




Environmental Home Visits: Their role for families and learners

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Pediatrics

Texas Children's Hospital®

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Learning Objectives

- Identify who would benefit from environmental home visits.
- Describe basic elements of an environmental home visit for different clients.
- Explain how learners can participate and learn from an environmental investigation.


STOP

Current HEH Clinical Model

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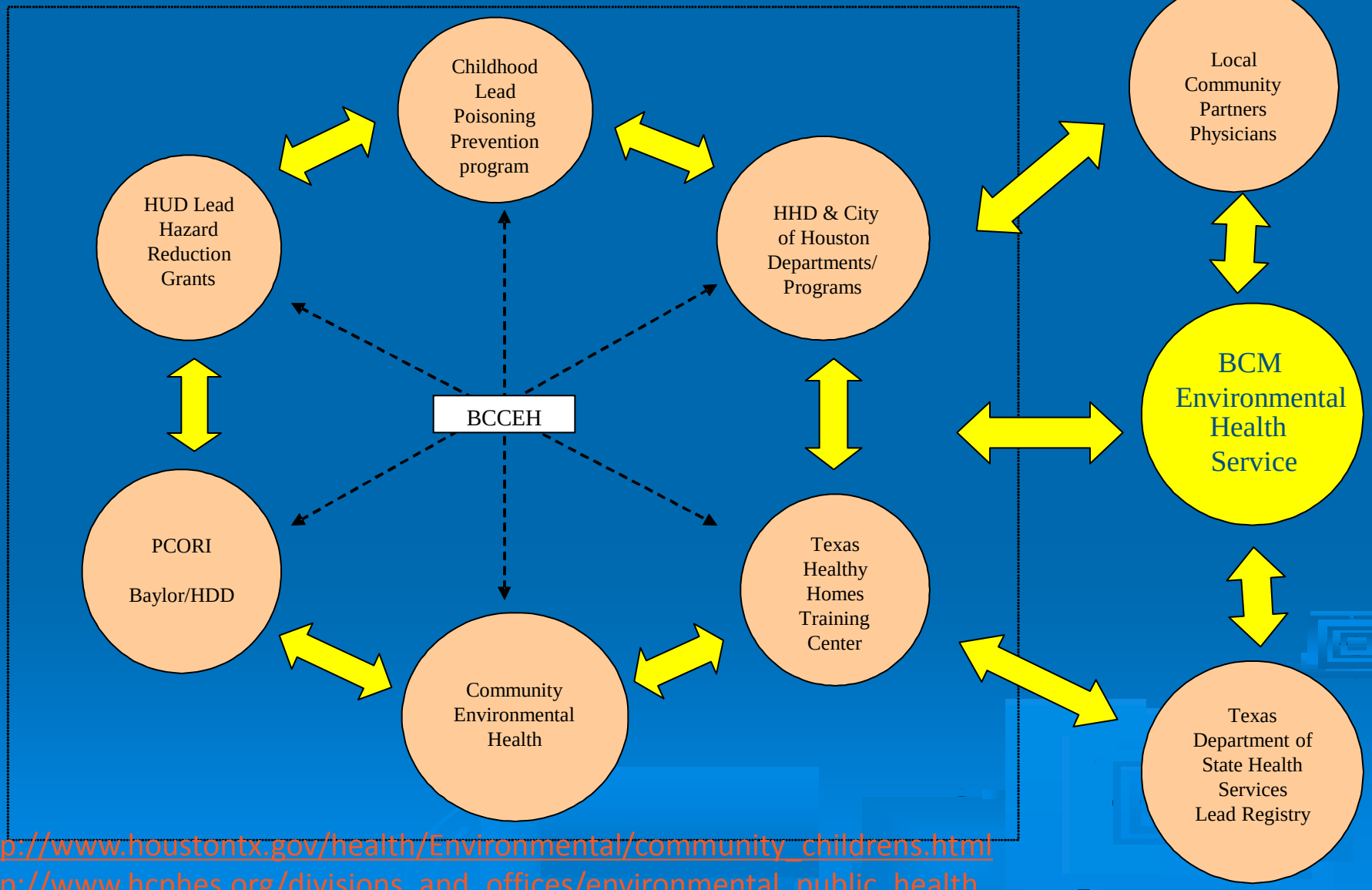
ENVIRONMENTAL HEALTH SERVICE

- **Two BCM EH clinics**
  - Both in Harris Health System
  - PAHC in Pasadena (pediatric)
    - Tuesdays 8 am–noon (4/2014)
  - Smith Clinic in TMC (adult)
    - Thursdays 8 am–noon (11/2014)

- **PCORI HIIT-BAC Research**
  - 300 African American adults
    - Poorly controlled asthma
    - Randomized clinical trial
      - Enhanced in-clinic visit vs. Enhanced in-clinic visit plus year-long home intervention
    - Reinforces clinical paradigm

Houston Bureau of Community & Children's Environmental Health, Baylor College of Medicine Environmental Health Services, & Harris County Health Department Cross Referral Process for Clients



http://www.houstontx.gov/health/Environmental/community_childrens.html
http://www.hcphes.org/divisions_and_offices/environmental_public_health
https://www.bcm.edu/departments/medicine/sections-divisions-centers/general-internal-medicine/environm

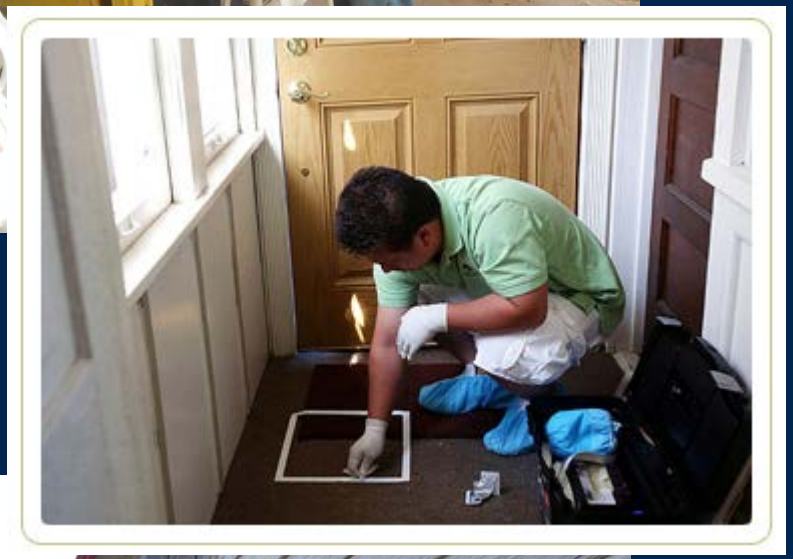
Case I: SG & EG

referred @ 1 & 3yo d/t younger 15.8 @ 12 mos.
Both were < 3 ug/dl @ 6 mos

- Pb Risks:
  - Travel to mexico1-2 x per year: no bump up post
  - Dad wood stainer, new construction; later – old ; never tested
  - Mom- level 7ug/dl

- Environment- chemicals and spray/bomb use
  - Discussed proper storage & Integrated Pest Management IPM

- Complications: none



First ELI:

Environmental lead investigation

- Ext: LBP + window casing, sash, door jamb & casing, front wall siding
- Interior: LBP +living Room window sill & door casing
- Dust wipes: thresholds, 3 window sills: negative
  - Remediation: not eligible d/t structurally unsound

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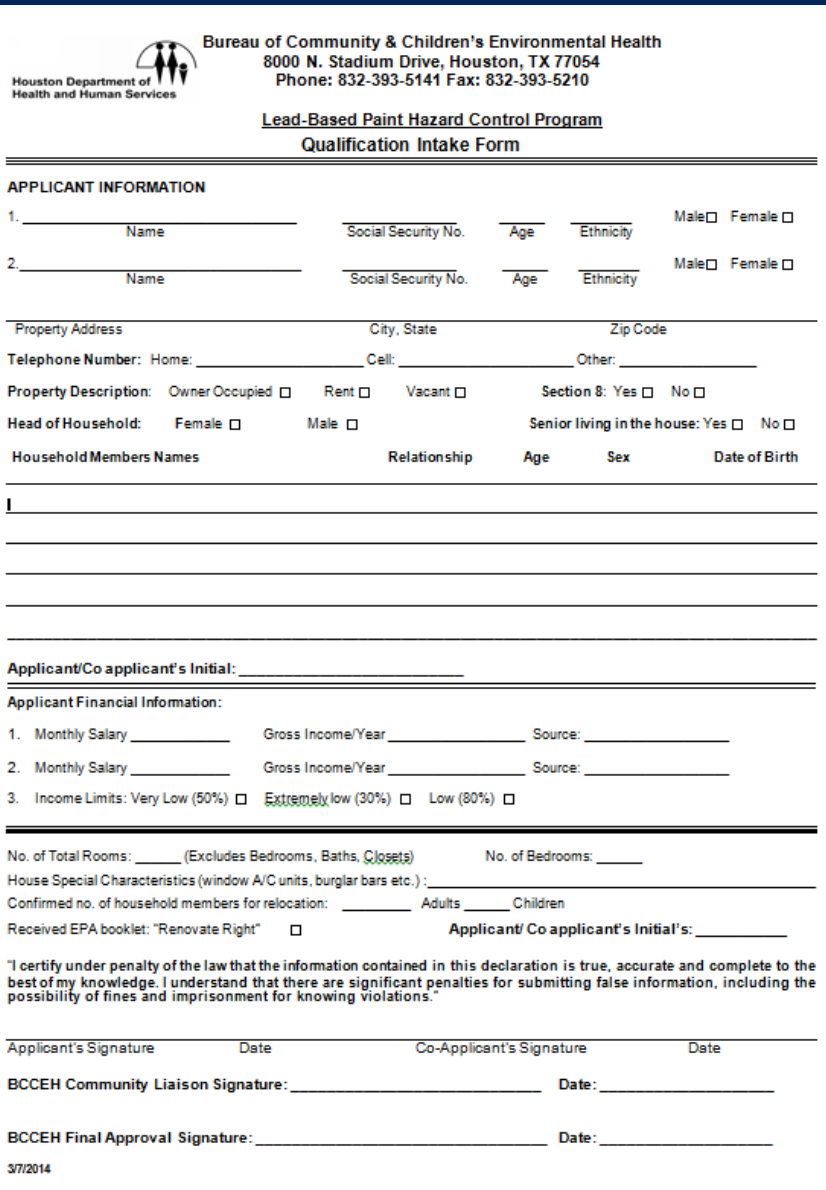
Qualification Form for Pb Remediation



Houston Department of Health and Human Services

Bureau of Community & Children's Environmental Health
8000 N. Stadium Drive, Houston, TX 77054
Phone: 832-393-5141 Fax: 832-393-5210

Lead-Based Paint Hazard Control Program
Qualification Intake Form

APPLICANT INFORMATION

1. _____ Name _____ Social Security No. ____ Age ____ Ethnicity Male☐ Female☐
2. _____ Name _____ Social Security No. ____ Age ____ Ethnicity Male☐ Female☐

_____ Property Address _____ City, State _____ Zip Code

Telephone Number: Home: _____ Cell: _____ Other: _____

Property Description: Owner Occupied ☐ Rent ☐ Vacant ☐ Section 8: Yes ☐ No ☐

Head of Household: Female ☐ Male ☐ Senior living in the house: Yes ☐ No ☐

Household Members Names	Relationship	Age	Sex	Date of Birth
1				

Applicant/Co applicant's Initial: _____

Applicant Financial Information:

1. Monthly Salary _____ Gross Income/Year _____ Source: _____
2. Monthly Salary _____ Gross Income/Year _____ Source: _____
3. Income Limits: Very Low (50%) ☐ Extremely low (30%) ☐ Low (80%) ☐

No. of Total Rooms: _____ (Excludes Bedrooms, Baths, Closets) No. of Bedrooms: _____
House Special Characteristics (window A/C units, burglar bars etc.) : _____
Confirmed no. of household members for relocation: _____ Adults _____ Children
Received EPA booklet: "Renovate Right" ☐ Applicant/ Co applicant's Initial's: _____

"I certify under penalty of the law that the information contained in this declaration is true, accurate and complete to the best of my knowledge. I understand that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations."

_____ Applicant's Signature Date Co-Applicant's Signature Date

BCCEH Community Liaison Signature: _____ Date: _____

BCCEH Final Approval Signature: _____ Date: _____

3/7/2014

- Repaired the roof: eligible
- 2nd ELI
  - XRF - 46 of 91 elevated or actionable
  - Dust wipe: Child BR mini blind : pos;
    - toy wood train, truck, push car steering wheel: neg

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Case I: SG & EG- 2nd ELI cont. SOIL

- Soil sample: 120 ug/g,
  - HUD EPA standard
    - Play area: > 400 ug/g
    - Other : > 2,000 ug/g
    - >5,000 ug/g abate by HUD

Case I: Remediation: $15,000

- Aluminum storm doors, windows and solid doors,
  - Energy efficient low E glass number 2
- Vinyl siding & trim entire exterior walls
- Wet scrape & prepare and prime and Paint ext. non siding
- Same for interior
- Contain lead dust and debris using 6 mm plastic sheeting
  - Floors, furniture, appliance, ground & open entrances to uncontaminated areas

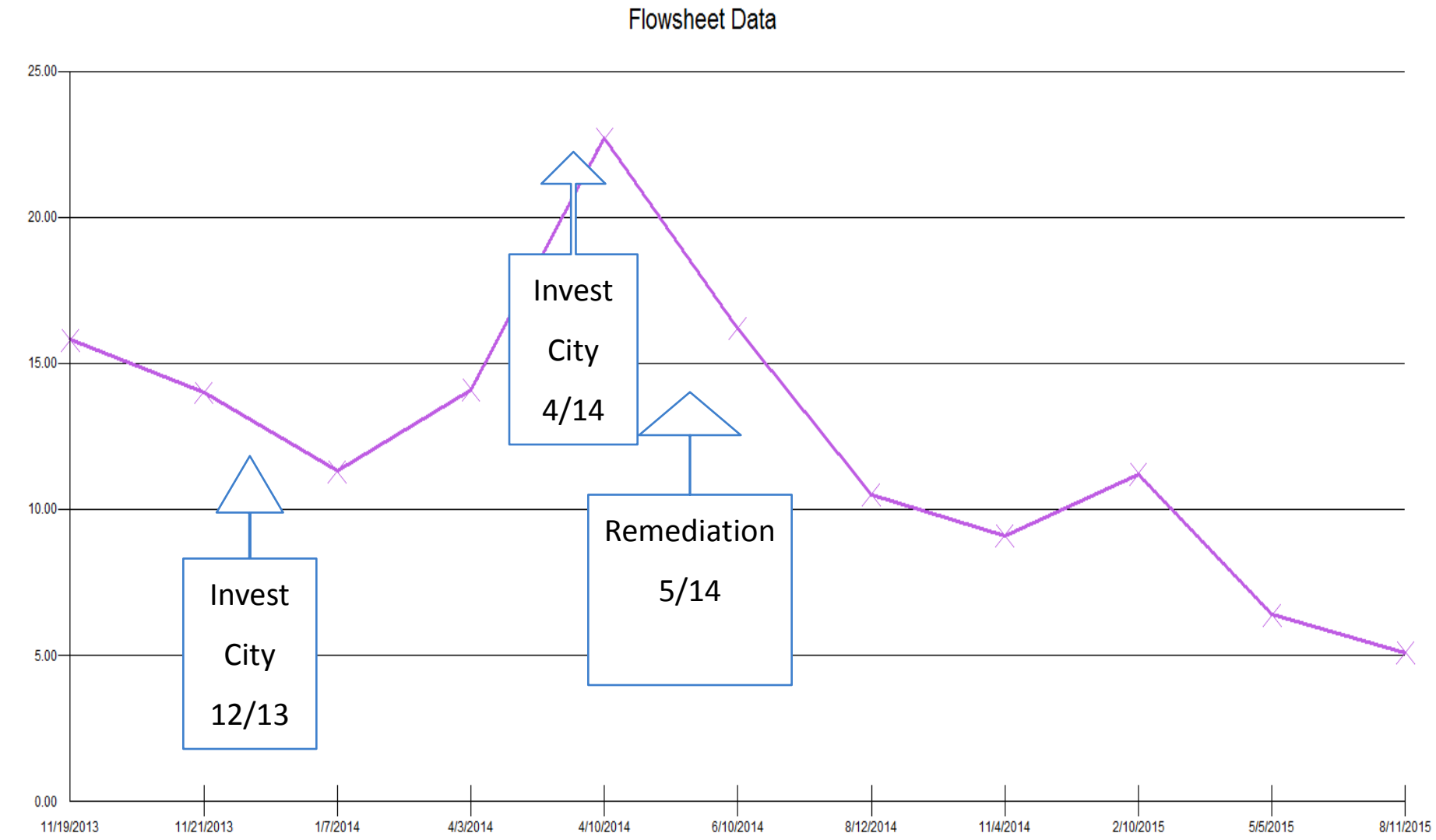
Case I: Post Remediation

- Dust samples:
  - Front entry floor, kitehen floor, BR floor, LR window sill, Child BR Window sill- all less than 10 ug/ft2

SG lead levels: 11/2013- 8/2015

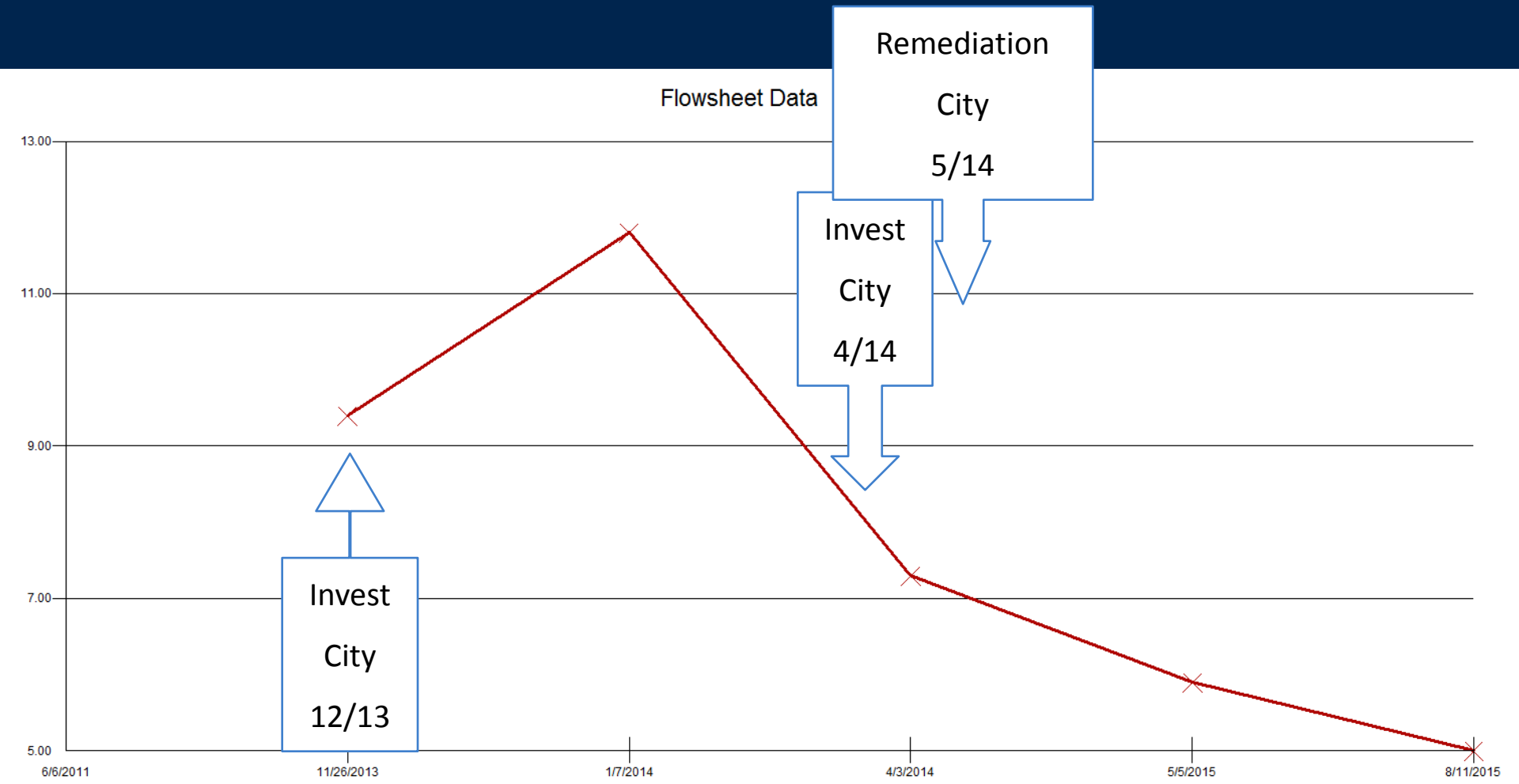
dob: 11/2012; <3 ug/dl @ 6 mos;

elev: @ 12 mos



EG Lead levels 11/2013- 8/2015

dob: 11/2010; < 3ug/dl @ 6mos; elevated at 3 years



Case: AV 12 y/o poorly controlled severe persistent asthmatic

- s/p anaphylactic reaction => Hypoxic Ischemic event at 8y/o
  - Blind & Mild cerebral palsy: attends boarding school for blind
    - Commutes: weekends and holidays
  - Severe atopic dermatitis and multiple food allergies
    - Topical pimecrolimus & triamcinolone
    - Cetirizine daily and atarax @ night
  - Referred by pulmonologist life threatening asthma clinic
    - Meds: inhaled nasal mometasone & budesonide/formoterol , theophyline

EH Clinic: Office Visit

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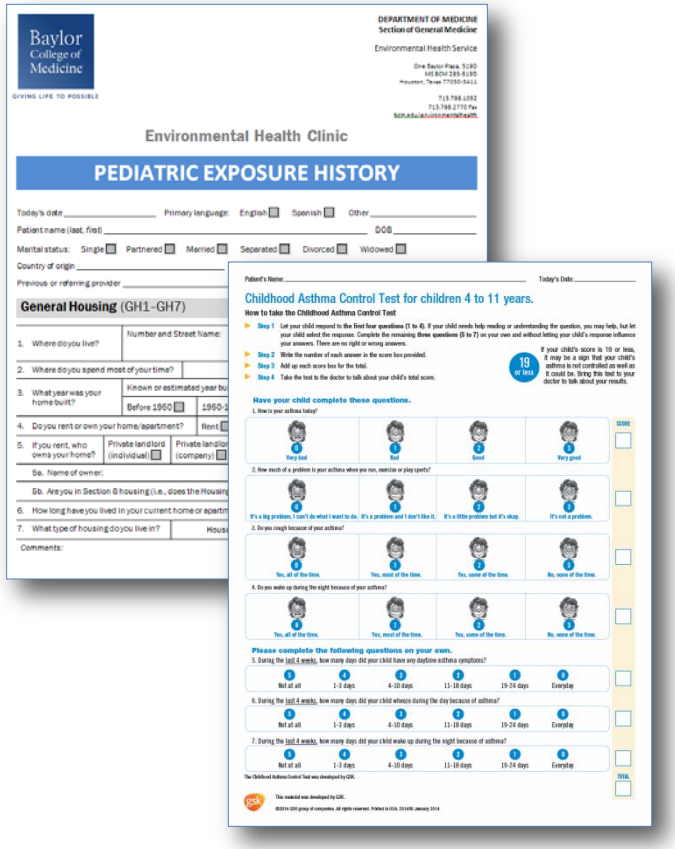
- Clinic visit (NP OV 99204)
  - Consent (optional; for outcome analyses)
  - *Pediatric Exposure History*
    - E.g., housing, pets, pests, proximity to freeways/industry, moisture, school environment, occupational exposures, food, water, pesticides, cleaning chemicals, hobbies…
    - Signs and symptoms of exposure-related concerns (timing, location, etc.)
  - Other: ACT, QOL, HC utilization
  - PFTs, allergy testing and other labs as appropriate



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Environmental Health Service

Environmental Health Clinic

PEDIATRIC EXPOSURE HISTORY

General Housing (GH1-GH7)

Childhood Asthma Control Test for children 4 to 11 years.

Asthma and its Triggers

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- **Common triggers (generally multifactorial)**
  - Dust mites
  - Pet dander
  - Candles
  - Roadways
  - Mold, pollen
  - Perfumes
  - Air pollution
  - Gas stoves
  - Cold weather
  - Stress
  - And so on….

Asthma and its Triggers

- **Asthma Management** (NAEPP EPR 3, 2007)
  - Key Recommendations
    - Education (linked with motivation factors)
    - Control of environmental factors
    - Medications
      - Inhaled corticosteroids (e.g., Flovent®)
        - » Anti-inflammatory
      - Cromolyn sodium & nedocromil (e.g., Nasalcrom®)
        - » Mast cell stabilizers
      - Omalizumab (e.g., Xolair®)
        - » Immune modulator (anti-IgE)
      - Leukotriene blockers (e.g., Singular®)
      - Short-acting bronchodilators (e.g., Xopenex®)
      - Longer-acting bronchodilators (e.g., Serevent®)

AV

ASTHMA PAST MEDICAL HISTORY		
Recent History:		
	In the last month, how many school days have been missed due to asthma?	27 days missed last year in school
	In the last month, how many work days has the caretaker/parent missed?	27
	Last exacerbation occurred	3 days ago
	In the last month, how many unscheduled visits to the clinic have you had due to asthma?	2
	Effective treatment for exacerbations in the past has included	inhaled albuterol .
Have you ever:		
	Been hospitalized	yes - dec 2014
	Last hospitalization	6months ago
	Been treated in ER for asthma	yes - last month
	Attended Educational classes for asthma	no
	Seen an asthma specialist	yes - in Austin and at TCH
	Seen an allergy specialist	yes - in Austin
	Been tested for allergies	yes - in Austin, Dr. Reddy
In the past 12 months have you ever:		
	Been treated in ER for asthma	yes - ER/intubated December 2014
	# of ER visit in last year	6
	Been hospitalized	yes - 12/2014
	Required oral steroids	yes - see below
	# of PO steroid courses in last year	6

AV

	last year	
Are you allergic to any of the following:		
	Medicines (e.g. aspirin)	no
	Food	yes - shellfish, peanuts
	Animals	yes - record requested
	Mold	yes - record requested
	Pollen	yes - record requested
	Dust/dustmites	yes - record requested
	Cockroaches	yes - record requested

ASTHMA TRIGGERS		
Do any of the following items trigger your asthma (cause you to cough, wheeze, have shortness of breath or chest tightness)?		
	Air pollutants	yes -
	Changes in weather	yes - cold and hot
	Exposure to cold air	yes -
	Infections, such as cold or respiratory illness	yes -
	Food additives (e.g., sulfites)	yes - sulfite
	Emotions such as laughing, crying, anger, etc	yes -
	Exercise	yes -
	Tobacco	No/mom smokes
	Aerosol sprays or cleaning products	no
	Mowing the lawn	yes -
	Sweeping or vacuuming house	Not much-
	Animals	yes -
	Menstrual cycle	no

AV- Pediatric Environmental Clinic

- Questionnaires preferably pre clinic if possible
  - Pediatric Exposure History :
  - Peds QL pediatric quality of life inventory: age specific 8-12
    - Health & Activities: 16/32 14 mom
    - Feelings: 10/20 10 mom
    - Get along with others 6/20 6 mom
    - School: 10/20 7 mom
  - Asthma Control Test = ACT: 13/25; <20 poor control

Summary of Environmental Exposure Questionnaire:

Category	*Positive Exposures*	*Comments*
Health Related Exposure Questions	yes - multiple triggers	
General Housing	Yes- lives in dorm-mon-Friday (carpeting) Lives with mom here in houston weekends	
Indoor Home Environment	Yes- carpeting in dorm	
School Environment	Yes- carpeting in dorm, some symptoms with cleaning wipes in class	
Food & Water	no	**Allergic to shellfish and peanuts**
Air Pollution/Outdoor Environment	Yes- mom smokes	**Outdoors only**
Chemical Exposures	Yes- sensitivities to chemicals in wipes at school	

Case AV: Management Plan

-**Long Term Goals:**

- 1. *(Parent)*- ACT score >19. Control of asthma to prevent recurrent admissions.
- 2. *(Child)*- Overall improvement in health; participation in activities.

-**Short Term Goals:**

- 1. *(Parent)*- less missed school days.
- 2. *(Child)*-

Case AV: Management Plan

- **Motivators:**
  - 1. *(Parent)*- Overall asthma control.
  - 2. *(Child)*- Be able to participate in activities at school; exercise- eg. Swimming.

- **Barriers:**
  - 1. *(Parent)*- commute to out of town school
  - 2. *(Child)*- Being away from home; visually impaired.

Case AV: Management Plan

- Asthma: Reviewed
  - Asthma action plan, medications, delivery method
- Environment: recommended
  - Reduce inhaled allergen exposures: dust mite covers all bedding
  - Smoking cessation for Mom:
  - Asthma: Environmental Control- Pediatric Advisor
  - 7 tips for Keeping a Healthy Home- CDC/HUD
- Scheduled home visit

EH Clinic: Field Assessment

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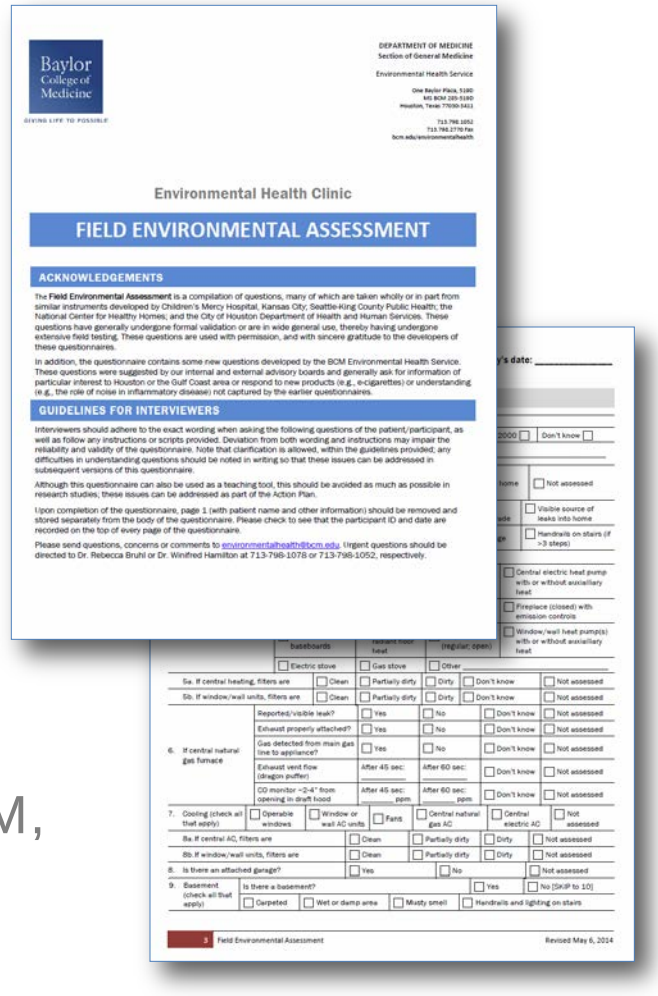
- Healthy Homes-based paper and/or tablet app
  - Environmental hygienist and nurse (continuity)
  - Consent for assessment (scope)
  - *Field Environmental Assessment*
    - Neighborhood/site assessment
    - Building characteristics
      - E.g., year built, roof integrity, type of heat/AC, ventilation
    - Room-by-room assessment
      - E.g., moisture, dust, odors, clutter, unvented heaters, evidence of pests, tobacco odor
      - Measurements (humidity, CO, PM, gases, air flow)



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FIELD ENVIRONMENTAL ASSESSMENT

ACKNOWLEDGEMENTS

GUIDELINES FOR INTERVIEWERS

Field Environmental Assessment

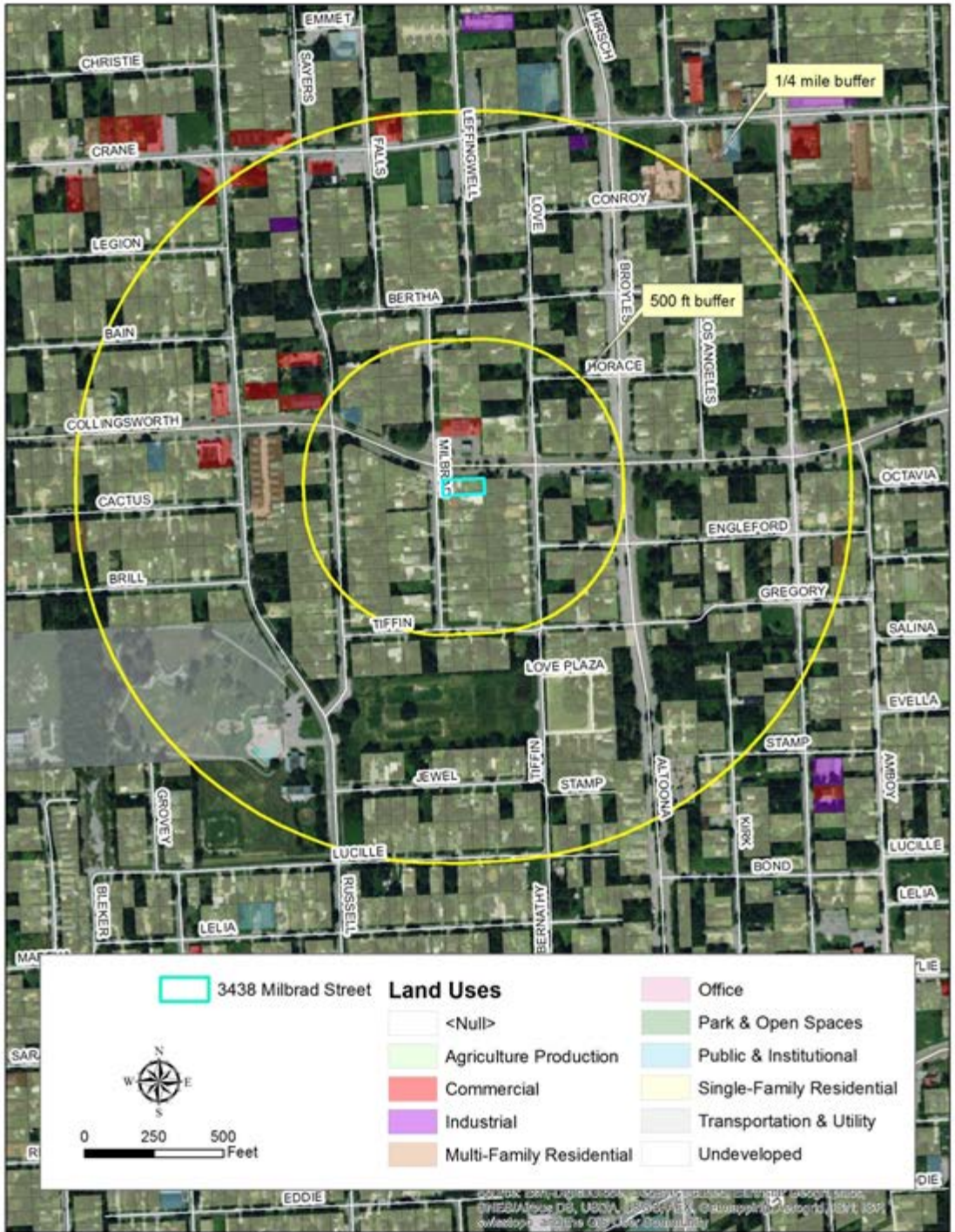
Revised May 6, 2014

AV: GSI map

-Apartment Complex: 1979

-multifamily neighborhood

- 500 ft & ¼ mile buffers



Participant ID_____ Today's date: _____

Building and Construction Characteristics (BC1–BC13)

1. What year was the home built?	Known or estimated year built:				
	Before 1950 ☐	1950-1978 ☐	1979-2000 ☐	After 2000 ☐	Don't know ☐
2. Year of last renovation	Year: _____	Description: _____			
3. What type of building is it?	☐ Apartment	☐ Single detached house	☐ Duplex	☐ Mobile home	☐ Not assessed
4. Exterior observation (check all that apply)	☐ Roof problems	☐ Missing siding/brick	☐ Cracks in foundation grade	☐ Visible source of leaks into home	
	☐ Standing water at foundation	☐ Vents not screened	☐ Debris/garbage	☐ Handrails on stairs (if >3 steps)	
	Describe vegetation:				
5. Heating sources (choose all that apply)	☐ Natural gas space heater	☐ Kerosense or propane space heater	☐ Electric coil or infrared space heater	☐ Central electric heat pump with or without auxialliary heat	
	☐ Central natural gas furnace	☐ Electric (coil) space heater	☐ Wood or coal stove	☐ Fireplace (closed) with emission controls	
	☐ Electric baseboards	☐ Electric radiant floor heat	☐ Fireplace (regular; open)	☐ Window/wall heat pump(s) with or without auxialliary heat	
	☐ Electric stove	☐ Gas stove	☐ Other _____		
5a. If central heating, filters are	☐ Clean	☐ Partially dirty	☐ Dirty	☐ Don't know	☐ Not assessed
5b. If window/wall units, filters are	☐ Clean	☐ Partially dirty	☐ Dirty	☐ Don't know	☐ Not assessed
6. If central natural gas furnace	Reported/visible leak?	☐ Yes	☐ No	☐ Don't know	☐ Not assessed
	Exhaust properly attached?	☐ Yes	☐ No	☐ Don't know	☐ Not assessed
	Gas detected from main gas line to appliance?	☐ Yes	☐ No	☐ Don't know	☐ Not assessed
	Exhaust vent flow (dragon puffer)	After 45 sec: _____	After 60 sec: _____	☐ Don't know	☐ Not assessed
	CO monitor ~2-4" from opening in draft hood	After 45 sec: _____ ppm	After 60 sec: _____ ppm	☐ Don't know	☐ Not assessed
7. Cooling (check all that apply)	☐ Operable windows	☐ Window or wall AC units	☐ Fans	☐ Central natural gas AC	☐ Central electric AC	☐ Not assessed
8a. If central AC, filters are	☐ Clean	☐ Partially dirty	☐ Dirty	☐ Not assessed	
8b. If window/wall units, filters are	☐ Clean	☐ Partially dirty	☐ Dirty	☐ Not assessed	
8. Is there an attached garage?	☐ Yes	☐ No	☐ Not assessed		
9. Basement (check all that apply)	Is there a basement?	☐ Yes	☐ No [SKIP to 10]		
	☐ Carpeted	☐ Wet or damp area	☐ Musty smell	☐ Handrails and lighting on stairs	

AV: Home Investigation: Inhalants: allergic

- Home for roaches, and dust mites
  - Unsecured food on the kitchen
  - Cardboard boxes, shoes, bags etc. on the floor in the patient's bedroom closet.

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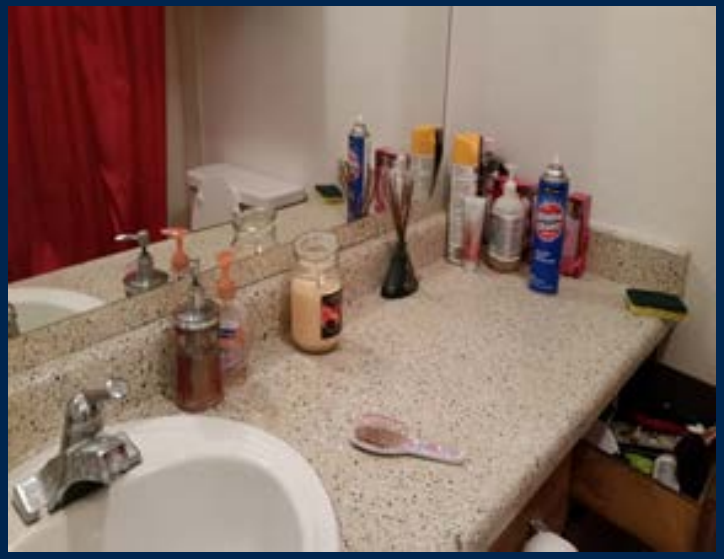
AV- Home investigation: Inhalants

- : Moderate dust build up on the air filter and diffuser grille in the HVAC unit.

- Cleaning chemicals under the kitchen sink

AV: Home investigation: Inhalants: irritants?



- Candles, incense sticks, window cleaner spray in the bathroom

- Plug-in air fragrance in the kitchen.

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AV- dust mite allergen covers:

Some, not all bedding:

General: Four direct reading handheld factory calibrated instruments: ,

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- **Core HIIT-BAC Instruments**
  - Gas Detector (TIF 8800)- leaks near gas appliances
  - Moisture Meter (Tramex Moisture Encounter Plus):around visible growth
  - IAQ Meter (TSI IAQ-CALC 7545): CO2, CO, humidity
  - Particle Counter (TSI Aerotrak 9303)

General Guide: IAQ & Particle Counter

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- Always take an outside control reading
- Take measurements in core areas of the home:
  - Patient's bedroom
  - Kitchen
  - Bathroom
  - Living area
  - Areas where patient spends significant time
- If time permits, or if home is small, try to take measurements in all rooms.

TSI IAQ-CALC 7545

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- **Set to display:**
  - CO2: <1,000 ppm
  - % RH: 30-60%
  - CO: <5ppm
- **Set to collect:**
  - CO2
  - % RH
  - CO
  - Temperature:
    - Winter: 68-75
    - Summer: 73-79
      - Low: condensation
      - High: high humidity

AeroTrak PM Counter 9303

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- **Counts particles by size**
  - 0.3–1.0 µm: combustion
  - 1.0–5.0 µm:
  - 5.0–25 µm: pollen & mold, dust
- **Middle bin is adjustable.**
- **Different size particles optically**
  - suggest different sources
- **No universal standards for residential particle counts.**
  - General guidelines based on: WHO, ASHRAE, EPA, HUD

- **Carbon Dioxide:** Elevated levels were noted throughout the house ranging from 2,515 to 3,145 parts per million (ppm). Levels vary throughout the day but generally should be 1000 ppm or less.
- **Temperature:** Temperature ranging from 81-83^{0}F was noted throughout the house. ASHRAE recommends the temperature range between 73-79^{0}F in summer.

IAQ MEASUREMENTS

Date	Location	CO_2 (ppm)	Temp (^{0}F)	RH (%)	Dew Point (F)	Wet Bulb (F)	CO (ppm)
8/13/2015	Outside	934	83.0	88	79	80	0.0
8/13/2015	Living Room	2,515	83	57	66	71	0.4
8/13/2015	Kitchen	3,145	82	58	66	71	1.3
8/13/2015	Patient's Bedroom	3,115	81	55	64	69	1.3
8/13/2015	Patient's Bedroom Bathroom	3,144	81	60	66	70	1.2

Key: ppm – parts per million ^{0}F – degrees Fahrenheit

NOTE 1: CO_2 levels vary throughout the day but generally levels above 1000 ppm indicate a potential fresh air exchange iss

- **Particulate Matter (PM):** Particle counts of size 5.0–25 µm were very high throughout the house whereas particle counts of size 1.0–5.0 µm were noted to be slightly higher in the living room and patient's bedroom. Ideally PM counts should be less than 100% of the PM counts taken outside.
- **Volatile Organic Compounds (VOCs):** Potential sources of VOCs such as cleaning chemicals, air fresheners, plug-in air fragrances and candles were observed throughout the house.

PARTICULATE MATTER (PM) COUNTS

Location/Use (see floor plan)	0.3–1.0 µm	% of outside 0.3–1.0 PM	1.0–5.0 µm	% of outside 1.0–5.0 PM	5.0–25 µm	% of outside 5.0–25.0 PM
Outside	121,763,190		1,502,192		34,287	
Living Room	577,730,765	98%	5,550,439	105%	34,424	546%
Kitchen	585,594,616	100%	5,280,498	100%	27,595	438%
Patient's Bedroom	588,824,150	100%	6,390,980	121%	31,582	501%
Bathroom	584,032,028	99%	5,132,090	97%	12,246	194%

Key: µm – micrometer **PM** – particulate matter **N/A** – not applicable

NOTE: Samples were taken on 8/13/15 between 1:33-1:45 pm. Ideally PM counts should be less than 100% of the PM cou

EH Clinic: Field Assessment

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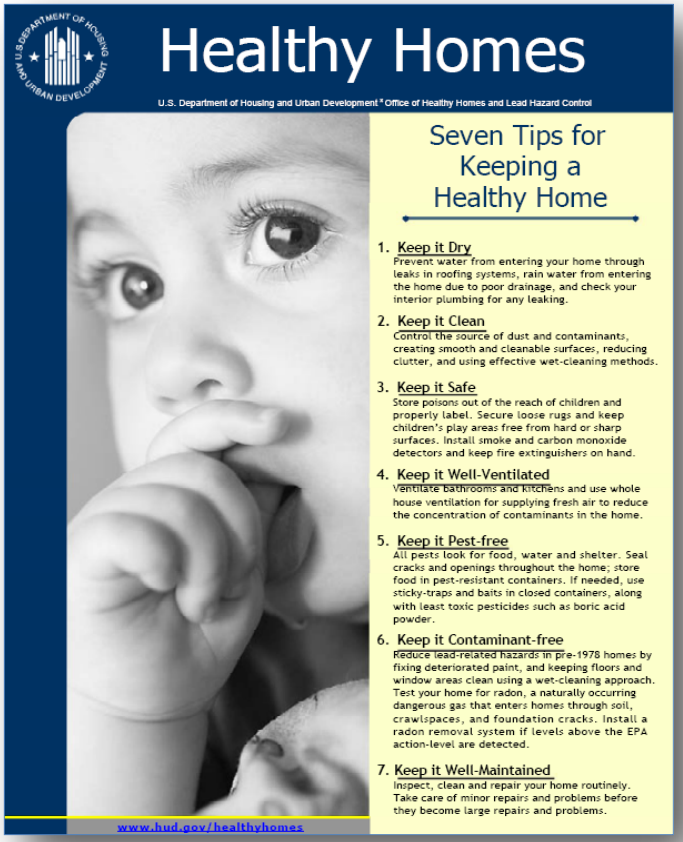
- Utilize “enhanced” Healthy Homes approach
- Keep it (7 principles)
  1. Dry
  2. Clean
  3. Safe
  4. Well ventilated
  5. Pest free
  6. Contaminant free
  7. Well maintained
- Our program also
  - Driven by clinical findings
  - Addresses relevant near neighborhood exposures
  - Obtains key measurements (humidity, CO, PM)



EH Clinic: Action Plan

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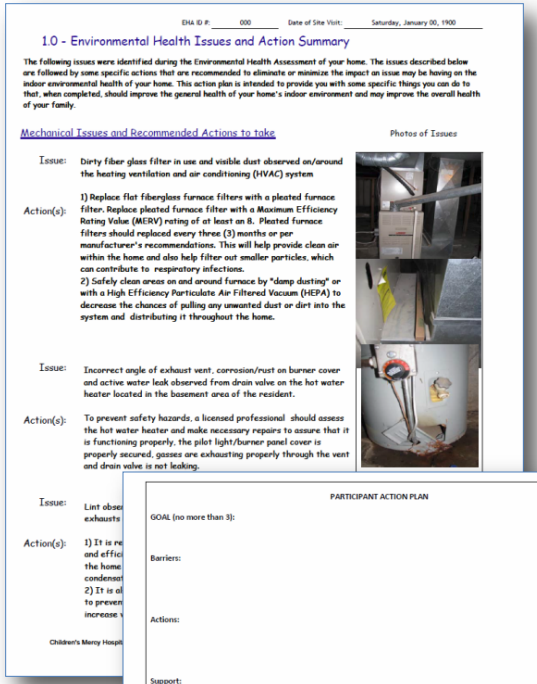
- *Integrated Action Plan*
  - Develop with client
    - Motivational Interviewing
  - Up to 4 home visits over 1 year
    - Implement exposure-reduction
      - Protocols:

        pest control,
        moisture control
    - Educate: Asthma self-management
      - medical compliance,
      - issues interfering with asthma control
        - » mental health, code violations
    - Provide supplies : <$350



EHA ID #: 000 Date of Site Visit: Saturday, January 00, 1900

1.0 - Environmental Health Issues and Action Summary

The following issues were identified during the Environmental Health Assessment of your home. The issues described below are followed by some specific actions that are recommended to eliminate or minimize the impact an issue may be having on the indoor environmental health of your home. This action plan is intended to provide you with some specific things you can do to that, when completed, should improve the general health of your home's indoor environment and may improve the overall health of your family.

Mechanical Issues and Recommended Actions to take — Photos of Issues

Issue: Dirty fiber glass filter in use and visible dust observed on/around the heating ventilation and air conditioning (HVAC) system

Action(s): 1) Replace flat fiberglass furnace filters with a pleated furnace filter. Replace pleated furnace filter with a Maximum Efficiency Rating Value (MERV) rating of at least an 8. Pleated furnace filters should replaced every three (3) months or per manufacturer's recommendations. This will help provide clean air within the home and also help filter out smaller particles, which can contribute to respiratory infections.
2) Safely clean areas on and around furnace by "damp dusting" or with a High Efficiency Particulate Air Filtered Vacuum (HEPA) to decrease the chances of pulling any unwanted dust or dirt into the system and distributing it throughout the home.

Issue: Incorrect angle of exhaust vent, corrosion/rust on burner cover and active water leak observed from drain valve on the hot water heater located in the basement area of the resident.

Action(s): To prevent safety hazards, a licensed professional should assess the hot water heater and make necessary repairs to assure that it is functioning properly, the pilot light/burner panel cover is properly secured, gasses are exhausting properly through the vent and drain valve is not leaking.

Issue: Lint obse
exhausts

Action(s): 1) It is re
and effici
the home
condenser
2) It is al
to preven
increase

Children's Mercy Hospi

PARTICIPANT ACTION PLAN

GOAL (no more than 3):

Barriers:

Actions:

Support:

Rewards for Success

SOAP NOTES: optional

•Subjective

• Objective

• Assessment

• Plan

Referrals made:

•Supplies given: (check all given)

__medicine box __green cleaning kit __spacer __peak flow meter __mattress/pillow casings (Size- Circle one: single, double, queen, king) __vacuum __ HEPA filter machine

COMMENTS:

CMV visit encounter form_ 122009 3

SUPPLIES BY BCM
up to $350 per participant

- One (1) green cleaning kit
  - (bucket,1 pair of latex free gloves spray bottle, vinegar, baking soda, dishing washing liquid, 4 bacterial sponges, micro-fiber dust cloths, etc.).

SUPPLIES AND SERVICES BCM: (2)

- Dust mite pillow cases, mattress covers
- Air filters- dust mite
- HEPA Vacuum: reusable
- Door matts: in & out
- Starter IPM kit: traps & glue boards

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Supplies Provided to Patient AV

- Two (2) green cleaning kits
- Two (2) dust mite pillow cases.
- 20 x 16 x 1 Air filter
- HEPA Vac for school

AV: Conclusions & Recommendations

Tailored approach based upon: Findings & Motivational Interviewing

- 10 point plan and & 7 Healthy Homes Principles
  - Agreed to 3 :
    - remove fragrances & incense
    - replace and buy new filters
    - Mother will use bathrobe while smoking & leave outside

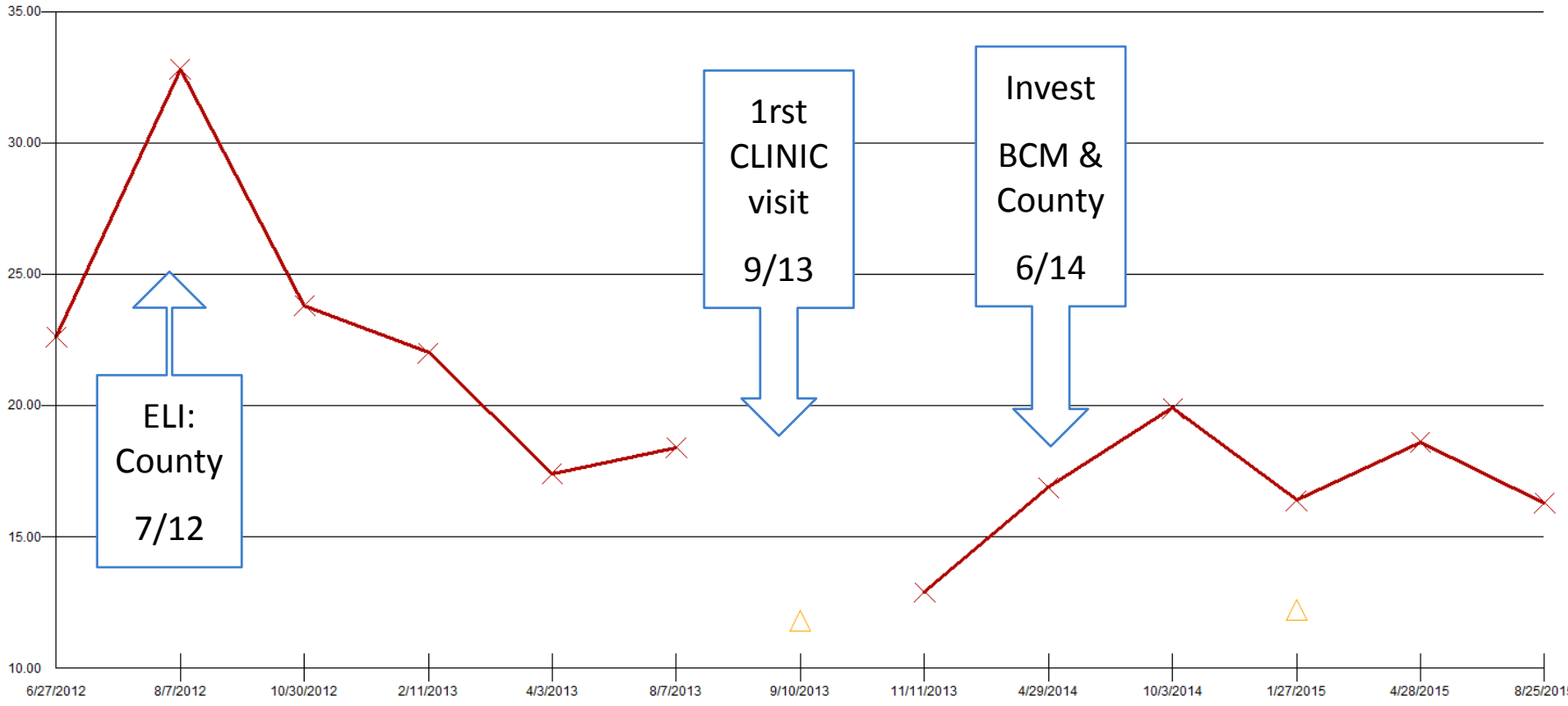
- Recommendations for school: General & specific
  - Remove carpet &/or not have patient vacuum: use HEPA vac
  - Dust mite covers for all bedding

M family of 3: JM 6m/o, **PM 31m/o, AM: 4y/o

Persistent Elevated Lead Levels

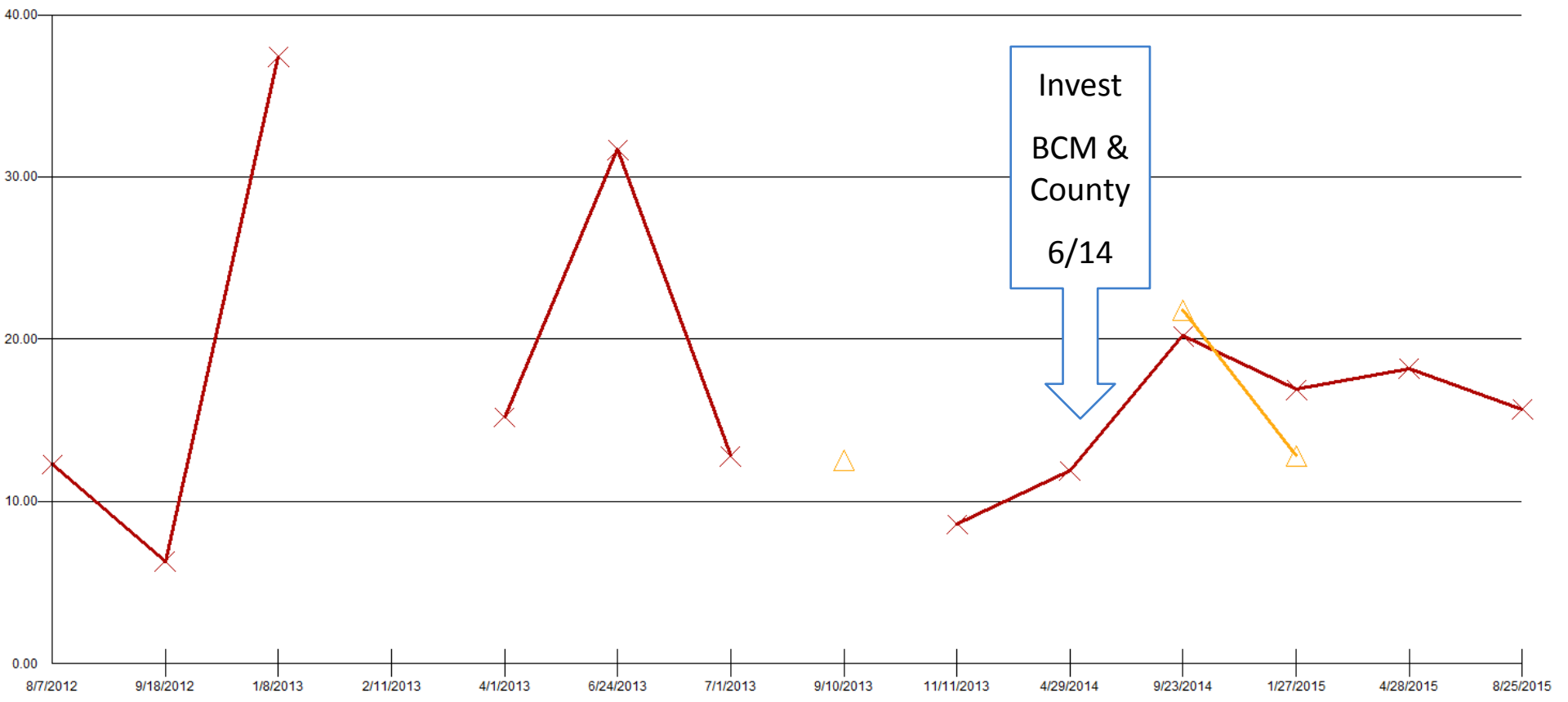
- Index was 31 m/o PM, tested at first wcv
- Lead risks Hx:
  - foreign food and candy from Mexico and locally;
  - Dad initially new home construction; later pipes petro industry, denied lead
- ELI of trailer by County: dust wipe sl. + Master BR floor
  - XRF all negative incl. toys; dust wipes: other negative soil: neg ; vinyl mini blind: not tested
- Environmental risks by Hx:
  - cockroaches, w/o smoke detector, > 2 hr TV

PM persistent elevated lead: INDEX @ 31 mos 1rst check up 6/12-8/15

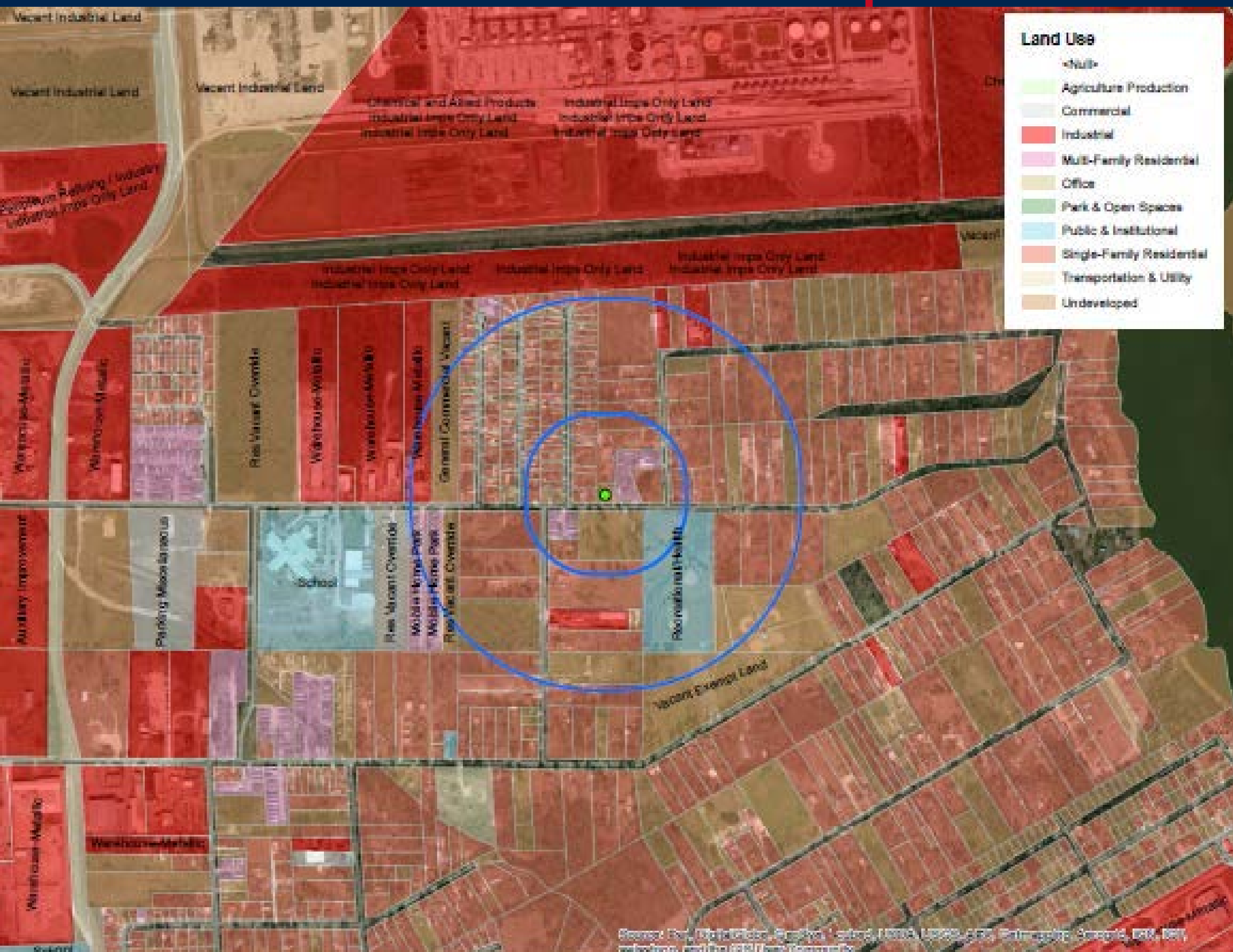


AM: persistent elevated lead: 4/12: < 3ug/dl -8/15

JM Persistent Elevated Lead: 8/12-8/15



M Family: GSI- **multi industrial & chemical sites w/i 2 miles, metal warehouse w/i 1 mile **, *multi* and single family



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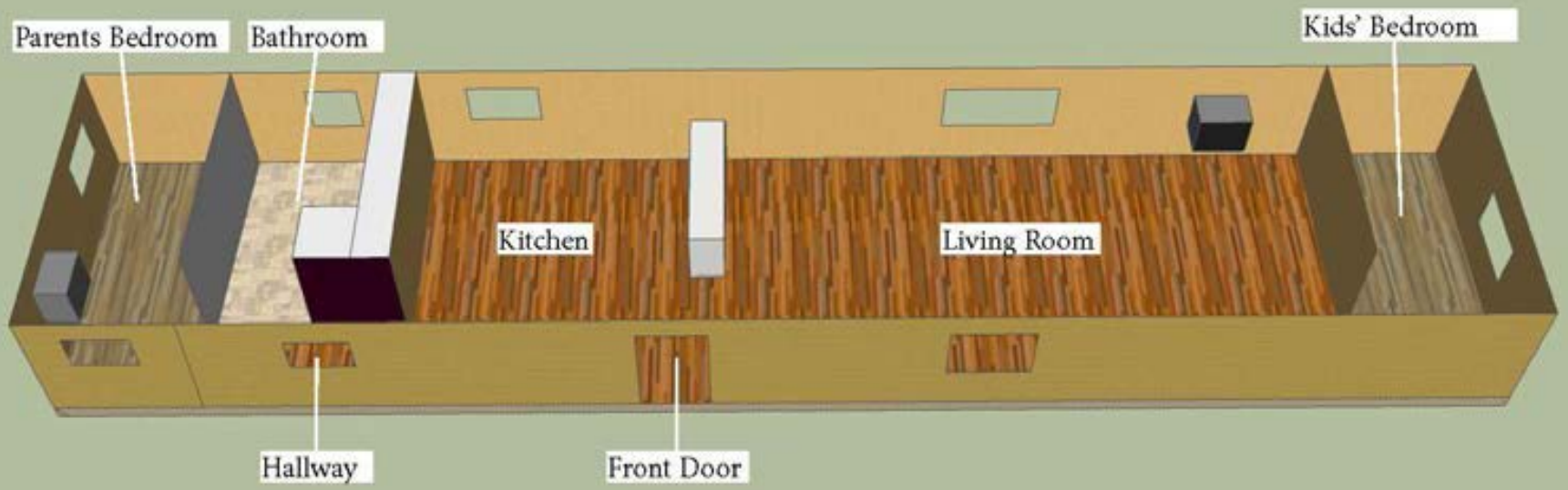

Parents Bedroom
Bathroom
Kids' Bedroom
Kitchen
Living Room
Hallway
Front Door

BCM: Invest.: 6/14; BCM & County: 9/14

- Pb:
  - Dad present & describes work in metal industry type unknown
    - Dad: POC Pb: > 50ug/dl; older sibs elevated
- General :
  - evidence of rodent & cockroach: IPM
  - Increased: CO2, particles, and humidity: incr. circulation, door matts for dust control; uncovered plugs: covers;
- County & BCM 3 mos. later- Dust wipes:
  - living room couch cushion 120 ug/ft2, kitchen chair 54ug/ft2, master bedroom sheet 88 ug/ft2, father automobile seat 120

M Family Plan & Status:

- Dad: seek medical care-
- Father: changes clothes and wash at work
- Father: make anonymous referral to OSHA
  - Work providing PPE and all precautions.
- Father sold his work vehicle

Environmental Home Visits : Pediatric Residents : Objectives

Community Pediatrics Rotation:

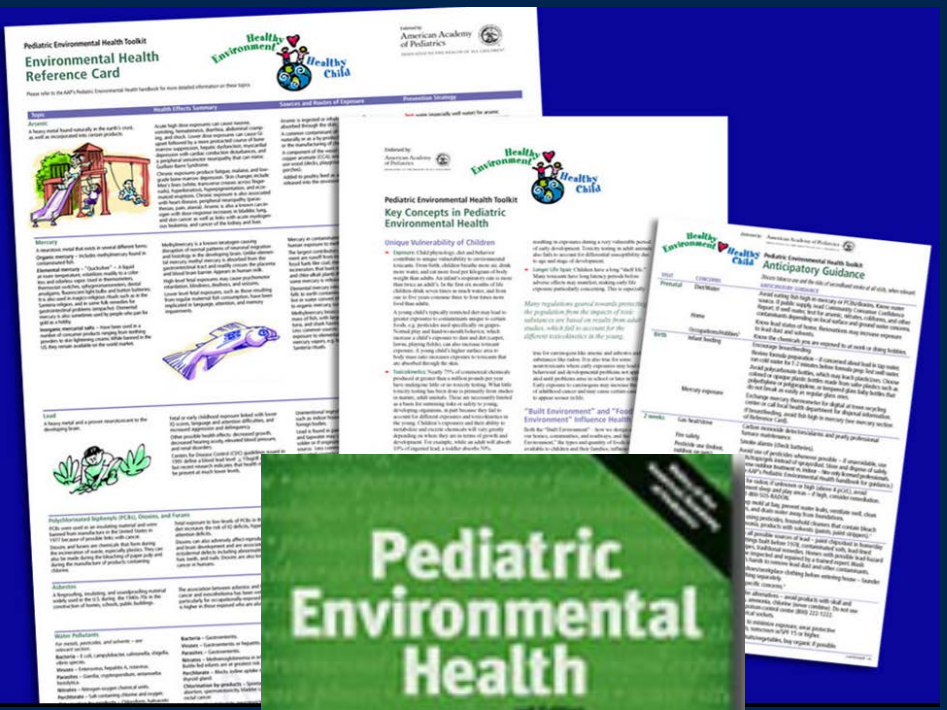
- Learn about environmental health & children

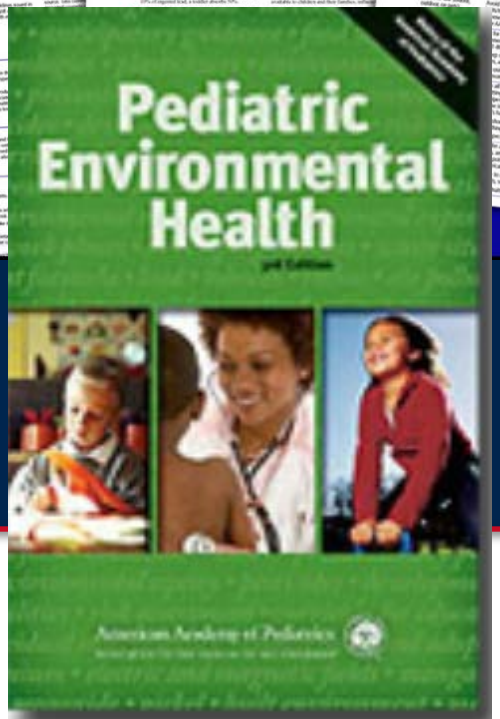
- **Learn to take an Environmental History:**

- Participate Home Visit with **environmental public health specialist**

- Become familiar with and provide **resources to the family to address environmental risks**

Resident Environmenal training and home visit All residents receive:





- An electronic orientation with links to all resources
- AAP Green Book
- PSR Environmental Health Tool Kit
  - -Environ. Reference card-
  - - Anticipatory guidance card

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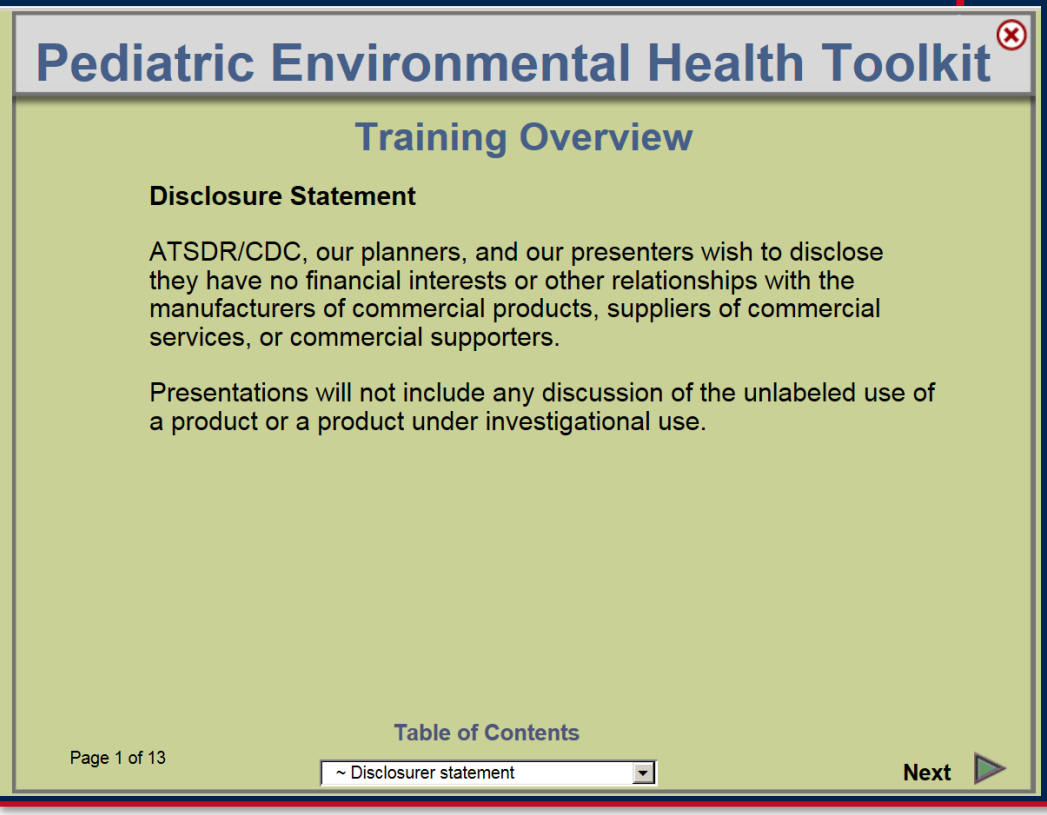
Take the ATSDR Pediatric Environmental Health Tool Kit Module



http://www.atsdr.cdc.gov/emes/training/page9.html
http://www.psr.org/resources/pediatric-toolkit.html

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Pediatric Environmental History (0-18 Years of Age)

The Screening Environmental History

For all of the questions below, most are often asked about the child's primary residence. Although some questions may specify certain locations, one should always consider all places where the child spends time, such as daycare centers, schools, and relative's houses.

Where does your child live and spend most of his/her time?	_____
What are the age, condition, and location of your home?	_____
Does anyone in the family smoke?	❑ Yes ❑ No ❑ Not sure
Do you have a carbon monoxide detector?	❑ Yes ❑ No ❑ Not sure
Do you have any indoor furry pets?	❑ Yes ❑ No ❑ Not sure
What type of heating/air system does your home have? ❑ Radiator ❑ Forced air ❑ Gas stove ❑ Wood stove ❑ Other_____	
What is the source of your drinking water? ❑ Well water ❑ City water ❑ Bottled water	
Is your child protected from excessive sun exposure?	❑ Yes ❑ No ❑ Not sure
Is your child exposed to any toxic chemicals of which you are aware?	❑ Yes ❑ No ❑ Not sure
What are the occupations of all adults in the household?	_____
Have you tested your home for radon?	❑ Yes ❑ No ❑ Not sure
Does your child watch TV, or use a computer or video game system more than two hours a day?	❑ Yes ❑ No ❑ Not sure
How many times a week does your child have unstructured, free play outside for at least 60 minutes?	_____
Do you have any other questions or concerns about your child's home environment or symptoms that may be a result of his or her environment?	_____

Follow up/ Notes

This screening environmental history is designed to capture most of the common environmental exposures to children. The screening history can be administered regularly during well-child exams as well as to assess whether an environmental exposure plays a role in a child's symptoms. If a positive response is given to one or more of the screening questions, the primary care provider can consider asking questions on the topic provided in the Additional Categories and Questions to Supplement the Screening Environmental History, accessible at www.neefusa.org/pdf/PEHIhistory.pdf.

The Screening Environmental History is taken in part from the following sources:

- American Academy of Pediatrics Committee on Environmental Health. Pediatric Environmental Health 2nd ed. Etzel RA, Balk SJ, Eds. Elk Grove Village, IL: American Academy of Pediatrics; 2003. Chapter 4: How to Take an Environmental History.
- Balk SJ. The environmental history: asking the right questions. *Contemp Pediatr.* 1996;13:19-36.
- Frank A, Balk S, Carter W, et al. Case Studies in Environmental Medicine. Agency for Toxic Substances and Disease Registry. Atlanta GA. 1992, rev. 2000. Taking an Exposure History.

National Environmental Education Foundation
Knowledge to live by

Health & Environment

Pediatrics

Call Family:

Administer NEEF History

http://www.neefusa.org/pdf/PedEnvHistoryForm_complete.pdf
http://www.neefusa.org/health/PEHI/index.htm

Introduces you to **NEEF's Pediatric Environmental History Initiative**

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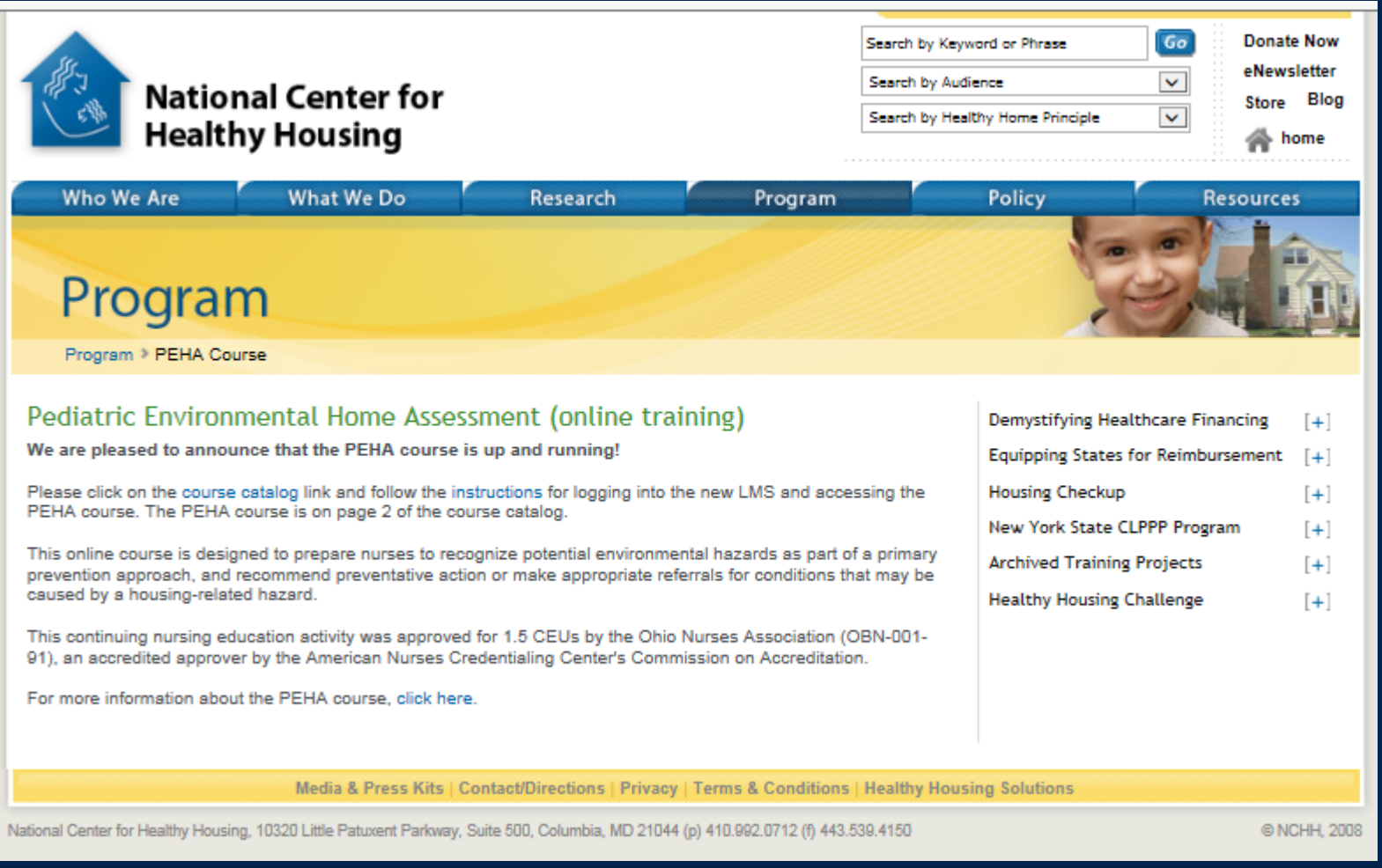
Pediatric Environmental Home Assesment : Online training



http://www.nchh.org/Program/PEHACourse.aspx

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Site Visit:

Pediatric Environmental Home Assessment
HOME VISIT EXERCISE ANSWER SHEET

RESIDENT REPORTED INFORMATION
Bolded responses indicate areas of greater concern.

General Housing Characteristics					
Type of ownership		❑ Own house	❑ Market rate rental hsg.	❑ Subsidized rental hsg.	❑ Shelter
Age of home		❑ **Pre-1950**	❑ **1950 -1978**	❑ Post-1978	❑ **Don't know**
Structural foundation		❑ Basement	❑ Slab on grade	❑ Crawlspace	❑ Don't know
Floors lived in (check all that apply)		❑ Basement	❑ 1st	❑ 2nd	❑ 3rd or higher
Heating	Fuel used	❑ Natural gas / LPG	❑ Oil	❑ Electric	❑ Wood
	Sources in home	❑ Radiators	❑ Forced hot air vents	❑ Space heater or oven	❑ **Other:** _____
	Filters changed	❑ Yes	❑ **No**	❑ **Don't know**	❑ No filter
	Control	❑ Easy to control heat	❑ Hard to control heat		
Cooling		❑ Windows	❑ Central/window AC	❑ Fans	❑ None
Ventilation (check all that apply)		❑ Opens windows	❑ Kitchen & bathroom fans	❑ Central ventilation	

NOTES:

Indoor Pollutants					
Mold and moisture		❑ Uses dehumidifier ❑ No damage	❑ **Uses vaporizer or humidifier**	❑ **Musty odor evident**	❑ **Visible water / mold damage**
Pet	Presence	❑ No pets	❑ **Cat #**_____	❑ **Dog #**_____	❑ Other: _____
	Management	❑ Kept strictly outdoors	❑ Not allowed in patient's bedroom	❑ **Full access in home**	❑ Sleeping location: _____
Pests	Cockroaches	❑ None	❑ **Family reports**	❑ **Evidence seen**	Present in ❑ kitchen ❑ bedroom ❑ other
	Mice	❑ None	❑ **Family reports**	❑ **Evidence seen**	Present in ❑ kitchen ❑ bedroom ❑ other
	Rats	❑ None	❑ **Family reports**	❑ **Evidence seen**	Present in ❑ kitchen ❑ bedroom ❑ other
	Bedbugs	❑ None	❑ **Family reports**	❑ **Evidence seen**	Present in ❑ bedroom ❑ other
Lead paint hazards		❑ Tested and passed	❑ Tested, failed, and mitigated	❑ **Not tested/Don't know**	❑ **Loose, peeling, or chipping, paint**
Asbestos		❑ Tested – None present	❑ Tested, failed, and mitigated	❑ **Not tested/Don't know**	❑ **Damaged material**
Radon		❑ Tested and passed	❑ Tested, failed, and mitigated	❑ **Not tested/Don't know**	❑ **Failed test but not mitigated**
Health and Safety Alarms		❑ Smoke alarm working and well placed	❑ CO alarm working and one on each floor	❑ **CO alarm does not log peak level**	❑ **No smoke alarm** ❑ **No CO alarm**
Tobacco smoke exposure		❑ No smoking allowed	❑ Smoking only allowed outdoors	❑ **Smoking allowed indoors** ❑ **bedroom** ❑ **playroom**	❑ **Total # smokers in household:**_____ ❑ **Mother smokes**
Other irritants		❑ None	❑ **Air fresheners**	❑ **Potpourri, incense, candles**	❑ **Other strong odors:** _____
Type of cleaning		❑ Standard Vacuum (non HEPA)	❑ HEPA vacuum	❑ Damp mop and damp dusting	❑ **Sweep or dry mop**
Cleaning products used		❑ Labeled non-toxic	❑ **Bleach**	❑ **Ammonia**	❑ **Other:** _____

- Administer Pediatric Environmental Home Assesment

PEHA_Survey_REVISED_Oct_09.doc

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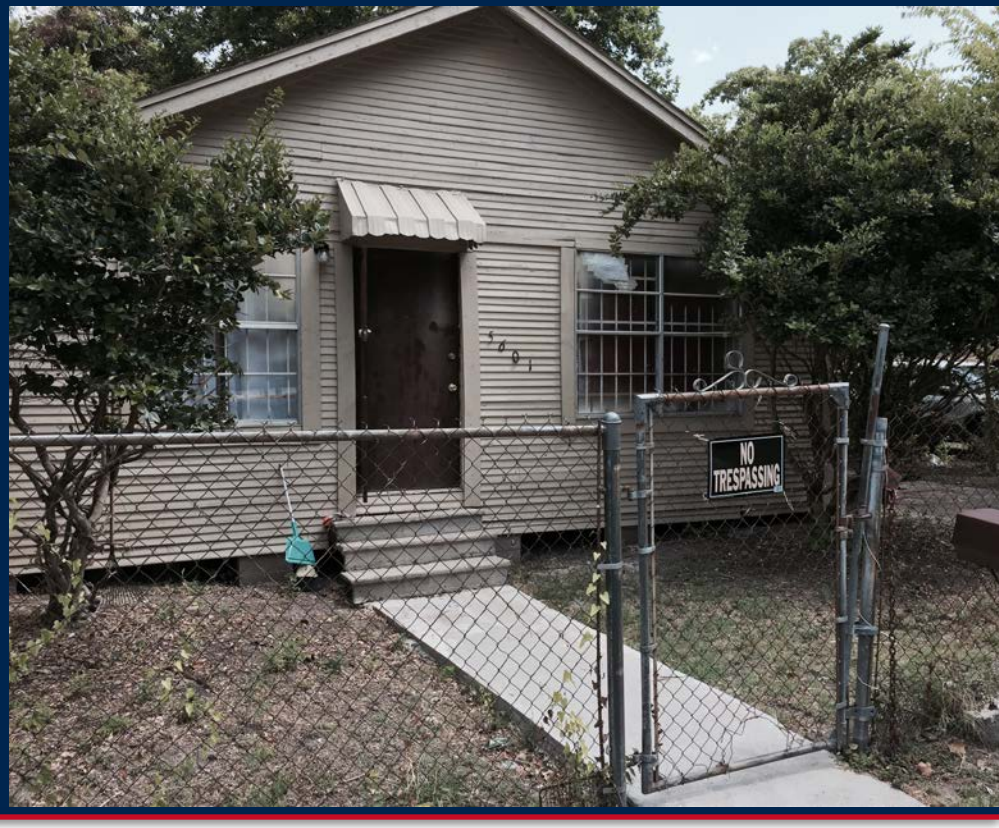
RESIDENT home visit:
4 children: 3,4,7, 9;
2 with autism
Mom pregnant

What did they find?

Or let's find Waldo!



Resident Visit: Debris, trampoline, air conditioner, standing water,

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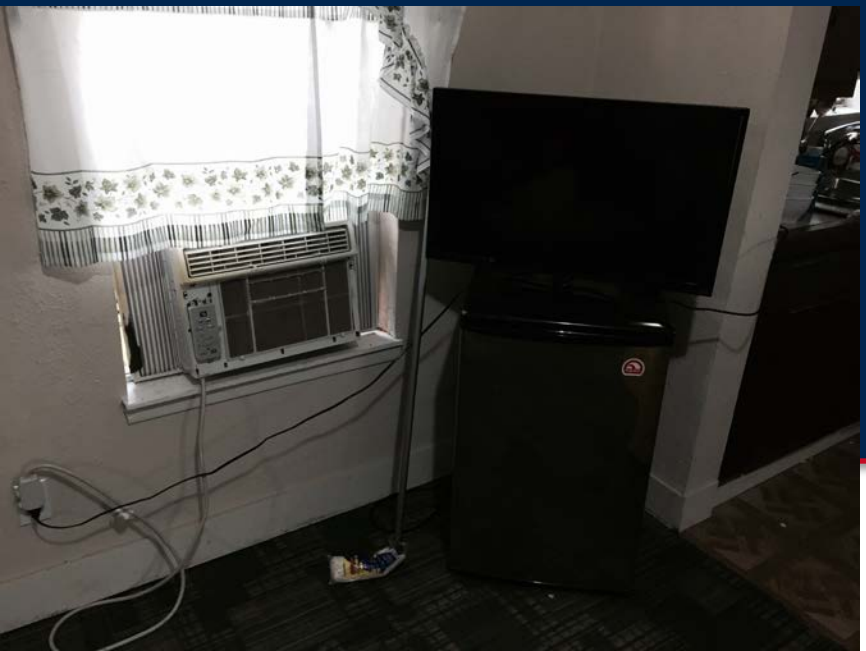
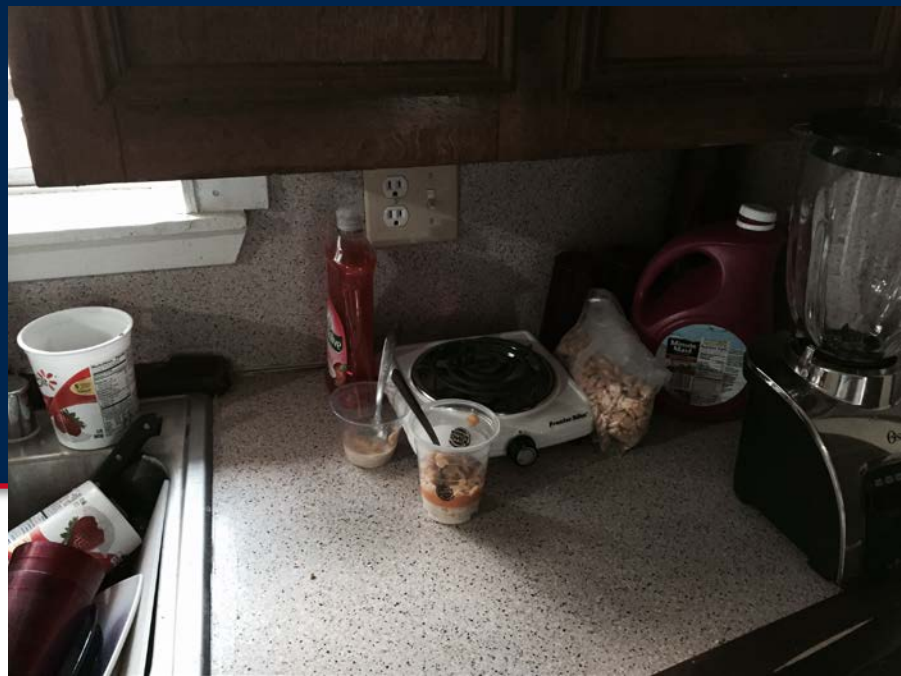
Resident Visit:

- TV unsecure
- Electric Cords
- Burglar bars
- Electric hot plate





Resident Visit:.

- Bunk Beds
- Crib with bumper guards

CARE PLAN:.With home inspector

Pediatric Environmental Home Assessment Form

NURSING CARE PLAN

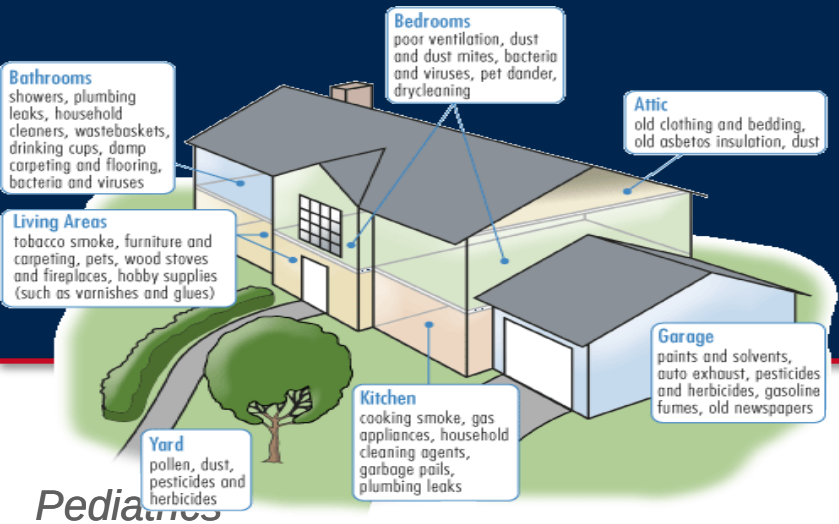
After completing the assessment, use this as a guide for patient education and recommending corrective action.

General Housing Characteristics		
CONCERN	**NURSE TO DO**	**FAMILY TO DO**
Age of home	☐ If built before 1978, educate as follows: ○ Home is likely to have lead paint. ○ Lead hazards can be harmful to young children's health and development. ○ If family has a child less than six years old then it is important to test for lead hazards. ☐ Get more information about lead testing at www.epa.gov/lead/ and provide to family. ☐ Review items in "Family To Do" column with family.	☐ If your child is less than six years old, contact the childhood lead poisoning prevention program (CLPPP) at your state and local departments of health. ☐ Consider getting a lead paint inspection or risk assessment to determine whether there are lead hazards in your home. ☐ If there are hazards, repair them based on state and local regulations and requirements. Consult with state CLPPP.
Heating source - Other: Kerosene heaters, space heaters, fireplaces, wood stoves	☐ Counsel family about the dangers of such heating sources in terms of fire safety and indoor air quality. ☐ Get more information about indoor air quality and combustion sources in the home at http://www.epa.gov/iaq/combust.html and provide to family. ☐ Review items in "Family To Do" column with family.	☐ Make sure kerosene heaters are vented to the outdoors or not used. ☐ Make sure space heaters are at least 3 feet from anything flammable. ☐ When necessary, use only 12 or 14 gauge extension cords (the lower the better). ☐ Ensure that there is a good seal on fireplace screen or woodstove doors.
Filters	☐ Counsel family to do proper filter maintenance. ☐ Review items in "Family To Do" column with family.	☐ Change filters quarterly. ☐ Use filters which are rated MERV 10.
Indoor Pollutants		
CONCERN	**NURSE TO DO**	**FAMILY TO DO**
Vaporizers/Humidifiers	☐ Counsel the family about the importance of proper vaporizer/humidifier maintenance and impact of mold growth on patient health. ☐ Get more information about humidifier maintenance at http://www.epa.gov/iaq/pubs/humidif.html and provide to family. ☐ Review items in "Family To Do" column with family.	☐ Change the water daily with clean cold water. ☐ Use distilled or demineralized water. ☐ Clean humidifier every 3 days. Follow manufacturer's instructions. ☐ Change filter regularly. Follow manufacturer's instructions. Change more often if dirty. ☐ Keep surrounding area dry. ☐ Drain and clean humidifier before storing. ☐ Only run humidifier a few hours a day to avoid mold growth.
Mold/Musty odor	☐ Educate family about the importance of keeping things dry and the impact of mold on family health. ☐ Get more information at http://www.epa.gov/mold/moldguide.html and provide to family. ☐ Review items in "Family To Do" column with family.	☐ Any mold or musty odor must be investigated for a source of water. Examine plumbing, roofing, or other possible leaks. ☐ If homeowner, then make necessary repairs. ☐ If renter, then talk with your landlord about needed repairs. Consider calling the local board of health for possible code violations.

http://www.nchh.org/Portals/0/PEHA_Blank_Nursing_Action_Plan.pdf

Conclusions: .

- Identify who benefits from home visits.
- Describe basic elements of home visits per client
- Explain how learners can participate & learn from home visits



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THE TEAMS:.

•Bureau of Community & Children's Environmental Health

Dr. Brenda Reyes: Director
Mayann Barthelemy:
Jyothi Domakonda.
Jesse Craine
Irma Cordon
Muhammad Farhad
Kabita Sharma
Robert Isaacson
Jesus Garcia

•BCM Environmental Health Service

- **Winifred Hamilton: Dir.**
- **Rebecca Bruhl: Assoc. Dir.**
- Maggie Abitua: Pt. Serv. Coor.
- Jamie Boles: Admin
- Allison Carr: Recycling & sustainability
- Ronilla Ernest: Environ Hygienist
- LaSondra Hampton: CHW
- Brett Perkison: Adult Med. Dir.
- Ryan Ramphul: Sr. Res. Coord.
- Abida Solomon: Res. Fellow
- Ashley Ugarte: Res. Coord.
- Poojan Upadhaya: Environ. Hygienist
- Kilian Williams: Clinical Case Manager

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1. PAHC Environmental Health Clinic
2. **Evidence Base**
   - **Exposure History**
   - **Intervention** (Home-based Exposure Reduction)
   - **ROI** (Return on Investment)
   - **Programs** (Programs Elsewhere)
3. Future Plans / Challenges
4. Questions / Comments

Evidence Base

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BCM Environmental Health Service

"For successful long-term management of asthma, it is essential to identify and reduce exposures to relevant allergens and irritants and to control factors that have been shown to increase asthma symptoms and/or precipitate asthma exacerbations."

National Asthma Education and Prevention Program, Third Expert Panel on the Diagnosis and Management of Asthma, NHLBI, August 2007 (EPR-3)

Evidence Base

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BCM Environmental Health Service

- **Growing awareness of key role of environmental health hazards in disease and susceptibility**
  - E.g., in asthmatic children…
    - Residential NO_2 from gas stoves assoc w inc (Belanger at al, 2013)
      - Asthma severity score (OR 1.37)
      - Wheeze (OR 1.49)
      - Night symptoms (OR 1.52)
      - Rescue medication use (OR 1.78)
    - Residential proximity to roadways assoc w inc wheezing, hospital-izations, & inflam biomarkers (Brown et al, 2012)
    - Prenatal BPA assoc w development of atopic asthma (Nakajima et al, 2012)

Evidence-Base

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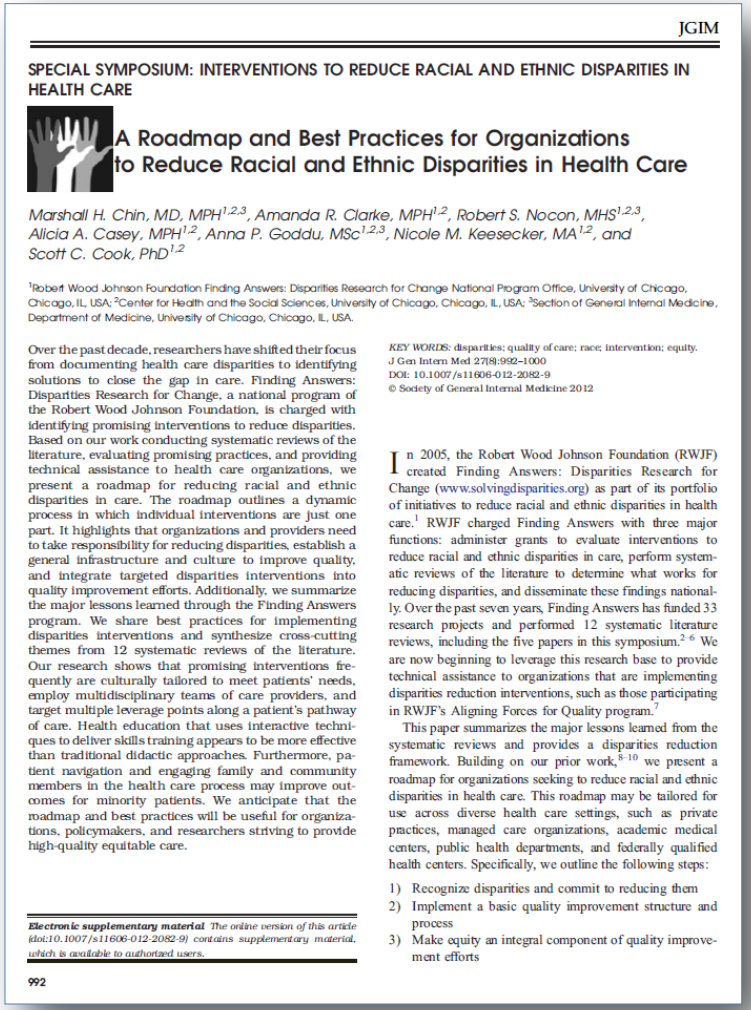
BCM Environmental Health Service

- **Improved outcome associated with**
  - Patient-centered approaches (Press et al, 2012; Chin et al, 2012)
  - Better patient-clinician communication (Schatz et al, 2012, Apter et al, 1998)
  - Addressing barriers to environmental control measures (Gergen et al, 1999; Schatz and Zeiger 2012)



JGIM

SPECIAL SYMPOSIUM: INTERVENTIONS TO REDUCE RACIAL AND ETHNIC DISPARITIES IN HEALTH CARE

A Roadmap and Best Practices for Organizations to Reduce Racial and Ethnic Disparities in Health Care

Marshall H. Chin, MD, MPH[1,2,3], Amanda R. Clarke, MPH[1,2], Robert S. Nocon, MHS[1,2,3], Alicia A. Casey, MPH[1,2], Anna P. Goddu, MSc[1,2,3], Nicole M. Keesecker, MA[1,2], and Scott C. Cook, PhD[1,2]

[1]Robert Wood Johnson Foundation Finding Answers: Disparities Research for Change National Program Office, University of Chicago, Chicago, IL, USA; [2]Center for Health and the Social Sciences, University of Chicago, Chicago, IL, USA; [3]Section of General Internal Medicine, Department of Medicine, University of Chicago, Chicago, IL, USA.

Over the past decade, researchers have shifted their focus from documenting health care disparities to identifying solutions to close the gap in care. Finding Answers: Disparities Research for Change, a national program of the Robert Wood Johnson Foundation, is charged with identifying promising interventions to reduce disparities. Based on our work conducting systematic reviews of the literature, evaluating promising practices, and providing technical assistance to health care organizations, we present a roadmap for reducing racial and ethnic disparities in care. The roadmap outlines a dynamic process in which individual interventions are just one part. It highlights that organizations and providers need to take responsibility for reducing disparities, establish a general infrastructure and culture to improve quality, and integrate targeted disparities interventions into quality improvement efforts. Additionally, we summarize the major lessons learned through the Finding Answers program. We share best practices for implementing disparities interventions and synthesize cross-cutting themes from 12 systematic reviews of the literature. Our research shows that promising interventions frequently are culturally tailored to meet patients' needs, employ multidisciplinary teams of care providers, and target multiple leverage points along a patient's pathway of care. Health education that uses interactive techniques to deliver skills training appears to be more effective than traditional didactic approaches. Furthermore, patient navigation and engaging family and community members in the health care process may improve outcomes for minority patients. We anticipate that the roadmap and best practices will be useful for organizations, policymakers, and researchers striving to provide high-quality equitable care.

KEY WORDS: disparities; quality of care; race; intervention; equity.
J Gen Intern Med 27(8):992–1000
DOI: 10.1007/s11606-012-2082-9

In 2005, the Robert Wood Johnson Foundation (RWJF) created Finding Answers: Disparities Research for Change (www.solvingdisparities.org) as part of its portfolio of initiatives to reduce racial and ethnic disparities in health care.[1] RWJF charged Finding Answers with three major functions: administer grants to evaluate interventions to reduce racial and ethnic disparities in care, perform systematic reviews of the literature to determine what works for reducing disparities, and disseminate these findings nationally. Over the past seven years, Finding Answers has funded 33 research projects and performed 12 systematic literature reviews, including the five papers in this symposium.[2–6] We are now beginning to leverage this research base to provide technical assistance to organizations that are implementing disparities reduction interventions, such as those participating in RWJF's Aligning Forces for Quality program.[7]

This paper summarizes the major lessons learned from the systematic reviews and provides a disparities reduction framework. Building on our prior work,[8–10] we present a roadmap for organizations seeking to reduce racial and ethnic disparities in health care. This roadmap may be tailored for use across diverse health care settings, such as private practices, managed care organizations, academic medical centers, public health departments, and federally qualified health centers. Specifically, we outline the following steps:

1) Recognize disparities and commit to reducing them
2) Implement a basic quality improvement structure and process
3) Make equity an integral component of quality improvement efforts

Electronic supplementary material *The online version of this article (doi:10.1007/s11606-012-2082-9) contains supplementary material, which is available to authorized users.*

Evidence-Base

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BCM Environmental Health Service

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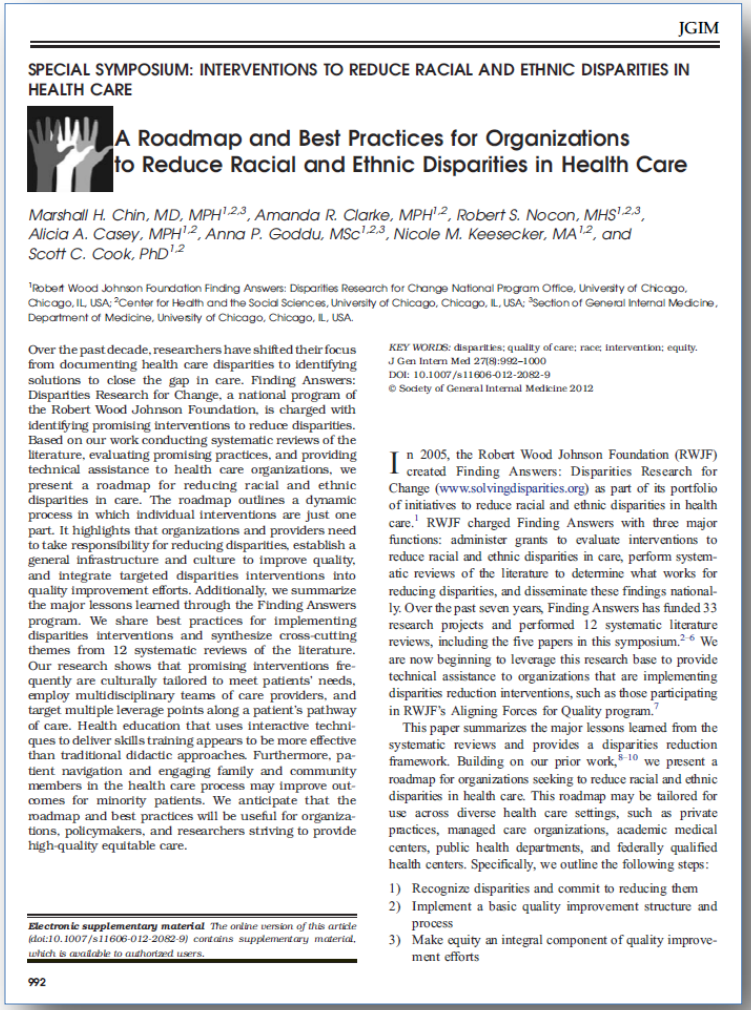

JGIM

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Marshall H. Chin, MD, MPH[1,2,3], Amanda R. Clarke, MPH[1,2], Robert S. Nocon, MHS[1,2,3], Alicia A. Casey, MPH[1,2], Anna P. Goddu, MSc[1,2,3], Nicole M. Keesecker, MA[1,2], and Scott C. Cook, PhD[1,2]

[1]Robert Wood Johnson Foundation Finding Answers: Disparities Research for Change National Program Office, University of Chicago, Chicago, IL, USA; [2]Center for Health and the Social Sciences, University of Chicago, Chicago, IL, USA; [3]Section of General Internal Medicine, Department of Medicine, University of Chicago, Chicago, IL, USA.

Over the past decade, researchers have shifted their focus from documenting health care disparities to identifying solutions to close the gap in care. Finding Answers: Disparities Research for Change, a national program of the Robert Wood Johnson Foundation, is charged with identifying promising interventions to reduce disparities. Based on our work conducting systematic reviews of the literature, evaluating promising practices, and providing technical assistance to health care organizations, we present a roadmap for reducing racial and ethnic disparities in care. The roadmap outlines a dynamic process in which individual interventions are just one part. It highlights that organizations and providers need to take responsibility for reducing disparities, establish a general infrastructure and culture to improve quality, and integrate targeted disparities interventions into quality improvement efforts. Additionally, we summarize the major lessons learned through the Finding Answers program. We share best practices for implementing disparities interventions and synthesize cross-cutting themes from 12 systematic reviews of the literature. Our research shows that promising interventions frequently are culturally tailored to meet patients' needs, employ multidisciplinary teams of care providers, and target multiple leverage points along a patient's pathway of care. Health education that uses interactive techniques to deliver skills training appears to be more effective than traditional didactic approaches. Furthermore, patient navigation and engaging family and community members in the health care process may improve outcomes for minority patients. We anticipate that the roadmap and best practices will be useful for organizations, policymakers, and researchers striving to provide high-quality equitable care.

KEY WORDS: disparities; quality of care; race; intervention; equity.
J Gen Intern Med 27(8):992–1000
DOI: 10.1007/s11606-012-2082-9

In 2005, the Robert Wood Johnson Foundation (RWJF) created Finding Answers: Disparities Research for Change (www.solvingdisparities.org) as part of its portfolio of initiatives to reduce racial and ethnic disparities in health care.[1] RWJF charged Finding Answers with three major functions: administer grants to evaluate interventions to reduce racial and ethnic disparities in care, perform systematic reviews of the literature to determine what works for reducing disparities, and disseminate these findings nationally. Over the past seven years, Finding Answers has funded 33 research projects and performed 12 systematic literature reviews, including the five papers in this symposium.[2–6] We are now beginning to leverage this research base to provide technical assistance to organizations that are implementing disparities reduction interventions, such as those participating in RWJF's Aligning Forces for Quality program.[7]

This paper summarizes the major lessons learned from the systematic reviews and provides a disparities reduction framework. Building on our prior work,[8–10] we present a roadmap for organizations seeking to reduce racial and ethnic disparities in health care. This roadmap may be tailored for use across diverse health care settings, such as private practices, managed care organizations, academic medical centers, public health departments, and federally qualified health centers. Specifically, we outline the following steps:

1) Recognize disparities and commit to reducing them
2) Implement a basic quality improvement structure and process
3) Make equity an integral component of quality improvement efforts

Electronic supplementary material *The online version of this article (doi:10.1007/s11606-012-2082-9) contains supplementary material, which is available to authorized users.*

Evidence Base: Exposure Hx

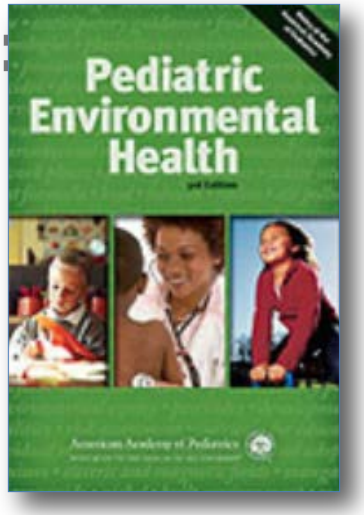
Baylor College of Medicine

BCM Environmental Health Service

"Only way to address immense cost of chronic disease [e.g., asthma] in US is to address the "environmental health gap."

Pew Environmental Health Commission, 2001

- **Key issues perpetuating the EH gap:**
  - Physicians have little/no training in EH
    - Most unable to take an EH Hx, which often leads to misdiagnoses and continuing exposure
  - Prevention underfunded, not profitable
  - Little or no training in EH during medical school
    - 86.1% TMA PCPs received no training in EH Hx taking (Hamilton 2005)
  - Public health requires different expertise/interest

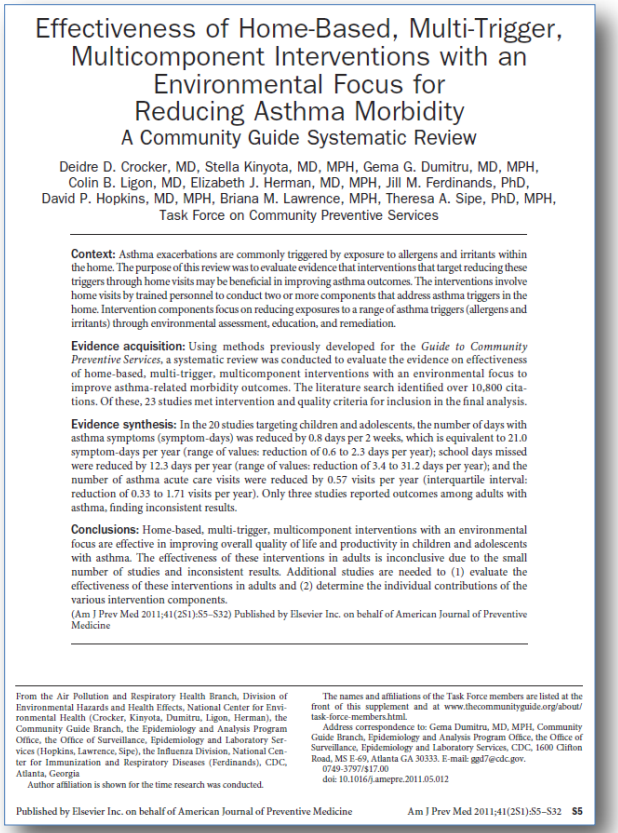


Evidence Base: Intervention

Baylor College of Medicine

BCM Environmental Health Service

- **CDC Task Force on Community Preventive Services (Crocker et al, 2011)**
  - Based on 23 studies (20 children)
  - Strong evidence of effectiveness of home-based, multi-trigger, multicomponent environmental interventions in
    - Reducing symptom days (21/yr)
    - Improving QOL/symp scores (16.5%)
    - Reducing school days missed (12.3/yr)
  - Benefit-cost ratios: 5.3–14.0



Effectiveness of Home-Based, Multi-Trigger, Multicomponent Interventions with an Environmental Focus for Reducing Asthma Morbidity

A Community Guide Systematic Review

Deidre D. Crocker, MD, Stella Kinyota, MD, MPH, Gema G. Dumitru, MD, MPH, Colin B. Ligon, MD, Elizabeth J. Herman, MD, MPH, Jill M. Ferdinands, PhD, David P. Hopkins, MD, MPH, Briana M. Lawrence, MPH, Theresa A. Sipe, PhD, MPH, Task Force on Community Preventive Services

Context: Asthma exacerbations are commonly triggered by exposure to allergens and irritants within the home. The purpose of this review was to evaluate evidence that interventions that target reducing these triggers through home visits may be beneficial in improving asthma outcomes. The interventions involve home visits by trained personnel to conduct two or more components that address asthma triggers in the home. Intervention components focus on reducing exposures to a range of asthma triggers (allergens and irritants) through environmental assessment, education, and remediation.

Evidence acquisition: Using methods previously developed for the *Guide to Community Preventive Services*, a systematic review was conducted to evaluate the evidence on effectiveness of home-based, multi-trigger, multicomponent interventions with an environmental focus to improve asthma-related morbidity outcomes. The literature search identified over 10,800 citations. Of these, 23 studies met intervention and quality criteria for inclusion in the final analysis.

Evidence synthesis: In the 20 studies targeting children and adolescents, the number of days with asthma symptoms (symptom-days) was reduced by 0.8 days per 2 weeks, which is equivalent to 21.0 symptom-days per year (range of values: reduction of 0.6 to 2.3 days per year); school days missed were reduced by 12.3 days per year (range of values: reduction of 3.4 to 31.2 days per year); and the number of asthma acute care visits were reduced by 0.57 visits per year (interquartile interval: reduction of 0.33 to 1.71 visits per year). Only three studies reported outcomes among adults with asthma, finding inconsistent results.

Conclusions: Home-based, multi-trigger, multicomponent interventions with an environmental focus are effective in improving overall quality of life and productivity in children and adolescents with asthma. The effectiveness of these interventions in adults is inconclusive due to the small number of studies and inconsistent results. Additional studies are needed to (1) evaluate the effectiveness of these interventions in adults and (2) determine the individual contributions of the various intervention components.

(Am J Prev Med 2011;41(2S1):S5–S32) Published by Elsevier Inc. on behalf of American Journal of Preventive Medicine

From the Air Pollution and Respiratory Health Branch, Division of Environmental Hazards and Health Effects, National Center for Environmental Health (Crocker, Kinyota, Dumitru, Ligon, Herman), the Community Guide Branch, the Epidemiology and Analysis Program Office, the Office of Surveillance, Epidemiology and Laboratory Services (Hopkins, Lawrence, Sipe), the Influenza Division, National Center for Immunization and Respiratory Diseases (Ferdinands), CDC, Atlanta, Georgia

Author affiliation is shown for the time research was conducted.

The names and affiliations of the Task Force members are listed at the front of this supplement and at www.thecommunityguide.org/about/task-force-members.html.

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0749-3797/$17.00
doi: 10.1016/j.amepre.2011.05.012

Evidence Base: Intervention

- **Inner City Asthma Study (Morgan et al, 2004)**
  - 937 5–11yo children with atopic hard-to-control asthma from low-income CTs in 7 US cities
    - Randomized 1-yr intervention (444 vs. 425)
    - Patient-specific intervention
      - Dust mites, smoking, roaches, pets, rodents, mold
      - Included caretaker education, alle… HEPA air filters, pest control, etc.
  - Results
    - Fewer days with symptoms
    - Decline in Der f1 and Bla g1
      - 50% reduction in allergen levels for 49% of kids with detectable Der f1 and 52% with Bla g1

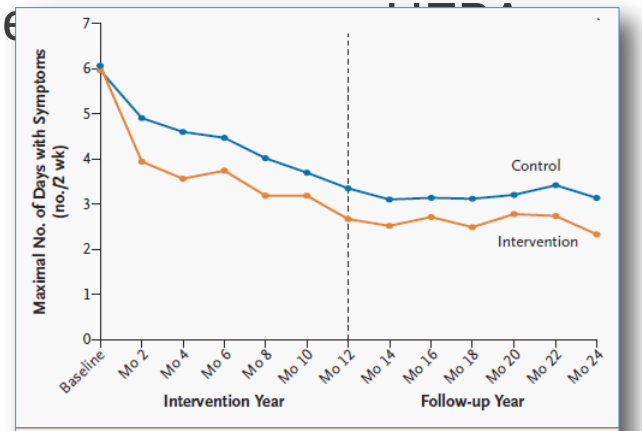


Figure 2. Mean Maximal Number of Days with Symptoms for Every Two-Week Period before a Follow-up Assessment during the Two Years of the Study.
The difference between the groups was significant in both the intervention year ($P<0.001$) and the follow-up year ($P<0.001$).

Evidence Base: Intervention

Baylor College of Medicine

BCM Environmental Health Service

- **Multnomah County Health Dept, Portland, OR**
  - Participants 5.1X less likely to use ED after intervention (intervention similar to ours)
  - Savings of ~ $1,389,066/yr for 100 children
  - Program includes
    - Multidisciplinary team w nurse and CHW
    - Supplies (green cleaning kits, etc.)
    - Env education
    - Evaluation
    - Linkage to community partners

Healthy Home Program Results

Cost Savings ED Utilization for 100 children (80 cases + 20 siblings)

- 1.0 visits reduction per child
- 105 prevented visits
- $760*105 = $79,800 (2009 dollars)
- Adjusted for Oregon medical inflation rate (8%) for four years = **$108,567 (2013 dollars)**

Cost Savings Hospitalization

- (105 visits x 38%) x $8,970 (2010 hospitalization visit cost) = $941,850(2010 dollars)
- Adjusted for medical inflation rate = **$1,281,377 (2013 dollars)**

Parental Lost Wages

- $285 per day in lost wages in 2003 dollars with applied inflation at 3.2% = $390 per day x 2.5 days lost per asthmatic child = **$976 (2013 dollars) 976 *100 = $97,600**

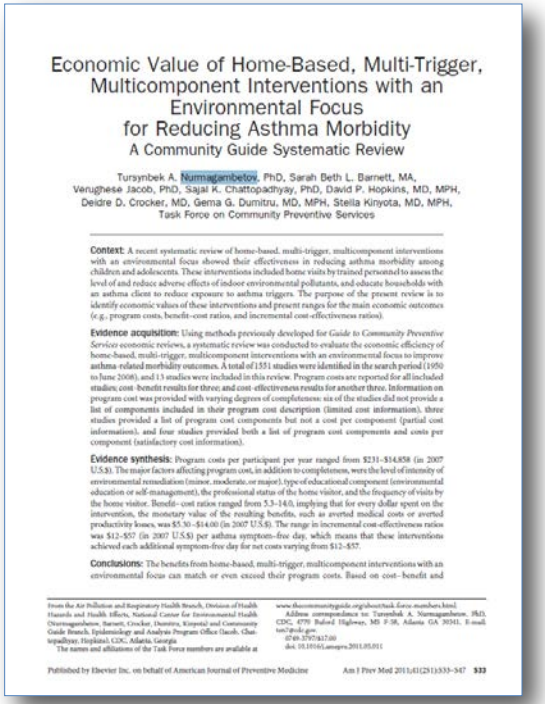
*65 visits x $760 (Center for Financing, Access and Cost Trends, Agency for Healthcare Research and Quality: Medical Expenditure Panel Survey, 2009.)
**Hospitalization admissions per emergency department referral for children 0-5 with an asthma diagnosis are 38% from Multnomah County discharge data

Evidence Base: ROI

Baylor College of Medicine

BCM Environmental Health Service

- **Economic Value of Home-Based, Multi-Trigger, Multicomponent Interventions with an Environmental Focus for Reducing Asthma Morbidity (Nurmagambetov et al, 2011)**
  - Based on 6 studies
  - Benefit-cost ratios: 5.3–14.0
    - Cost/symptom-free day: $12–$57
    - Costs PPPY: $231–$14,858
      - Env intervention (mild, mod, major)
      - Type of educational component
      - Professional status of home visitor
      - Frequency of visits
- **BCM EHS: $2,296 PPPY (inc OV)**



Economic Value of Home-Based, Multi-Trigger, Multicomponent Interventions with an Environmental Focus for Reducing Asthma Morbidity

A Community Guide Systematic Review

Tursynbek A. Nurmagambetov, PhD, Sarah Beth L. Barnett, MA, Verughese Jacob, PhD, Sajal K. Chattopadhyay, PhD, David P. Hopkins, MD, MPH, Deidre D. Crocker, MD, Gema G. Dumitru, MD, MPH, Stella Kinyota, MD, MPH, Task Force on Community Preventive Services

Context: A recent systematic review of home-based, multi-trigger, multicomponent interventions with an environmental focus showed their effectiveness in reducing asthma morbidity among children and adolescents. These interventions included home visits by trained personnel to assess the level of and reduce adverse effects of indoor environmental pollutants, and educate households with an asthma client to reduce exposure to asthma triggers. The purpose of the present review is to identify economic values of these interventions and present ranges for the main economic outcomes (e.g., program costs, benefit–cost ratios, and incremental cost-effectiveness ratios).

Evidence acquisition: Using methods previously developed for *Guide to Community Preventive Services* economic reviews, a systematic review was conducted to evaluate the economic efficiency of home-based, multi-trigger, multicomponent interventions with an environmental focus to improve asthma-related morbidity outcomes. A total of 1551 studies were identified in the search period (1950 to June 2008), and 13 studies were included in this review. Program costs are reported for all included studies; cost–benefit results for three; and cost–effectiveness results for another three. Information on program cost was provided with varying degrees of completeness: six of the studies did not provide a list of components included in their program cost description (limited cost information), three studies provided a list of program cost components but not a cost per component (partial cost information), and four studies provided both a list of program cost components and costs per component (satisfactory cost information).

Evidence synthesis: Program costs per participant per year ranged from $231–$14,858 (in 2007 U.S.$). The major factors affecting program cost, in addition to completeness, were the level of intensity of environmental remediation (minor, moderate, or major), type of educational component (environmental education or self-management), the professional status of the home visitor, and the frequency of visits by the home visitor. Benefit–cost ratios ranged from 5.3–14.0, implying that for every dollar spent on the intervention, the monetary value of the resulting benefits, such as averted medical costs or averted productivity losses, was $5.30–$14.00 (in 2007 U.S.$). The range in incremental cost-effectiveness ratios was $12–$57 (in 2007 U.S.$) per asthma symptom-free day, which means that these interventions achieved each additional symptom-free day for net costs varying from $12–$57.

Conclusions: The benefits from home-based, multi-trigger, multicomponent interventions with an environmental focus can match or even exceed their program costs. Based on cost–benefit and

From the Air Pollution and Respiratory Health Branch, Division of Health Hazards and Health Effects, National Center for Environmental Health, Nurmagambetov, Barnett, Crocker, Dumitru, Kinyota) and Community Guide Branch, Epidemiology and Analysis Program Office (Jacob, Chattopadhyay, Hopkins), CDC, Atlanta, Georgia

The names and affiliations of the Task Force members are available at www.thecommunityguide.org/about/task-force-members.html

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Evidence Base: ROI

Baylor College of Medicine

BCM Environmental Health Service

- **EHS utilized AHRQ's Asthma ROI Calculator (AHRQ, 2013) and published studies for ROI calculations for our pediatric program**
  - Conservative assumptions

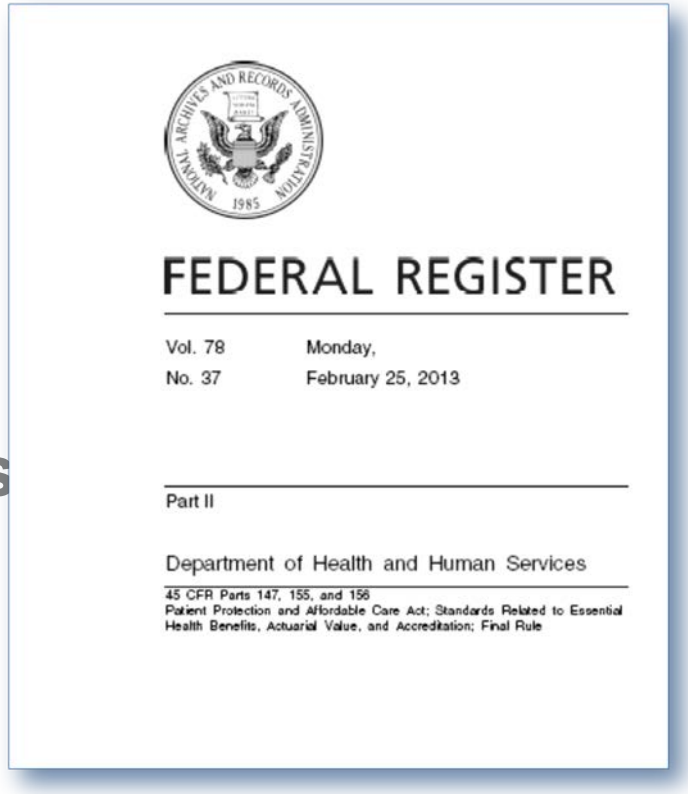
SERVICE	PRE $ PBPM	REFERENCE	POST $ PBPM	REFERENCE	% DECREASE
Inpatient Stay	$190	Moore, 2013; AHRQ, 2013	$51	AHRQ, 2013	73.2%
Emergency Services	$13	Moore, 2013; AHRQ, 2013	$9	AHRQ, 2013	30.8%
Prof. Primary Care	$10	Wang et al, 2005	$11	3% Inflation rate	-10.0%
Prof. Specialty Care	$11	Tran, 2013; Moore, 2013	$4	AHRQ, 2013	63.6%
Laboratory Services	$3	AHRQ, 2013	$1	AHRQ, 2013	66.7%
Durable Medical Equipment	$6	Ireys et al, 1997	$7	3% Inflation rate	-16.7%
Long-term Care	$6	Sapra et al, 2005	$6	3% Inflation rate	0.0%
Ambulance	$2	Olson, 2010	$1	AHRQ, 2013	50.0%
Caregiver Productivity	$15	AHRQ, 2013	$10	AHRQ, 2013	33.3%
Prescription Drugs	$177	Szefler et al, 2011	$151	Szefler et al, 2011	14.7%

Evidence Base: ROI

Baylor College of Medicine

BCM Environmental Health Service

- **Proposed new rules will allow for home environmental assessments by non clinicians professionals**
  - Healthy Homes specialists
  - Environmental professionals
- **Reimbursement is—or may soon be—available for environmental assessments**



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Part II

Department of Health and Human Services

45 CFR Parts 147, 155, and 156
Patient Protection and Affordable Care Act; Standards Related to Essential Health Benefits, Actuarial Value, and Accreditation; Final Rule

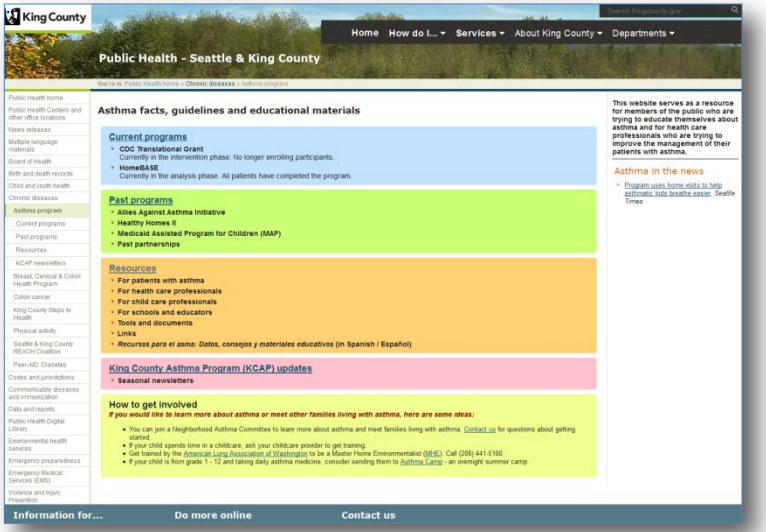
Dept. of Health & Human Services, Final Rule on Essential Health Benefits, February 2013

Evidence Base: Programs

Baylor College of Medicine

BCM Environmental Health Service

- **Seattle-King County Asthma Program**
  - Developed and evaluated home-visit programs for asthma over 12 years
  - Department of Health-based
  - Immense resource for instruments, training scripts, educational materials, outcomes research
  - Networking with Seattle, Chicago, and NYC on sharing protocols, developing common products



Evidence Base: Programs

Baylor College of Medicine

BCM Environmental Health Service

- **Kansas City Mercy Children's Hospital**
  - Center for Environmental Health
    - Within Dept of Allergy, Asthma, and Immunology
  - Began home visits in 1995
  - Stratify patients (3 levels) on risk of exacerbations
    - Determines level of service
  - Baseline is a 5-visit model
  - Teach Healthy Homes courses for NCHH
  - Developed home assessment software
    - Healthy Homes Manager

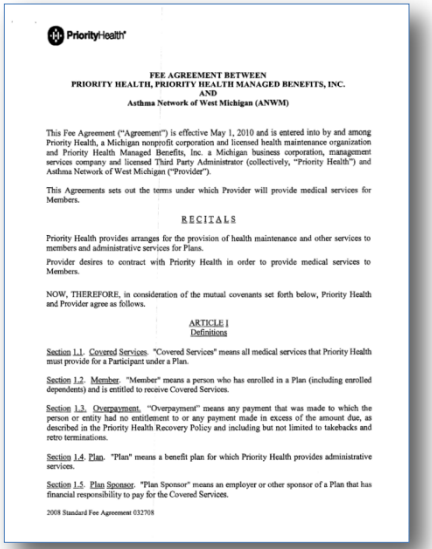
Evidence Base: Programs

Baylor College of Medicine

BCM Environmental Health Service

- **Asthma Network of West Michigan**
  - Began home-based asthma care in 1996
  - St. Mary's Health Care (hospital) provides home, administrative oversight
  - Negotiated reimbursement ($115 traditional; $85 Medicaid) from 6 MI MCOs
    - Priority Health agreement (1st in U.S.) includes 18 home visits/yr (education focus)

Clinical Outcomes	Cohort Groups N=45			Control Group N=39			Cohort vs. Control
	Pre	Study	P-value	Yr 1	Yr2	P-value	P-value
ED Visits	80	61	0.047	28	43	0.0211	0.0040
Hospitalizations	41	13	<0.0001	23	28	0.1457	<0.0001
Days Hospitalized	114	25	<0.0001	55	67	0.0779	<0.0001



Priority Health

FEE AGREEMENT BETWEEN
PRIORITY HEALTH, PRIORITY HEALTH MANAGED BENEFITS, INC.
AND
Asthma Network of West Michigan (ANWM)

This Fee Agreement ("Agreement") is effective May 1, 2010 and is entered into by and among Priority Health, a Michigan nonprofit corporation and licensed health maintenance organization and Priority Health Managed Benefits, Inc. a Michigan business corporation, management services company and licensed Third Party Administrator (collectively, "Priority Health") and Asthma Network of West Michigan ("Provider").

This Agreements sets out the terms under which Provider will provide medical services for Members.

RECITALS

Priority Health provides arranges for the provision of health maintenance and other services to members and administrative services for Plans.

Provider desires to contract with Priority Health in order to provide medical services to Members.

NOW, THEREFORE, in consideration of the mutual covenants set forth below, Priority Health and Provider agree as follows.

ARTICLE I
Definitions

Section 1.1. Covered Services. "Covered Services" means all medical services that Priority Health must provide for a Participant under a Plan.

Section 1.2. Member. "Member" means a person who has enrolled in a Plan (including enrolled dependents) and is entitled to receive Covered Services.

Section 1.3. Overpayment. "Overpayment" means any payment that was made to which the person or entity had no entitlement to or any payment made in excess of the amount due, as described in the Priority Health Recovery Policy and including but not limited to takebacks and retro terminations.

Section 1.4. Plan. "Plan" means a benefit plan for which Priority Health provides administrative services.

Section 1.5. Plan Sponsor. "Plan Sponsor" means an employer or other sponsor of a Plan that has financial responsibility to pay for the Covered Services.

2008 Standard Fee Agreement 032708