



**National Center for
Healthy Housing**

Creating healthy and safe homes for children through practical and proven steps.



Studying the Impact of Home Energy Work on Resident Health



Project Partners

- **Study Team:**
 - King County Housing Authority-Grantee
 - Public Health Seattle-King County
 - Highline School District, Puget Sound Educational Service District
 - Neighborhood House
 - National Center for Healthy Housing
- **Funder:**
 - HUD Office of Healthy Homes & Lead Hazard Control



Purpose of Study

1. Reduce asthma triggers in low-income households w/ ≥ 1 child w/asthma
2. Evaluate impact of energy upgrades on child asthma outcomes
3. Demonstrate that weatherization+asthma education more effective, longer-lasting impact on asthma than education alone.



Eligibility Criteria

- Live Highline School District/Intend to stay 1 yr
- Speak English, Spanish, or Vietnamese
- No mental or physical disability preventing participation
- Household safe for visitation
- No participation in other asthma programs past 3 years



**National Center for
Healthy Housing**

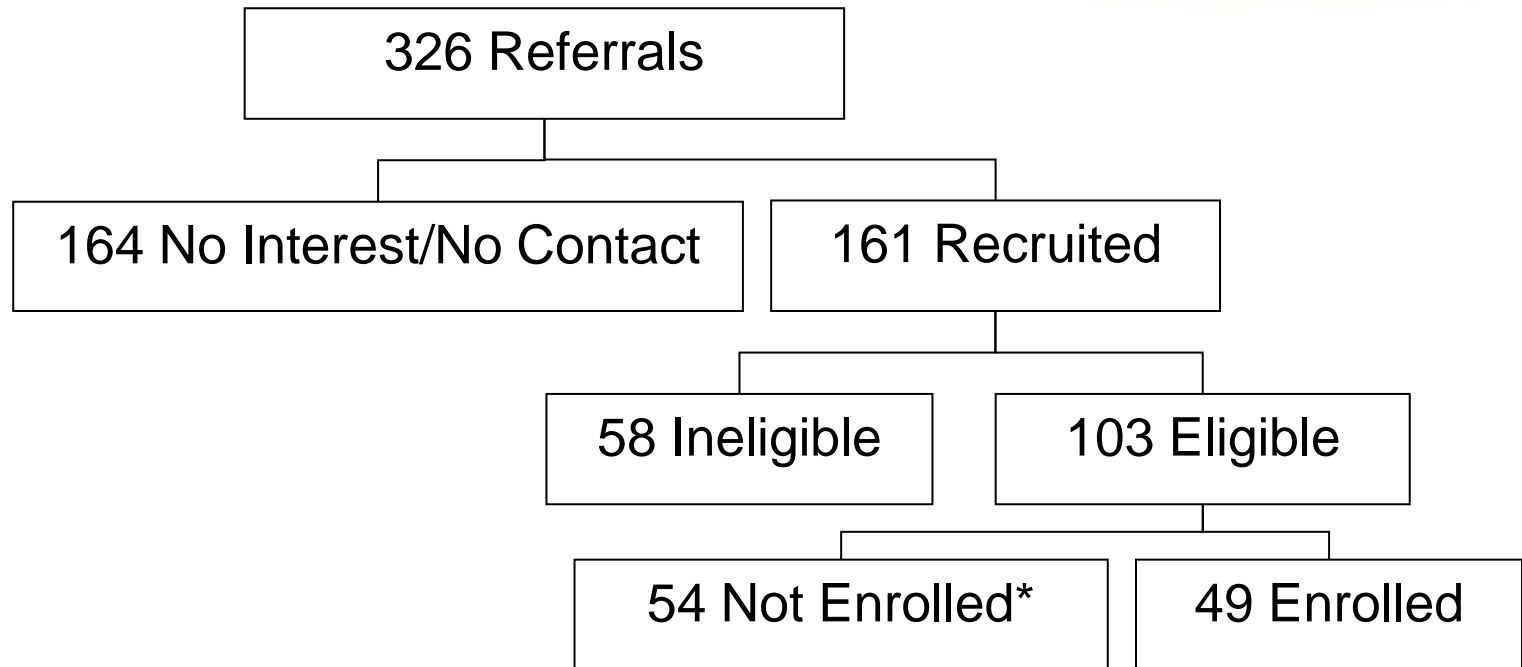
Creating healthy and safe homes for children
through practical and proven steps.

Eligibility Criteria, cont'd

- Not well/poor asthma control
- If renter, homeowner willing to participate
- Income eligible: both HUD (80% AMI) and federal weatherization funding (60% state median income/200% federal poverty)



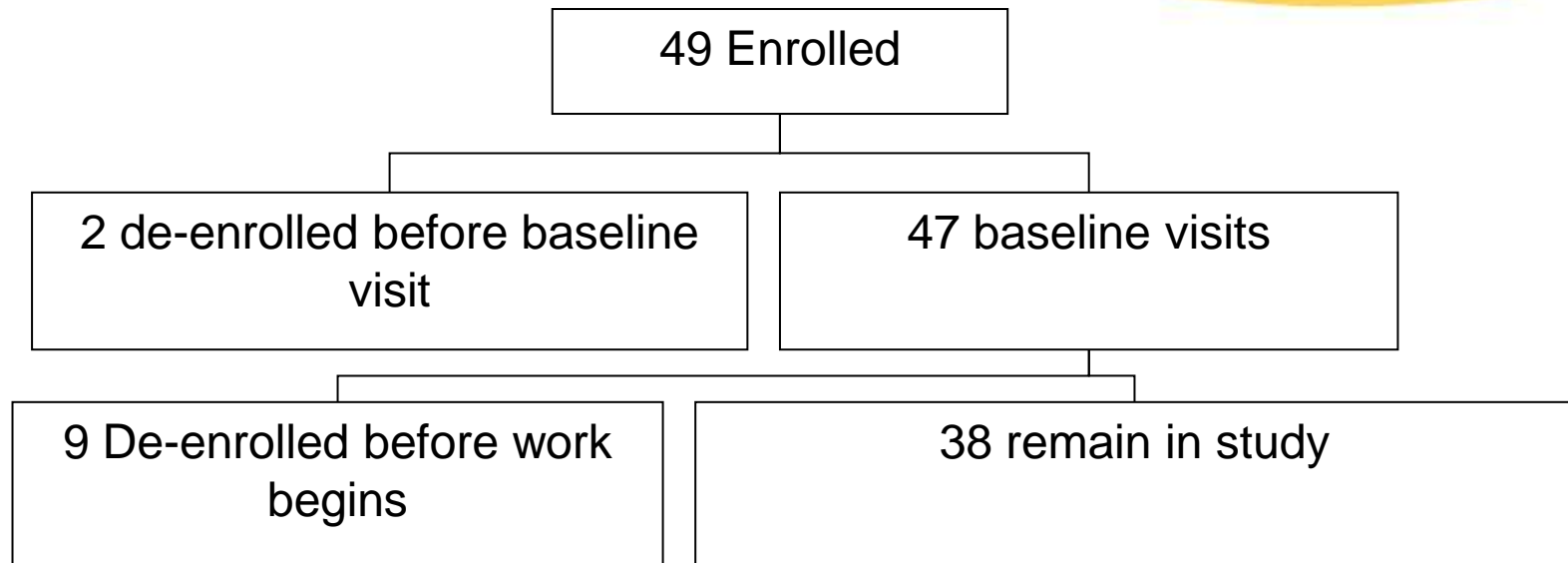
Recruitment



*8 Lost to follow-up; 6 Refused to continue; 24 not enrolled at study close; 16 unspecified reasons



Retention





Visits and Data Collection

Type of Data	Enroll Visit Mo 0	Visit 1 Mo 0.5	Visit 2 Mo 1	Visit 3 Mo 4.5	Exit Visit Mo 12
Signed Consent & HIPAA	X				
Home Environ Chklist	X				X
Health Interview Survey	X				X
Interior Sketch		X			
Allergen Sample Collection		X			X
Education/Supplies		X	X	X	
Weatherization Work Rpt					X



**National Center for
Healthy Housing**

Creating healthy and safe homes for children
through practical and proven steps.

Education Components & Supplies





Child Description

- 34% Hispanic, 19% Vietnamese, 19% Black, 11% White, 9% American Indian/Alaskan, 8% Other Race
- Mean Age: 8 years
- 64% Male
- 49% English, 34% Spanish, 17% Vietnamese
- Asthma Control Level: Not well-controlled or very poorly controlled



Baseline Housing Characteristics

- 57% Units Single Detached, 36% Apts w/ \geq 3 Units, 7% Duplex
- 11% Units Pre-50, 55% 1950-1969, 34% post-70
- 61% Units Rental
- 30% rooms w/visible mold



Weatherization+Health Work Summary (partial)

Top 5 HH Tasks		Top 5 Weatherization Tasks	
Bathroom fan timer	85%	Insulate hot water pipes	85%
Replace carpet	75%	Combustion safety test	45%
Replace bathroom fan	70%	Reduce air infiltration	45%
Install CO detector	45%	Install CFLs	40%
Install smoke detector	20%	Weatherstrip doors	35%



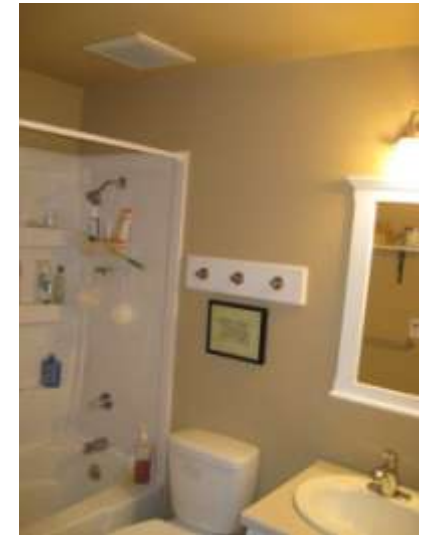
**National Center for
Healthy Housing**

Creating healthy and safe homes for children
through practical and proven steps.

Before



After





**National Center for
Healthy Housing**

Creating healthy and safe homes for children
through practical and proven steps.

Before



After





**National Center for
Healthy Housing**

Creating healthy and safe homes for children
through practical and proven steps.

Examples of New Flooring





Costs (\$/dwelling) (partial)

	Apartment			Single-Family		
	HH	Wx	Total	HH	WX	Total
Min	460	0	460	0	225	225
Med	2,414	1,357	3,888	2,330	7,097	10,587
Max	7,490	6,612	12,596	7,149	16,928	21,067



Construction Costs

- HUD-funded improvements cost more than originally anticipated due to:
 - Davis-Bacon wage rate requirements
 - Increased cost of healthy home improvements yielded more cost per dwelling
 - Lack of leveraged funding from other sources



Lesson Learned

- Difficult to coordinate weatherization yhat begins with children w/asthma
- Coordination of programs difficult but not insurmountable
- Teamwork and flexibility critical



Ongoing Work

- Finish weatherization work & educational/exit visits by end of summer
- Data analysis Fall 2011
- Draft manuscript Early 2012



**National Center for
Healthy Housing**

Creating healthy and safe homes for children
through practical and proven steps.

For More Information:

Jill Breyse	Joel Gregory	Miriam Philby
National Center for Healthy Housing	King County Housing Authority	Public Health- Seattle King County
jbreyse@nchh.org	joelg@kcha.org	Miriam.philby@kingcounty.org
443-539-4155	206-214-1249	206-263-8235
www.nchh.org	www.kcha.org	www.kingcounty.gov/healthservices/ health.aspx

Building America: The Non-Energy Requirements

Cheryn Engebrecht

National Healthy Homes Conference

June 21st, 2011

Denver, CO



What is ?

- Funded by the Department of Energy
- 15 industry/research teams
 - Lead by private companies, universities, and consulting firms
 - Team members include industry experts, utilities, manufacturers, research centers, builders, remodeling contractors, community organizations,
- Managed by the National Renewable Energy Lab
- Focus on building/retrofitting highly energy efficient homes

Building America: Performance Goals

	Source Energy Savings	Mixed/Hot-Dry and Marine	Mixed-Humid and Hot-Humid	Cold (Includes Cold, Very Cold, and Subarctic)
Existing Homes	Current “best in class” (15% or above)	2011	2011	2011
	30%	2012	2013	2014
	50%	2015	2016	2017

	Source Energy Savings	Mixed/Hot-Dry and Marine	Mixed-Humid and Hot-Humid	Cold (Includes Cold, Very Cold, and Subarctic)
New Homes	Current “best in class” (20% or above)	2010	2011	2011
	30%	2011	2012	2013
	50%	2014	2015	2016

Building America goals relative to BA [HSP](#) (about 2009 IECC)

Question for you:

What are the challenges
you might expect in trying to incorporate
healthy home requirements into a
nation wide, energy savings focused, program?

Existing Home Challenges

- Expense!!
- Government funded program must lead by example
- Responsibility of the Building America Team member to provide most up-to-date knowledge and expertise on specified issues
- Ultimately the homeowners responsibility to address the concerns of the Building America Team
 - If issues that affect tradesmen are not addressed, the team must walk away

General Non-Energy Requirements

- Cost effective
 - Marketable to the general public
 - Comparable in price to other homes in the area
- Healthy
 - Keep workers and homeowners free from sickness
- Durable
 - Moisture damage resistant
 - Quality construction

Existing Homes: Non-Energy Requirements

- Safe environment for the tradesmen, in the areas where retrofit work is being conducted
 - No sign of asbestos
 - No Mold/moisture damage
 - No lead paint
 - Low radon levels
- Safe for the homeowner
 - Closed combustion appliances
 - Low radon levels

Our “Insurance Policy”

- http://apps1.eere.energy.gov/buildings/publications/pdfs/building_america/participation_requirements_release.pdf

Retrofit Participation Requirements and Release

Building America Retrofit Participation Requirements and Release

(NOTE: THIS FORM HAS TWO SIDES. PLEASE BE SURE TO FILL OUT BOTH.)

The results of an initial inspection of each retrofit home in the Building America Program will populate this form. If "yes" is a response to any of the following questions, the participating homeowner shall be responsible to undertake appropriate mitigation of the health and safety issue. The "action taken" will be documented by the Building America Team member. The homeowner (or building owner in the case of retrofit on a central system in multifamily) shall approve each action and release responsibility from all other parties. By signing this document, the Building America Team member verifies the following checklist is filled out to the best of their knowledge.

Home's Identifier: _____ Year Built: _____

	YES	NO	Action Taken (including date)	Homeowner Approved Action
<p>Will asbestos be disturbed by conducting this retrofit work?</p> <p>- If present, homeowner is responsible for hiring a licensed professional to properly mitigate. (see below)</p>				
<p>Will lead be disturbed by conducting this retrofit work?</p> <p>- If present, homeowner is responsible for hiring a trained professional to evaluate potential for lead exposure and properly mitigate in accordance with 29 CFR 1926.62 as applicable. (see below)</p>				
<p>Are radon levels greater than or equal to 4 pCi/L in the home?</p> <p>- If present, homeowner is responsible for hiring a licensed professional to properly mitigate. (see below)</p>				
<p>Will knob and tube wiring be disturbed by conducting this retrofit work?</p> <p>- If present, homeowner is responsible for hiring a licensed electrician to properly mitigate. (see below)</p>				

Additional measures in combustion appliances shall not be disturbed.

- If present, homeowner is responsible for redirecting combustion to the exterior.

I, _____, a Building America Team member of the _____ team, (xxx) used my best judgment to identify health, safety and durability issues in this home and have documented the action taken to correct those issues:

Signature: _____ Form completion date: ___/___/___

BA Team Member Name (printed): _____

Alliance/NREL (Engbrecht) TSD

Retrofit Participation Requirements and Release

Building America Retrofit Participation Requirements and Release

Page 2

For each issue that requires a professional to mitigate/treat relevant areas, please provide the individual name and company of the professional hired to perform mitigation:

I, _____, an employee of _____,
am a(n) _____ (asbestos, mold, etc.) mitigation professional. I certify that I have
used the knowledge provided by this form and have done my job to the best of my ability.

Signature: _____ Date: ____/____/____

I, _____, an employee of _____,
am a(n) _____ (asbestos, mold, etc.) mitigation professional. I certify that I have
used the knowledge provided by this form and have done my job to the best of my ability.

Signature: _____ Date: ____/____/____

I, _____,
am a(n) _____
used the knowledge provided by this form and have done my job to the best of my ability.

Signature: _____

HOMEOWNER/BUILDING OWNER/BANK REPRESENTATIVE (Printed): _____

I, _____, HOMEOWNER/BUILDING OWNER/BANK REPRESENTATIVE (Printed): _____
RETROFIT OF MY HOME/BUILDING AND ACKNOWLEDGE THAT THE BUILDING AMERICA TEAMS, ASSOCIATED MEMBERS AND AFFILIATES, THE U.S. DEPARTMENT OF ENERGY, AND THE ALLIANCE FOR SUSTAINABLE ENERGY, LLC IN ITS CAPACITY AS MANAGER AND OPERATOR OF THE NATIONAL RENEWABLE ENERGY LABORATORY (COLLECTIVELY "BUILDING AMERICA PROGRAM CONSTITUENTS") WHO WILL CONDUCT ENERGY RETROFIT ACTIVITIES HAVE NO LIABILITY TO ME AS A PARTICIPATING HOMEOWNER/BUILDING OWNER/BANK REPRESENTATIVE AND I HEREBY RELEASE, INDEMNIFY, AND HOLD HARMLESS THE BUILDING AMERICA PROGRAM CONSTITUENTS FROM ALL RESPONSIBILITY AND LIABILITY FOR THE MITIGATION OF HEALTH AND SAFETY ISSUES IDENTIFIED BEFORE, DURING, OR AFTER COMPLETION AND ASSOCIATED WITH THE ENERGY RETROFIT OF MY HOME.

Homeowner/Building Owner/Bank Representative Signature: _____

Homeowner/Building Owner/Bank Representative Signature: _____

Alliance/NREL (Energy) T&C

HOMEOWNER/BUILDING OWNER (if retrofit work is on central system)/BANK REPRESENTATIVE (if bank owned) RELEASE AND ASSUMPTION OF RISK

I, _____, HAVE VOLUNTARILY AGREED TO PARTICIPATE IN AN ENERGY RETROFIT OF MY HOME/BUILDING AND ACKNOWLEDGE THAT THE BUILDING AMERICA TEAMS, ASSOCIATED MEMBERS AND AFFILIATES, THE U.S. DEPARTMENT OF ENERGY, AND THE ALLIANCE FOR SUSTAINABLE ENERGY, LLC IN ITS CAPACITY AS MANAGER AND OPERATOR OF THE NATIONAL RENEWABLE ENERGY LABORATORY (COLLECTIVELY "BUILDING AMERICA PROGRAM CONSTITUENTS") WHO WILL CONDUCT ENERGY RETROFIT ACTIVITIES HAVE NO LIABILITY TO ME AS A PARTICIPATING HOMEOWNER/BUILDING OWNER/BANK REPRESENTATIVE AND I HEREBY RELEASE, INDEMNIFY, AND HOLD HARMLESS THE BUILDING AMERICA PROGRAM CONSTITUENTS FROM ALL RESPONSIBILITY AND LIABILITY FOR THE MITIGATION OF HEALTH AND SAFETY ISSUES IDENTIFIED BEFORE, DURING, OR AFTER COMPLETION AND ASSOCIATED WITH THE ENERGY RETROFIT OF MY HOME.

Homeowner/Building Owner/Bank Representative Signature: _____ Date: ____/____/____

Homeowner/Building Owner Name/Bank Representative (Printed): _____

New Homes: Non-Energy Requirements

ENERGY STAR V3 Requirements

- Thermal Bypass Checklist (Energy)
- HVAC System Quality Installation Checklist (mostly energy)
- Water Management System Checklist (durability)
- Examples (paraphrased):
 - Ventilation system does not utilize outside air unless designed with motorized damper
 - Driveways, etc. sloped ≥ 0.25 in. per ft. away from home

New Homes: Non-Energy Requirements

Builders Challenge

- Indoor Air Quality (IAQ) requirements (health/safety)
- Materials & Moisture Management requirements (durability)
- Examples (paraphrased):
 - Fossil-fuel fired appliances in conditioned spaces must be sealed combustion, direct vented or power-vented.
 - When using water absorptive cladding, provide a pathway for bulk water that enters the wall assembly from the exterior and drains to the exterior.

Building America New Home Non-Energy Requirements

- Currently awaiting recommendations from a combined ENERGY STAR and Builders Challenge program

Questions?



Watts and Well-Being: *Energy Upgrades and Resident Health*

Yianice Hernandez
Deputy Director, Green Communities
June 21, 2011



Leading with Ideas
DEMONSTRATION THROUGH ACTION
Transforming with Capital
SUSTAINING THROUGH POLICIES AND PARTNERSHIP

Program Overview



Community Weatherization Partners, LLC

- Joint initiative of LISC and Enterprise with HPD support
- ***Goal: Weatherize 2143 affordable homes by August 2011***

Weatherization Scope of Work

- Ventilation clean seal and balance
- Smoke & carbon monoxide detectors installation as needed
- Test combustion appliances (stoves/ovens in units, boilers)
- Weather seal around doors and windows
- Lighting
- Refrigerator replacement
- Boiler clean and tune
- Piping insulation
- Aerators and low flow shower heads
- Roof insulation
- Window and Boiler replacements selectively

Study Overview

Watts to Well-Bring: Do Residential Energy Conservation Upgrades Improve Health?



Sponsored by HUD in collaboration with:

- National Center for Healthy Housing
- Action for Boston Community Development
- Center for Neighborhood Technology
- Tohn Environmental Strategies
- Enterprise Community Partners

Study Overview

Purpose of Study:

- Characterize effect of energy upgrades on resident health in affordable homes in three cities: Boston, Chicago and New York City.

Anticipated Outcomes:

- Improvements in self-reported health measures between baseline and post retrofit
- Changes in air concentrations of CO, CO₂, NO₂, and PM_{2.5} between baseline and post-retrofit

Data Collection Protocol

1. Recruitment
2. Enrollment and informed consent
3. Telephone survey health data collection
4. Energy upgrade data collection
5. Air sampling field data collection
6. Resident notification of air sampling results
7. Provision of compensation
8. Data submitted to NCHH



Recruitment Process

- Enterprise outreach staff provided information about the health study to residents.
- Once residents agreed to participate, they provided staff with their availability for a phone interview.
- Telephone survey firm contacted residents at specified times to formally enroll study participants, obtain informed consent, and administer interview.

GREEN & HEALTHY LIVING: **Watts-to-Well-Being**



If you join the **Watts-to-Well-Being** Project health study, you will gain an understanding of how energy efficiency upgrades improve your health. **And you get a \$50 money order!**

It's really easy and won't take much time. **Just answer two short phone surveys.** Some homes may be asked to allow testing of the air quality.

THE PHONE SURVEYS WILL TAKE PLACE ON THE FOLLOWING DATES:

There will be a representative in the building to tell you about the program. Look for a flyer in your mailbox on how to sign up.

If you would like to know more, contact
Yianice Hernandez with
Enterprise Community Partners
at 347 687 6034



This study is funded by the American
Energy Recovery
and Reinvestment Act of 2009

Resident Population

GREEN & HEALTHY LIVING:

Watts-to-Well-Being



Si usted participa en el estudio de salud **Watts-to-Well-Being**, comprenderá como la asistencia WAP que mejora la eficiencia energética de su hogar también puede mejorar su salud. **¡Y también recibirá un giro postal de \$50!**

Participación es fácil y no se demora mucho tiempo. **Sólo tiene que completar dos encuestas telefónicas.** Se le puede pedir a algunos hogares permiso para llevar a cabo exámenes de calidad del aire.

LAS ENCUESTAS TELEFÓNICAS OCURRIRÁN EN LAS SIGUIENTES FECHAS:

Un representante estará presente en su edificio para contarle más sobre el estudio. Busque en su buzón de correo para más información sobre como inscribirse.

Si quiere saber más, comuníquese con:
Yankee Homesites
Enterprise Community Partners
347 687 6034



Экологическая & Здоровая Жизнь

Watts-to-Well-Being



Примите участие в проекте **Watts-to-Well Being** исследование здоровья и вы узнаете как использование эффективной энергии улучшит ваше здоровье. **К тому же вы получите купон на \$50 в подарок!**

Это очень просто и не займет много времени. **Просто примите участие в двух телефонных опросах.** Возможно вас попросят разрешить протестировать качество воздуха в вашей квартире.

Телефонные опросы будут проводиться в следующие дни:

В здании будет присутствовать наш представитель который расскажет вам подробнее о программе Watts-to-Well-Being. Листок с объяснением как записаться и принять участие вы найдёте в вашем почтовом ящике.

Если вы хотите узнать больше, вы можете связаться с Янне Харнадак в Enterprise Community Partners по телефону 347 687 6034



푸르고 건강한 생활

Watts-to-Well-Being



Watts-to-Well-Being 프로젝트의 건강연구에 참여하면 에너지효율개선이 당신의 신체건강증진에 얼마나 유익한지에 대한 이해를 얻게 될 것입니다. **그리고 \$50도 받으세요!**

참여 방법은 매우 간단하며 시간도 별로 소요되지 않습니다. **두 개의 짧은 전화 설문에 응답하시면 됩니다.** 일부 가정은 집안 공기 질 측정을 허락해 달라는 요청을 받을 수도 있습니다.

전화 설문은 아래의 날짜에 열람 예정입니다.

빙딩으로 본 프로그램에 대하여 설명해 주는 대표자가 미강될 예정입니다. 우편함에서 참여 방법에 대한 설명이 나와 있는 천단지를 찾아 보세요.

본 프로그램에 대해 더 자세히 알고 싶다면,
Enterprise Community Partners, 의
Yankee-Homesites에게 연락주세요.
전화: 347 687 6034



Resident Population Detail

- 60% Spanish-speaking residents
- Very low-income individuals and families
- Enrolled households are include family and senior properties



Air Sampling Data Collection

- Conducted sampling in a subset of 10% of homes
- Tested for CO, CO₂, NO₂, and PM_{2.5}
 - Kitagawa detector tubes & pump for CO, CO₂, and NO₂
 - Personal dataRam™ 1200 for PM_{2.5}
- Collected samples from middle of kitchen
- Resident received a signed copy of results

GREEN & HEALTHY LIVING:
Healthy Living



EASY IMPROVEMENTS FOR YOUR HOME

Prepared for Enterprise Community Partners



How Can We Reduce Asthma Triggers?

Pests

- Report pest problems
- Use good housekeeping
- Cooperate with pest professionals



Moisture & Mold

- Report leaks (plumbing, roof, toilets)
- Use bath & kitchen fans



Smoke Free Housing

- Explore smoke free policies
- Start with a tenant survey





DID YOU NOTICE OUR NEW LIGHT BULBS?

Not only do they look different but they consume less than 25% of electricity than other bulbs. *Change your lightbulbs to save energy & money.*



HAVE YOU NOTICED THAT OUR LIGHTS ARE DIFFERENT?

We changed out the lightbulbs on our hallways to conserve energy. They dim when no one is in the room and *light up* as you walk by.



AVOID CLUTTER & WASTE WHILE SAVING THE ENVIRONMENT!

Drop your junk mail by registering on our website or by calling 1-800-455-6263. You can also drop it off at a firm and address from our list of participating firms. Every manager to send a letter.



EVERY DROP COUNTS!

Showered your shower by a minute or two and you'll **SAVE UP TO 180 gallons** per month while helping your building save money.



CONTRIBUTE TO YOUR COMMUNITY'S HEALTH

Your neighbors are helping by **recycling**. You can help too by disposing of your trash properly and **maintaining a clean environment**.



AVOID PESTS!

Prevent pests by removing food waste, standing water and clutter in your home.



DID YOU NOTICE THE FRESH PAINT AND NEW CABINETS?

Your walls and cabinets have been upgraded using **LOW VOC** material so you can now breathe easier!



HAVE YOU USED THE STAIRS LATELY?

Try using the stairs instead of the elevator and improve your health while conserving energy.





**STOP CLUTTER & WASTE WHILE
HELPING THE ENVIRONMENT!**

STOP junk mail by registering on
www.dmachoice.org/dma/member/regist.action,
or pick up a form and address from
the property manager to send a letter.



Next Steps

- Re-engage with residents for post-weatherization interviews
- Conduct statistical analysis and share results with study teams
- Publish Study Results
- ***Goal: Health improvements may help to stimulate further investment in energy conservation work***



Thank you!



For more information:

Website: www.greencommunitiesonline.org

Mailbox: greencommunities@enterprisecommunity.org