), Dietary pattern adherence (N=8)
- **Outcomes**
  - Atopic dermatitis (N=26)
  - Asthma ≥ 2y (N=21)
  - Allergic rhinitis (N=17)
  - Food allergy (N=7)

Summary of the Evidence Synthesis: Atopic Dermatitis

Pregnancy

- **No association** between consumption/restriction and risk of atopic dermatitis/eczema
  - Cow's milk products (6 of 7 studies-2 RCTs, 4 PCS)
  - Egg (4 of 4 studies-2 RCTs, 2 PCS)
  - Peanut (2 of 2 PCS)
  - Soybean (1 of 1 PCS)
  - Dietary Patterns (6 of 6 PCS)
- **Higher consumption** associated with **reduced** risk of atopic dermatitis/eczema
  - Yogurt (2 of 3 PCS)
  - Fish (2 of 7 PCS)
  - Wheat (1 of 2 PCS)
  - Vegetable (1 of 2 PCS)
  - Fruit (1 of 2 PCS)
- **Higher consumption** associated with **increased** risk of atopic dermatitis/eczema
  - Meat (1 of 4 PCS)

Summary of the Evidence Synthesis: Atopic Dermatitis (continued)

Pregnancy and Lactation

- **No relationship** between restriction of cow's milk products and eggs and risk of atopic dermatitis/eczema
  - (1 of 1 NRCT)

- **Restriction reduced** risk of atopic dermatitis/eczema
  - Cow's milk products (2 of 2 RCTs)

Lactation

- **Restriction reduced** risk of atopic dermatitis/eczema
  - Cow's milk products (1 of 1 RCT)

DRAFT Conclusion Statements and Grades: Cow's Milk Products and Atopic Dermatitis

Conclusion statement

Moderate evidence suggests that a lower or restricted consumption of cow's milk products during pregnancy does not reduce the risk of atopic dermatitis/eczema in the offspring.

Grade: Moderate

Conclusion statement

Insufficient evidence is available to determine the relationship between restricted consumption of cow's milk products during both pregnancy and lactation, or during lactation alone, and risk of atopic dermatitis/eczema in the offspring

Grade: Grade Not Assignable

DRAFT Conclusion Statements and Grades: Egg and Atopic Dermatitis

Conclusion statement

Moderate evidence suggests that lower or restricted consumption of egg during pregnancy, or during both pregnancy and lactation, does not reduce the risk of atopic dermatitis/eczema in the offspring.

Grade: Moderate

DRAFT Conclusion Statements and Grades: Fish and Atopic Dermatitis

Conclusion statement

Limited evidence suggests that maternal fish consumption during pregnancy does not increase the risk of atopic dermatitis/eczema in the offspring.

Grade: Limited

DRAFT Conclusion Statements and Grades: Tree Nuts/Seeds and Atopic Dermatitis

Conclusion statement

No evidence is available to determine the relationship between maternal tree nut and seed consumption during pregnancy and risk of atopic dermatitis/eczema in the offspring.

Grade: Grade Not Assignable

DRAFT Conclusion Statements and Grades: Dietary Patterns and Atopic Dermatitis

Conclusion statement

Limited evidence suggests that dietary patterns during pregnancy are not associated with the risk of atopic dermatitis/eczema in the offspring.

Grade: Limited

DRAFT Conclusion Statements and Grades: Atopic Dermatitis

Conclusion statement

Insufficient evidence is available to determine the relationship between maternal consumption of **peanut, soybean, wheat/cereal, yogurt and probiotic milk products, and foods not commonly considered to be allergens, such as meat, vegetables, and fruits,** during pregnancy and risk of atopic dermatitis/eczema in the offspring.*

Grade: Grade Not Assignable

**This conclusion statement was edited to reflect the Committee's discussion*

DRAFT Conclusion Statements and Grades: Atopic Dermatitis (continued)

Conclusion statement

No evidence is available to determine the relationship between maternal consumption of **yogurt and probiotic milk products**, **egg, fish, peanut, tree nuts and seeds, soybean, wheat/cereal, dietary patterns, and foods not commonly considered to be allergens, such as meat, vegetables, and fruits,** during lactation and the risk of atopic dermatitis/eczema in the offspring

Grade: Grade Not Assignable

**This conclusion statement was edited to reflect the Committee's discussion*

Summary of the Evidence Synthesis: Food Allergy

Pregnancy

- **No association** between consumption and risk of food allergy
  - Cow's milk products (1 of 1 PCS)
  - Egg (1 of 1 PCS)
  - Soybean (2 of 2 PCS)
  - Wheat (1 of 1 PCS)

- **Higher consumption** associated with **reduced** risk of food allergy
  - Peanut (1 of 1 PCS)

Pregnancy and Lactation

- **No association** between restriction and risk of food allergy
  - Cow's milk products (1 of 1 RCT)

DRAFT Conclusion Statement and Grade: Soybean and Food Allergy

Conclusion statement

Limited evidence suggests no relationship between maternal soybean consumption during pregnancy and risk of food allergy in the offspring.

Grade: Limited

DRAFT Conclusion Statement and Grade: Cow's Milk Products and Food Allergy

Conclusion statement

Insufficient evidence is available to determine the relationship between lower or restricted consumption of cow's milk products during pregnancy alone, or during both pregnancy and lactation, and risk of food allergy in the offspring.

Grade: Grade Not Assignable

DRAFT Conclusion Statement and Grade: Other Foods and Food Allergy

Conclusion statement

No evidence is available to determine the relationship between maternal consumption of foods not commonly considered to be allergens during pregnancy and risk of food allergy in the offspring.

Grade: Grade Not Assignable

Conclusion statement

Insufficient evidence is available to determine the relationship between maternal consumption of foods not commonly considered to be allergens during lactation and risk of food allergy in the offspring.

Grade: Grade Not Assignable

DRAFT Conclusion Statement and Grade: Food Allergy

Conclusion statement

Insufficient evidence is available to determine the relationship between maternal consumption of **peanuts, eggs, or wheat** during pregnancy and risk of food allergy in the offspring.

Grade: Grade Not Assignable

DRAFT Conclusion Statement and Grade: Food Allergy (continued)

Conclusion statement

No evidence is available to determine the relationship between maternal consumption of **fish or tree nuts and seeds** during pregnancy or during lactation and risk of food allergy in the offspring.

Grade: Grade Not Assignable

Conclusion statement

No evidence is available to determine the relationship between maternal consumption of **cow's milk products, eggs, peanuts**, **soybeans, or wheat** during lactation and risk of food allergy in the offspring.

Grade: Grade Not Assignable

Summary of the Evidence Synthesis: Allergic Rhinitis

Pregnancy

- **No association** between consumption/restriction and risk of allergic rhinitis
  - Cow's milk products (fermented or non-fermented) (2 RCTs of the 5 studies)
  - Egg (3 of 3 studies-2 RCTs, 1 PCS)
  - Tree nut (1 of 1 PCS)
  - Soybean (1 of 1 PCS)
  - Wheat (1 of 1 PCS)
  - Dietary Patterns (3 of 3 PCS)

- **Higher consumption** associated with **reduced** risk of allergic rhinitis
  - Fish (1 of 2 PCS)
  - Peanut (1 of 2 PCS)

Pregnancy and Lactation

- **No association** between restriction and risk of allergic rhinitis
  - Cow's milk products (1 of 1 RCT)

DRAFT Conclusion Statement and Grade: Cow's Milk Products and Allergic Rhinitis

Conclusion statement

Insufficient evidence is available to determine the relationship between consumption of cow's milk products (fermented or non-fermented) during pregnancy alone, or during both pregnancy and lactation, and risk of allergic rhinitis in the offspring.

Grade: Grade Not Assignable

DRAFT Conclusion Statement and Grade: Egg and Allergic Rhinitis

Conclusion statement

Moderate evidence suggests that lower or restricted consumption of egg during pregnancy does not reduce the risk of allergic rhinitis in the offspring.

Grade: Moderate

DRAFT Conclusion Statement and Grade: Seeds and Allergic Rhinitis

Conclusion statement

No evidence is available to determine the relationship between maternal seed consumption during pregnancy or during lactation and the risk of allergic rhinitis in the offspring.

Grade: Grade Not Assignable

DRAFT Conclusion Statement and Grade: Dietary Patterns and Allergic Rhinitis

Conclusion statement

Limited evidence suggests that dietary patterns during pregnancy are not associated with the risk of allergic rhinitis in the offspring.

Grade: Limited

DRAFT Conclusion Statements and Grades: Allergic Rhinitis

Conclusion statement

Insufficient evidence is available to determine the relationship between maternal consumption of **fish, peanut, tree nuts, soybean, wheat, and foods not commonly considered to be allergens** during pregnancy and risk of allergic rhinitis in the offspring.

Grade: Grade Not Assignable

DRAFT Conclusion Statements and Grades: Allergic Rhinitis (continued)

Conclusion statement

No evidence is available to determine the relationship between maternal consumption of **cow's milk products, egg, fish, peanut, tree nuts, soybean, wheat, dietary patterns, and foods not commonly considered to be allergens** during lactation and the risk of allergic rhinitis in the offspring

Grade: Grade Not Assignable

**This conclusion statement was edited to reflect the Committee's discussion*

Summary of the Evidence Synthesis: Asthma

Pregnancy

- **No association** between consumption/restriction and risk of asthma
  - Egg (2 of 2 PCS)
- **Higher consumption** associated with **reduced** risk of asthma
  - Fish (1 of 3 PCS)

- Under review
  - Cow's milk products
  - Peanut, tree nut and seed
  - Soybean
  - Wheat
  - Dietary patterns
  - Others (Fruits, Vegetables, Beverage, Margarine, Oils, Butter)

DRAFT Conclusion Statement and Grade: Egg and Asthma

Conclusion statement

Limited evidence suggests no relationship between maternal consumption of egg during pregnancy and risk of asthma in the offspring.

Grade: Limited

Conclusion statement

No evidence is available to determine the relationship between maternal egg consumption during lactation and the risk of asthma in the offspring.

Grade: Grade Not Assignable

DRAFT Conclusion Statement and Grade: Fish and Asthma

Conclusion statement

Limited evidence suggests no relationship between maternal fish consumption during pregnancy and risk of asthma in the offspring.

Grade: Limited

Conclusion statement

No evidence is available to determine the relationship between maternal fish consumption during lactation and the risk of asthma in the offspring.

Grade: Grade Not Assignable

Question:
omega-3 and neurocognitive development

What is the relationship between **omega-3 fatty acids** from supplements and/or fortified foods* consumed before and during pregnancy and lactation and **developmental milestones, including neurocognitive development**?

Approach to Answer Question: NESR Systematic Review

** The Committee decided to focus the search on supplements and remove fortified foods as the Fats and Seafood DGAC Subcommittee evaluated the evidence between maternal diet and developmental milestones, including neurocognitive development of the offspring.*

***The above statement was added to clarify the Committee's discussion*

Analytic Framework: omega-3 and neurocognitive development

Systematic review question: What is the relationship between **omega-3 fatty acids** from supplements consumed before and during pregnancy and lactation and **developmental milestones, including neurocognitive development**?

Intervention/exposure	vs	Comparator
Exposure to, including intake of, **Omega-3 fatty acids** from: • Dietary supplements (including multiple-nutrient supplements)		Different level of exposure to, including intake of, **Omega-3 fatty acids** from: • Dietary supplements (including multiple-nutrient supplements)
Population: Women before and during pregnancy and/or during lactation; healthy and/or at risk for chronic disease		

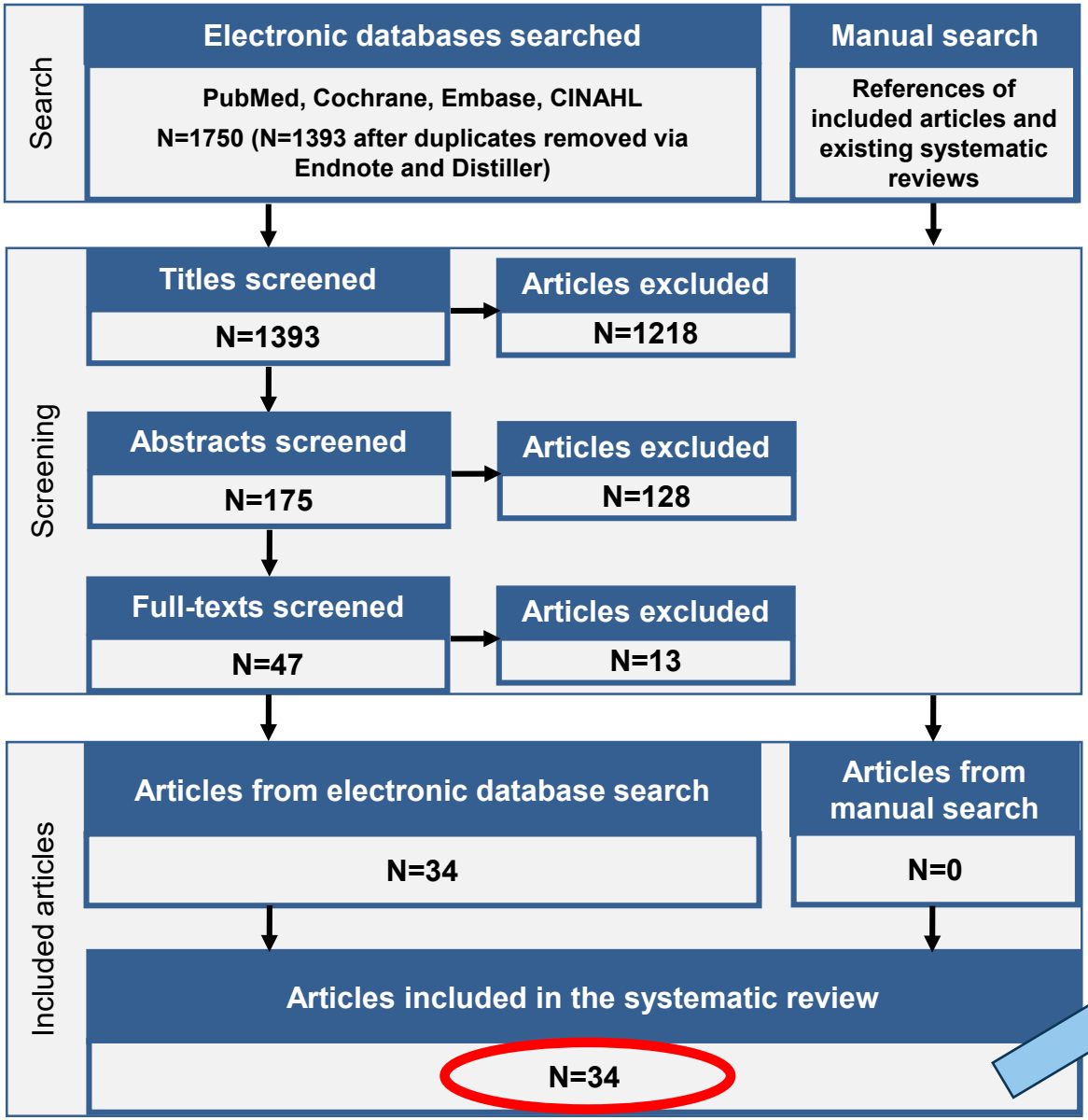
Outcomes

- Developmental domains, examined via milestone achievement and/or scales/indices, including:
  - Cognitive,
  - Language/communication,
  - Movement/physical,
  - Social-emotional
- Academic performance
- Attention deficit disorder (ADD) or attention-deficit/hyperactivity disorder (ADHD)
- Anxiety
- Depression
- Autism spectrum disorder (ASD)

Population: Infants and toddlers (birth to 24 months), children and adolescents (ages 2-18 years)

Key Confounders: Age, Race/ethnicity, Socioeconomic status, Fish and other seafood consumption, Anthropometry (pre-pregnancy BMI and gestational weight gain (during pregnancy) or Obesity status (before pregnancy and lactation)), Smoking, Parity, Child sex, Gestational age, Breastfeeding practices (intensity, duration); **Other factors to be considered:** Maternal substance use (alcohol, drug use), Family history/diagnosis of neurocognitive disorders, complementary feeding

Literature Search and Screening Results: omega-3 and neurocognitive development



34 included articles
- 14 RCTs (33 articles)
- 1 PCS

34 articles addressed the question - what is the relationship between **omega-3 fatty acids** from supplements consumed before and during pregnancy and lactation and **developmental milestones, including neurocognitive development**

Description and Summary of the Evidence

- **Sample characteristics**
  - 34 included articles (14 RCTs, 1 PCS)
  - Conducted in Australia, the U.S., Mexico, Denmark, Norway, Germany, Hungary, Spain, the Netherlands, Canada, and Iran
- **Interventions/Exposures**
  - RCTs
    - Omega-3 supplement vs. placebo
  - PCS
    - Average supplemental omega-3 dose: 100 mg/d
  - Timing: Pregnancy (8 RCTs, 1 PCS), Lactation (2 RCTs), Pregnancy and Lactation (4 RCTs)
- **Outcomes**
  - 8 major outcomes: Cognitive (13 RCTs), Visual (6 RCTs), Language (10 RCTs), Motor (10 RCTs), Social-emotional (8 RCTs), ADHD (1 RCTs), ASD (1 PCS)

Next Steps

- Grade conclusion statements for the following:
  - Remaining statements for maternal diet and asthma
  - Omega-3 supplementation during lactation and neurocognitive development

2020 Dietary Guidelines Advisory Committee: Pregnancy and Lactation Subcommittee

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