The Science and Value Behind Targeted Home Environmental Interventions Webinar

October 22, 2009
1 – 2:30 pm

"The Science and Value Behind Targeted Home Environmental Interventions"

The Community Guide Asthma Review

Special Topics in Program Evaluation Webinar

October 22, 2009

Deidre Crocker| David Hopkins| Stella Kinyota| Gema Dumitru

Colin Ligon| Briana Lawrence| Theresa Sipe

Disclaimer

The findings and conclusions in this presentation should not be construed to represent any Task Force on Community Preventive Services or CDC determination or policy.

Objectives

- To link the evaluation of the systematic review of home-based interventions to the CDC Framework for Program Evaluation
- To provide a useful tool for partners in asthma control
- To help the participants become familiar with the analytic framework of the systematic review of home-based environmental interventions
- To describe the impact of these interventions on quality of life, health care utilization and productivity for people with asthma
- To identify the applicability, barriers to implementation, and additional benefits of these interventions

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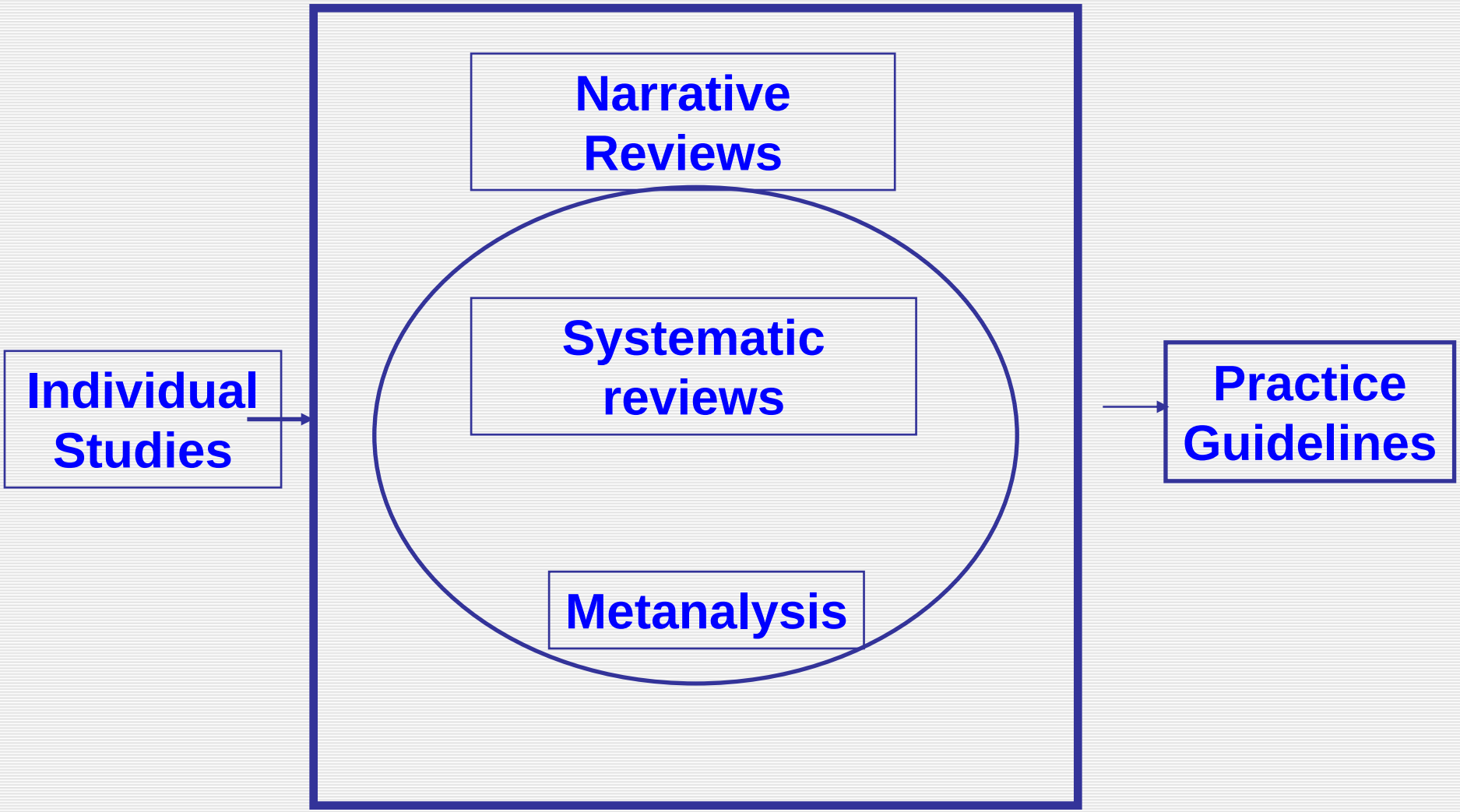
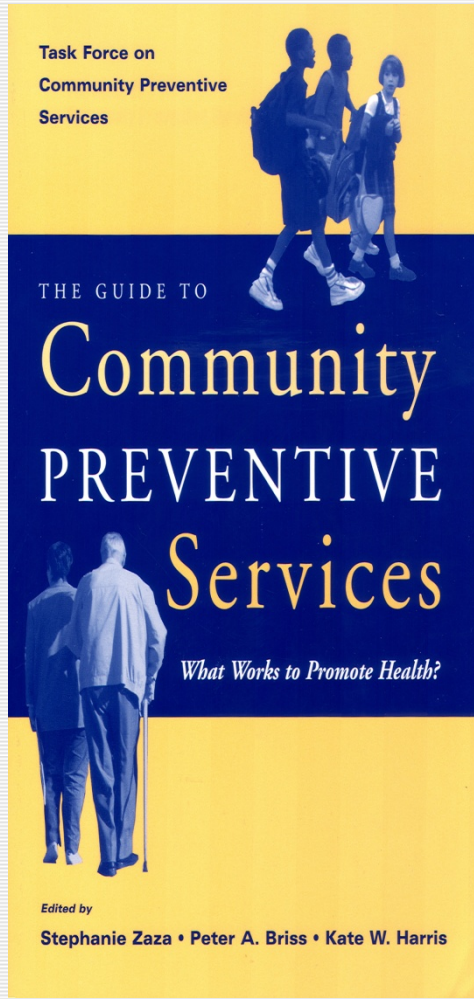
Some Terminology



The Community Guide

- Resource for public health
- Directed by the Task Force on Community Preventive Services
- Established in 1996; at CDC
- Conducts rigorous systematic reviews of evidence for community interventions
- Makes recommendations for use of public health interventions
- http://www.thecommunityguide.org



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Steps in a Community Guide Review

1. Convene systematic review team
2. Conceptualize topic (logic model)
3. Define the intervention and the goal for the review
4. Search for evidence
5. Conceptualize intervention review (analytic framework)
6. Data abstraction and critical evaluation
7. Summarize evaluation results
8. Task Force Deliberation
9. Disseminate to stakeholders and/or decision makers

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Why Asthma?

>20 million Americans

4.7 million office visits

1.8 million ED visits

~500,000 Hospitalizations

$37.2 billion/yr

12.8 million missed school days

Coordination and Consulting Team

Task Force Member

Ned Calonge…CO Dept of PH

External Partners

Denise Dougherty, PhD..... AHRQ

Katherine Pruitt, PhD..... ALA

Alisa Smith, PhD.....US EPA

Kurt Elward, MD.....AAFP

CDC

Deidre Crocker, MD.....APRHB

Stella Kinyota, MD.....APRHB

Gema Dumitru, MD.....APRHB

Colin Ligon, fellow.....APRHB

Elizabeth Herman, MD.....APRHB

Tursynbek Nurmagambetov,PhD.....APRHB

David Hopkins, MD..... Community Guide

Briana Lawrence, fellow..Community Guide

Sarah Merkle, MPH..... DASH

James Krieger, MD, MPH
Chief, Epidemiology Planning and Evaluation Unit
Public Health - Seattle and King County

Megan Sandel, MD, MPH
Assistant Professor of Pediatrics
Boston University School of Medicine

David Jacobs, PhD
Director of Research
National Center for Healthy Housing

Darryl C. Zeldin, M.D.
Environmental Diseases & Medicine Program
Division of Intramural Research
National Institute on Environmental Health Sciences (NIEHS)

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The Air Pollution & Respiratory Health Branch, CDC

- A branch within the National Center for Environmental Health (NCEH)
- National Asthma Control Program
- Aims to identify effective interventions
  - To guide our funded programs and others in appropriately allocating their resources
  - To direct our research and evaluation activities

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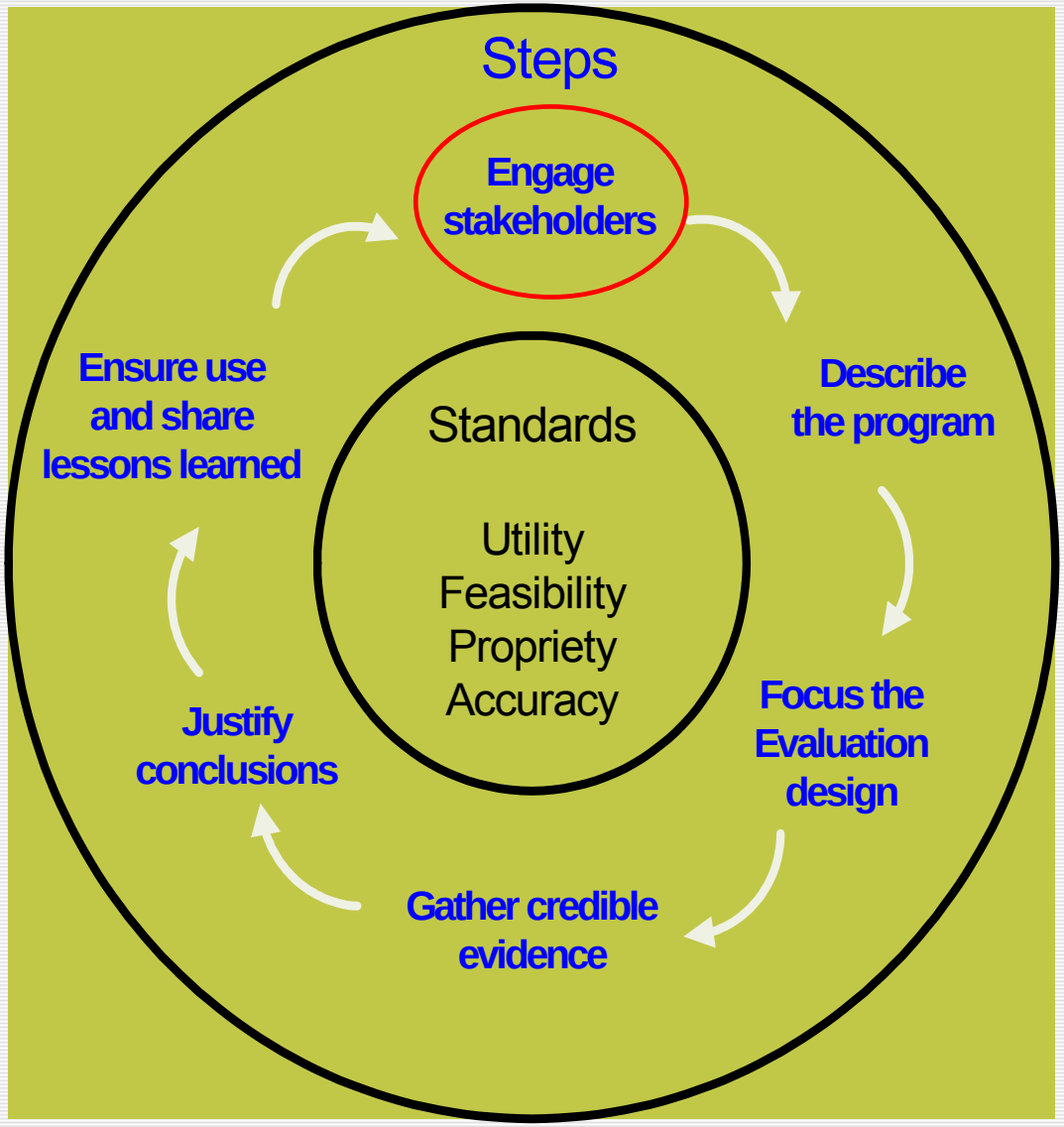
CDC Evaluation Framework



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Engage Stakeholders

- State Health Departments
- Academics
- NGO's/Advocacy groups
- CDC and Federal agencies
- Field staff
- Asthma patients and families
- Community members
- Health care providers

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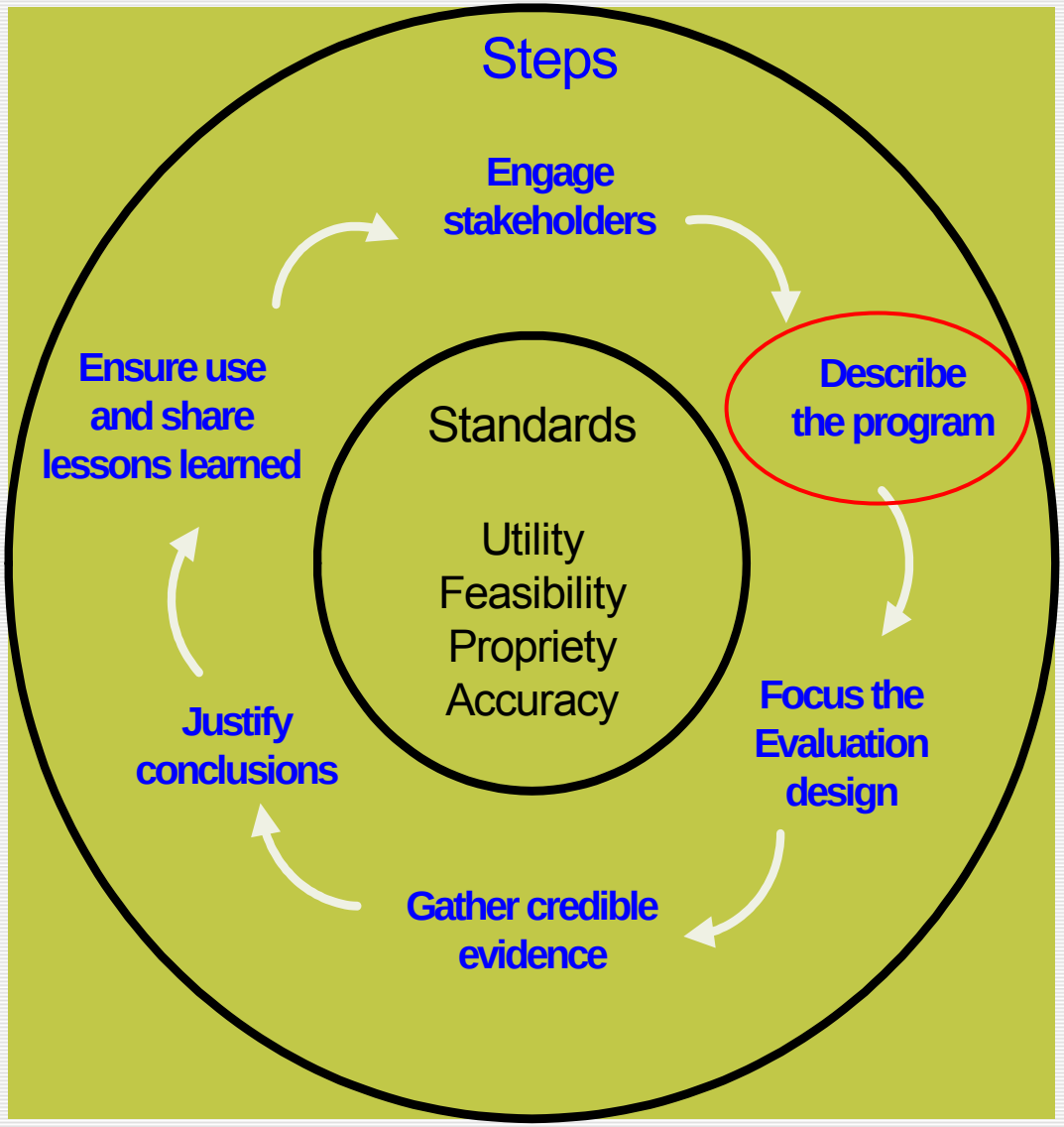
CDC Evaluation Framework



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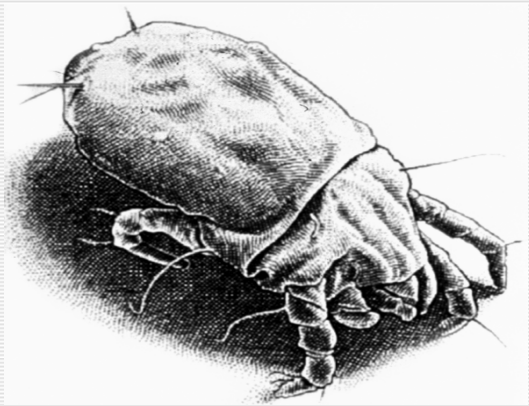
Describe the Program

- Describe what the program does
- Program activities
- Outcomes
- Logic model

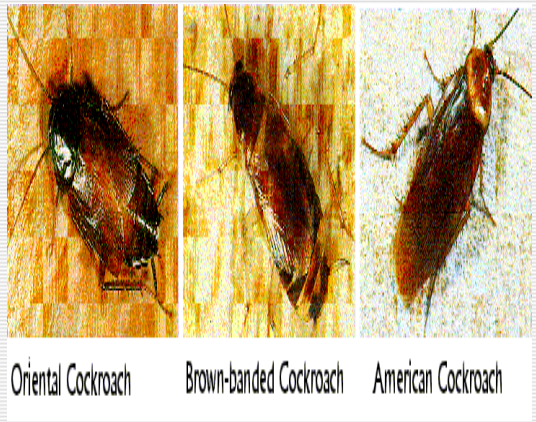
Describe the Program

To systematically review the effectiveness of multicomponent, multi-trigger home-based environmental interventions in improving asthma morbidity

Why Home-Based Asthma Interventions?



Dust Mites



Cockroach Allergens

Rodents

Pet Dander

Mold

Cigarette Smoke

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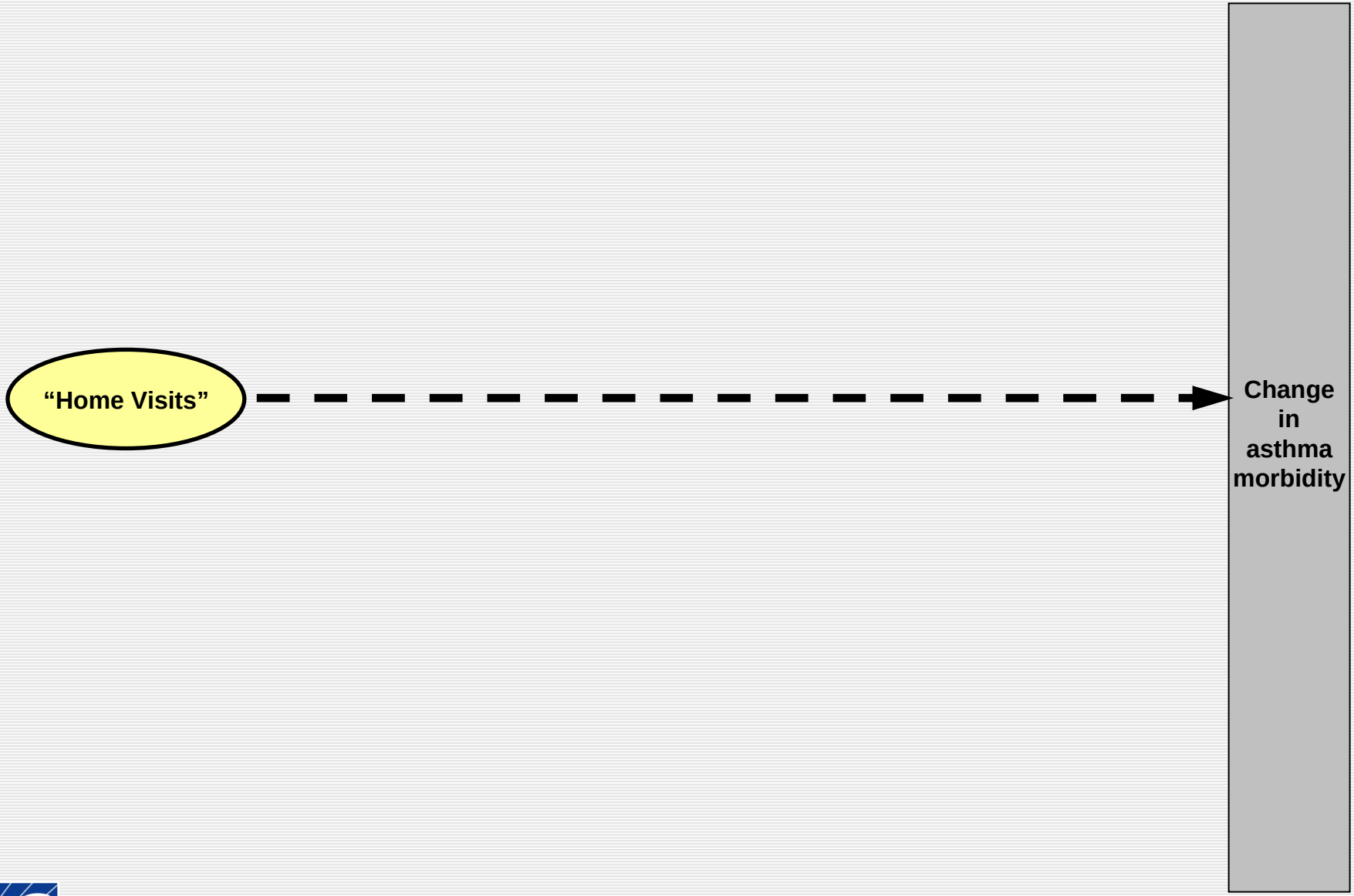
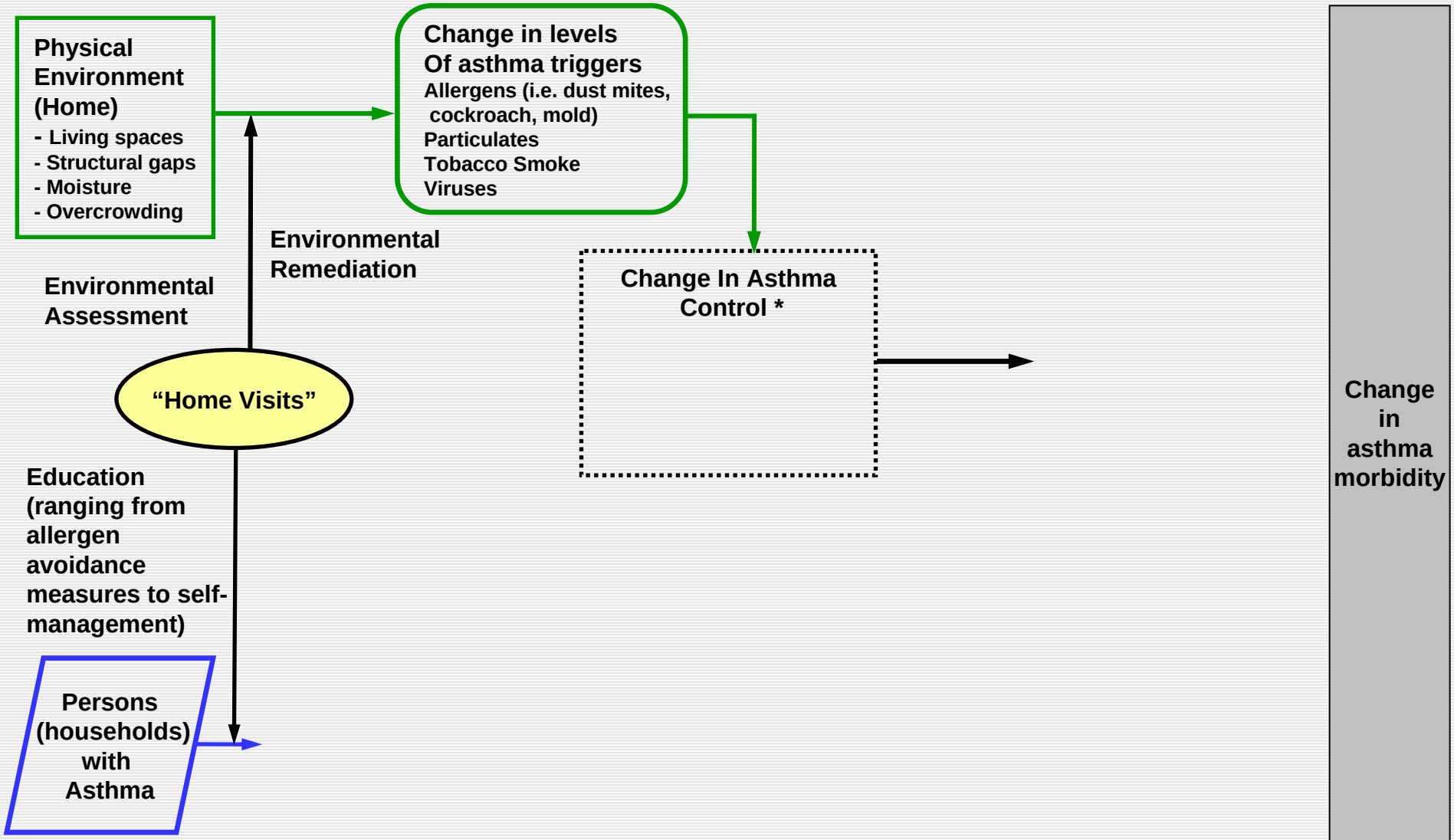
Analytic Framework

Home-Based Environmental Interventions



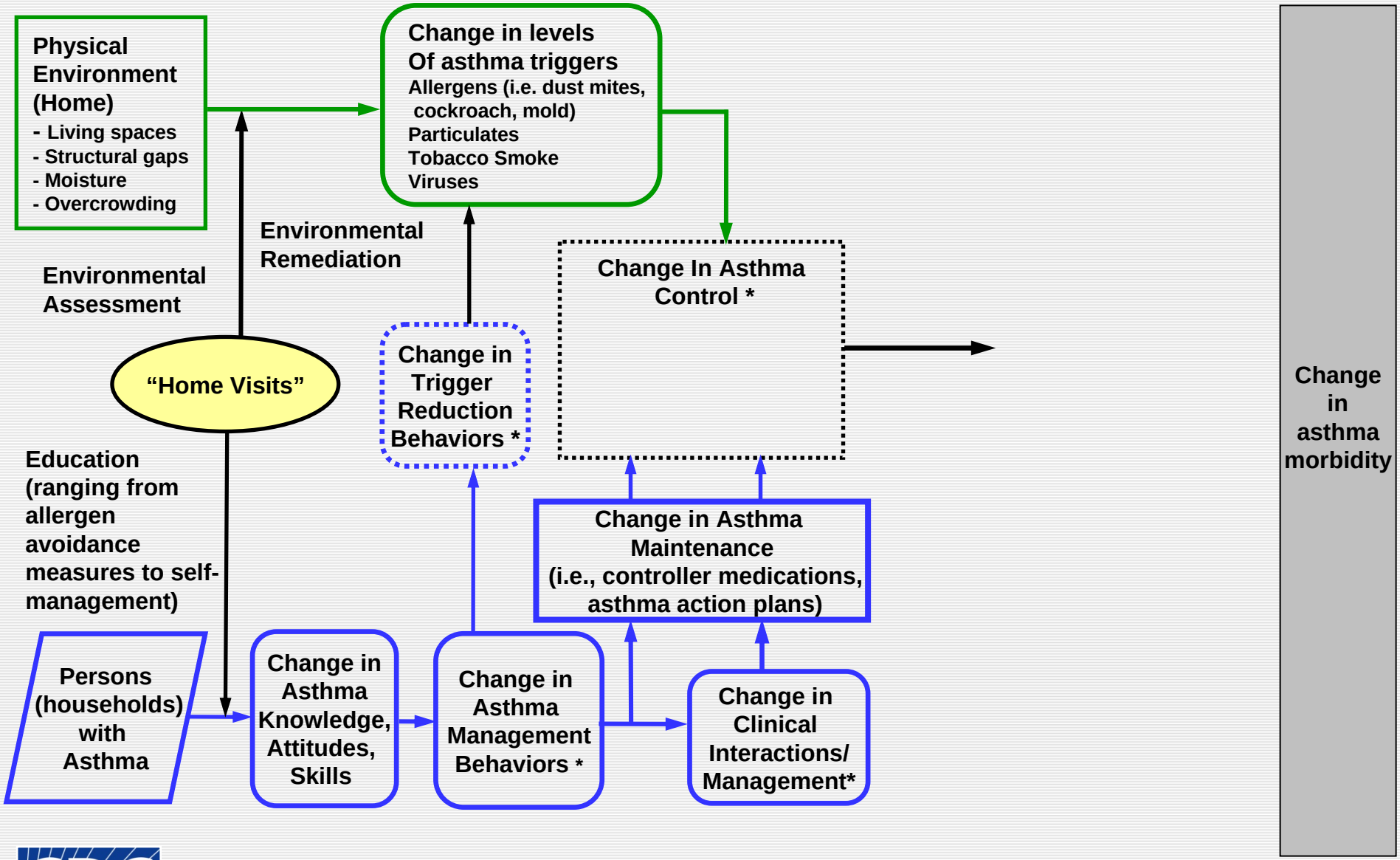
Two Major Pathways: Environmental and Behavioral Change

Environmental Change



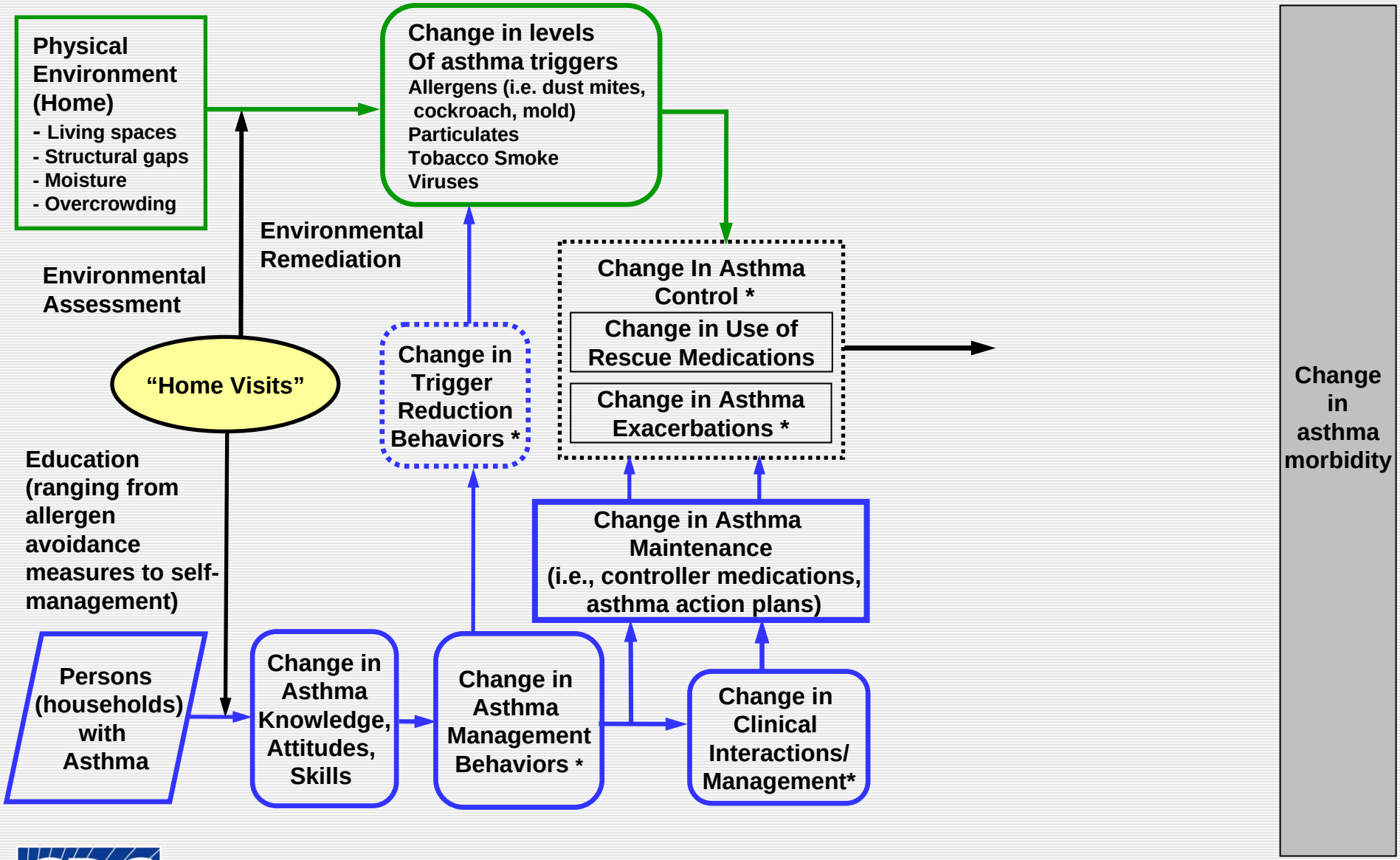
* With additional definitions and criteria

Behavior Change



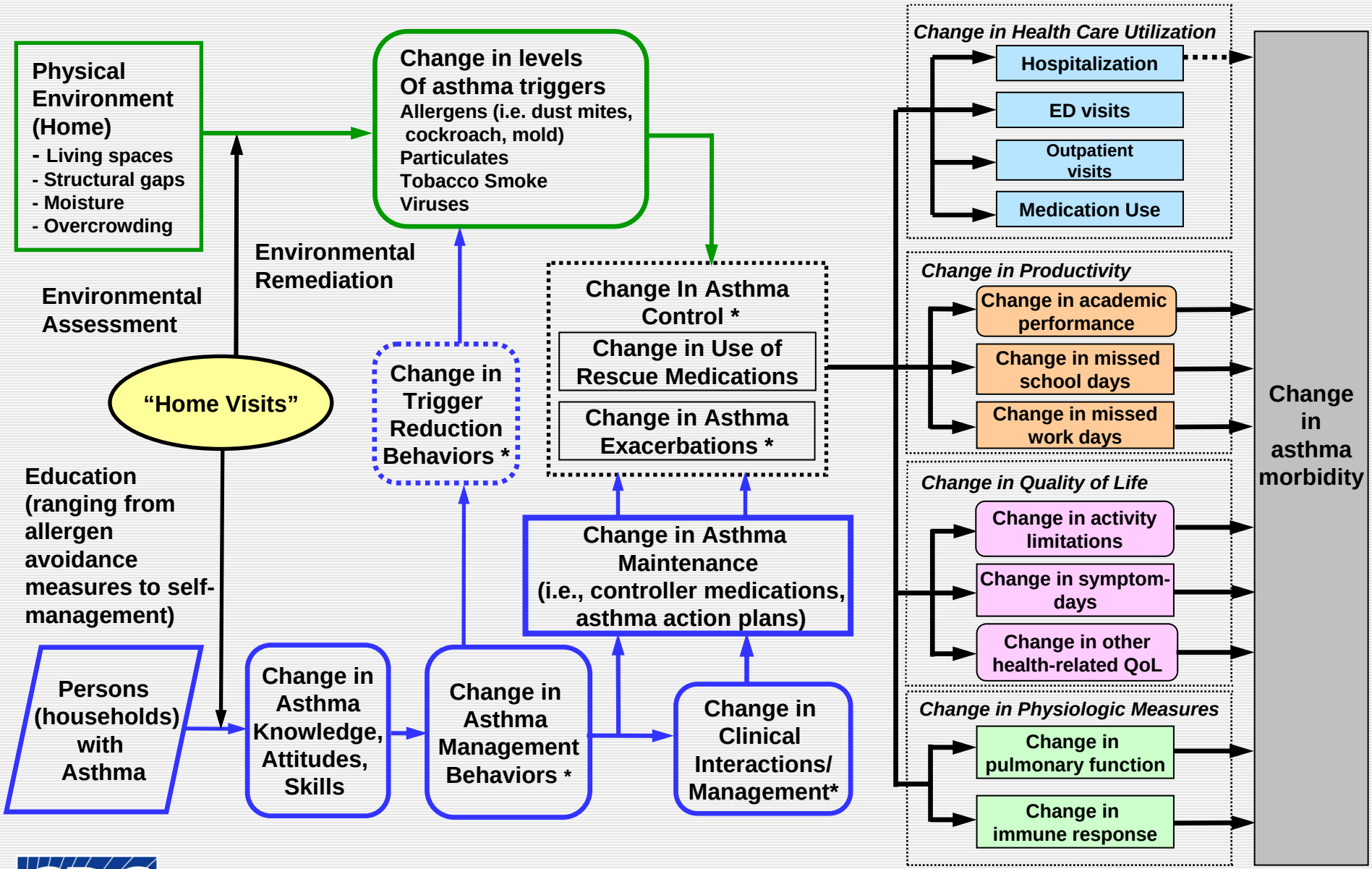
* With additional definitions and criteria

Environmental and Behavioral Change Should Impact "Control"



* With additional definitions and criteria

...and May Improve Physiologic Measures of Asthma



* With additional definitions and criteria

Intervention Definition

- Home-based
  - ≥ 1 home visit
- Multi-component
  - ≥ 2 components (environmental assessment, remediation, education)
  - ≥ 1 component towards home environment
- Multi-trigger
  - ≥ 2 potential asthma triggers

Home visit

- Effort to change the home environment
  - Assessment
  - Remediation
  - Education
  - +/- additional components
- Conducted by trained personnel
  - Clinician or healthcare provider
  - Community health worker
  - Pest control professional

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Multi-Trigger Defined

- Activities to reduce exposures to two or more environmental triggers/allergens that exacerbate asthma
  - Barriers such as allergen impermeable covers
  - Cleaning interventions/materials
  - Pest management
  - Home improvements
  - Moisture remediation
  - Education to reduce environmental tobacco smoke exposure
- Can be tailored to the environment or client sensitivities

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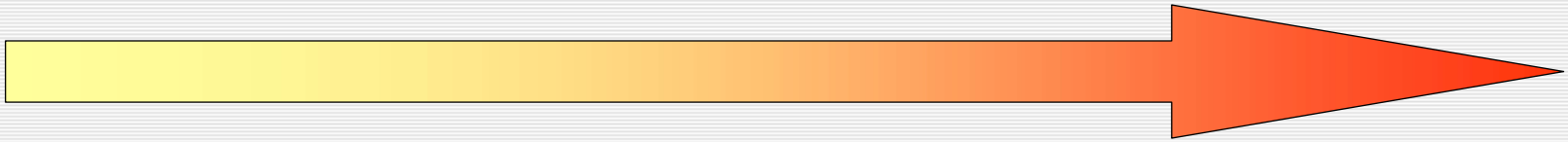
Environmental Remediation Intensity



Minor

- Environmental assessment
- Pillow and mattress covers

Moderate

- Dehumidifiers
- HEPA filters
- Vacuums
- Integrated pest management
- Minor repairs

Major

- New form of HVAC
- Insulation
- Re-roofing
- Removal of water damaged materials

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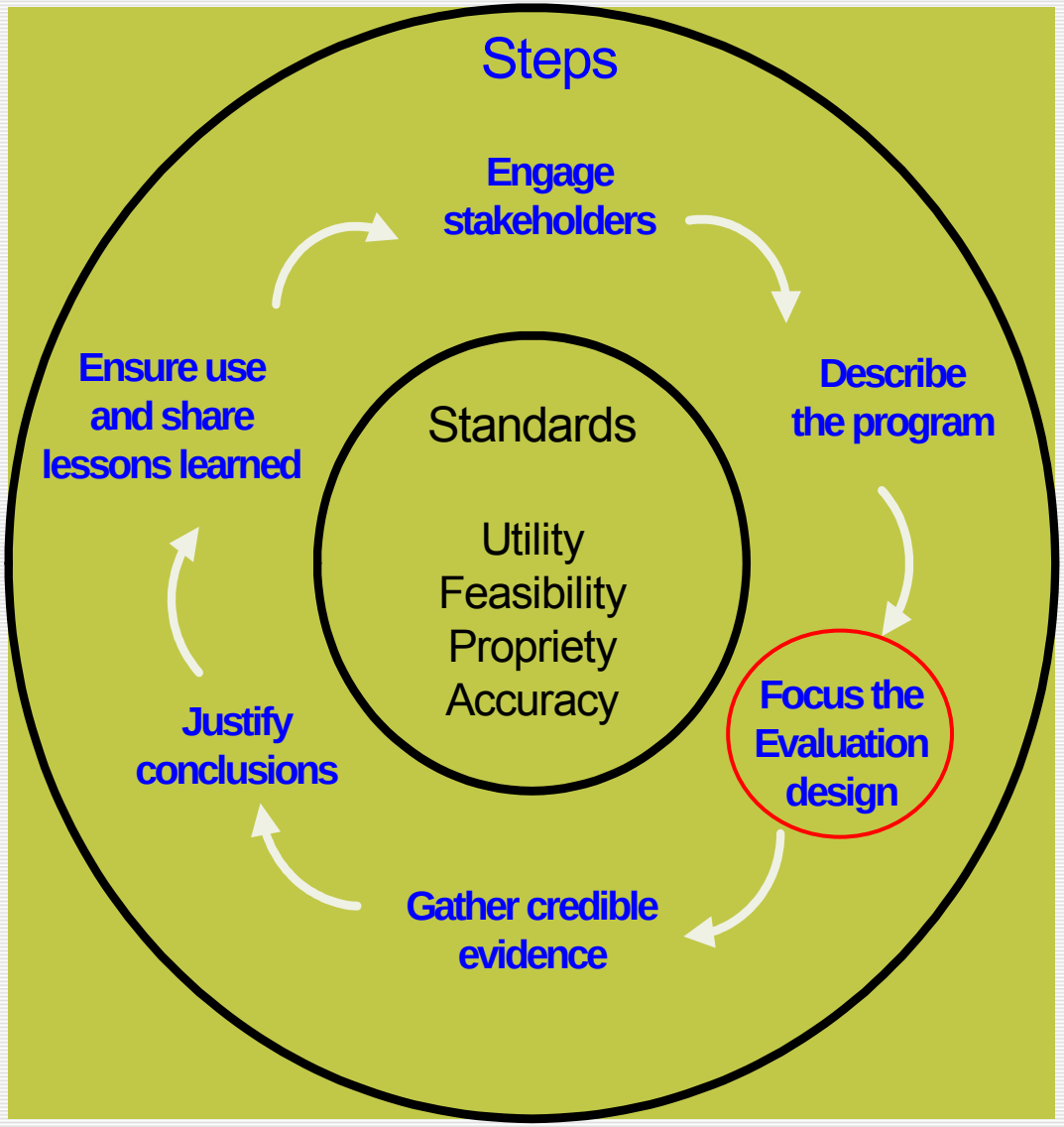
CDC Evaluation Framework



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Focus the Evaluation Design

- Evaluation purpose
- Users
- Uses
- Questions
- Methods

Key Questions Addressed by the CG Review

- Do multi-component home-based environmental interventions improve asthma morbidity?
- How does intervention intensity (# of home visits, type of remediation) influence effectiveness?
- What is the added benefit of interventions with additional non-environmental components (SM, SS, CC)?
- Is this intervention more effective for certain subpopulations?

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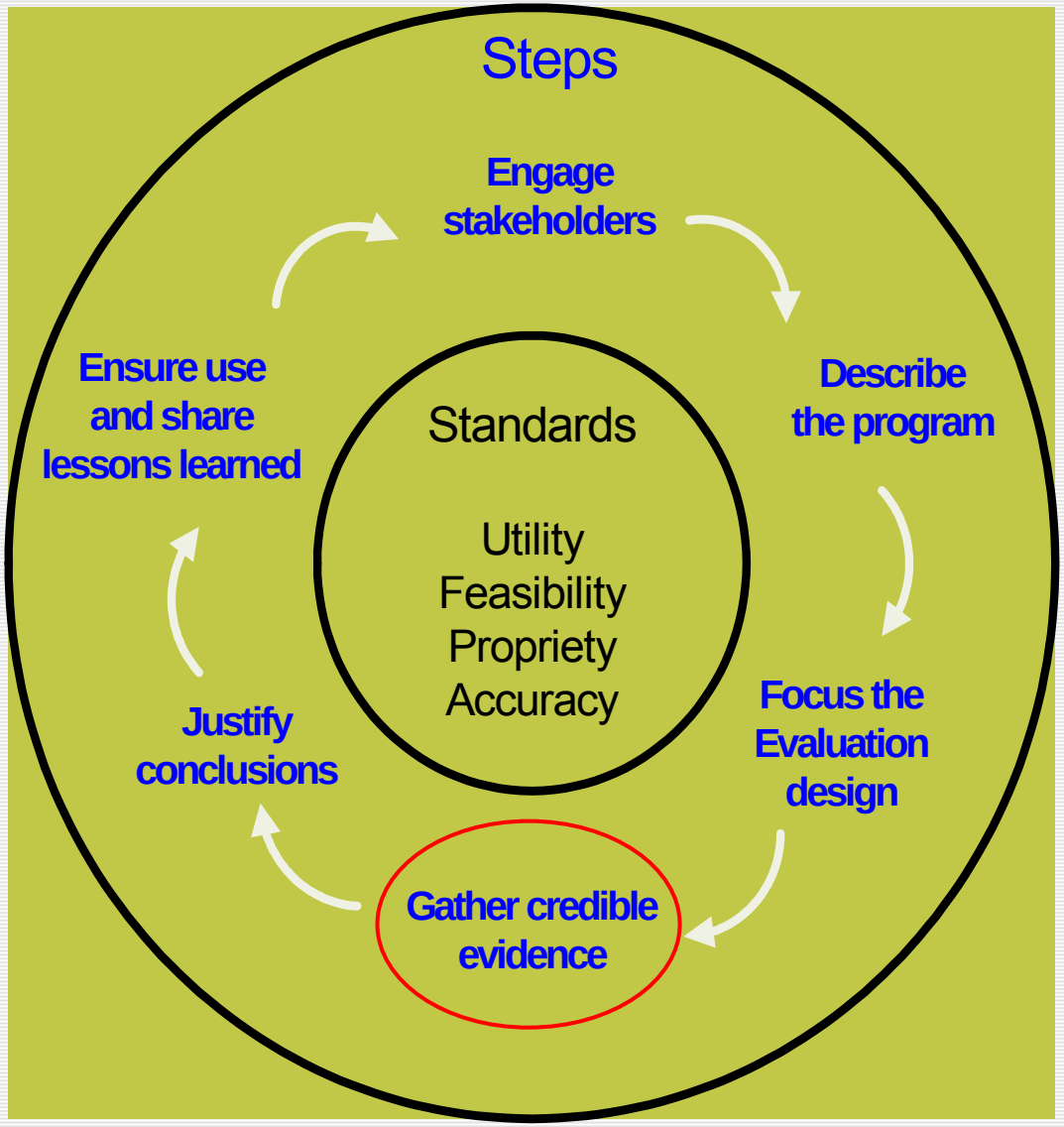
CDC Evaluation Framework



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Gather Credible Evidence

- Sources of evidence
- Quality
- Quantity
- Logistics
- Indicators

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Literature Search

- For the period 1966 – Feb. 2008
- Inclusion Criteria
  - English-language
  - Published or unpublished
  - Home based
  - Meets intervention definition
  - Evaluates ≥1 outcome of interest
- Exclusion Criteria
  - Drug trials
  - Primary prevention

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Databases

- MEDLINE
- Cochrane library
- CINAHL
- PsychINFO
- Web of Science
- EMBASE
- ERIC
- Sociological Abstracts

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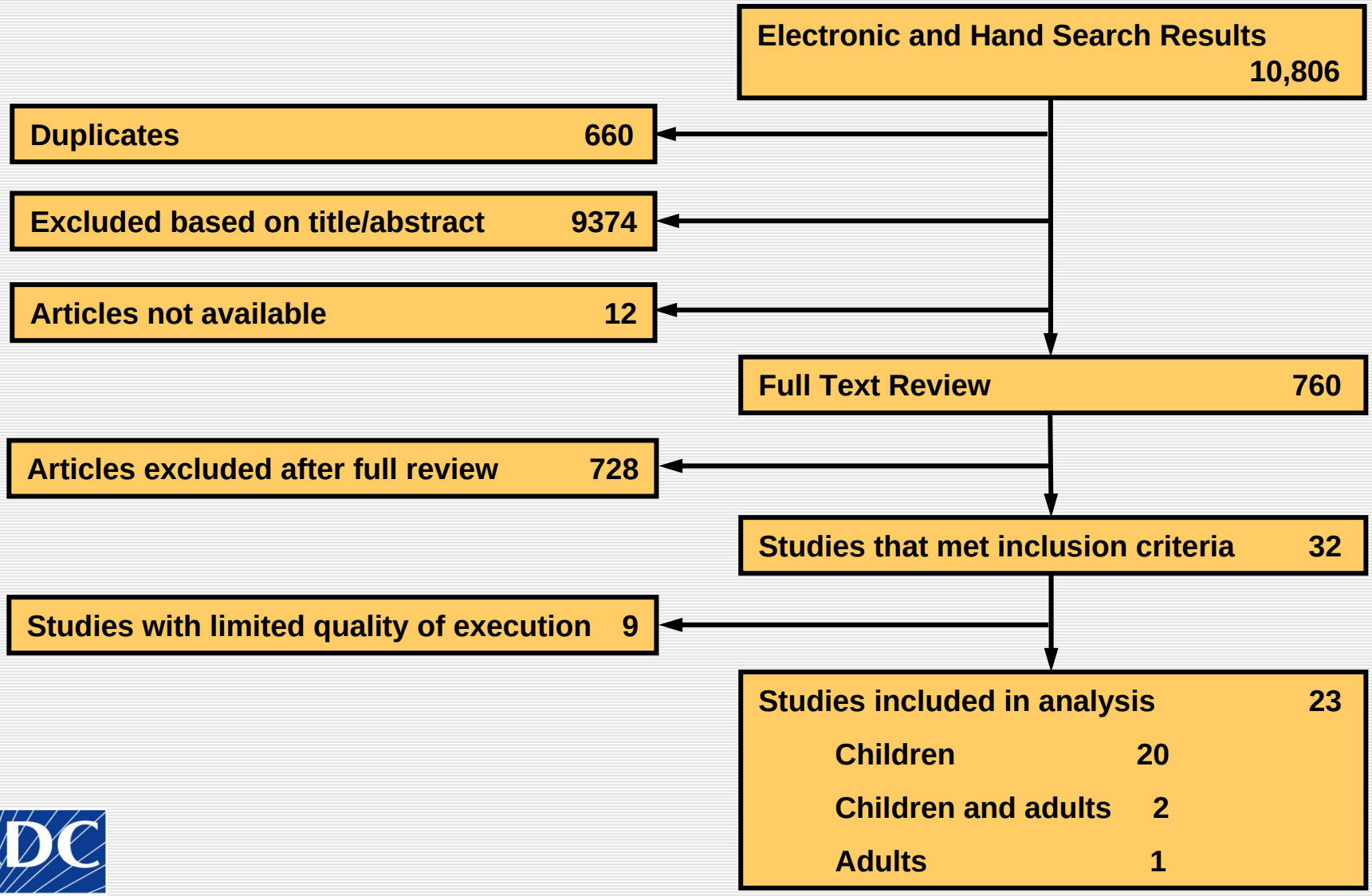
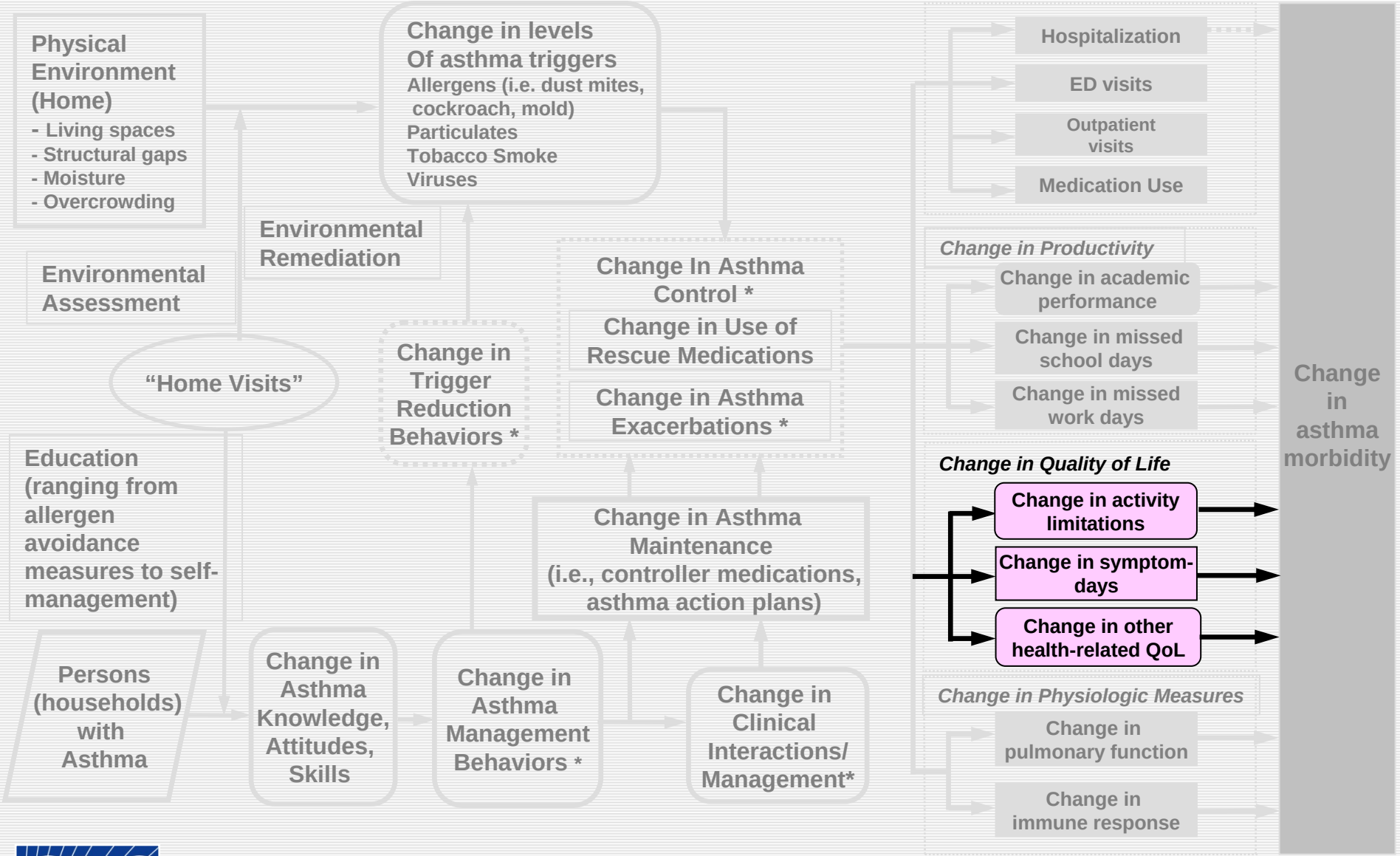
Search Results: 1966–February 2008



Study Results: Children

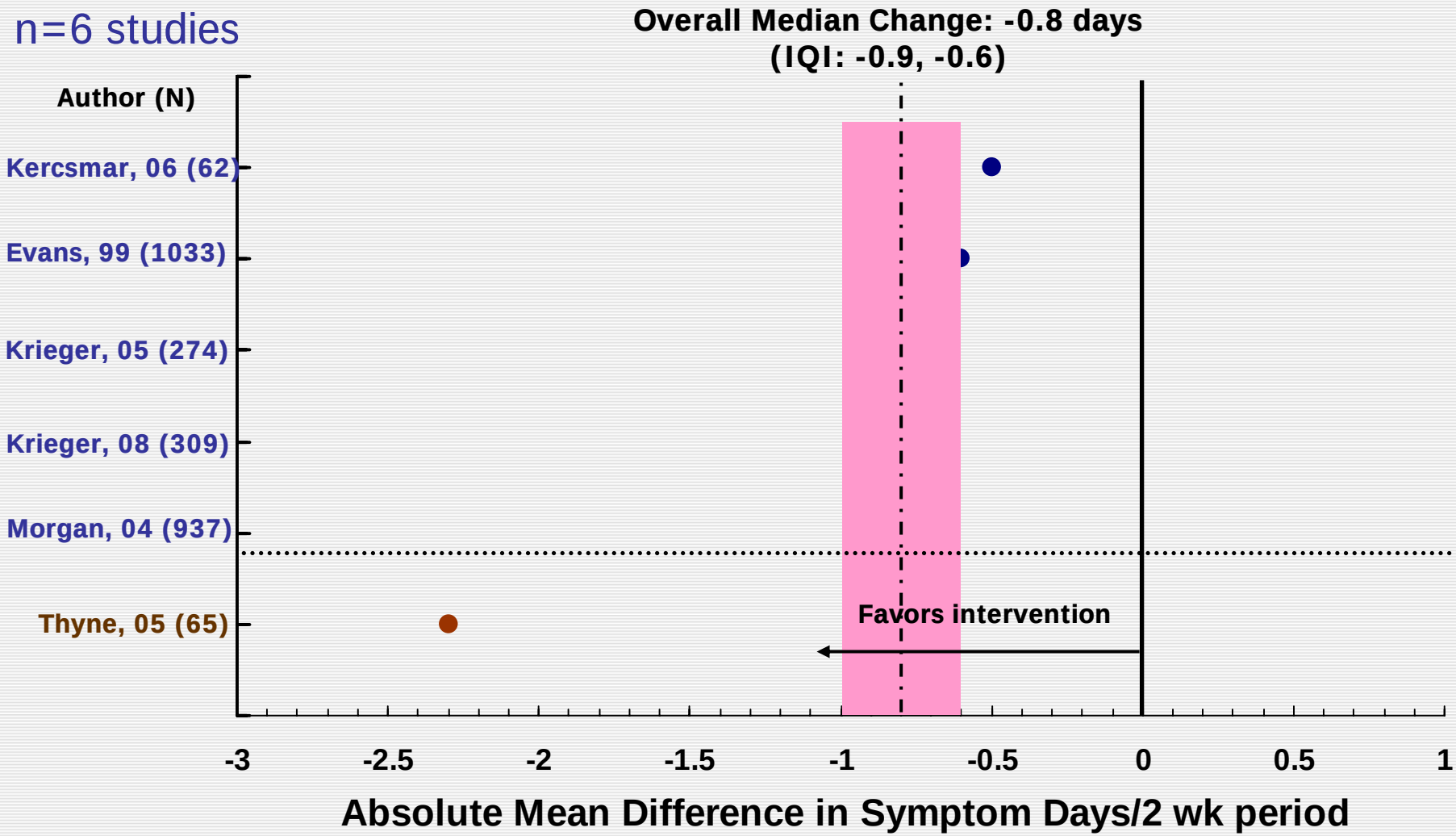
Quality of Life Outcomes



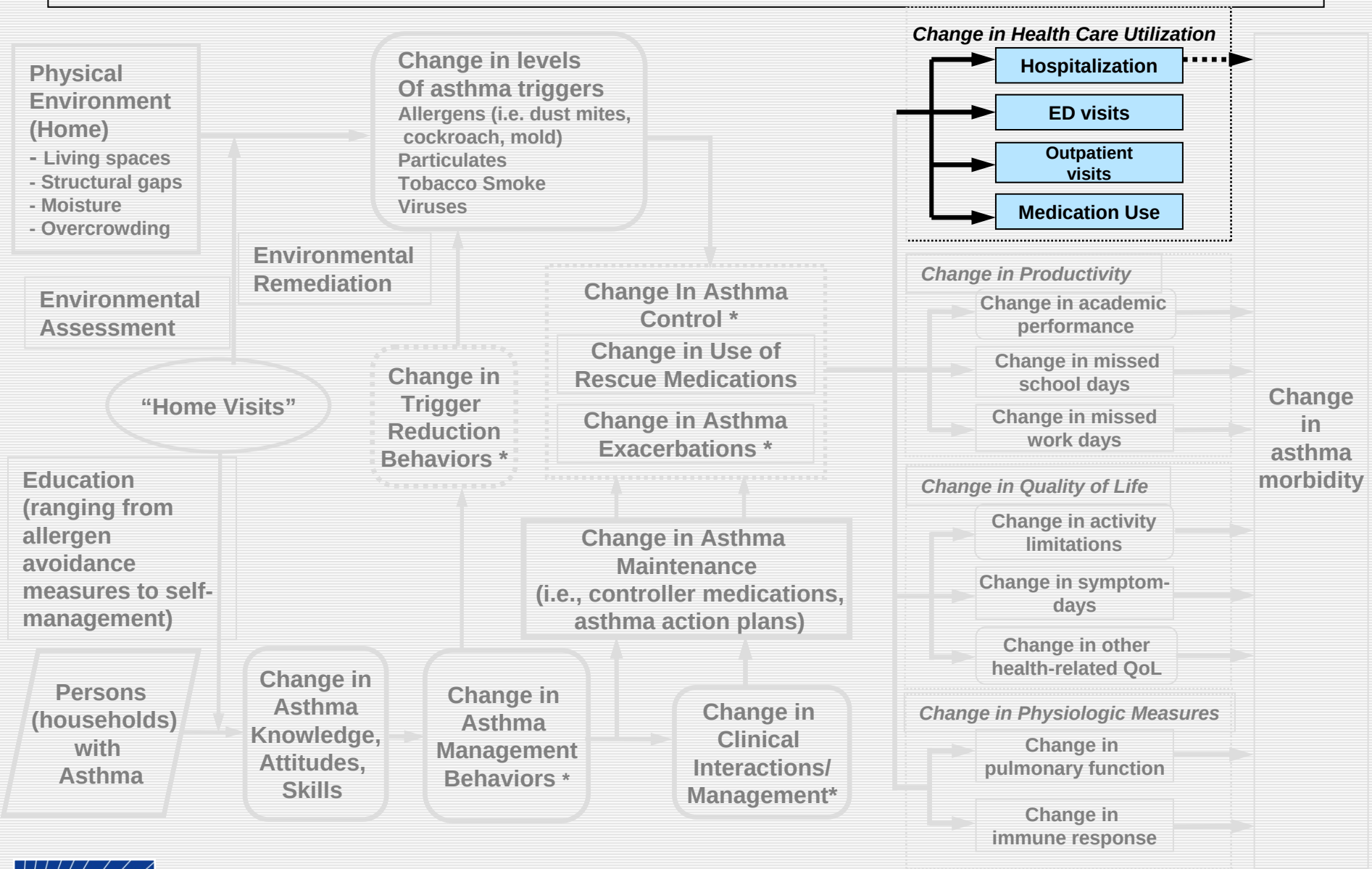
* With additional definitions and criteria

Quality of Life: Symptom Days

n=6 studies



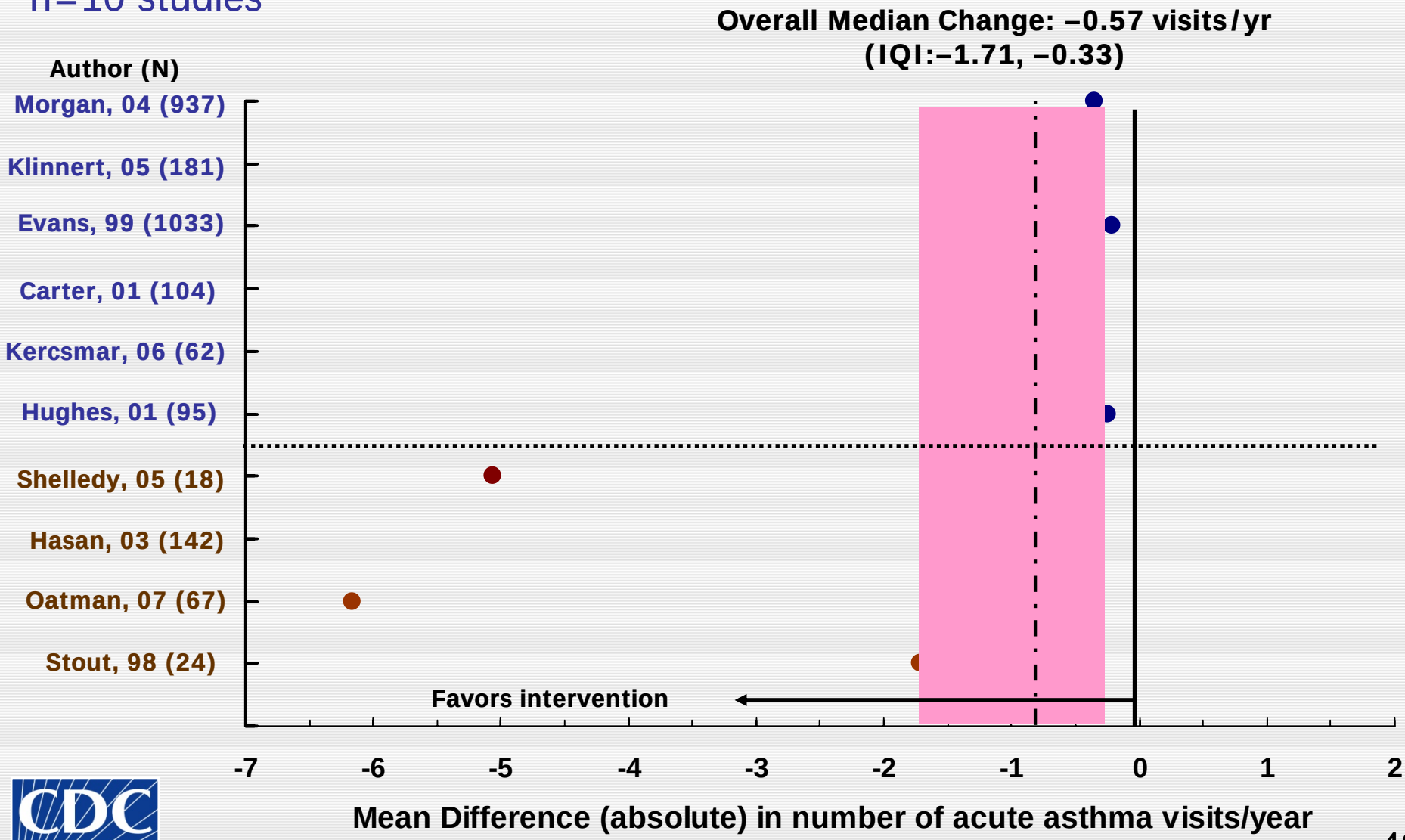
Healthcare Utilization Outcomes



* With additional definitions and criteria

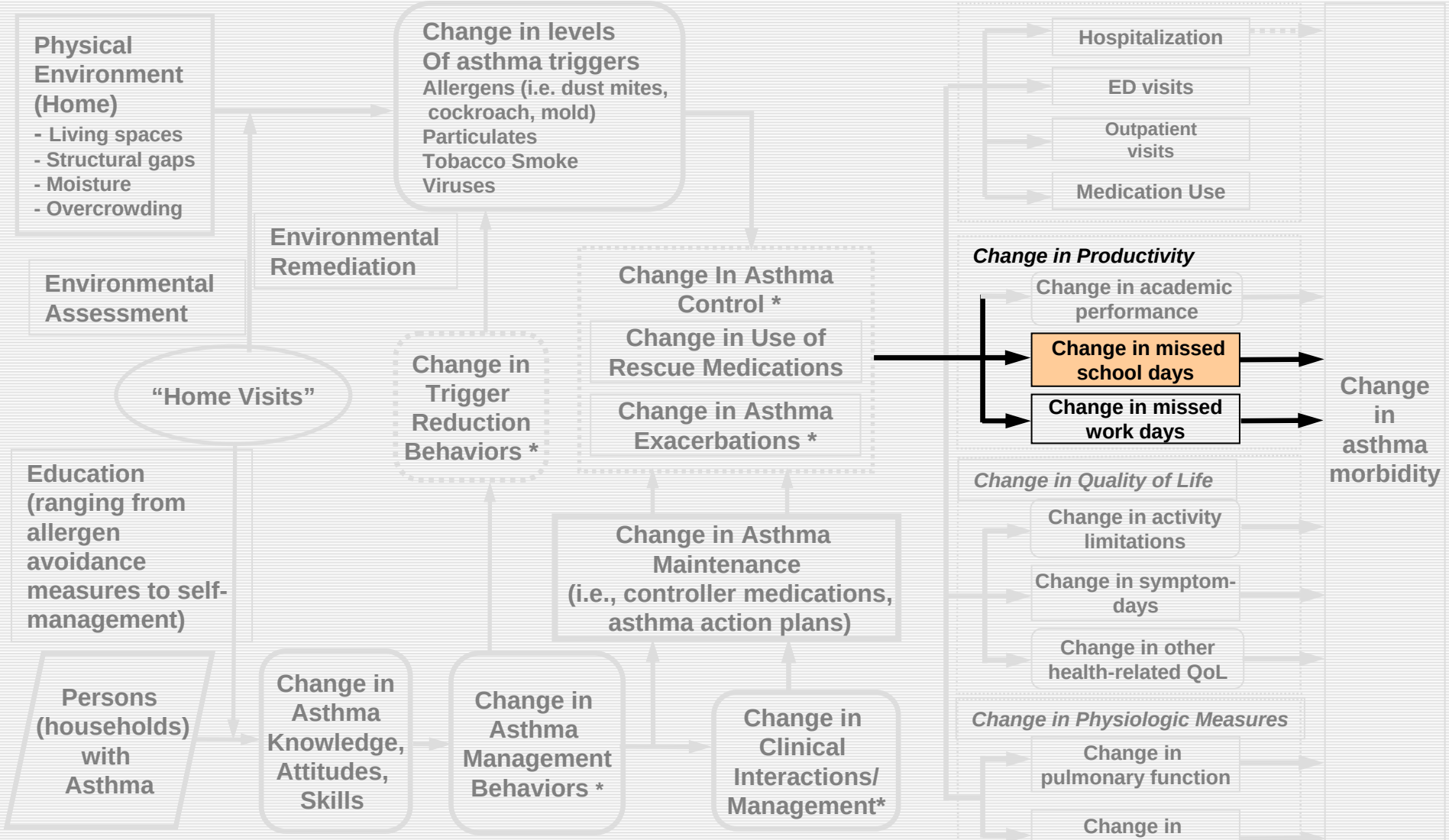
Health Care Utilization: Acute Care Visits/yr*

n=10 studies



*Acute care visits = sum of hospital, ED, and unscheduled office visits

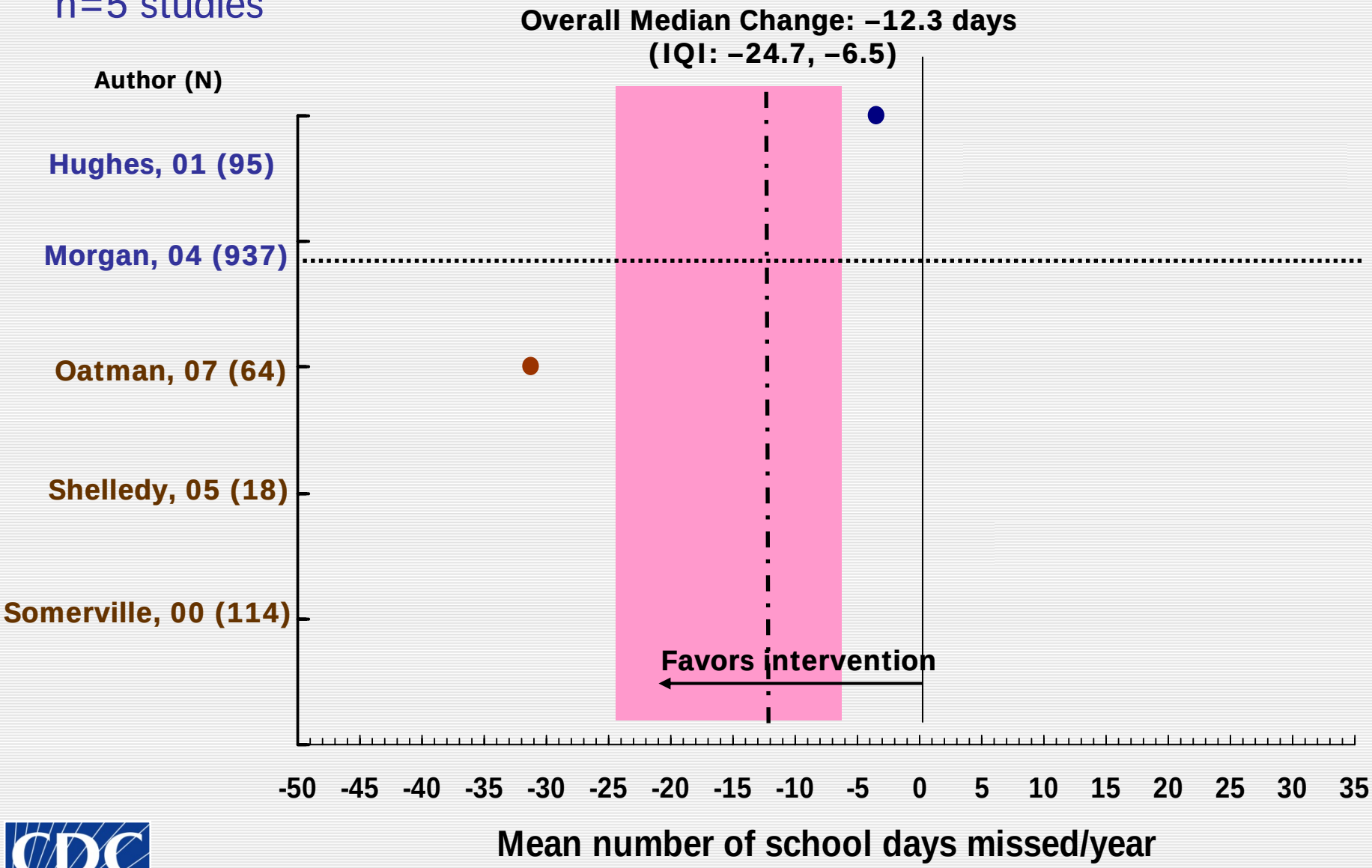
Productivity Outcomes



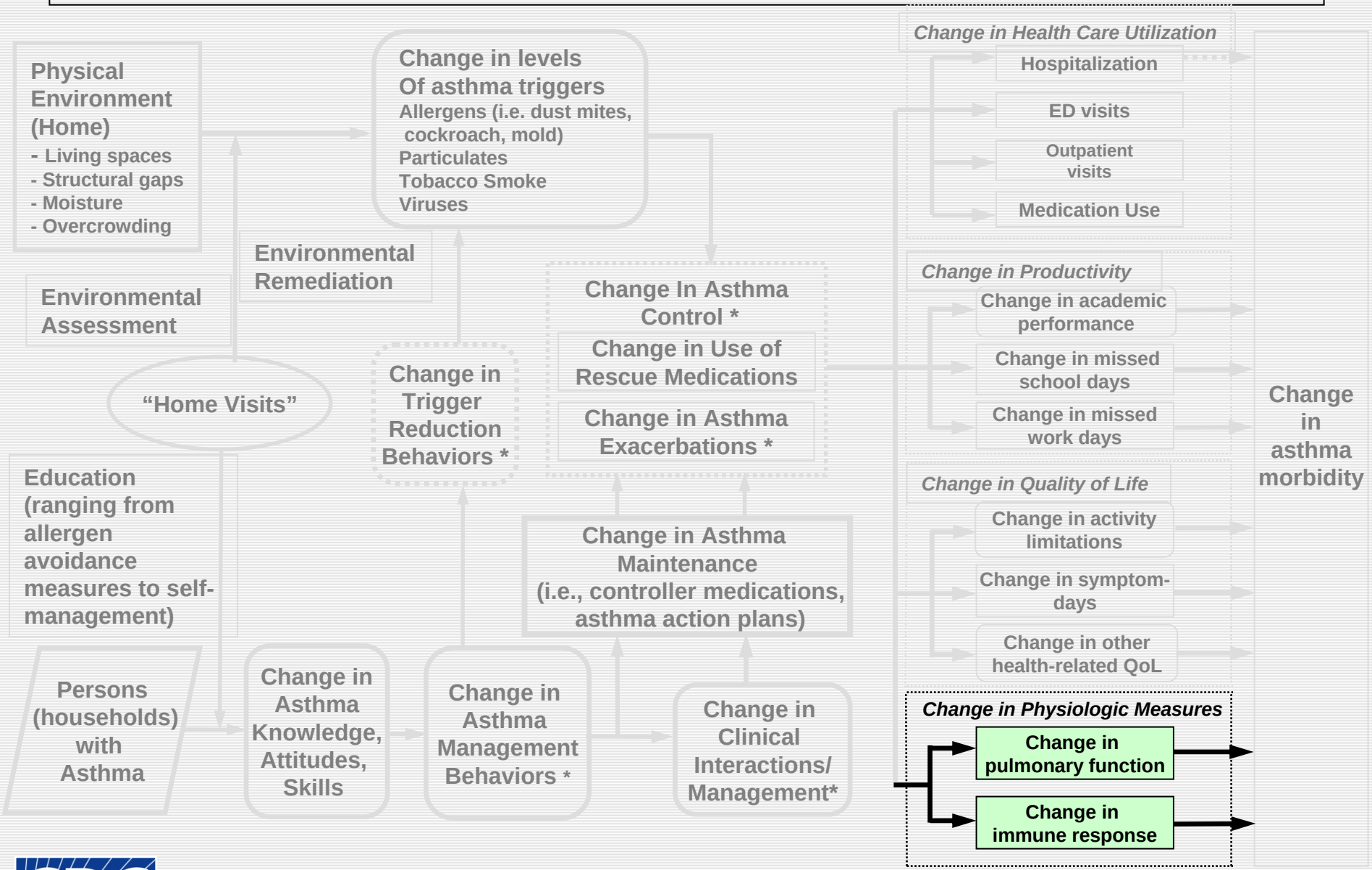
* With additional definitions and criteria

Productivity: School Days Missed/Year

n=5 studies



Physiologic Outcomes



* With additional definitions and criteria

Physiologic Outcomes

(n= 7 studies)

- All with different measurements
- Two studies showed significant improvement in pulmonary function
- Overall, no significant improvement

Summary of Outcomes in Children

- Health care utilization
  - Acute care visits reduced by 0.57 visits/year
- Quality of Life
  - Asthma symptom days reduced by 21 days/year
- Productivity
  - School days missed due to asthma reduced by 12.3 days/year
- Physiology
  - No significant improvement in pulmonary function or immunologic response

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Summary of Outcomes in Adults

Outcome	No. of Studies	Findings
Quality of Life	2	Improvement in QoL scores
Health Care Utilization	1	Reduction in acute care visits
Productivity	1	No improvement
Physiology	0	Not Reported

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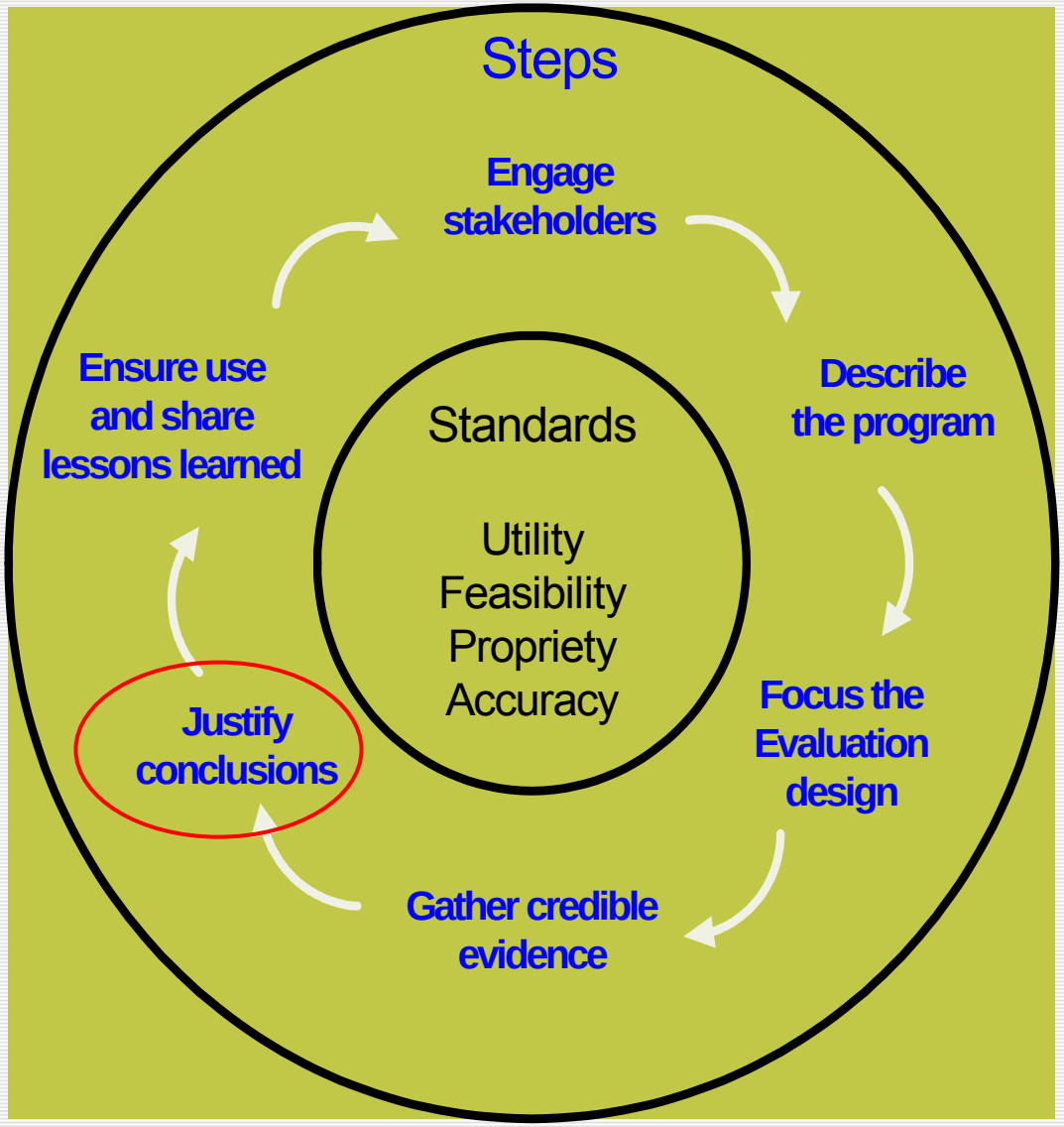

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Justifying Conclusions

- Use appropriate methods of analysis
- Interpret the significance of results
- Make judgments according to clearly stated values that classify a result
- Recommend actions or decisions that are consistent with the conclusions

Task Force Recommendation for Children and Adolescents

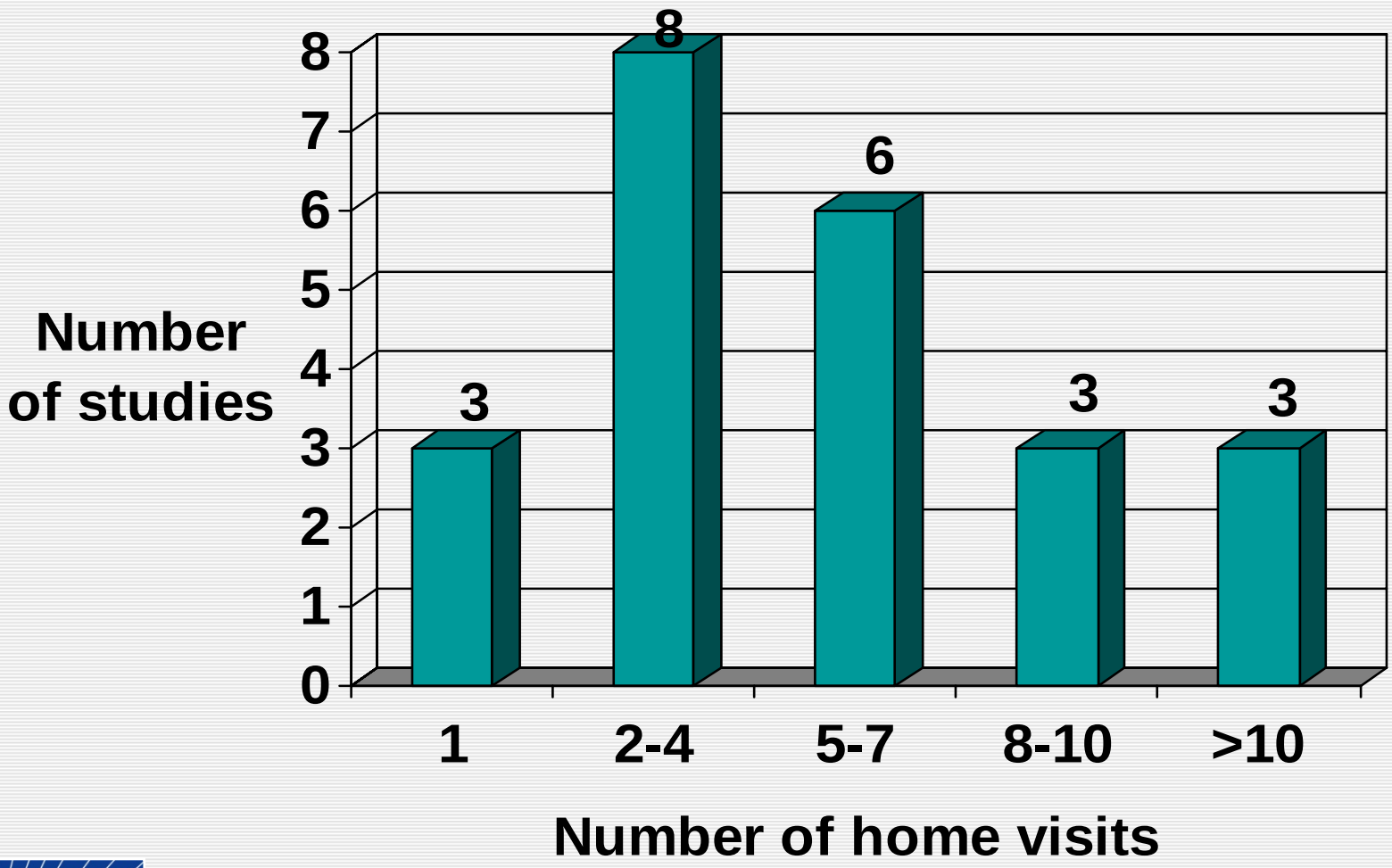
The Task Force recommends the use of home-based multicomponent, multi-trigger environmental interventions for **children and adolescents** with asthma on the basis of strong evidence of effectiveness in reducing symptom days, improving quality of life or symptom scores, and reducing the number of school days missed.

Task Force Recommendation for Adults

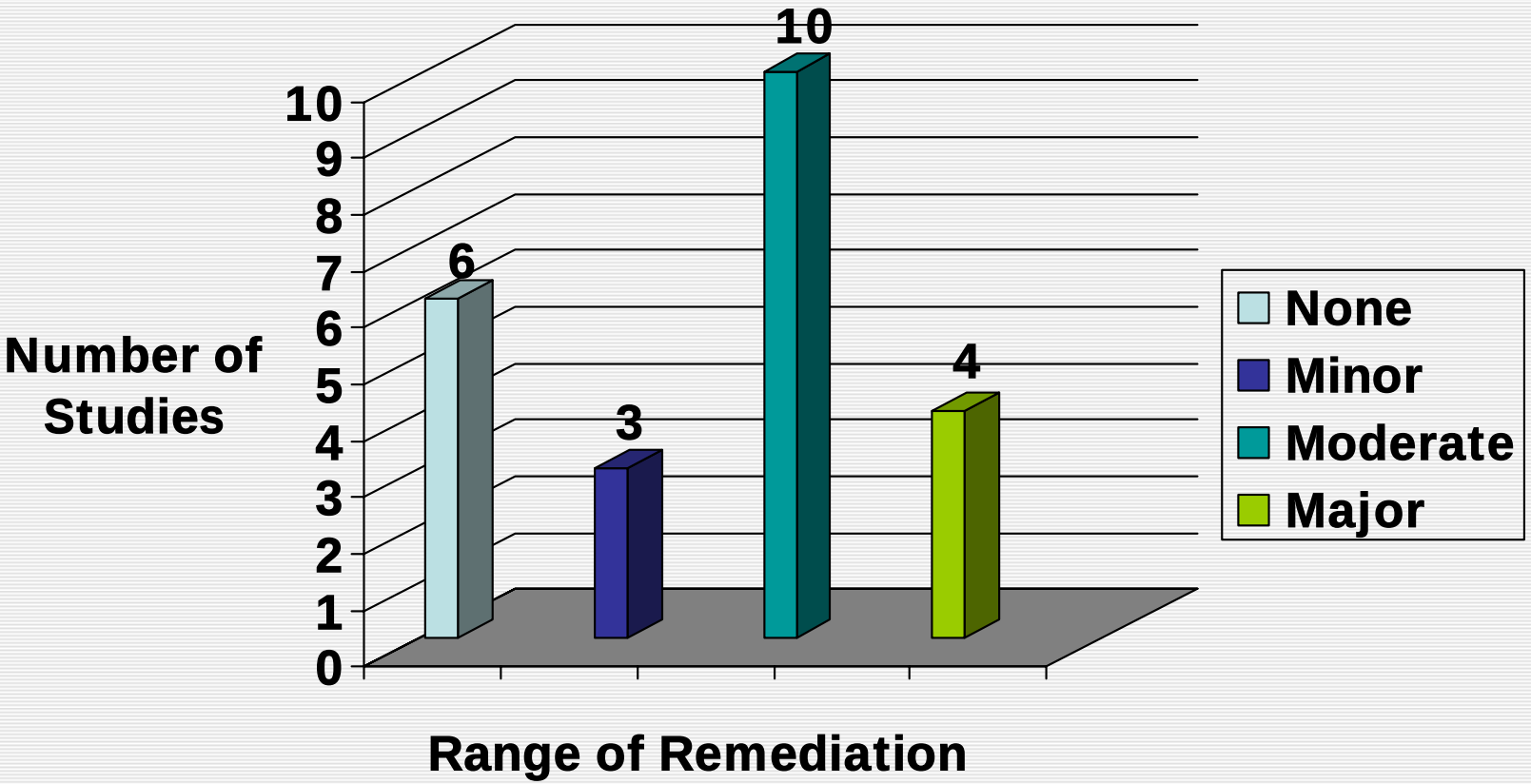
The Task Force found insufficient evidence to determine the effectiveness of home-based multicomponent, multi-trigger environmental interventions in **adults** with asthma due to a small number of studies with inconsistent results.

Additional Findings

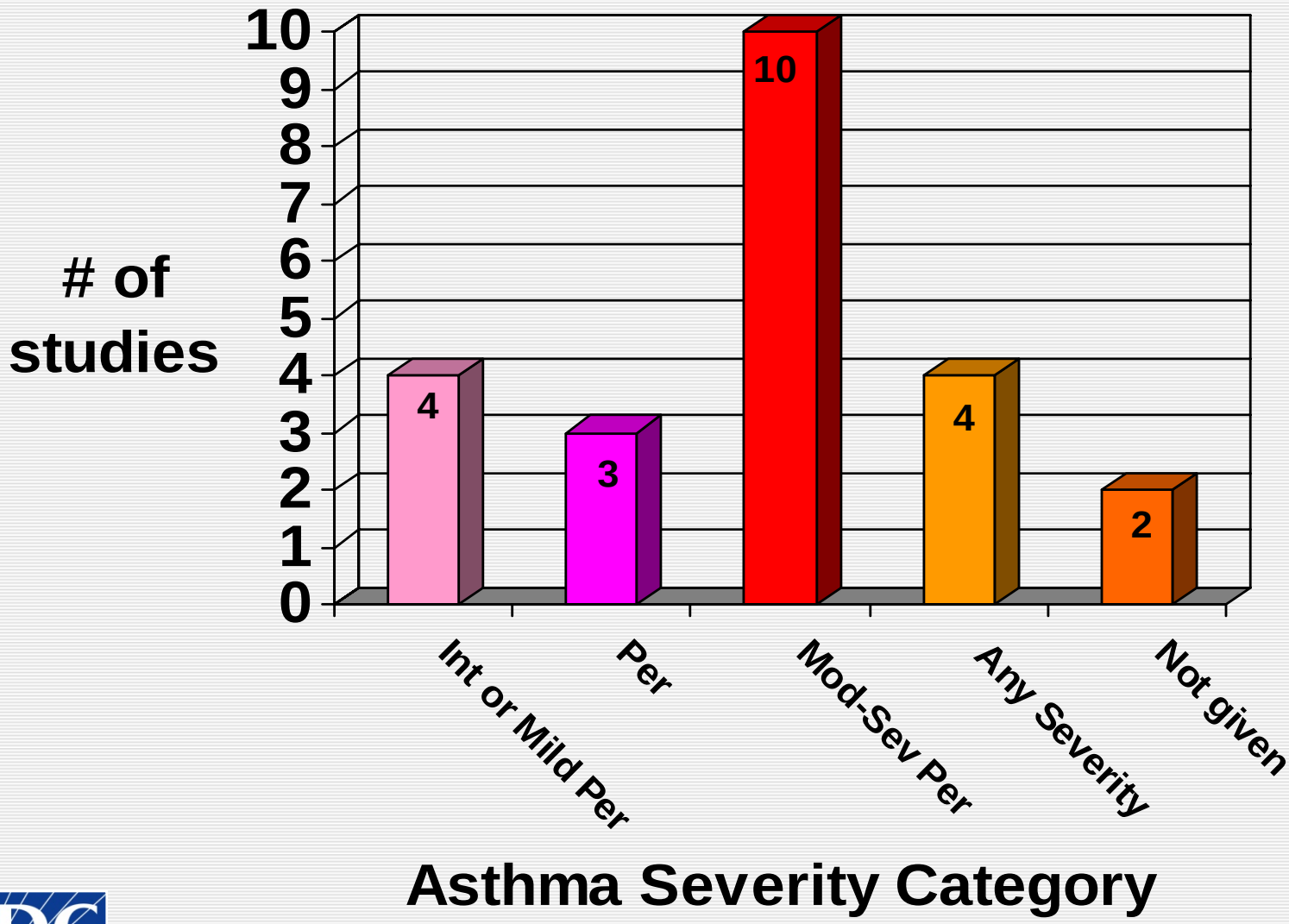
Number of Home Visits



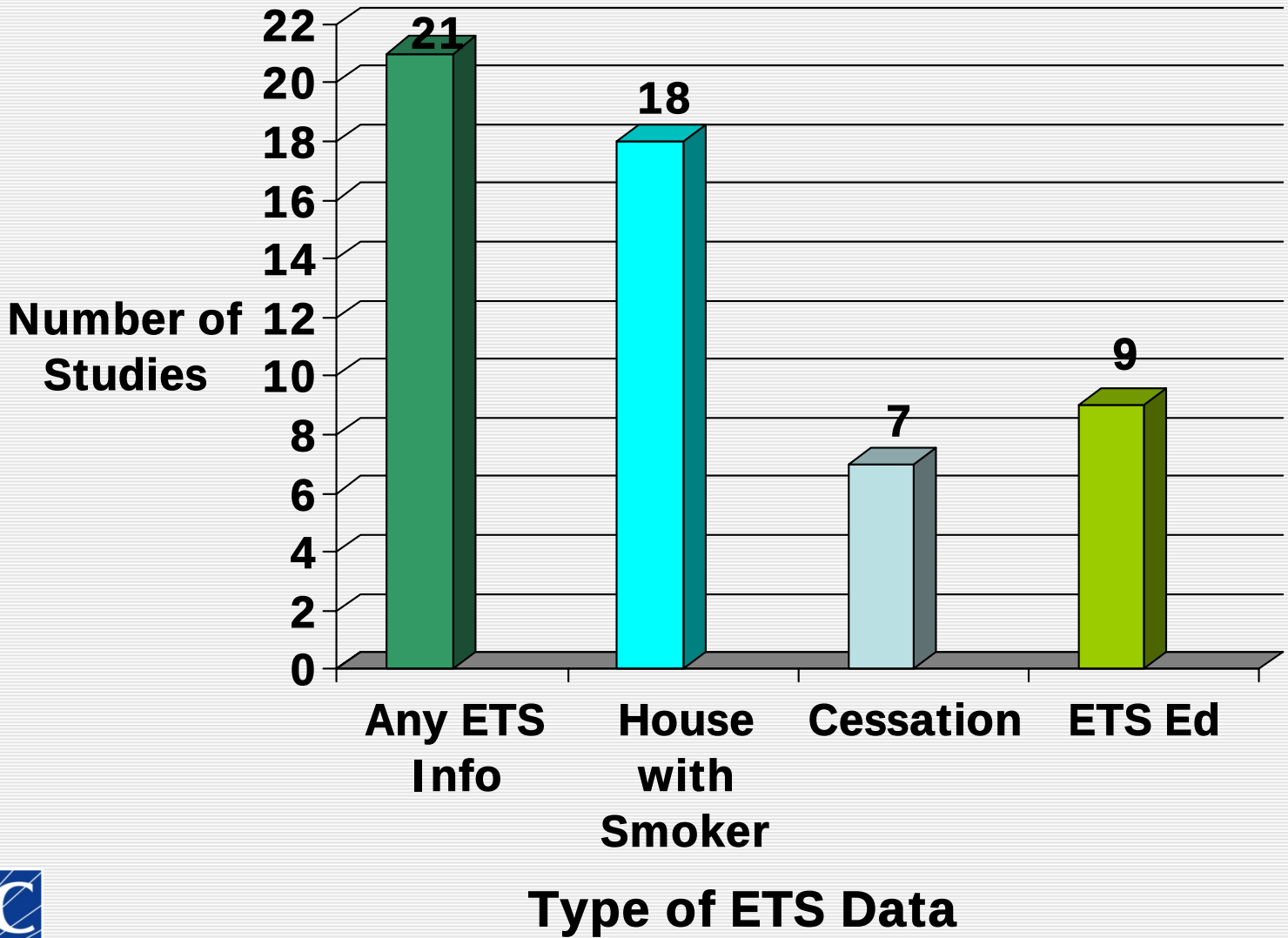
Remediation Intensity



Asthma Severity



Studies with ETS Data



Economic review

- Economic review of these interventions – completed 2009
- The Task Force found that home interventions with the combination of minor to moderate environmental remediation with an educational component provide good value for the money invested
- The economic benefits from these interventions have the potential to match or even exceed the cost of interventions

- **For additional information on the economic review**

Tursynbek Nurmagambetov, PhD, Economist, CDC

Email: ten7@cdc.gov

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Additional Benefits

- Improved caregiver support
- Caregiver smoking cessation
- Health benefits for parents and siblings of study children
- Home visit identifies additional public health concerns in the home

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Challenges/Barriers to Implementation

- Expense of interventions to participant - major remediation
- Remodeling may increase triggers and worsen asthma/allergies
- Acceptability of home visit-privacy issues
- Insurance issues
- Sustainability

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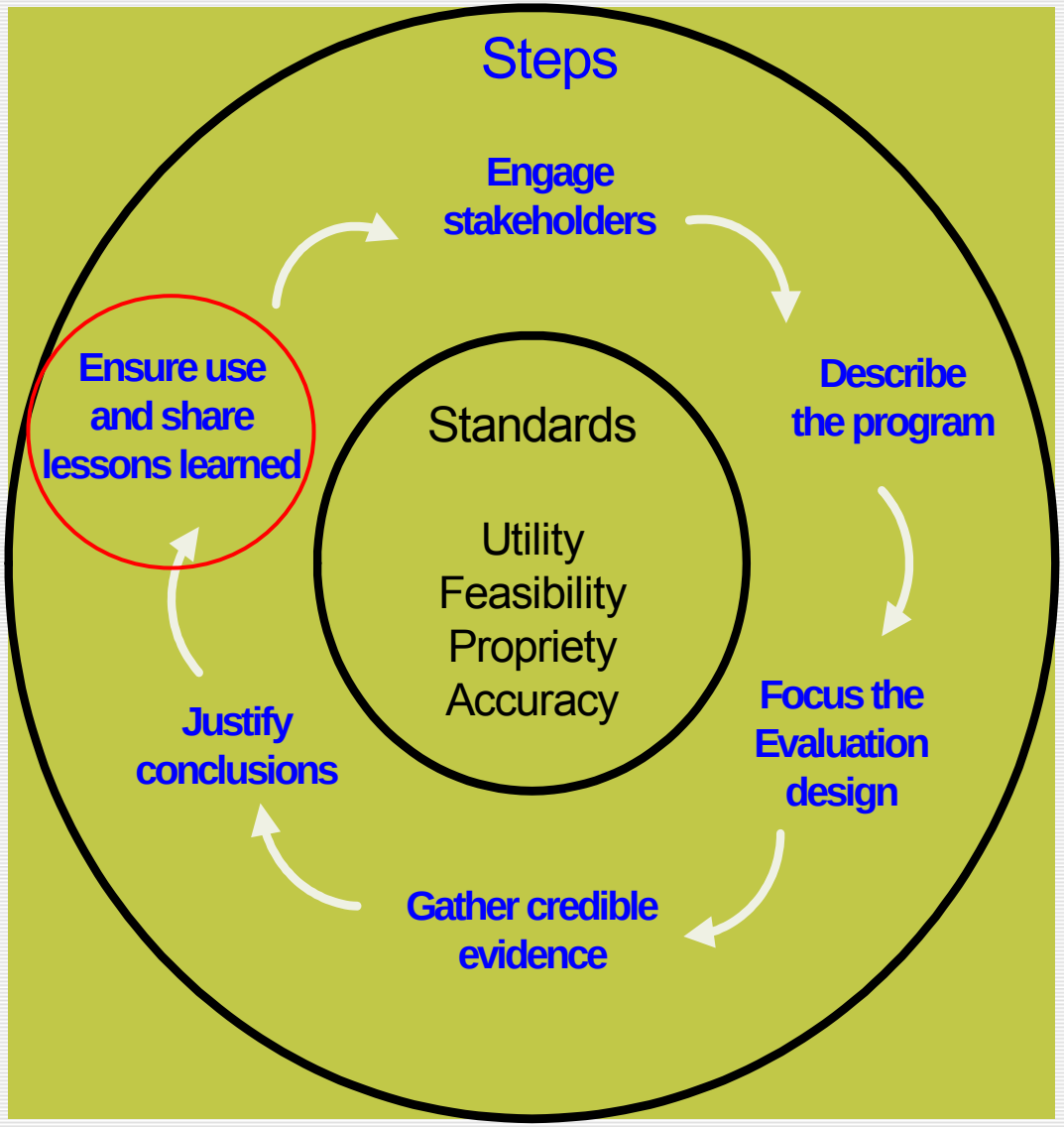

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Ensure Use and Share Lessons Learned

- Resource for partners to improve asthma control
- Dissemination of results
- Diversity of studies
- Diversity of study participants
- Applicability

Applicability

- Countries:
  - **United States** (**18**), UK (3), Canada (1), Japan (1)
- Setting
  - **Urban/inner city** (**17**)
  - Rural (2)
  - Unspecified (4)

- Client Population
  - Adult (1); **Children** (**21**); Both (2)
  - **Majority African-American** (**10**), White (6), Hispanic (6), Asian (1)
  - **Low income** (**21**); Not specified (2)
- Implementing Organizations
  - Hospitals (4); clinics (6); community health centers (6); **mixed** (**7**)

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Uses of this Systematic Asthma Review

- Public Health Programs
  - Identify effective interventions to fund/implement
  - Findings posted on CG and the CDC Asthma websites
- Health practitioners/researchers
  - Communicate/translate research
  - Identify key research gaps
- Policy Development
  - Develop practice recommendations (housing, insurance etc.)

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Future Directions of Research

- Determine the added benefit of conducting in-home intervention
- Ideal population for this intervention
  - Frequent users of health care services?
  - Participants with more severe asthma?
- Determine impact of secondhand smoke
- Need more studies in adults
- Article publication in AJPM-near future

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Conclusion

Children and adolescents with asthma

Home-based multi-trigger, multi-component, environmental interventions are effective in reducing

- symptom days
- missed school days
- acute asthma visits

Adults with asthma

Insufficient evidence

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Additional Resources

- Community Guide Asthma Recommendation
  http://www.thecommunityguide.org/asthma/multicomponent.html
- Air Pollution and Respiratory Health Branch
  http://www.cdc.gov/asthma/

- For additional information on the **effectiveness review**

Deidre Crocker, MD, Epidemiologist, Coordinating scientist, CDC
Email: dvj4@cdc.gov

Gema Dumitru, MD, MPH, ORISE fellow, CDC
Email: ggd7@cdc.gov

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Thank you!

Questions

Thank you for joining us!

- Please provide your feedback using the Question and Answer pane.
- Archive of this Webinar will be posted to: www.AsthmaCommunityNetwork.org
- Continue the discussion! Visit the forums: www.AsthmaCommunityNetwork.org/Forums
- Save the Date! Next Webinar: Dec. 3, 2009

Economic Evaluation of Home-Based Environmental Interventions

Additional slides

Other Evidence Based Reviews

- Agency for Healthcare Research Quality
  - Closing the Quality Gap: A Critical Analysis of Quality Improvement Strategies. Volume 5: Asthma Care
  - Released January, 2007
  - Evaluates nine asthma interventions

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AHRQ Review Interventions

1. Patient or caregiver education
2. Self-monitoring or self management (children and adults)
3. Organizational change
4. Audit and feedback
5. Provider reminders
6. Patient reminders
7. Facilitated relay of clinical data to providers
8. Financial, regulatory, or legislative incentives
9. Healthcare provider education

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Other Evidence Based Reviews-Continued

- Asthma Health Outcomes Project (AHOP)
  - Funded by EPA in 2006
  - Reviewed 111 asthma programs
  - Included local and community based programs
  - Did not evaluate study quality

Reviews of Environmental Interventions

- Environmental Change as a Strategy for Asthma
  - Single Allergen Interventions (Not Effective)
    - Impermeable covers, air filters, chemical methods not effective alone

      [Mills, Woodcock (Cochrane, 2008)]

  - Multi-trigger Environmental Remediation (Mixed Results)
    - Custovic et al (1998)- Avoidance of moisture, pets, and carpeting shows promise in reducing symptoms
    - Chapman (2005)- Multi-trigger interventions appear improve health, but depend on study design and patient sensitivities

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Reviews of Environmental Interventions- Cont

- Home as a Setting for Interventions
  - Home Visits (Effective)
    - Sweet (2004)- Home visits beneficial, but vary widely in design; more evidence needed
  - Multi-component Interventions (Effective)
    - Wu et al (2007), Sandel- Improve health and are cost-effective, but value of each component unknown

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Intervention Components

1. Environmental Assessment (EA)
   - In-home written assessment of environmental triggers that exacerbate asthma

2. Environmental Remediation (ER)
   - Actions conducted or financed to reduce triggers in the home that exacerbate asthma
     - Major Remediation-large structural changes
     - Minor remediation-small additions

3. Environmental Education (EE)
   - Patient education regarding actions to reduce triggers in the home that exacerbate asthma

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Intervention Components-Cont

4. Self-Management Education (SM)
   - Patient education on monitoring symptoms and taking action to modify treatment.
   - Must include two or more of the following elements: written action plan; regular medical review; self monitoring of peak expiratory flow or symptoms; asthma education

5. Asthma Education (AE)
   - General education regarding the definition, pathophysiology, and treatment of asthma without a SM component

6. Social Services (SS)
   - Services to improve access to medical care or to advocate for environmental remediation

7. Case Management (CM)

   Services to improve coordination of asthma care between health care providers and home health workers

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Single-Allergen/Single-Component (SA/SC) Interventions Excluded

- SA/SC interventions Excluded because
  - Proven not effective (several systematic reviews)
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One Lump/Split Concern

- How to incorporate evidence from studies including self-management training (SM)
  - Primary focus of SM is improving asthma management behaviors
  - These strategies may lead to an improvement in the patient's asthma (independently of environmental changes)
  - Frequently include environmental education
  - Are these interventions two different

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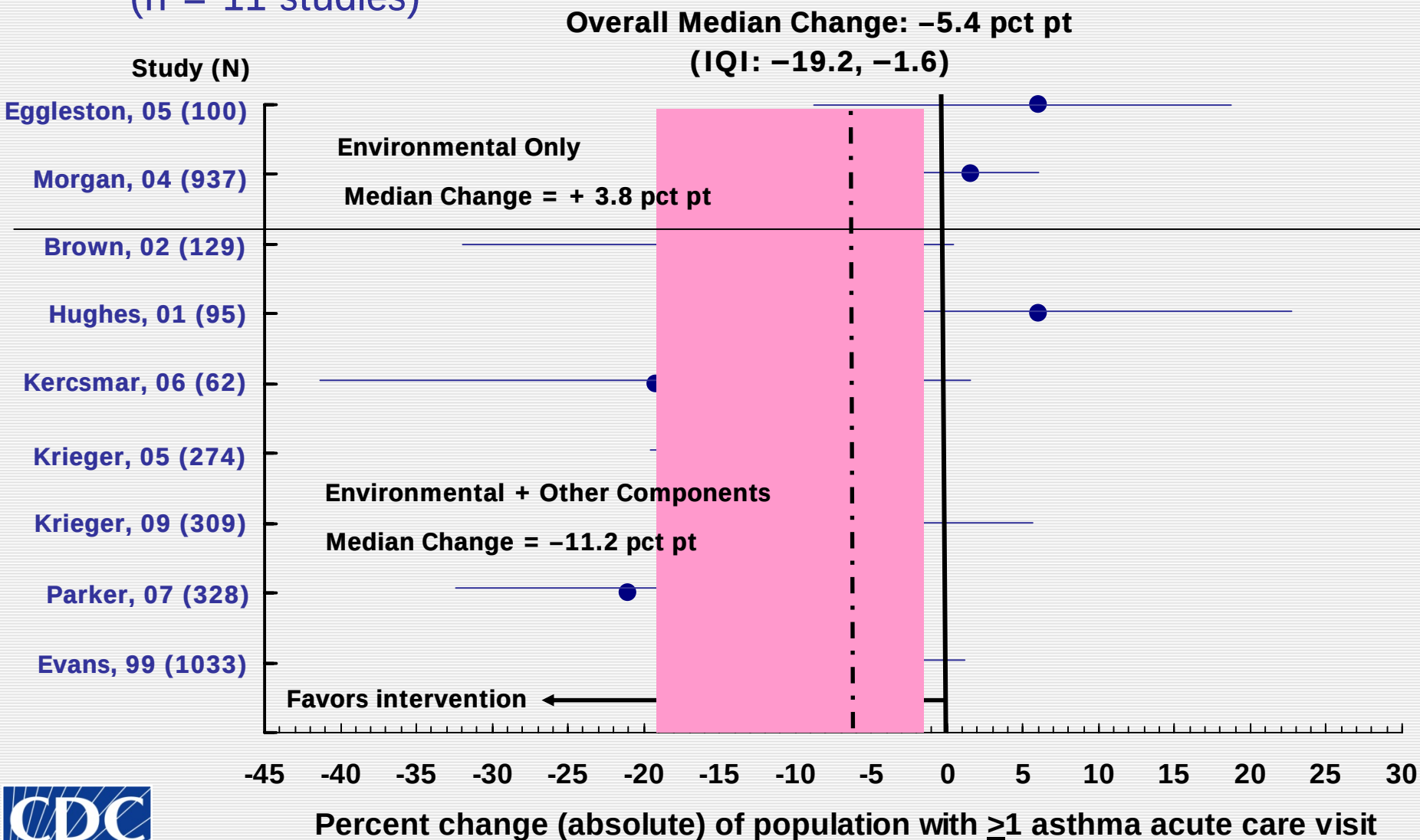
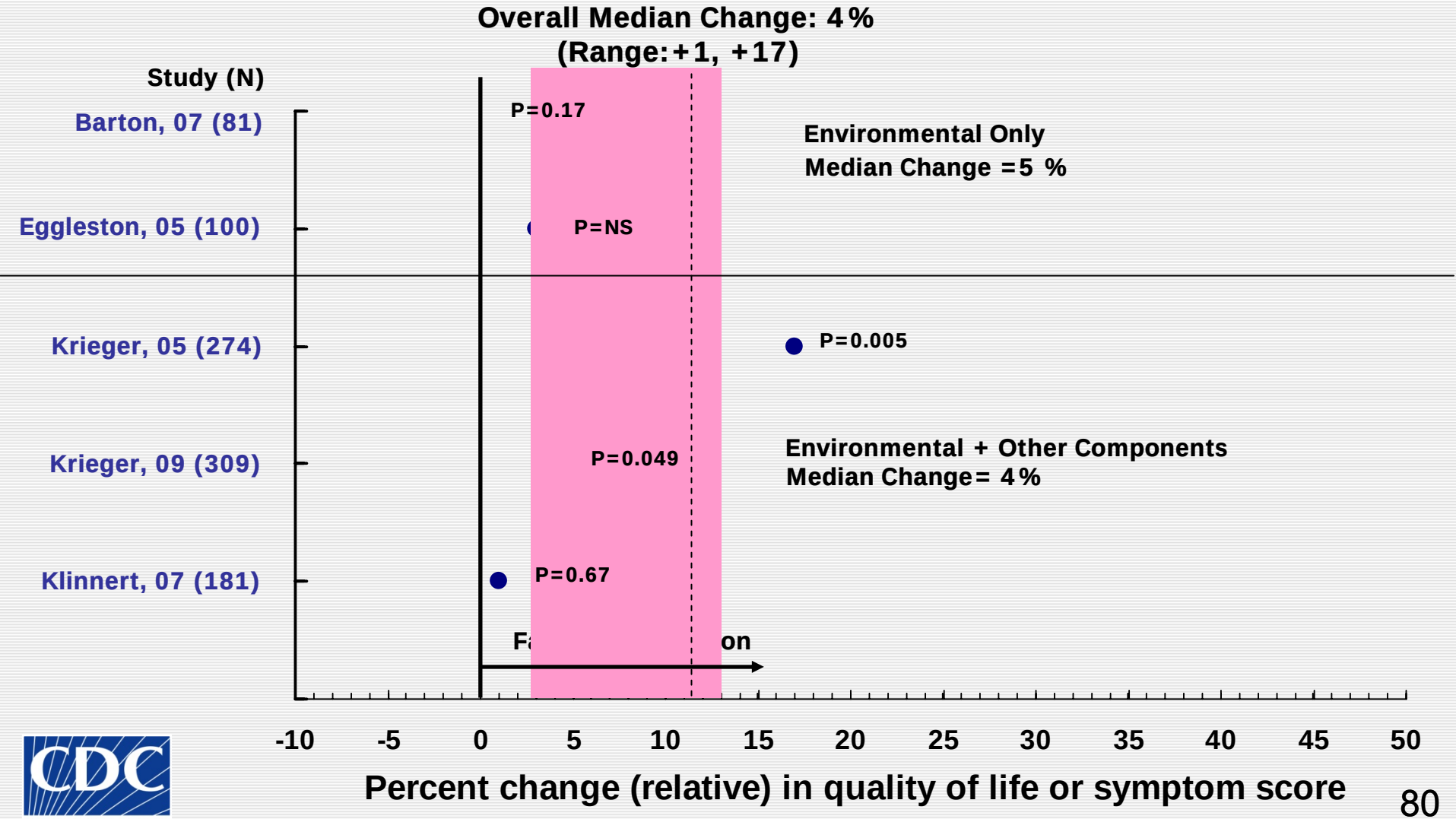
Percentage of Population with Asthma Acute Care Visits by Component

(n = 11 studies)



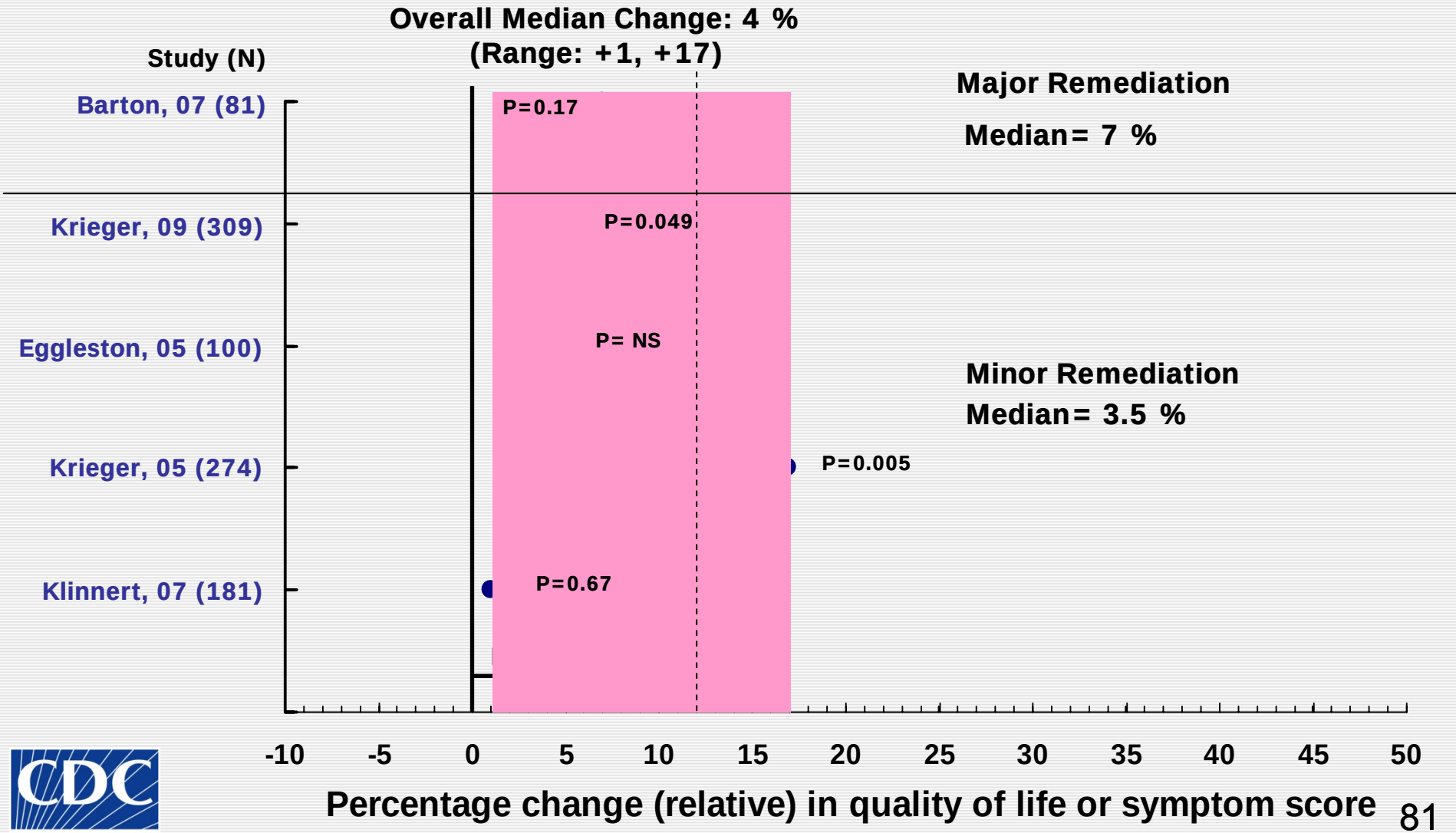
Percent Change in Symptom/Quality of Life Score by Component

(n = 8 studies)



Quality of Life: Symptom/Quality of Life Score

(n = 5 studies)



Environmental Tobacco Smoke (ETS)

Measurement	# of studies	% Median (range)
Studies including ETS measures	14/25	-
Measured caregivers who smoke	12/25	40 (21 to 73)
Smoking cessation counseling	13/25	
Quit smoking	7/13	–5 (+3 to –19.5)
Changed smoking habits	4/13	+2.9 (–5.8 to +13.3)

Physiologic Outcomes Reported in the Included Studies

(n=7 studies)

Study	Physiologic Measure	Summary
Eggleston, 2005	FEV 1	No change
Hughes, 2001	FEV1, FEV1/FVC, RV/TLC, exp flow 25% 50%, peak flow	No change except for exp flow at 25% and 50% improved significantly
Morgan, 2004	FEV1, FVC, peak flow	No change
Parker, 2007	FEV1, FVC	FEV1 and FVC improved significantly
Barton, 2007	FEV1/FVC and peak flow	No change
Williams, 1999	IgE levels	Trend downward but NS
Klinnert, 2007	FEV 0.5, FVC, FEV0.5/FVC	Trend towards improvement but NS

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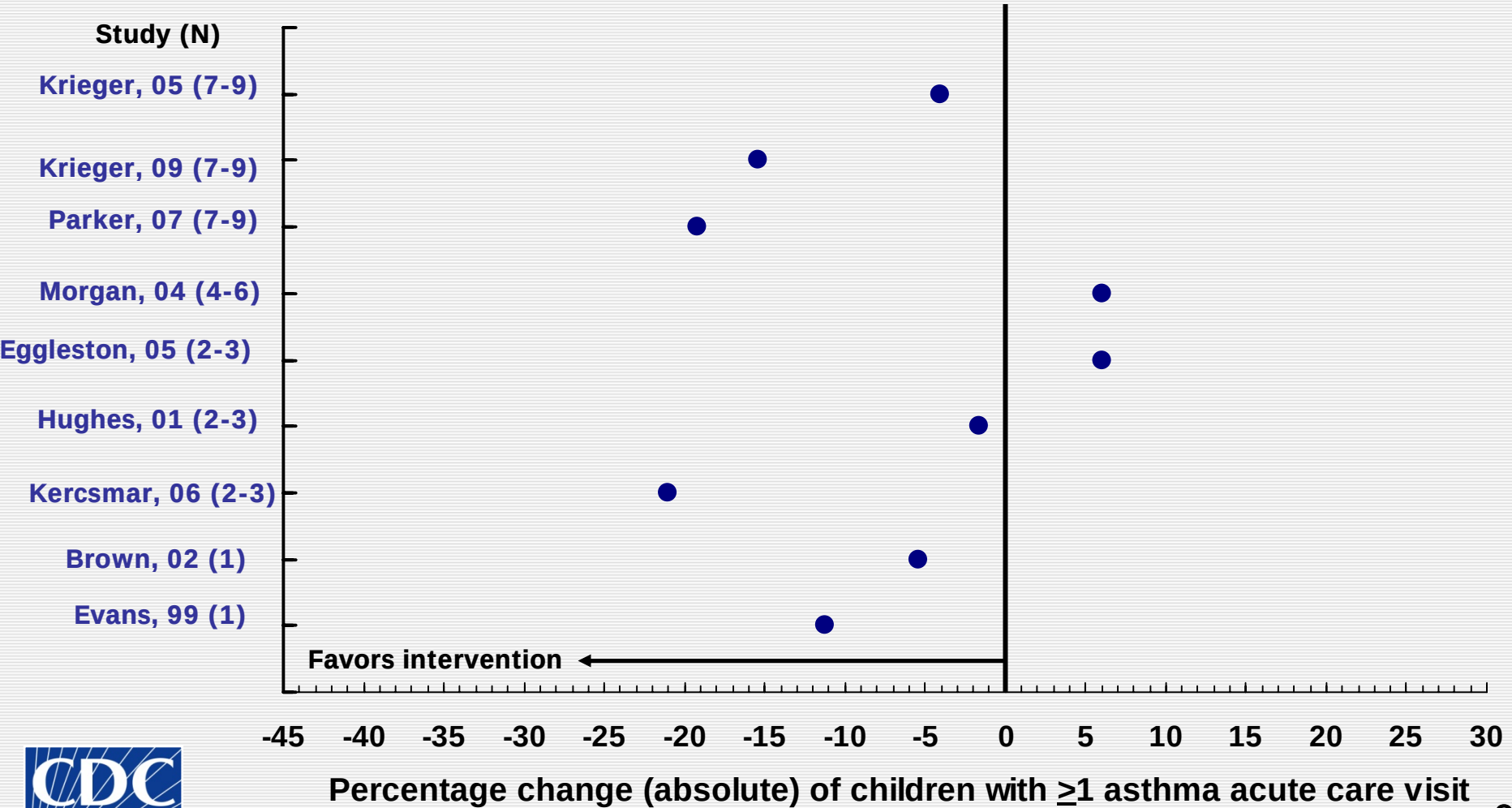
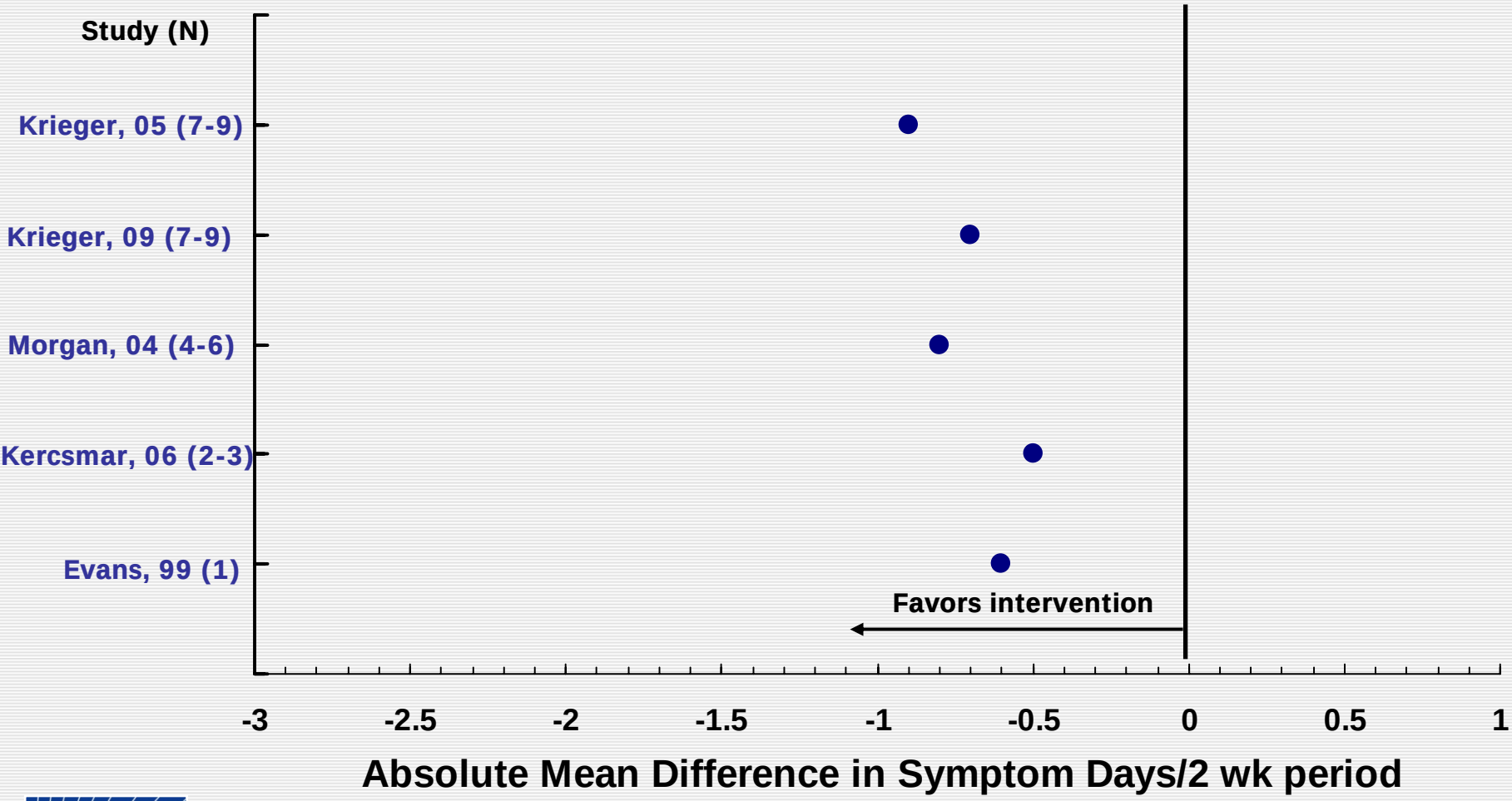
Health Care Utilization: Percentage of Children with Acute Care Visits by # of home visits

(n = 9)



Quality of Life: Mean Symptom Days by # of home Visits

n = 5 studies



Impact of the Home Visit: Carter, 2001

- Individual RCT (Atlanta, GA)
- Population: 104 children (ages 5–16) with asthma
- Intervention group: 4 home visits over 1 year (EA, ER, EE)
- Placebo group: 4 home visits over 1 year (EA, **ineffective** ER)
- Control group: usual care (no home visits)

Group	Total # acute care visits/yr		
	Baseline	1yr	Difference
Intervention	51	34	-17
Placebo	64	45	-19
Control	45	48	+3

NS

P≤0.001

Healthy Homes Initiative

- Expert Panel looking at 5 subjects including asthma
  - Interior Biological Agents*
  - Interior Chemical Agents
  - External Exposures (drinking water)
  - Structural Deficiencies
  - Intersection between House and Community (zoning, location)
- Panel Meeting held in December, 2007
- 3 consultants in the CG review also in this panel*

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Single-Allergen/Single-Component (SA/SC) Interventions Excluded

- SA/SC interventions Excluded because
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Combinations of Interventions-CT's

Study	Home Visit	Env Edu	Env Asses	Env Rem	Self-Mge	Asthma Edu	Social Srvcs	Case Mge
Barton, 2007	X		X	X				
Eggelstein, 2005	X	X	X	X				
Morgan, 2004	X	X	X	X				
Nishioka, 2006	X	X	X	X*				
Carter, 2001	X	X	X	X				
Evans, 1999	X**	X	X	X	X		X	
Krieger, 2008	X	X	X	X	X		X	
Kercsmar, 2006	X	X	X	X	X			
Williams, 2006	X		X	X	X		X	
Brown, MD 2002	X	X	X		X			
Smith, 2005	X	X***			X		X	
Klinnert, 2007	X	X	X		X		X	
Parker, 2007	X	X	X	X		X	X	
Krieger, 2005	X	X	X	X			X	
Hughes, 2001	X	X	X		X			

*ER was by parent **Home Visit financed but not conducted by study *** EE very minor

Combinations of Interventions- Before/After Studies

Study	Home Visit	Env Edu	Env Asmt	Env Rem	Self-Mge	Asthma Edu	Social Srvcs	Case Mge
Somerville, 2000	X		X	X				
Primomo, 2006	X	X	X	X	X			
Levy, 2006	X	X	X	X	X		X	
Nicholas, 2005	X	X	X	X	X		X	
Thyne, 2006	X	X	X	X	X		X	X
Shelledy, 2005	X	X	X	X	X		X	X
Jowers, 2000	X	X	X		X			X
Stout, 1998	X	X	X		X		X	X
Oatman, 2007	X	X	X	X		X		
Hasan, 2003	X	X			X			X

Describe the Program (cont.)

- Nine priority interventions
  - Trigger reduction
  - Self Management for children
  - Self Management for adults
  - Systems Change
  - School Interventions
  - Provider Education
  - Air Quality Alerts
  - Diesel Exhaust
  - Case identification
- Why home-based interventions?

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