

# Subcommittee 4:

Food & Physical Activity  
Environments

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# Scope

## Food and Physical Activity Environments

### *Physical environment*

Key settings – neighborhood and community food access, food retail, schools, early care and education, workplace

### *Macro environment*

e.g., message environment - food marketing

- Understand and assess the role of food environment in promoting or hindering healthy eating in various settings and subpopulations.
- Identify the most effective evidence-based diet-related programs, practices, environmental and policy approaches (“what works”) to improve health and reduce disparities.

# Key Topic Areas Discussed Today

- Food access
- Early child care and education settings
- Schools

# Invited Experts and Consultants

## **Invited Experts**

Individuals invited by the SC, usually on a one time basis, to provide their expertise to inform the SC's work. Invited experts do not participate in decisions at the SC level.

## **Consultant SC Members**

Individuals sought by the SC to participate in SC discussions and decisions on an ongoing basis but are not members of the full DGAC. Like DGAC members, consultants complete training and have been reviewed and cleared through a formal process within the Federal government.

# Experts & Consultants

## **Invited Experts**

Sue Krebs-Smith, PhD, National Cancer Institute, NIH

Jill Reedy, PhD, National Cancer Institute, NIH

## **Consultant SC Members**

None

# Food Access Background

## **Food accessibility includes:**

- Accessibility to sources of healthy food, as measured by distance to a store or by the number of stores in an area.
- Individual-level resources that may affect accessibility, such as family-income or vehicle availability.
- Neighborhood-level indicators of resources, such as average income of the neighborhood and the availability of public transportation.

*Source: USDA/ERS Food Access Research Atlas*

# Food Access Questions

What is the relationship between neighborhood and community access to food retail settings and:

1. Individuals' dietary intake and quality?
2. Weight status?

## **Approach:**

NEL (Nutrition Evidence Library) systematic review

# Analytical Framework: Food Access

**Target Population**  
Children (2-12 years), adolescents (13-18 years), healthy adults (19 y+) and adults at risk for chronic disease

**Intervention/Exposure**

- Availability (measured by distance to store, number of stores in an area, density per capita, in-store characteristics, etc.)
- Affordability [measured by average cost of foods, total food costs (includes cost of food and travel), etc.]
- Type of food retail setting

**Comparator**  
Different levels of availability  
Different levels of affordability

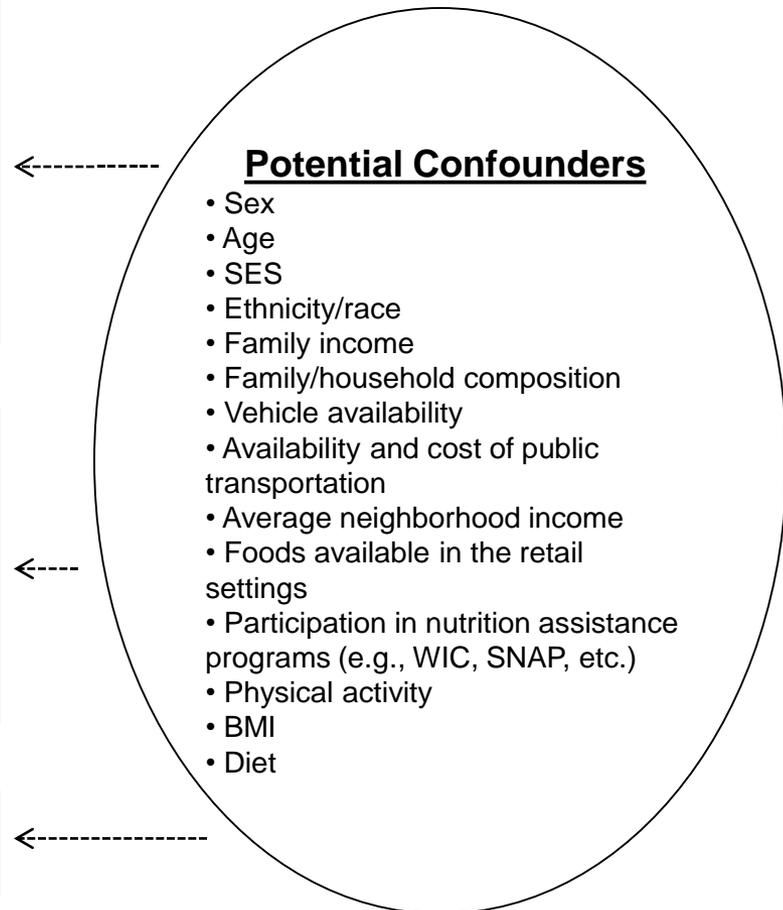
**Intermediate Health Outcomes**

• Nutrient intake	• Body weight
• Macronutrient composition of diet	• BMI
• Foods/food groups	• Adiposity
• Dietary patterns	
• Diet quality	

**Endpoint Health Outcomes**  
Incidence/prevalence of healthy weight, overweight and obesity

**Key Definitions**

- Food access
- Diet quality



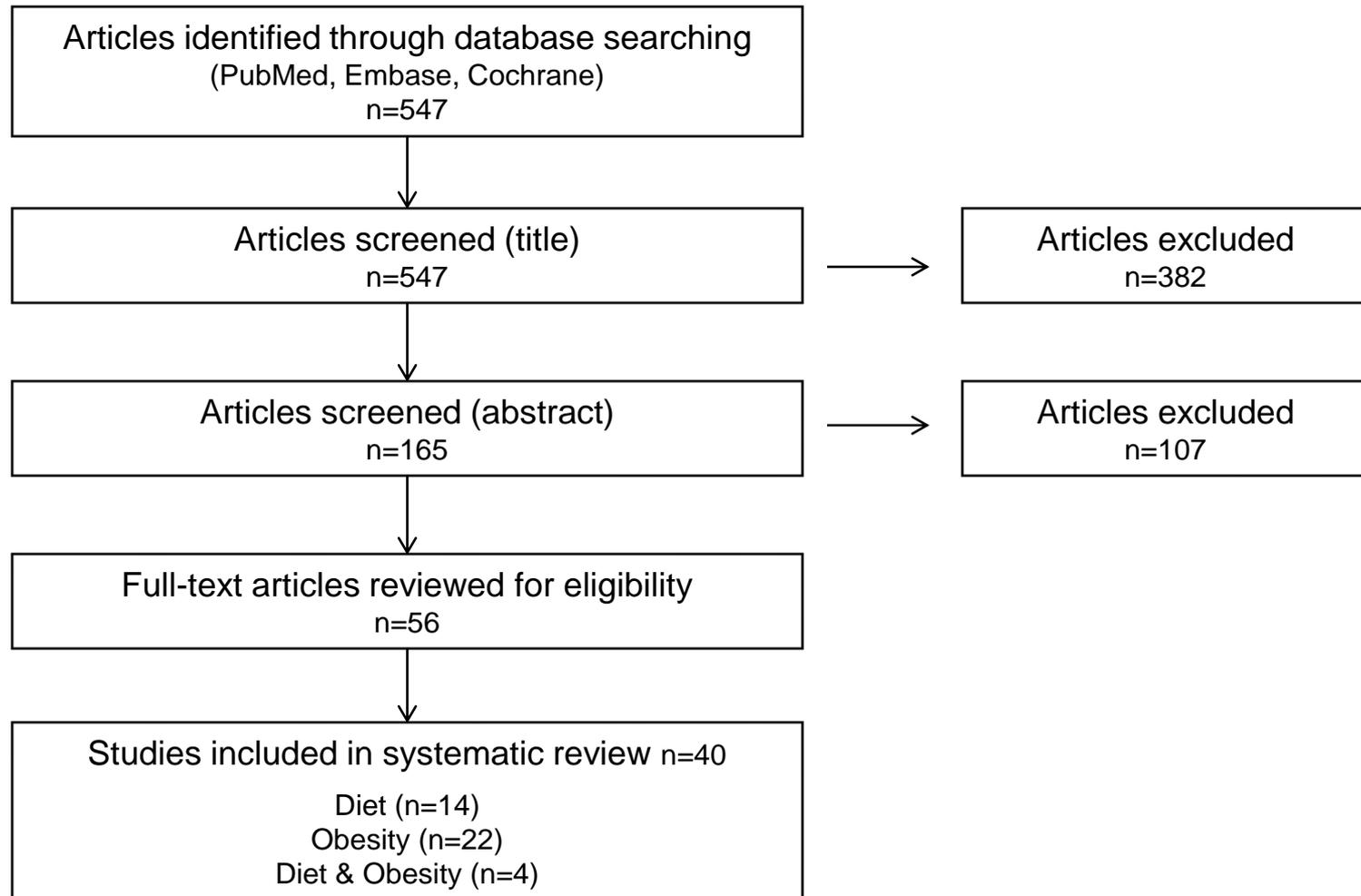
# Food Access

## Literature Search: Inclusion/Exclusion Criteria

- RCTs, non-RCTs, prospective cohort studies and cross-sectional studies conducted in the US
- Published in English in peer-reviewed journals between 2004-2013
- Exposure: availability to food retail settings and affordability
- Subjects:  $\geq 2$  years; generally healthy or with elevated chronic disease risk
- Weight outcomes: weight, BMI, BMI z-score, adiposity; prevalence of healthy weight, overweight and obesity
- Dietary outcomes: dietary intake and quality

# Food Access

## Literature Search Results



# Food Access

## Description of the Evidence

### Exposures

- *Food availability* measured by:
  - Proximity to food outlets
  - Density of food outlets
  - Distance to the outlet closest to a residence
  - Mean distance traveled to primary store
  - Foods available in stores
- *Food affordability* measured by:
  - Cost of weekly groceries
  - Perceived affordability of foods
  - Various price indexes by food or food groups

# Food Access

## Description of the Evidence

### Outcomes

- *Dietary intake* assessed by:
  - Energy intake
  - Intake of nutrients, foods and food groups
  - Frequency of eating certain foods
- *Diet quality* assessed by:
  - Healthy Eating Index
  - Diet Quality Index
  - Author-derived indices
- *Weight status* assessed by:
  - BMI
  - BMI percentile
  - BMI z-scores

# Food Access

## Description of the Evidence: Dietary Intake & Quality

- Includes 18 studies published between 2007 and 2013
- **Study Design:** 2 non-RCT, 1 longitudinal, 5 cross-sectional
- **Location:** US
- **Subjects:** generally healthy population aged ~8-70y
  - Children/Adolescents: 5 studies
  - Adults: 13 studies
- **Sample Size:** 116 to 15,634
- **Risk of Bias:** relatively low, 0-8 points out of 26 or 28

# Food Access

## Key Findings: Dietary Intake & Quality

- Wide variation (settings, methods, demographics) across studies making comparisons challenging
- Despite the variability, the relationship between farmers' markets/produce stands and dietary intake, quality and variety was consistent, but limited:
  - 2 studies (out of 2) found significant, favorable associations
- Findings related to dietary outcomes and other food outlets were inconsistent

# Food Access

## *Draft* Conclusion Statement: Dietary Intake & Quality

Limited but consistent evidence indicates that the relationship between access to farmers' markets/produce stands and dietary intake and quality is favorable.

**Grade:** Limited due to a small number of studies.

Note: A limited body of evidence shows conflicting results regarding access to other food outlets, such as supermarkets, grocery stores and convenience stores, and dietary intake and quality.

# Food Access

## Description of the Evidence: Weight Status

- Includes 26 studies published between 2005 and 2013
- **Study Design:** 19 cross-sectional, 7 longitudinal
- **Location:** US
- **Subjects:** generally healthy population aged ~5-63y
  - Children/Adolescents: 11 studies
  - Adults: 15 studies
- **Sample Size:** 237 to 48,014
- **Risk of Bias:** relatively low, 0-8 points out of 26 or 28

# Food Access

## Key Findings: Weight Status

- Wide variety (methods, settings, demographics) across studies making comparisons challenging
- Despite the variability, the relationship between convenience stores and weight status was consistent:
  - 7 studies found unfavorable associations, no studies showed a favorable relationship and 8 had null findings
- Findings related to dietary outcomes and other food outlets were inconsistent

# Food Access

## *Draft* Conclusion Statement: Weight Status

Limited but consistent evidence indicates that the relationship between access to convenience stores and weight status is unfavorable with closer proximity and greater access being associated with significantly higher BMI and/or increased odds of overweight/obesity.

**Grade:** Limited due to a small number of studies.

Note: A limited body of evidence shows conflicting results regarding access to other food outlets, such as supermarkets, grocery stores and farmers' markets/produce stands, and weight status.

# Food Access

*Draft* Implications and Research Recommendations

Under development

# Food Access

## Discussion

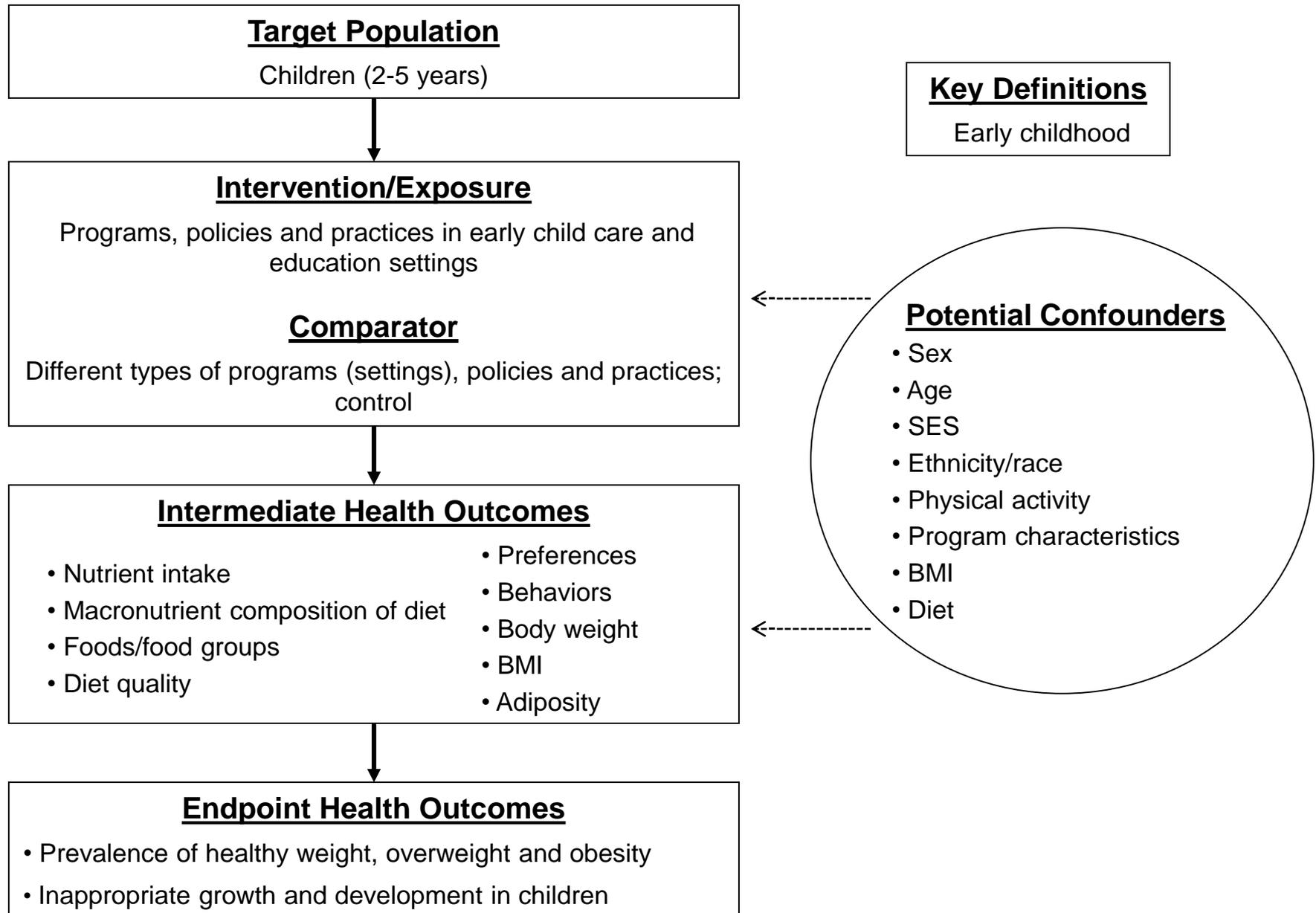
# Early Care and Education Questions

What is the impact of obesity prevention approaches in early care and education (ECE) programs on the weight status of children two to five years of age?

## **Approach:**

- Existing systematic review *plus*
- NEL systematic review to update the literature

# Analytical Framework: Early Care and Education



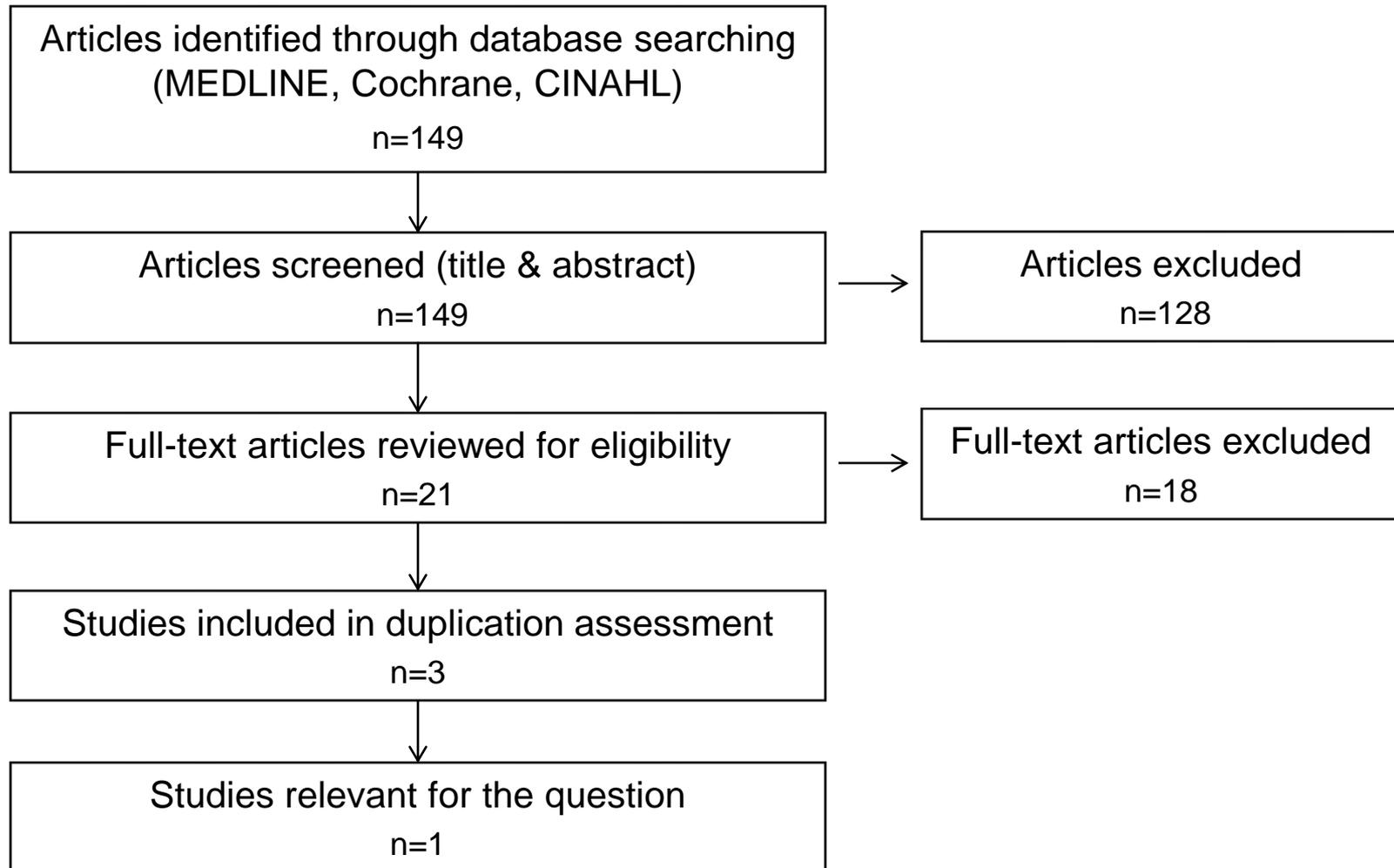
# Early Care and Education

## Literature Search: Inclusion/Exclusion Criteria

- Systematic reviews that include RCTs, non-RCTs, prospective cohort, cross-sectional and pre- and post-policy studies
- Published in English in peer-reviewed journals between 2010 and present
- Exposure: different programs, policies and practices in early child care and education settings
- Subjects: children aged 2-5y
- Weight outcomes: body weight, BMI, BMI z-score, adiposity; incidence of healthy weight, overweight and obesity; inappropriate growth and development
- Dietary outcomes: dietary intake, quality, behaviors and preferences

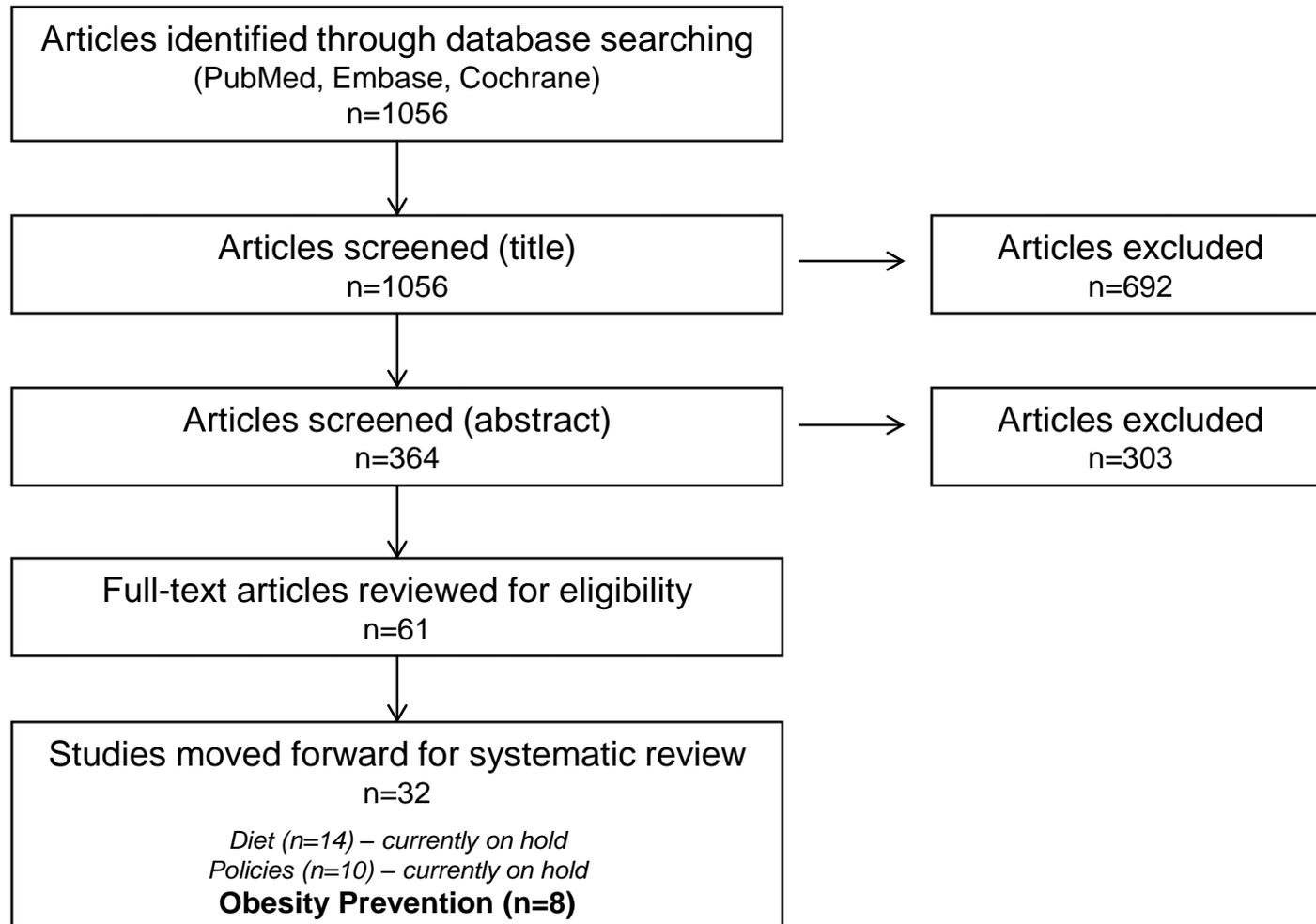
# Early Care and Education

## Literature Search Results for Duplication Assessment



# Early Care and Education

## Literature Search Results for Literature Update



# Early Care and Education

## Description of the Evidence

- Includes 1 existing systematic review including studies published between 2000 and 2012 and a *de novo* NEL systematic review including studies published between 2012 and 2014
- **Study Design**
  - Zhou *et al.*, 2013: 15 controlled trials
  - NEL review: 5 cluster randomized trials, 1 before-and-after study, 1 non-controlled trial
- **Location**
  - 9 studies in the United States
  - 3 studies each in Israel and in Germany
  - 1 study each: France, Scotland, Australia, Switzerland, China, Colombia, Belgium
- **Subjects:** generally healthy children aged 2-5y
- **Outcomes:** BMI and BMI z-score
- **Risk of Bias**
  - AMSTAR score of 9/11 for Zhou *et al.* review
  - 6/26 to 16/26 for NEL review
- **Sample Size for Studies in NEL Review:** 112 to 1,102

# Early Care and Education

## Key Findings

- **Interventions**

- Wide variation in obesity prevention approaches
- Most approaches were multi-component
  - Include dietary and physical activity interventions
  - Target children plus center staff and/or parents

- **Zhou *et al.* Review**

- 7 out of 10 multi-component interventions demonstrated improvements in adiposity
- Interventions targeting only nutrition or physical activity did achieve significant improvements in nutrition or physical activity outcomes, respectively

- **NEL Review**

- All 6 multi-component interventions demonstrated improvements in adiposity
- 1 study, targeting only diet, did not elicit change in weight status but increased fruit and vegetable intake

# Early Care and Education

## *Draft* Conclusion Statement

Moderate evidence suggests that multi-component obesity prevention approaches implemented in child care settings improve adiposity-related outcomes in preschoolers. A combination of dietary and physical activity interventions is most effective for preventing or slowing excess weight gain and reducing the proportion of overweight and obese preschoolers.

**Grade:** Moderate

# Early Childhood

## *Draft* Implications & Research Recommendations

Under development

# Early Care and Education

## Discussion

# Schools

## Questions

1. What is the impact of school-based approaches on the dietary intake, quality, behaviors and/or preferences of school-aged children?
2. What is the impact of school-based policies on the dietary intake, quality, behaviors and/or preferences of school-aged children?
3. What is the impact of school-based approaches on the weight status of school-aged children?
4. What is the impact of school-based policies on the weight status of school-aged children?

**Approach:** Existing Systematic Reviews

# Analytical Framework: Schools

## Target Population

School-aged children (kindergarten through 12th grade)

## Intervention/Exposure

School-based interventions, programs, policies and practices

## Comparator

Different levels/types of interventions, programs, policies and practices  
No intervention/program/policy/practice/control

## Intermediate Health Outcomes

- Nutrient intake
- Macronutrient composition of diet
- Foods/food groups
- Diet quality
- Preferences
- Behaviors
- Body weight
- BMI
- Adiposity

## Endpoint Health Outcomes

- Prevalence/incidence of healthy weight, overweight and obesity
- Inappropriate growth and development in children

## Key Definitions

Dietary quality

## Potential Confounders

- Sex
- Age
- SES
- Ethnicity/race
- Tanner stage
- Physical activity
- BMI
- Diet
- School characteristics

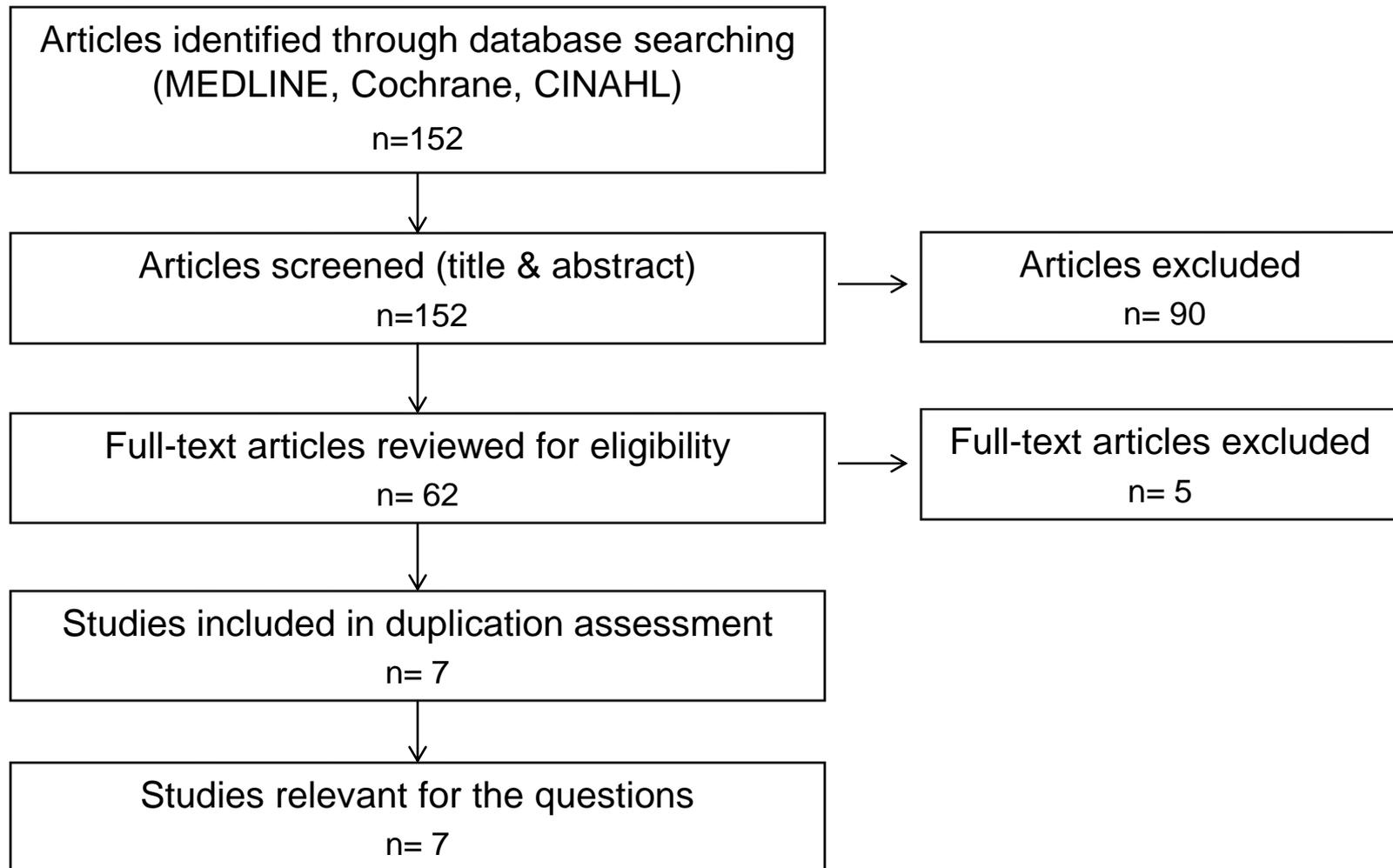
# Schools

## Literature Search: Inclusion/Exclusion Criteria

- Systematic reviews that include RCTs, non-RCTs, prospective cohort, cross-sectional and pre- and post-policy studies
- Published in English in peer-reviewed journals between 2010 and present
- Exposure: different programs, policies and practices in school (K-12) settings
- Subjects: children 5-18 years
- Weight outcomes: body weight, BMI, BMI z-score, adiposity; incidence of healthy weight, overweight and obesity; inappropriate growth and development
- Dietary outcomes: dietary intake, quality, behaviors and preferences

# Schools

## Literature Search Results for Duplication Assessment



# Schools (Q1)

## Description of the Evidence: School-based Approaches & Dietary Intakes

- Includes 3 systematic reviews/meta-analyses
  - Published between 2011 and 2012
  - Risk of Bias: AMSTAR scores were high, ranging from 8/11 to 11/11
  - Total of 75 studies published between 1985-2011
  - No overlap of studies between reviews
- **Study Designs:** RCT, non-RCT, cross-sectional, modeling
- **Location**
  - 49 studies in the United States
  - 26 studies in other highly developed countries (HDI)
- **Subjects:** generally healthy children aged 5-18y
- **Sample Sizes**
  - N = 29,361 for meta-analysis
  - N = 24 to 3,382 for 75 studies included in the reviews
- **Outcomes:** diet intake/quality (proxy = daily fruit and vegetable intake)

# Schools (Q2)

## Description of the Evidence: School-based Policies & Dietary Intakes

- Includes 2 systematic reviews/meta-analyses
  - Published between 2011 and 2013
  - Risk of Bias: AMSTAR scores were high, ranging from 8/11 to 11/11
  - Total of 52 studies published between 1990-2013
  - No overlap of studies between reviews
- **Study Designs:** RCT, non-RCT, cross-sectional, pre/post, and price simulation
- **Location**
  - 41 studies in the United States
  - 11 studies in other highly developed countries (HDI)
- **Subjects:** generally healthy children in grades K-12 (~5-18y)
- **Sample Size:** ranged from 3 high schools to 130,353 subjects, and a varying number of districts
- **Outcomes:** diet intake/quality (proxy = accessibility, availability, and consumption of competitive foods and beverages)

# Schools (Q3)

## Description of the Evidence: School-based Approaches & Weight Status

- Includes 2 systematic reviews/meta-analyses
  - Published between 2011 and 2013
  - Risk of Bias: AMSTAR scores were high, both scoring 11/11
  - Total of 116 studies published between 1985-2012
  - Overlap of studies: 13 between reviews
  - Studies included in meta-analysis: 37 studies
- **Study Designs:** RCT, non-RCT
- **Location**
  - 49 studies in the United States
  - 67 studies in other highly developed countries (HDI)
- **Subjects:** generally healthy children aged 5-18y
- **Sample Size:**
  - N = 30 to 1807
  - Meta-analysis N = 27,946
- **Outcomes:** indices of weight status

# Schools (Q4)

## Description of the Evidence: School-based Policies & Weight Status

- Includes 2 systematic reviews
  - Published in 2013
  - Risk of Bias: AMSTAR scores were high, ranging from 9/11 to 11/11
  - Total of 45 studies published between 2003-2013
  - No overlap of studies between reviews
- **Study Designs:** RCT, non-RCT, cohort, cross-sectional and pre/post-policy
- **Location**
  - 40 studies in the United States
  - 5 studies in other highly developed countries (HDI)
- **Subjects:** generally healthy children aged 4-18y
- **Sample Size:** ranged from 3 high schools to 130,353 subjects, and a varying number of districts
- **Outcomes:** indices of weight status

# Schools

## Discussion

# Next Steps:

- Food Access and Early Care and Education settings: develop implications statements and research recommendations
- Schools: develop conclusion and implications statements and research recommendations
- Worksite settings: evidence analysis
- Sodium and policies or environmental strategies to promote recommended intake: evidence analysis

## **Subcommittee 4:** Food & Physical Activity Environments

**Mary Story**

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