

PRELIMINARY
FINDINGS:
NON-ENERGY
IMPACTS (NEIS) OF
WEATHERIZING
AFFORDABLE
MULTIFAMILY
HOUSING

Bruce Tonn
Three³, Inc.

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- The JPB Foundation & Utility Energy Efficiency Program Administrators in Massachusetts

Key Team Members

- Three³ – Bruce Tonn, Beth Hawkins, Erin Rose, Michaela Marincic
- Seventhwave – Claire Cowan, Scott Pigg, David Vigliotta & many others
- NMR – Greg Clendenning, Nicole Rosenberg, Christina Smaglia & many others
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Contributors

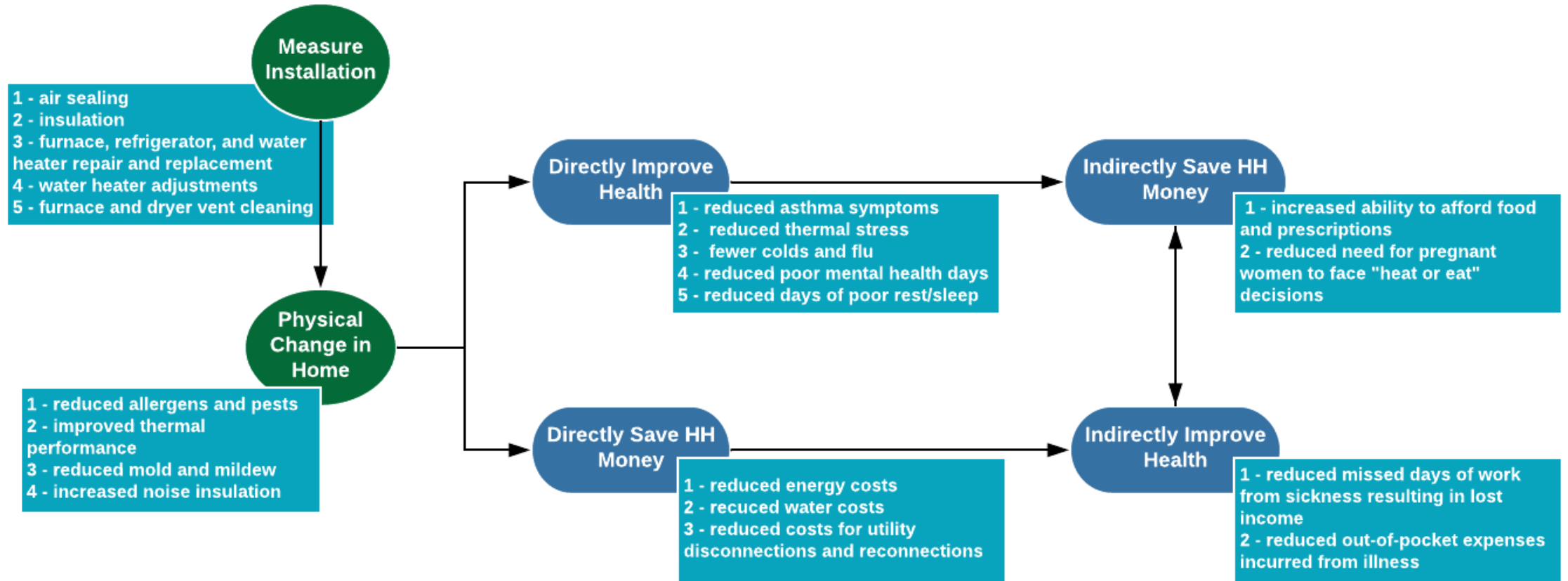
- Weatherization Agencies (e.g., CEDA, La Casa, Project Home, Racine Kenosha CAA, AEA, NMIC, SPRC, ABCD, Action Inc.)
- Building Owners (e.g., LUCHA, Mercy Housing, Related Midwest)
- Utilities (e.g., National Grid, Eversource)
- State Weatherization Offices (e.g., WI, VT, NH)
- Energy Efficiency For All State Leads & others in the affordable housing sector

OUTLINE

- Research Overview
- Research Design
- Preliminary Survey Findings*
 - Sample Characterization
 - Health Impacts
 - Budget Impacts

* Note: Results presented herein are based on preliminary analysis of mid-stream survey data. Final results will almost certainly vary. Please do not cite figures from this presentation in formal reports, papers or presentations.

How Weatherization Can Yield Health Impacts



Additional Considerations:

- 1 - Households in better financial condition may be able to forego predatory loans, which further decreases financial strains.
- 2 - Improvements in health and finance may improve mental health, which may lead to further health improvements.

RESEARCH PROJECT ESSENTIALS

- **Goals:**
 - Estimate the health & household related NEIs attributable to weatherizing affordable multifamily (MF) buildings
 - Impact policy—increase funding allocations for income-eligible utility and/or weatherization programs providing services to our vulnerable populations
- **Hypothesis:** single-family (SF) weatherization NEI estimates cannot be generalized to the MF sector
 - Different demographics
 - Different measures installed
 - Building envelopes behave differently
- **Sample:** MF buildings with 5+ units located in MA, NYC, IL, WI, RI, VT
- **Recruiting buildings that:** have already been weatherized, will soon be weatherized, and will not be weatherized, referred to as:
 - CwT- Comparison with Treatment (Weatherized)
 - T - Treatment (Unweatherized)
 - C - Control (Unweatherized)



MAJOR STUDY COMPONENTS

- **RS (Resident Survey):** addresses health, budget, apartment conditions, social community resilience
- **PM (Property Manager) Survey:** addresses building systems resilience
- **PO (Property Owner) Interview:** discusses weatherization programs: process, strengths and weaknesses
- **Data With a Soul (DWaS):** documents personal experiences
- **Monetization of Non-Energy Impacts (NEIs):** health and household related NEIs, at the household and societal levels



PROJECT STATUS

- Phase I (baseline) survey data collection is ongoing and will continue through February 2019, possibly through April 2019
- Phase II (post-weatherization) data collection will resurvey the T and C groups only, starting fall 2019 and extending to March 2020
- Preliminary results presented herein are based on 185 buildings and 1,325 completed surveys
- Statistical results presented are comparisons between the weatherized (CwT) group and the unweatherized (a combined T+ C) group for a cross-sectional analysis



BUILDING THE SAMPLE FRAME

- **Challenge**

- No national or regional affordable MF building database
- No national or regional database of affordable MF buildings already or about to be weatherized

- **Research Approach**

- Convenience sampling
- Reached out to over 100 organizations & individuals (Summer 2017 – present)
 - State and local weatherization agencies, utilities, building owners (non-profit and commercial), other interested parties (e.g., Energy Efficiency for All (EEFA) state leads)
- Recruiting property owners to participate in the study was much more difficult and time consuming than expected
- Number of buildings in the queue for weatherization was much lower than expected (we are not in the ARRA period anymore!)
- Expect to enlist more treatment buildings from NYC, IL, WI, NH, and maybe PA through Feb/March 2019



ADMINISTERING THE RESIDENT SURVEY

- **Challenge**

- No contact information for occupants

- **Research Approach**

- Send in-field staff to each sample building to:
 - Deliver survey packets with unique ID #s (3 models: leave on door, knock on door, or distribute surveys at resident meetings)
 - Utilize digital data collection tool to link each survey ID # with unit and building level data
- Survey packets contain: survey booklet, cover letter, project description, informed consent and postage paid envelope
- Multi-lingual surveys available: English, Spanish, Russian and Mandarin
- Surveys also offered via phone and web
- \$25 Target/Kroger/Shaw's gift card as incentive (both residents and PMs)
- To date, the team has distributed ~ 6,160 survey packets
- Response rate of 25.8% is slightly below our anticipated response rate of 33.3%



Demographics of Resident Survey Respondents

	Weatherized (CwT) (n=434)	Unweatherized (T) (n=253)	Unweatherized (C) (n=638)
Respondent Age (mean)***	63	56	58
Gender (female) (**)	65%	64%	54%
Primary Wage Earner Employed (%)	21%	26%	23%
Primary Wage Earner Retired (%)	56%	38%	42%
Household Size (mean)	1.4	1.7	1.4
Single Person Household (%)	75%	62%	80%
Respondent Education (%)			
No high school diploma	22%	37%	18%
High school graduate	34%	32%	36%
Some college	22%	18%	25%
College graduate	23%	25%	21%
Race/Ethnicity (%)			
Hispanic or Latino Origin (**)	12%	43%	8%
White (***)	55%	39%	35%
Black or African-American (***)	27%	25%	54%
Asian (***)	9%	0%	1%
Native Hawaiian/other Pacific Islander	1%	1%	1%
Other (if volunteered)	5%	15%	7%
Refused/Missing	12%	30%	10%

* Difference is statistically significant at the p<.05 level.

** Difference is statistically significant at the p<.01 level.

*** Difference is statistically significant at the p<.001 level.

DWELLING QUALITY AND SAFETY

Resident Survey Question	Weatherized (CwT)	Unweatherized (T + C)	(+/-)
How much outdoor noise do you hear indoors when the windows are closed? (A great deal)	17.2% (n=412)	22.2% (n=863)	-5.0%*
How much does outdoor noise interfere with your sleep at night? (Extremely, very much)	12.4% (n=339)	16.1% (n=719)	-3.7%
How much does outdoor noise bother, disturb or annoy you when you are inside your apartment? (A great deal or moderately)	29.0% (n=372)	33.6% (n=766)	-4.6%
How often do you smell odors from outside your home when the windows are closed? (Very, fairly often)	12.0% (n=383)	17.5% (n=779)	-5.5%*
How concerned are you about the quality of water coming from the faucets inside the apartment? (Concerned, very concerned)	32.9% (n=374)	38.5% (n=756)	-5.6%
How bright or dark is the outside property of your building? (somewhat dark, very dark)	12.2% (n=411)	16.8% (n=834)	-4.6%*
How safe do you feel on your building's property? (somewhat unsafe, very unsafe)	8.1% (n=417)	12.4% (n=855)	-4.3%*

* Difference is statistically significant at the p<.05 level.

** Difference is statistically significant at the p<.01 level.

*** Difference is statistically significant at the p<.001 level.

ASTHMA

Resident Survey Question (Answers provided are from Main Respondent Only)	Weatherized (CwT)	Unweatherized (T + C)	(+/-)
Have you ever been told by a doctor or other health professional that you have asthma? (lifetime asthma) (Yes)	25.8% (n=419)	25.6% (n=866)	
Do you still have asthma? (current asthma) (Yes)	22.7% (n=419)	21.7% (n=866)	
How long has it been since you last had any symptoms of asthma? (< 3 months ago)	66.7% (n=90)	62.6% (n=174)	+4.1%
During the past 3 months, how many flare-ups did you have? (mean)	5.2 (n=64)	7.0 (n=118)	-1.8
During the past 12 months, how many times did you visit an urgent care center because of asthma? (mean)	0.8 (n=65)	1.1 (n=118)	-0.3
During the past 12 months, how many times did you have to stay overnight in the hospital because of asthma? (mean)	0.3 (n=64)	0.6 (n=125)	-0.3
During the past 12 months, how many times did you visit the ED because of asthma? (mean)	0.4 (n=58)	1.2 (n=114)	-0.8**

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THERMAL STRESS

Resident Survey Question	Weatherized (CwT)	Unweatherized (T + C)	+/-
During the past 12 months, how often was your apartment at a temperature that you felt was <u>unsafe or unhealthy</u> ? (almost every month or some months)	16.2% (n=421)	25.9% (n=872)	-9.7%***
Thermal Stress - Cold			
During the past 12 months, has anyone in the household had to stay overnight in the <u>hospital</u> because your apartment was <u>too cold</u> ? (yes)	0.4% (n=409)	1.3% (n=849)	-0.9%
Not counting hospitalizations, during the past 12 months, did anyone in the household go to the <u>emergency room</u> at a hospital because your apartment was <u>too cold</u> ? (yes)	0.7% (n=404)	1.9% (n=843)	-1.2%
During the past 12 months, did anyone in the household have to visit a <u>doctor's office</u> because your apartment was <u>too cold</u> ? (yes)	1.7% (n=409)	3.7% (n=842)	-2.0%*
Thermal Stress - Hot			
During the past 12 months, has anyone in the household had to stay overnight in the <u>hospital</u> because your apartment was <u>too hot</u> ? (yes)	0.1% (n=411)	0.4% (n=855)	-0.3%
Not counting hospitalizations, during the past 12 months, did anyone in the household go to the <u>emergency room</u> at a hospital because your apartment was <u>too hot</u> ? (yes)	0.7% (n=407)	0.8% (n=841)	-0.1%
During the past 12 months, did anyone in the household have to visit a doctor's office because your apartment was <u>too hot</u> ? (yes)	1.0% (n=410)	1.8% (n=846)	-0.8%

* Difference is statistically significant at the p<.05 level. ** Difference is statistically significant at the p<.01 level. *** Difference is statistically significant at the p<.001 level.

CHANGES IN HEALTH CONDITIONS

Resident Survey Question	Weatherized (CwT)	Unweatherized (T + C)	(+/-)
In the past 12 months, did anyone in the household see a medical professional because of CO poisoning? (Yes)	1.0% (n=410)	0.6% (n=849)	+0.4%
In the past 12 months, how many individuals needed medical attention because of fire-related injuries such as burns or smoke inhalation? (mean)	0.02 (n=337)	0.03 (n=694)	-0.01
In the past 12 months, about how many days of work did the primary wage earner miss because of illness or injury? (mean)	8.2 (n=66)	6.8 (n=145)	+1.4
In the past 12 months, about how many days of work did the primary wage earner miss because of illness or injury of another household member? (mean)	0.6 (n=56)	0.7 (n=113)	-0.1
During the past 30 days, for about how many days have you felt you did not get enough rest or sleep? (mean)	6.6 (n=326)	7.1 (n=662)	-0.5
During the past 30 days, for about how many days was your mental health not good? (mean)	5.0 (n=321)	6.2 (n=657)	-1.2*
During the past 30 days, for about how many days did poor physical or mental health keep you from your usual activities? (mean)	4.4 (n=318)	4.9 (n=649)	-0.5

* Difference is statistically significant at the p<.05 level.

** Difference is statistically significant at the p<.01 level.

*** Difference is statistically significant at the p<.001 level.

CHANGES IN HEALTH CONDITIONS (Cont.)

Resident Survey Question	Weatherized (CwT)	Unweatherized (T + C)	(+/-)
Have you ever been told by a doctor or other health professional that you have COPD? (lifetime COPD) (Yes)	15.5% (n=394)	14.3% (n=847)	
Did you have to visit an emergency room or be admitted to a hospital in the past 12 months because of your COPD, chronic bronchitis, or emphysema? (Yes)	24.6% (n=61)	28.9% (n=114)	-4.3%
Have you ever been told by a doctor or other health professional that you have diabetes? (lifetime diabetes) (Yes) *	28.3% (n=407)	24.0% (n=843)	
How long has it been since you last had any symptoms of diabetes? (< 3 months ago)	41.4% (n=111)	52.7% (n=186)	-11.3%
Have you ever been told by a doctor or other health professional that you have arthritis? (lifetime arthritis) (Yes) *	53.1% (n=414)	46.3% (n=854)	
During the past 12 months, how many times did you have to visit an urgent care center because of arthritis? (mean)	0.85 (n=40)	1.50 (n=86)	-0.65*

* Difference is statistically significant at the p<.05 level.

** Difference is statistically significant at the p<.01 level.

*** Difference is statistically significant at the p<.001 level.

ENERGY AFFORDABILITY AND TRADE-OFFS

Resident Survey Question	Weatherized (CwT)	Unweatherized (T + C)	(+/-)
During the past 12 months, received disconnect, shut-off or non-delivery notice? (Almost every month, some months)	10.2% (n=225)	11.3% (n=387)	-1.1%
During past 12 months, electricity or natural gas was disconnected because unable to pay home energy bill?	1.9% (n=259)	4.3% (n=447)	-2.4%
Did household receive energy assistance this past year?	30.6% (n=242)	35.4% (n=427)	-4.8%
How hard is it to pay energy bills? (Very hard or hard)	29.2% (n=226)	37.4% (n=385)	-8.2%*
During the past 12 months, how often did your household not purchase food in order to pay energy bill? (Every month, every other month)	3.6% (n=248)	7.5% (n=411)	-3.9%*
During the past 12 months, was there any time your household members needed prescription medicines but didn't get them because you couldn't afford it? (Yes)	9.4% (n=394)	15.3% (n=836)	-5.9%**
During past winter, worried would not have electricity or heating? (Yes)	16.5% (n=248)	19.5% (n=431)	-3.0%
During the past winter, how often did you use your oven to heat your home? (All of the time, frequently, or sometimes)	14.1% (n=410)	23.2% (n=835)	-9.1%***
Do you use any (secondary) heating equipment in your home? (Yes)	21.8% (n=431)	29.0% (n=886)	-7.2%**

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CONCLUDING THOUGHTS

- Initial analysis does suggest that there are substantial demographic differences between recipients of weatherization who live in SF homes versus MF buildings.
- Numerous challenges conducting research in the affordable MF building sector have been successfully managed.
- Preliminary results support the general hypothesis that weatherization can improve the health and well being of occupants.
 - Asthma, thermal stress, mental health, arthritis, noise, odors, safety, energy affordability
- It is expected that the number of Treatment buildings and completed surveys will appreciably increase over the next several months.
- The biggest uncertainty in Phase II pertains to the response rate for the Resident Survey.

Note: Results presented herein are based on preliminary analysis of mid-stream survey data. Final results will almost certainly vary. Please do not cite figures from this presentation in formal reports, papers or presentations.

NEXT STEPS

- Continue Phase I through Feb. 2019
- Begin Phase II Summer/Fall 2019
- Implement other tasks:
 - Data With a Soul
 - Property Owner Interviews

Contact:

Dr. Bruce Tonn, President, Three³, Inc.

btonn@threecubed.org

www.threecubed.org

Knoxville, Tennessee, USA

865-963-3254

THANK YOU!!