

Ohio Residential Energy Assistance Challenge Option Program (REACH)

Final Evaluation Report

**Prepared for the Ohio Department of
Development, Office of Community Services**



June 2010

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Executive Summary

This report presents findings from the evaluation of The Ohio Residential Energy Assistance Challenge Option Program (REACH) Project. The Ohio REACH project targets additional resources to low-income weatherization to go beyond energy use and energy bill reduction and more comprehensively address the needs of low-income households. This project sends energy professionals and health professionals to the homes of clients at the same time. Each professional is responsible for conducting an assessment of the needs in the home. Together, they prioritize the health and energy investments so that they complement each other, rather than work at cross purposes. The outcome of the program should be that the household energy systems are able to deliver the energy services needed by the home in a way that is energy efficient and healthy. The goal is to ensure that all households that have vulnerable individuals who receive services through the weatherization program will have adequate energy services and a healthier home environment after the completion of service delivery.

Evaluation

There are three primary goals of the evaluation.

1. **Documentation:** The evaluation documents how the program was implemented so that the pilot can be adapted and implemented as a new statewide approach to low-income energy assistance.
2. **Impact measurement:** The evaluation assesses the impact of the program on the health and safety of the home environment, the health and energy-related behaviors of the household members, and the health status of the household members.
3. **Recommendations:** The evaluation provides recommendations for statewide program implementation.

The evaluation consists of both process and impact evaluation research.

1. **Process Evaluation Research:** This research documents how the activities were implemented and develops a comprehensive understanding of barriers to implementation and potential modifications that would allow for improved execution or enhanced outcomes.
2. **Outcome Evaluation Research:** This research measures the impact of the services provided on the safety of the household environment and the health of the occupants.

Program Design

ODOD supports an extensive training program for Ohio weatherization providers. As part of that training, HWAP inspectors and work crews are trained to recognize conditions in the

home that may negatively impact the health of the occupants and health and safety issues that relate to combustion appliances. They are trained to modify weatherization measures to ensure that they do not introduce health problems as a result of the installation of energy efficiency measures in the home. However, these individuals do not have the comprehensive understanding of health issues that a health professional would.

This project sends energy professionals and health professionals to the homes of clients at the same time. Each professional is responsible for conducting an assessment of the needs in the home. Together, they prioritize the health and energy investments so that they complement each other, rather than work at cross purposes. The outcome of the program should be that the household energy systems are able to deliver the energy services needed by the home in a way that is energy efficient and healthy.

A second innovation of this project is the direct installation of measures that go beyond those health and safety measures that are allowable under the HWAP program. Under the existing DOE rules, HWAP can install some measures that enhance the health and safety of the home. However, the primary focus of HWAP is saving energy; it cannot devote the level of attention to the indoor environment that is appropriate for these vulnerable households. In this pilot project, a health professional can explicitly look at the home in terms of its environmental risks and identify the key risks that need to be mitigated to create a healthy home.

The short term goal of the project is to enhance the health of vulnerable individuals served by the pilot program. This will be accomplished by assessing the health needs of individuals receiving weatherization services, prioritizing weatherization measures to best meet the energy and health needs of the households, funding supplemental measures that can reduce or eliminate environmental risks in the home, establishing a partnership with the household to take actions and develop behaviors to improve the health for vulnerable individuals, and leveraging other available resources to mitigate environmental health risks in the home.

The long term goal of this project is to develop a model for the Ohio energy programs that furnishes funding for supplemental measures to improve indoor environments for low-income households with vulnerable individuals, establishes protocols for weatherization measure selection and consumer education when services are delivered to homes that have vulnerable individuals, and establishes linkages between energy service delivery agencies and the agencies that can assist with environmental health risks for clients.

Program Implementation

This section describes how the program was implemented, challenges that were faced, and program accomplishments.

Program Challenges

The Ohio REACH project was developed to test a specific program design, as described above. The project's focus was on delivering weatherization to vulnerable households and households with serious health conditions in a manner that more effectively addressed their needs. The key to the program design was a new model for service delivery with some additional funds for key health measures, rather than on a large additional funding method for addressing all potential issues in the home.

Program partners were not comfortable with this approach to service delivery. Based on their experience with a HUD healthy home program, they felt it was not feasible to address issues in the home with this level of funding. Their previous program delivery was focused on comprehensively addressing the home health issues, and they would not approach this project as a new model for service delivery. To allow for greater costs of program measures, the REACH program dollars, with approval from HHS, were reprogrammed to increase the average home spending and reduce the number of treated homes.

Additionally, there was a concern that the REACH program was not always delivered in conjunction with HWAP, as designed, but as a post-HWAP service delivery system to provide additional services that HWAP could not provide. Conversations with managers at the lead agencies revealed that each household is treated in a somewhat different manner, so it was difficult to quantify the extent to which service delivery was implemented in this manner.

Service Delivery

The major issues that the agencies have found during the program visits included:

- Minor home repairs that lead to excess moisture
- Plumbing leaks
- Water leakage through basement walls
- Duct work
- Mold in the basement
- Wet insulation
- Gutters/downspouts that are improperly positioned
- Gutters that not properly installed or joints that are not sealed
- Lack of exhaust fans.
- Material in basements
- Lack of air conditioning in homes with elderly household members
- Air conditioning that needs repair or replacement
- Roofs that need to be fixed or replaced

According to the lead agency managers, the REACH program worked well. While, it took some time for the agencies to develop the many partnerships that they needed, the partnerships eventually were worked out, and served the program quite well. The REACH

program allowed the agencies to help households in ways that other programs had not allowed. The managers expected to see changes in air quality, and resulting changes in occupant health, as result of the additional services.

Program Accomplishments

While the REACH program faced many challenges and the service delivery was not implemented according to original plans, there were several accomplishments.

- *Service delivery:* 180 homes received REACH services.
- *Underserved households:* The lead agencies noted that the Ohio REACH program allowed them to serve households that otherwise could not receive weatherization.
- *Program coordination:* The Cleveland Housing Network and the Breathing Association both worked diligently to leverage funds from all available programs and provide comprehensive services to REACH participants.
- *New partnerships:* In addition to leveraging funds, the REACH program also leveraged human capital to help assist the households served by the program.
- *Capacity building:* Weatherization and health staff worked together to conduct joint assessments of the needs of participating households. This cooperation helped to build the skills of both groups.

Program Costs and Measures

Table ES-1 summarizes the average job costs that were funded through REACH and the total job costs. REACH provided about half of the funding for the job costs. The rest of the funding was provided through WAP, utility program funding, and other local resources.

Table ES-1
Program Cost Summary

	All Jobs	CHN Jobs	BA Jobs
Mean REACH Costs	\$2,629	\$3,523	\$1,715
Mean Total Costs	\$4,933	\$6,451	\$3,382
% REACH Funding	53%	55%	51%

Table ES-2 displays information on measures that were installed in more than half of the REACH jobs. The measures that were primarily funded through REACH are highlighted. As planned, these are the health and safety-related measures that include exhaust fans, HEPA air filters, gutter or downspout repair, and environmental cleanings. The typical weatherization measures, such as air sealing and insulation, were primarily funded through WAP.

**Table ES-2
Common Job Measures**

	All Jobs				
	Measure Installed		Funding		
	#	%	REACH	WAP	Other
Caulking & weather-stripping	139	79%	3%	93%	6%
Blower door guided air sealing	141	80%	1%	92%	7%
Non blower door guided air sealing	168	95%	1%	93%	7%
Duct sealing & repair	110	63%	2%	90%	9%
Attic Insulation	151	86%	1%	93%	7%
Wall Insulation	130	74%	0%	94%	7%
Exhaust Fan in Bathroom	99	56%	73%	16%	11%
HEPA Air Filter	91	52%	92%	6%	2%
Attic Ventilation	98	56%	0%	84%	14%
Smoke Alarm	88	50%	2%	14%	86%
CO Monitor	96	55%	7%	85%	7%
Gutter or Downspout Repair	96	55%	89%	7%	4%
Environmental Cleaning	124	70%	99%	0%	1%

Client Survey

A pre/post survey was included in the evaluation plan to assess the impact of the program. APPRISE attempted to conduct pre-treatment surveys with all clients prior to the delivery of any program services, and post surveys with clients one year later, whether or not they had been treated by the program. Because home conditions are related to the weather and the time of the year, it was important that these surveys be conducted at approximately the same time of year.

Managers at the Breathing Association and at Cleveland Housing Network sent APPRISE clients who were prescreened for services, APPRISE conducted the surveys, and then informed the agencies that the clients had been surveyed so that program service delivery could begin.

Table ES-3 displays key results from the pre post client survey. The gross changes for the treatment and comparison groups that are statistically significant are highlighted. The table shows that the treatment group had significant improvements in home safety, healthy home behaviors, mold, pests, humidity, household health, home comfort, and winter and summer temperatures. Net changes were statistically significant with respect to unsafe home conditions, healthy home behaviors, mold, humidity, home comfort, winter drafts, and summer home temperature. However, the program did not appear to impact specific health conditions, such as asthma, allergies, and bronchitis.

Table V-15
Summary

	Treated Clients (N=93)			Untreated Clients (N=59)			Net Change (Percentage Points)
	Pre	Post	Change (Percentage Points)	Pre	Post	Change (Percentage Points)	
Reported unsafe or unhealthy home condition	85%	38%	47**	80%	59%	21**	26**
Unsafe condition (unprompted) - mold	55%	16%	39**	49%	20%	29**	10
Unsafe condition (unprompted) - drafty	18%	6%	12**	15%	15%	0	12**
Smoke in home	27%	26%	1	22%	27%	-5	6**
Do not use exhaust fan when showering	58%	34%	24**	73%	75%	-2	26**
Do not use exhaust fan when cooking	57%	46%	11*	59%	54%	5	6
Warm up car in garage	4%	5%	1	0%	2%	2	-1
Use kitchen stove or oven to heat home	37%	8%	29**	32%	25%	7	22**
Any mold	69%	27%	42**	63%	39%	24**	18*
Mold in kitchen	5%	3%	2	10%	7%	3	-1
Mold in bathroom	42%	13%	29**	37%	20%	17**	12#
Mold in basement	51%	15%	36**	47%	29%	18**	18*
Pests	69%	51%	18**	71%	54%	17**	1
Used baits or poison	53%	33%	20**	53%	36%	17**	3
Poison still in home	20%	15%	5	25%	12%	13**	-8**
Summer home humidity – just right	22%	53%	31**	27%	46%	19**	12
Winter home humidity – just right	22%	44%	22**	25%	34%	9	13#
Has asthma	56%	53%	3	58%	53%	5	-2
Asthma – visited doctor	49%	45%	4	53%	47%	6	-2
Asthma – visited emergency room	22%	20%	2	25%	24%	1	1
Allergies	70%	66%	4	73%	63%	10	-6
Allergies – medicine	52%	49%	3	61%	47%	14*	-11*
Allergies - symptoms	76%	59%	17**	81%	58%	23**	-6
Bronchitis or lung disease	43%	41%	2	47%	42%	5	-3
Bronchitis – visited emergency room	18%	16%	2	24%	14%	10*	-8*
Household health – somewhat or very healthy	48%	64%	16**	44%	56%	12#	4

	Treated Clients (N=93)			Untreated Clients (N=59)			Net Change (Percentage Points)
	Pre	Post	Change (Percentage Points)	Pre	Post	Change (Percentage Points)	
Home comfort – somewhat or very comfortable	69%	87%	18**	72%	80%	8	10 [#]
Drafty in winter	83%	52%	31**	76%	66%	10	21**
Cannot heat home to comfortable temperature	27%	18%	9*	22%	15%	7	2
Home was uncomfortably cold	41%	35%	6	42%	32%	10 [#]	-4
Have air conditioner	85%	84%	1	85%	78%	-7	8 [#]
Cannot cool home to comfortable temperature	29%	14%	15**	19%	12%	7 [#]	8
Home was uncomfortably warm	52%	38%	14**	46%	47%	-1	15**

**Indicates statistically significant difference at the 99 percent level.

*Indicates statistically significant difference at the 95 percent level.

[#]Indicates statistically significant difference at the 90 percent level.

Pre/Post Assessment

Program implementers were asked to gather data about participant behaviors, home condition, and health at intake and one year later at a post assessment. The form used is shown in Appendix B.

While much of the pre and post assessment data were missing, the analysis of the available data showed that the results from the pre and post assessment analysis were consistent with the results of the pre and post client survey. The program seems to have positive impacts on home comfort and safety, but it did not appear to impact client health. Positive changes were measured in the dwelling condition, the presence of mold and pests, and the client's perception of winter and summer comfort and air quality.

Summary and Recommendations

The REACH program showed that WAP can leverage additional funds to provide beneficial health, safety, and comfort impacts for program participants. While it was challenging to have program providers deliver services in a way that differed from their normal methods, the providers did succeed in integrating additional health and safety measures into their established WAP procedures. These additional measures had a beneficial impact for the clients. The benefits were measured through the pre/post client surveys and the pre/post client assessment.

The WAP program in Ohio should consider using LIHEAP funding to continue to provide these ancillary services to WAP participants. They should attempt to find the most efficient

ways to integrate these measures with WAP agencies' current service delivery practices. Because agencies throughout the state implement WAP in different ways, there may be different models that work better with different agencies' current procedures. The new health and safety measures should be implemented in a flexible way, to take advantage of current partnerships that different agencies have and to create the greatest benefit for program participants.

I. Introduction

This report presents findings from the evaluation of The Ohio Residential Energy Assistance Challenge Option Program (REACH) Project. The Ohio REACH project targeted additional resources to low income weatherization to go beyond energy use and energy bill reduction and more comprehensively address the needs of low-income households. The goal was to ensure that all households with vulnerable members who receive weatherization achieve adequate energy services and a healthier home environment after the completion of service delivery.

A. Background

The Residential Energy Assistance Challenge Option Program (REACH) was designed to pilot innovative strategies to reduce the energy vulnerability of LIHEAP-eligible households. The Ohio Department of Development was awarded a REACH grant to develop a more comprehensive approach to their weatherization program by assessing the needs of vulnerable households and providing services that are targeted to individual household needs.

ODOD supports an extensive training program for Ohio weatherization providers. As part of that training, HWAP inspectors and work crews are trained to recognize conditions in the home that may negatively impact the health of the occupants and health and safety issues that relate to combustion appliances. They are trained to modify weatherization measures to ensure that they do not introduce health problems as a result of the installation of energy efficiency measures in the home. However, these individuals do not have the comprehensive understanding of health issues that a health professional would.

This project is designed to put energy professionals and health professionals in the homes of clients at the same time. Each professional is responsible for conducting an assessment of the needs in the home. Together, they prioritize the health and energy investments so that they complement each other, rather than work at cross purposes. The outcome of the program should be that the household energy systems are able to deliver the energy services needed by the home in a way that is energy efficient and healthy.

Under the existing DOE rules, HWAP can install some measures that enhance health and safety of the home. However, the primary focus of HWAP is saving energy; it cannot devote the level of attention to the indoor environment that is appropriate for these vulnerable households. In this pilot project, a health professional explicitly looks at the home in terms of its environmental risks and identifies the key risks that need to be mitigated to create a healthy home. Through this process, ODOD will develop better information on the performance of the installed measures in terms of concrete improvements in the health of individuals.

The short term goal of the project was to enhance the health of vulnerable individuals served by the pilot program. This was accomplished by assessing the health needs of individuals

receiving weatherization services, prioritizing weatherization measures to best meet the energy and health needs of the households, funding supplemental measures that can reduce or eliminate environmental risks in the home, establishing a partnership with the household to take actions and develop behaviors to improve health for vulnerable individuals, and leveraging other available resources to mitigate environmental health risks in the home.

The long term goal of this project was to develop a model for the Ohio energy programs that furnishes funding for supplemental measures to improve indoor environments for low-income households with vulnerable individuals, establishes protocols for weatherization measure selection and consumer education when services are delivered to homes that have vulnerable individuals, and establishes linkages between energy service delivery agencies and the agencies that can assist with environmental health risks for clients.

B. Evaluation Objectives and Activities

There were three primary goals of the evaluation.

1. **Documentation:** The evaluation documents how the program was implemented so that the pilot can be adapted and implemented as a new statewide approach to low-income energy assistance.
2. **Impact measurement:** The evaluation assesses the impact of the program on the health and safety of the home environment, the health and energy-related behaviors of the household members, and the health status of the household members.
3. **Recommendations:** The evaluation provides recommendations for implementation of the program statewide.

The evaluation consisted of both process and impact evaluation research.

1. **Process Evaluation Research:** This research documented how the activities were implemented and developed an understanding of the barriers to implementation and potential modifications that would allow for improved execution or enhanced outcomes. The Process Evaluation consisted of the following activities.
 - **Administrative Interviews:** APPRISE conducted interviews with individuals at the state, CBO, and subcontractors to document the development of the program, the initial implementation of program services, and any barriers to initial program implementation.
 - **Document Review:** APPRISE reviewed program documents, including assessment materials and client education materials.
 - **Baseline Client Interviews:** APPRISE conducted interviews with clients prior to delivery of program services. These interviews documented household conditions

and perceived health and safety problems in the household, client health conditions, and perceived need for program services.

- **Post Treatment Client Interviews:** APPRISE conducted post-treatment interviews approximately one year after program services were delivered. These interviews were conducted at the same time of year as the pre-treatment interviews, so that any changes in perceived home comfort or safety would not be related to the weather or time of year.
 - **On Site Client Interviews:** APPRISE conducted on-site interviews with a sample of program participants to assess how the services had impacted the households.
2. **Outcome Evaluation Research:** This research measured the impact of the services provided on the safety of the household environment and the health of the occupants. The Outcome Evaluation consisted of the following activities.
- **Pre/Post Weatherization Assessment:** APPRISE developed supplemental weatherization data collection forms to be used prior to service delivery and following service delivery. These forms collected information on the health and safety of the home. They included ambient levels of CO, levels of CO in the flue, presence of mold in the home, and other air quality measurements.
 - **Pre/Post Health Assessment:** APPRISE developed health assessment data collection forms to be used prior to service delivery and following service delivery. These forms collected information on additional health characteristics of the home and the occupants. They included issues such as smoking in the home, use of unsafe heating appliances, or control of unsafe indoor temperatures (those that are too hot or too cold for the health of the household members.)
 - **Pre/Post Client Assessment:** APPRISE analyzed the pre/post client assessment to determine if the treatments had an impact on clients' perceptions of home health and safety and client health.

C. Organization of the Report

Six sections follow this introduction.

- Section II – Program Design: This section describes the REACH program design.
- Section III – Program Implementation: This section describes the program implementation, obstacles that were faced, and modifications to the program design.
- Section IV – Program Costs and Measures: This section presents data on the costs, measures, and measure funding provided in the program.

- Section V – Pre/Post Client Survey: This section presents results from the analysis of pre and post treatment customer survey data.
- Section VI – Pre/Post Assessment: This section presents results from the analysis of pre and post assessment data collected by the providers.
- Section VII – Conclusion: This section provides a summary of the evaluation findings.

APPRISE prepared this report under contract to the Ohio Office of Community Services (OCS). OCS facilitated this research by furnishing data and information to APPRISE. Any errors or omissions in this report are the responsibility of APPRISE. Further, the statements, findings, conclusions, and recommendations are solely those of analysts from APPRISE and do not necessarily reflect the views of OCS or the other program participants.

II. Program Design

This section describes the motivation for the project and the original project design. There were challenges in implementing the program as designed, and several changes to the planned design are described in later sections of the report.

A. Ohio Energy Assistance Programs

The State of Ohio has four programs that help to mitigate the high cost of home energy for low-income households: LIHEAP, PIPP, HWAP, and EPP.

- LIHEAP – LIHEAP heating assistance benefits help low-income households with their home energy bills and LIHEAP crisis assistance benefits help low-income households maintain home energy services.
- PIPP – The Ohio Percentage of Income Payment program is a payment program that limits monthly payments for the main heating source to 10 percent of income and for the secondary heating source (which in most cases is electricity) to 5 percent of income.
- HWAP – The Ohio HWAP furnishes weatherization services to reduce energy usage and increase energy affordability and home comfort for low-income households.
- EPP – The Electric Partnership Program (EPP) furnishes electric baseload usage reduction services to PIPP participants in Ohio. It also provides weatherization services to PIPP participants who have a high heating or cooling load.

These programs illustrate the State's commitment to meeting the energy needs of low-income households in Ohio.

In addition, Ohio weatherization agencies also deliver the following programs:

- Columbia Gas' WarmChoice
- Vectren TEEM
- Dominion's Housewarming
- FirstEnergy's Community Connections
- Other weatherization programs funded by Duke Energy Ohio, the Dayton Power & Light Company, Northeast Ohio Natural Gas, and Cleveland Public Power.

B. Unmet Needs

Ohio program managers have found that programs enhancements are needed to meet the needs of those low-income households that include individuals with chronic health conditions, young children, or frail older individuals. Inadequate heating and cooling

systems, poor home ventilation systems, and other environmental risks can exacerbate the health conditions of vulnerable individuals, resulting in lost days at work and poor school attendance, and increase the need for expensive health interventions. In a home with good functioning energy systems, the existing energy assistance and weatherization programs can provide a healthy and safe living environment. However, when these systems are not functioning properly, no amount of energy assistance can resolve the household's health problems.

The current weatherization protocol is not always able to address the specific conditions that may result in environmental health risks. In the Ohio HWAP, EPP and various utility-funded programs, service providers furnish usage reduction services to low-income households. The weatherization services include installation of insulation, air infiltration measures, heating and cooling system duct measures, and other energy savings measures. The Weatherization Performance Standards used in all programs include testing of combustion of appliances (e.g., furnaces, water heaters, and gas stoves) and resolution of performance issues. However, while service providers are alert to potential health risks in the home (e.g., mold, humidity, and other environmental hazards) the current measure selection guidelines place the highest priority on energy saving measures. In homes where one or more residents have chronic health conditions, weatherization procedures are sometimes modified (e.g., minimum ventilation guidelines are raised), but there has been only a limited opportunity to adapt the weatherization protocol to specifically address health issues in a systematic way. Similarly, the EPP has focused on cost-effective electric energy saving measures, with no systematic approach to addressing health issues in a home.

C. Target Population

The literature shows that three groups of individuals are particularly vulnerable to the environmental risks in the home.

- **Chronic Health Conditions** – Individuals with chronic health conditions are susceptible to environmental risks associated with both the temperature in the home and indoor air quality. Individuals with diabetes, heart disease, and other circulatory problems may be susceptible to risks even when the winter indoor temperatures are as high as 65°F. Individuals with asthma and other respiratory problems are affected by mold, dampness, and other indoor air quality problems. Health statistics show that diabetes and asthma are two chronic conditions that are increasing rapidly in the low-income population.
- **Young Children** – In addition to risks associated with the indoor air quality and temperature, young children are at risk for poisoning associated with lead paint. While nationally there have been significant reductions in the average level of lead detected in young children, there are still substantial risks in older cities like those found in Ohio.
- **Frail Older Individuals** – Frail, older individuals are particularly susceptible to risks associated with temperature extremes. Many studies have found that individuals over 65, and especially those over 75, are the most likely to suffer from morbidity and

mortality due to exposure to extreme cold or extreme heat. This susceptibility may be due to a reduced ability to feel or respond to changes in temperature, illnesses, and medications.¹

The pilot program was designed to target homes with individuals under age six, individuals over age 65, and individuals that have been diagnosed with a chronic health problem, including: asthma, diabetes, and heart disease or stroke.

D. Geographic Areas

OCS aims to develop a statewide strategy for enhancing the energy assistance and weatherization programs to address the needs of vulnerable individuals. This pilot program focuses on two areas with particularly high needs: Cleveland and Franklin County.

Typical of many older cities in the Midwest, Cleveland has a large low-income population and an older housing stock. Over 23 percent of individuals in Cleveland have incomes below the poverty line and about 32 percent of children under the age 18 live in homes that have income below the poverty line. Over 80 percent of the homes in Cleveland were built prior to 1960, indicating that they are extremely vulnerable to lead paint risks. Cleveland is an Empowerment Zone community.

Franklin County includes both Columbus, the capital city of Ohio, and suburban and exurban areas outside Columbus. Columbus is an Empowerment Zone city with 17 percent of individuals in poverty and 23 percent of children under the age of 18 living in poverty. The homes in Columbus are newer, with about half of all units built since 1970. The inclusion of Columbus and Franklin County in the pilot was designed to help program managers to get a better understanding of how environmental risks compare between the older housing stock in Cleveland and the somewhat newer housing stock in Columbus and Franklin County.

¹ Kalkstein L and Valimont KM. "Climate Effects on Human Health," *Potential Effects of Future Climate Changes on Forests and Vegetation, Agriculture, Water Resources, and Human Health*. EPA Science and Advisory Committee Monograph #25389, 122-52, 1987. Basu R and Samet JM. "Relation Between Elevated Ambient Temperature and Mortality: A Review of the Epidemiologic Evidence," *Epidemiologic Reviews*, 24:190-202, 2002.

E. Logic Model

The project logic model summarizes the design framework.

Ohio REACH Logic Model

Assumptions	Activities	Immediate Outcomes	Intermediate Outcomes	Program Impacts
Unhealthy homes or unsafe indoor air quality can aggravate existing medical conditions.	Conduct pre-screening to select vulnerable households for assessment.	Clients with potential for health improvements to the home are identified.	The home uses less energy due to weatherization services.	Clients are able to better afford their energy bills. Clients’ health improves.
Clients are more dependent on energy programs due to the use of breathing assistance machines.				
Weatherization decisions can be better prioritized if health impacts are factored in.	Jointly conduct weatherization and healthy homes assessment.	A set of weatherization and healthy homes services that will most benefit the household are identified.	Clients change their behavior in ways that reduce their energy usage.	
Relatively small health-related investments can yield large improvements in health.	Jointly deliver weatherization services and healthy homes services.	Households receive services that improve the energy efficiency and health of their homes.	Clients change their behavior in ways that positively impact the health of their homes.	
Clients do not know how to reduce energy usage and create healthy homes.	Involve and educate the household as a partner in the home improvement process.	The householders take actions to reduce energy usage and increase the health of their homes.	Indoor air quality is improved.	
Households will be more invested if they are involved in the process.				
Additional services are available for eligible clients.	Make referrals for additional services.	Households receive additional social services.	Clients receive additional social services through the referrals (for example, lead abatement).	

F. REACH Program Design

The Ohio Office of Community Service (OCS) is planning to devote additional LIHEAP resources to weatherization. OCS would like to target those additional resources in a way that addresses the more comprehensive needs of low-income households, rather than primarily focusing on the reduction of home energy bills. Specifically, OCS plans to develop procedures for using those funds to:

- Assess in-home environmental health risks for vulnerable individuals.
- Prioritize usage reduction measures in a way that best addresses both energy and health needs of vulnerable individuals.
- Supplement usage reduction measures with measures that enhance the health and safety of occupants and the home.
- Establish a partnership with vulnerable households to take actions that will help to mitigate environmental health risks in the home.
- Refer clients to other services that can improve the health of the home and the clients who live there.

The goal is to ensure that all of the households that have vulnerable individuals who receive services through HWAP and EPP will have adequate energy services after the completion of service delivery, including:

- Heating System – A heating system that delivers safe and effective heat to the home for a reasonable cost.
- Cooling System/Strategy – A cooling system and/or strategy that delivers safe and effective cooling to the home for a reasonable cost.
- Indoor Air Quality Strategy – A ventilation system and/or strategy that results in high indoor air quality during all seasons of the year.

Through this pilot program, ODOD is developing procedures for assessing the needs of vulnerable households, establishing protocols for prioritizing the delivery of energy efficiency services in the homes of vulnerable individuals, installing appropriate health measures in the homes of vulnerable individuals, making referrals to other available services that can improve the health of low-income households, and measuring the impact of the program on the health and well-being of targeted individuals. The pilot plan includes the following elements.

- Partnerships – The participating CBOs will establish a partnership between the local HEAP delivery agency, the local weatherization delivery agency(ies), and a local health agency to jointly deliver assessment and remediation services.

- Inspections – The service delivery partners will identify treated homes with vulnerable individuals and will conduct inspections of completed weatherization jobs to assess the environmental outcomes of existing weatherization procedures, identify missed opportunities for installation of remediation measures, and measure the household's understanding of energy practices that lead to healthy in-home environments.
- Prescreening – The service delivery partners will prescreen weatherization jobs to identify households with vulnerable individuals.
- Assessment – The service delivery partners will conduct a joint assessment of the energy needs of the home, the environmental risks in the home, and the health status of all household members.
- Prioritization – The service delivery partners will prioritize weatherization measures to select those that have the greatest positive impact on both energy usage and health.
- Supplemental Measures – The service delivery partners will identify additional measures that can enhance the health of the vulnerable individuals in the home.
- Household Contract – The service delivery partners will work with members of the household to identify actions the household can take to reduce environmental risks in the home and behaviors that will enhance the long-term health of household members.
- Referrals – The service delivery partners will make referrals to additional services that may further improve the health of the home.
- Assessment – The program evaluation will examine the specific outcomes of the program in terms of both the minimization of environmental risks and the change in health status for individuals in the household.

The results of the pilot will be used by OCS in developing the LIHEAP State Plan and the Weatherization Performance Standards, as well as in making funding decisions with respect to the allocation of federal LIHEAP and HWAP funds.

1. Partnerships

The CBOs will establish a partnership among the local HEAP delivery agency, the local weatherization delivery agency (ies), and a local health agency to jointly deliver assessment and remediation services to households with vulnerable individuals.

In Cleveland, the Cleveland Housing Network (CHN) is the lead agency. CHN is a broad-based housing organization that delivers LIHEAP, HWAP, Housewarming, Community Connections, and EPP to low-income households in Cleveland. CHN had already established a partnership with the Cleveland Health Department to furnish health assessment services and to supply funding for lead abatement funding for homes with children under the age of six.

In Franklin County, the Breathing Association is the lead agency. The Breathing Association delivers LIHEAP in Franklin County, as well as a host of health and wellness programs. The Breathing Association will partner with Ground Level Solutions, Columbus LEADS, and Mid-Ohio Regional Planning Commission, the weatherization providers in Franklin County.

CHN and the Breathing Association will collaborate during the program design and implementation phase of the project to share their insights on program approaches and to compare and contrast their findings. The output from this phase is a series of agreements and/or contracts with partner organizations.

2. Design Inspections and Measurement

The service delivery partners have extensive experience working in households with vulnerable individuals. However, this project makes two new resources available to the weatherization provider – a joint assessment with a health professional and supplemental funding for measure(s) that target the improvement of the indoor environment of the home.

In the first phase of this project, the service delivery partners will screen 25 homes with vulnerable individuals and conduct on-site inspections of completed weatherization jobs. [Note: It is estimated that about 25 percent of treated homes will have vulnerable individuals (i.e., children under 6, individuals over 65, or individuals with a chronic health condition).] The purposes of the inspections are to:

- Assess the environmental outcomes of existing weatherization procedures,
- Identify missed opportunities for installation of remediation measures that could improve the indoor environment, and
- Measure the household's knowledge of energy practices that lead to healthy in-home environments.

As a result of completing and reviewing the inspections, the service delivery partners will be able to finalize the design of the program, including:

- Targeting – Refine the program targeting to identify the households that are in the greatest need for program services.
- Weatherization Measure Priority – Revise the priority assigned to weatherization measures to account for both energy and health impacts.
- Supplemental Measure Priority – Identify the highest priority supplemental measures that can improve the indoor environment for households with vulnerable individuals, estimate the cost of installing each type of measure, and finalize the targeted expenditures for supplemental measures.

- Household Actions and Behaviors – Assess the most important actions that households can take to improve their environment and the behaviors that are likely to lead to the greatest improvements in health.
- Linkages – Estimate the eligibility of homes for additional services that are furnished by other organizations with other funding sources.

The output from this phase will be a final program protocol.

3. Prescreening

The service delivery partners will prescreen all weatherization jobs in the targeted geographic areas to identify households that have targeted individuals. During weatherization program intake, schedulers will use a special module to identify households who meet the demographic and/or health requirements for the program. Those households will be targeted for delivery of the pilot program services.

Statistics from the prescreening step will be kept to give more accurate estimates of the statewide number of households with vulnerable individuals.

The output from this phase will be screened cases for service delivery.

4. Service Delivery

The service delivery phase will include four activities:

- Joint Assessment – Joint health and energy assessment
- Service Delivery – Prioritization and delivery of weatherization measures
- Supplemental Measures – Prioritization and delivery of environmental measures
- Household Contract – Establishment of the household contract

Joint Assessment

An initial in-home visit will be conducted jointly by the weatherization inspector and the health assessment auditor.

- The health assessment auditor will identify the specific health conditions faced by individuals in the home, the specific environmental risks observed in the home (including behaviors), and the environmental risks that would be likely to aggravate the health conditions faced by the individuals in the home.
- The weatherization inspector will conduct the standard weatherization audit. That audit would be supplemented by a review of the specific environmental risks identified by the health auditor.

The output of the assessment is a list of potential energy measures and environmental mitigation measures for the home.

Energy Service Delivery

In most cases, weatherization providers have to prioritize among a number of valuable energy efficiency measures; there are far more measures that could be applied to a home than can be installed with the available budget. In addition, the weatherization provider also must assess whether there are measures that must be installed to maintain a safe environment for the household. Under the existing guidelines, certain measures are already identified as necessary, even though they do not directly contribute to a reduction in energy use. The first step in the service delivery process for the pilot is for the weatherization inspector to identify the measures that would be funded in the absence of the pilot program, and other measures that are needed but are not the highest priority for funding.

The list of proposed measures, including those that are needed but not selected, is then reviewed by the health auditor. The health auditor will propose revisions in the priority list, increasing the priority of those measures that improve the indoor environment and reducing the priority of those measures that might detract from the indoor environment. [This information should be recorded, as well.]

The final set of weatherization measures will be determined by the weatherization inspector. The measures will be delivered with HWAP funds.

Supplemental Measures

Once the final set of weatherization measures has been identified, the health auditor will identify and prioritize a set of supplemental health measures that are targeted to increase the indoor environment in the home. The highest priority will be given to those measures that specifically address the health issues for the subject household. Examples of health measures include:

- Window Preservation - Enables windows to function as intended, allowing for cross ventilation for cooling and air quality improvement.
- Installation of Central AC – For individuals who cannot suffer from the heat and cannot tolerate the fine particulate matter in “fresh air”.
- Mold Remediation – Elimination of existing mold and remediation of the cause of mold growth.
- Ventilation System – Installation of a ventilation system that improves air quality and reduces relative humidity.
- Pest Control- Elimination of household pests that contribute to breathing problems.

The weatherization inspector will review the proposed supplemental measures and assess what energy impacts, if any, should be considered.

The final supplemental measure(s) will be selected by the health auditor. The pilot program funding will pay for the supplemental measures.

Household Contract

The health auditor will identify up to five health actions and/or behaviors that can be adopted by the client. These should include some one time measures (e.g., removal of dirty carpeting) and some on-going behaviors (e.g., stop smoking or smoke only outside the home).

The energy auditor will review the proposed health actions for energy consequences and will propose revisions.

The final household contract will be established by the health auditor with the household.

Summary

The output from this phase will be service delivery to 500 households.

5. Follow-Up and Inspection

The lead agency in each community will conduct follow-up with the client and inspection of a sample of homes.

Client Follow-Up

Each client served by the program will receive a follow-up call three months after service delivery. The call will serve several purposes, including: assessment of the performance of weatherization measures, assessment of the performance of supplemental health measures, follow-up on the actions and behaviors in the household contract, and tracking the impact of program linkages and referrals.

Post-Delivery Inspections

Following the model established in the program design inspections, the service delivery team for each CBO will conduct on-site inspections for 25 homes that received the program services. The inspection will be conducted one year after the completion of service delivery. Just as with the program design inspections, the inspections will include:

- Assess the environmental outcomes of existing weatherization procedures,
- Identify missed opportunities for installation of remediation measures that could improve the indoor environment, and

- Measure the household's knowledge of energy practices that lead to healthy in-home environments.

Summary

The output from this phase will be inspection reports for 50 jobs.

III. Program Implementation

This section of the report discusses how the program was implemented, the barriers that were faced during program implementation, and the program accomplishments. Service delivery statistics are also presented in this section.

A. *Program Partners*

The Cleveland Housing Network and the Breathing Association were the two lead service delivery agencies for the REACH grant. Each agency had partners that they worked with for service delivery. Additionally, Ohio Partners for Affordable Energy (OPAE) provided administration and coordination support.

1. Cleveland Housing Network (CHN)

The Cleveland Housing Network developed agreements with two weatherization partners and two health departments. These agencies are as follows.

- Cuyahoga County Department of Development – This is the weatherization agency for Cuyahoga County.
- Summit County Department of Community and Economic Development – This is the weatherization agency for Summit County.
- Cuyahoga County Board of Health – This is the agency that provides the healthy homes assessments in Cuyahoga County.
- Akron City Health Department – This is the agency that provides the healthy homes assessments in Summit County.

2. Breathing Association (BA)

The Breathing Association developed agreements with three weatherization partners. Three weatherization agencies that provide services in Columbus are:

- Ground Level Solutions
- Mid-Ohio Regional Planning Commission (MORPC)
- Columbus-Franklin County Community Action Association

The Breathing Association has also partnered with many other organizations in this work. The following is a list of these other organizations.

- Economic and Community Development Institute
- OSU College of Nursing
- Central Ohio Diabetes Association
- Ohio State University, Division of Environmental Health Sciences

- Ohio Agency on Aging
- Ohio Environmental Protection Environmental Education
- Rebuilding Together Central Ohio
- Ohio Department of Health
- SERVPRO (fire and water damage cleanup)
- City of Columbus, Department of Development, Emergency Repair Program

B. Implementation Challenges

The Ohio REACH project was developed to test a specific program design, as described in the previous section of this report. The project's focus was on delivering weatherization to vulnerable households and households with serious health conditions in a manner that more effectively addressed their needs. The key to the program design was a new model for service delivery with some additional funds for key health measures, rather than on a large additional funding method for addressing all potential issues in the home.

While the Ohio REACH program goal was to meet the needs of the most vulnerable households, the goal of the pilot was also to develop a model that can be implemented to enhance the weatherization program. Ohio's Office of Community Services does have the flexibility to use a portion of their LIHEAP funds to supplement weatherization measures. However, a model that requires thousands of dollars of additional measure funding is not feasible to continue after the conclusion of REACH, unless substantial leveraging is accomplished. Therefore, the REACH design focused on the reprioritizing of weatherization measures and the addition of some key health measures that could not be done through HWAP.

Given this program design, the original REACH budget allowed for an average of \$1,500 per home with \$500 allocated for the home health and energy audits and \$1,000 allocated for additional health-related measures. With this budget, it was expected that approximately 500 homes would be served with the grant, with 250 served by each of the key agencies.

Program partners were not comfortable with this approach to service delivery. Based on their experience with another HUD healthy home program, they felt it was not feasible to address issues in the home with this level of funding. Their previous program delivery was focused on comprehensively addressing the home health issues, and they would not approach this project as a new model for service delivery. To allow for the higher cost of measures, the REACH program dollars, with approval from HHS, were reprogrammed to increase the average home spending to \$3,000 and target a total of 250 treated homes (including the initial post-weatherization test jobs).

Additionally, there was a concern that the REACH program was not always delivered in conjunction with HWAP, but sometimes as a post-HWAP service delivery system to provide additional services that HWAP could not provide. Conversations with managers at the lead agencies revealed that each household was treated in a somewhat different manner, so it was difficult to quantify the extent to which service delivery was implemented in this manner.

C. Service Delivery

The first step in the service delivery was for each of the two lead providers to visit a sample of homes that had received weatherization services and had individuals who might be at risk, including children and the elderly.

The Cleveland Housing Network (CHN) went out to 12 homes as part of this effort and found problems that were either not identified at the time of the WAP visit or that had issues that had come about since the weatherization service delivery. Some of the types of issues that were addressed included:

- An overflowed toilet that had not been cleaned up.
- Moisture issues that could be addressed by fixing gutters and downspouts, and regrading soil
- Severe breathing issues in the home that could be addressed with central air conditioning
- Environmental and mold cleaning
- Minor roof repairs
- Ventilation

The Breathing Association targeted homes that had an individual under six, over 65, or with chronic health problems. They assigned three homes to each of their three weatherization providers. They determined that the priorities in these homes were mold, moisture, and environmental cleanings. Other issues that they found in these homes included:

- Active leaks in the plumbing
- Floor drain with standing water
- Gutter and downspout replacement or addition
- Plastic storage containers and shelves to hold cardboard boxes to help prevent mold formation on the boxes and other items stored in basements
- Dehumidifiers
- Extermination
- Ramps and rails to help clients deal with physical limitations

After the conclusion of these assessments, the agencies began full service delivery. The steps in the service delivery were the following:

1. The lead agency received a list of households who were referred to REACH. These households were usually referred to the program because of health issues that were identified in the home. The referrals came from LIHEAP, HWAP, Housewarming, a plumbing program, and other community partners.
2. The lead agency determined if the client was a good candidate for REACH.

The Breathing Association first determined that the household was income eligible for the program. They next looked to see if the client had a chronic illness, such as COPD, asthma, a heart condition, or heart disease. They looked for clients with conditions that had been identified by physicians as chronic. They preferred to have the condition associated with the home environment –respiratory or home mobility. They had more referrals than they could handle.

CHN conducted an initial questionnaire with the client to determine if there were health issues in the home, to see if there were moisture issues that could be addressed with HWAP, and to determine if there were breathing problems in the household. HWAP and Housewarming asked some of these questions during their audits to provide CHN with the information needed to determine if the client should be treated by REACH.

3. The lead agency sent these households to APPRISE so that APPRISE could conduct a pre-treatment interview with the household. It was important that this interview be conducted prior to any service delivery. APPRISE then notified the agency after the pre-treatment survey was completed.
4. A joint assessment of the home was conducted by the health and weatherization inspectors. They consulted and recommend measures for the home.
5. Services were delivered by the agencies and/or their subcontractors.
6. One year later, the home was revisited by the health inspector to assess the post treatment health and safety of the household. It is unclear the extent to which this step was implemented.

The major issues that the agencies found during these visits were similar to those found during the initial tests. These included:

- Minor home repairs that lead to excess moisture
- Plumbing leaks
- Water leakage through basement walls
- Duct work

- Mold in the basement
- Wet insulation
- Gutters/downspouts that were improperly positioned
- Gutters not properly installed or joints not sealed
- Lack of exhaust fans.
- Material in basements
- Lack of air conditioning in homes with elderly household members
- Need for air conditioning repairs
- Roofs that needed to be fixed or replaced

According to the lead agency managers, the REACH program worked well. It took some time for the agencies to develop the many partnerships that they needed, but once developed, they worked well. The REACH program allowed the agencies to help households in ways that other programs had not allowed. The managers said that they expected to see changes in air quality, and resulting changes in occupant health, as a result.

D. Program Accomplishments

While the REACH program faced many challenges and the service delivery was not implemented according to original plans, there were many significant accomplishments.

- *Underserved households:* The lead agencies noted that the Ohio REACH program allowed them to serve households that otherwise could not receive weatherization. These clients had other issues that needed to be resolved prior to weatherization, but that weatherization funding would not cover. Therefore, the program has helped clients who otherwise could not have been helped.
- *Program coordination:* The Cleveland Housing Network and the Breathing Association both worked diligently to leverage funds from all available programs and provide comprehensive services to REACH participants. They developed invaluable partnerships that will continue to benefit clients who are served by these agencies now that the REACH project has been completed.
- *New partnerships:* In addition to leveraging funds, the REACH program leveraged human capital to help assist the households served by the program. For example, the Breathing Association worked with the Ohio State College of Nursing. Student nurses worked on the program for one of their clinical rotations, and graduated

nurses worked on the program as part of their community rotation. The nurses provided important services to clients.

- *Capacity building:* Weatherization and health staff worked together to conduct joint assessments of the needs of participating households. This cooperation helped to build the skills of both groups. Weatherization staff, as a result, increased their knowledge of health issues in the home and the ways in which the weatherization program can be used to address those issues.

IV. Program Costs and Measures

This section analyzes information provided by Cleveland Housing Network and the Breathing Association on the program costs, measures that were installed, and the funding sources used for those measures.

A. Program Costs

Table IV-1 displays the labor costs, material costs, total REACH costs, and total jobs costs for all 180 jobs that the Cleveland Housing Network and the Breathing Association reported on. The table shows that the average total job cost was \$4,933. Of that amount, \$2,629 on average, or 53 percent was funded through REACH.

Table IV-1
Program Costs – All REACH Jobs

All REACH Jobs (n=180)				
	Mean	Percentile		
		25 th	50 th	75 th
Labor Costs	\$2,695	\$1,485	\$2,198	\$3,253
Material Costs	\$1,516	\$826	\$1,263	\$2,021
Total REACH Cost	\$2,629	\$1,444	\$2,579	\$3,547
Total Job Cost	\$4,933	\$2,942	\$4,404	\$6,233

Table IV-2 displays costs for the 91 jobs completed by the Cleveland Housing Network. The total costs for these jobs averaged \$6,451 and the REACH average cost was \$3,523, or 55 percent was funded through REACH.

Table IV-2
Cleveland Housing Network Job Costs

CHN Jobs (n=91)				
	Mean	Percentile		
		25 th	50 th	75 th
Labor Costs	\$3,544	\$1,929	\$2,877	\$2,659
Material Costs	\$1,519	\$827	\$1,233	\$1,997
Total REACH Cost	\$3,523	\$2,460	\$3,116	\$4,024
Total Job Cost	\$6,451	\$4,359	\$5,968	\$7,887

Table IV-3 displays costs for the 89 jobs completed by the Breathing Association. The total costs for these jobs averaged \$3,382 and the REACH average cost was \$1,715, or 51 percent was funded through REACH.

Table IV-3
Breathing Association Job Costs

BA Jobs (n=89)				
	Mean	Percentile		
		25 th	50 th	75 th
Labor Costs	\$1,827	\$1,033	\$1,684	\$2,308
Material Costs	\$1,512	\$824	\$1,362	\$2,027
Total REACH Cost	\$1,715	\$200	\$1,450	\$2,989
Total Job Cost	\$3,382	\$1,847	\$3,063	\$4,503

B. Program Measures

This section provides data on the measures installed and the funding sources for those measures. Because some measures were funded by more than one source, percentages may not add up to 100 percent.

Table IV-4 provides data on the air sealing measures that were provided. The table shows that the majority of the homes served received air sealing work, and this work was mostly funded through WAP.

Table IV-4
Air Sealing Measures

	All Jobs					CHN Jobs		BA Jobs	
	Measure Installed		Funding			Measure Installed		Measure Installed	
	#	%	REACH	WAP	Other	#	%	#	%
Caulking & weather-stripping	139	79%	3%	93%	6%	87	96%	52	61%
Blower door guided air sealing	141	80%	1%	92%	7%	88	97%	53	62%
Non blower door guided air sealing	168	95%	1%	93%	7%	88	97%	80	94%
Duct sealing & repair	110	63%	2%	90%	9%	40	44%	70	82%
Other air sealing work	34	19%	3%	88%	15%	8	9%	26	31%

Table IV-5 displays the insulation work that was provided by the program. The table shows that 86 percent of the homes received attic insulation and 74 percent received wall insulation. A minority of the jobs received other types of insulation work. These measures were also primarily funded through WAP.

Table IV-5
Insulation Measures

	All Jobs					CHN Jobs		BA Jobs	
	Measure Installed		Funding			Measure Installed		Measure Installed	
	#	%	REACH	WAP	Other	#	%	#	%
Attic Insulation	151	86%	1%	93%	7%	78	86%	73	86%
Wall Insulation	130	74%	0%	94%	7%	83	91%	47	55%
Floor Insulation	20	11%	5%	80%	15%	7	8%	13	15%
Duct Insulation	10	6%	0%	90%	0%	4	4%	6	7%
Other Insulation	15	9%	0%	100%	0%	4	4%	11	13%

Table IV-6 displays information on space heating measures. The table shows that about one third of the homes received a new space heating system, about one quarter received a system repair, and about one half received a system tune-up. These measures were unlikely to be funded through REACH. However, a significant percentage was funded through other sources as well as WAP.

Table IV-6
Space Heating Measures

	All Jobs					CHN Jobs		BA Jobs	
	Measure Installed		Funding			Measure Installed		Measure Installed	
	#	%	REACH	WAP	Other	#	%	#	%
New Space Heating System	56	32%	4%	64%	32%	31	34%	25	29%
Space Heating System Repair	41	23%	5%	78%	12%	8	9%	33	39%
Space Heating System Tune-Up	79	45%	3%	89%	9%	55	60%	24	28%

Table IV-7 displays the air conditioning measures that were provided. The table shows that eight percent of participants received a new central air conditioner, and in 86 percent of the jobs this was funded through REACH. Air conditioner tune-ups, provided in a small number of homes, were also likely to be funded through REACH.

**Table IV-7
Air Conditioning Measures**

	All Jobs					CHN Jobs		BA Jobs	
	Measure Installed		Funding			Measure Installed		Measure Installed	
	#	%	REACH	WAP	Other	#	%	#	%
New Window Air Conditioner	3	2%	0%	0%	67%	3	3%	0	0%
New Central Air Conditioner	14	8%	86%	7%	7%	4	4%	10	12%
Air Conditioner Repair	4	2%	50%	50%	0%	0	0%	4	5%
Air Conditioner Recharge or Tune-Up	8	5%	75%	13%	0%	2	2%	6	7%
Ceiling or Whole-House Fan Installation	11	6%	0%	18%	82%	11	12%	0	0%

Table IV-8 provides data on ventilation measures that were provided through the program. The table shows that over half of the treated homes received bathroom exhausts and about 20 percent received kitchen exhausts. About 75 percent of these measures were funded through REACH.

**Table IV-8
Ventilation Measures**

	All Jobs					CHN Jobs		BA Jobs	
	Measure Installed		Funding			Measure Installed		Measure Installed	
	#	%	REACH	WAP	Other	#	%	#	%
Exhaust Fan in Bathroom	99	56%	73%	16%	11%	87	96%	12	14%
Exhaust Fan in Kitchen	34	19%	76%	6%	18%	32	35%	2	24%
Whole House Ventilation System	2	1%	0%	50%	50%	1	1%	1	1%
Other Ventilation System Improvements	27	15%	19%	63%	11%	8	9%	19	22%

Table IV-9 provides data on HVAC accessories that were provided through the program. Over half of the homes received a HEPA air filter, and the majority of these filters were funded through REACH. Other common measures included new thermostats and standard air filters. These measures were more likely to be funded through WAP.

Table IV-9
HVAC Accessories

	All Jobs					CHN Jobs		BA Jobs	
	Measure Installed		Funding			Measure Installed		Measure Installed	
	#	%	REACH	WAP	Other	#	%	#	%
New Programmable Thermostat	32	18%	16%	75%	9%	28	31%	4	5%
New Standard Thermostat	86	49%	5%	63%	31%	55	60%	31	36%
Standard Air Filter	62	35%	2%	66%	31%	10	11%	52	61%
HEPA Air Filter	91	52%	92%	6%	2%	88	97%	3	4%
Other HVAC Accessories	31	18%	26%	45%	26%	5	5%	26	31%

Table IV-10 displays information on water heating measures provided to program participants. The table shows that most of these measures were funded through WAP. About half of the participants received pipe insulation, 16 percent received a new water heater, 27 percent received a system repair, and 29 percent received a temperature turndown.

Table IV-10
Water Heating Measures

	All Jobs					CHN Jobs		BA Jobs	
	Measure Installed		Funding			Measure Installed		Measure Installed	
	#	%	REACH	WAP	Other	#	%	#	%
New Water Heater	28	16%	7%	54%	39%	8	9%	20	24%
Water Heating System Repair	47	27%	2%	87%	9%	23	25%	24	28%
Water Heater Tank Insulation Wrap	42	24%	0%	90%	7%	20	22%	22	26%
Pipe Insulation	85	48%	1%	89%	7%	40	44%	45	53%
Water Heater Temperature Reduction	51	29%	0%	92%	8%	44	48%	7	8%
Other Water Heating System Measure	9	5%	0%	67%	22%	0	0%	9	11%

Table IV-11 displays information on other baseload measures that were provided to participating clients. These measures were mostly funded by non-REACH, non-WAP programs. Households received lighting measures, new refrigerators, and other baseload measures.

Table IV-11
Other Baseload Measures

	All Jobs					CHN Jobs		BA Jobs	
	Measure Installed		Funding			Measure Installed		Measure Installed	
	#	%	REACH	WAP	Other	#	%	#	%
Indoor Lighting	36	20%	0%	6%	94%	21	23%	15	18%
Outdoor Lighting	31	18%	0%	10%	90%	18	20%	13	15%
Refrigerator	24	14%	0%	4%	96%	16	18%	8	9%
Other Baseload Measures	10	6%	0%	0%	100%	2	2%	8	9%

Table IV-12 displays the attic and roof measures that were provided. The table shows that over half of the clients received attic ventilation, and this was largely funded through WAP. Roof repair was funded through REACH, WAP, and other sources, as were metal chimney liners.

Table IV-12
Attic and Roof Measures

	All Jobs					CHN Jobs		BA Jobs	
	Measure Installed		Funding			Measure Installed		Measure Installed	
	#	%	REACH	WAP	Other	#	%	#	%
Attic Ventilation	98	56%	0%	84%	14%	76	84%	22	26%
Roof Repair	26	15%	23%	27%	50%	25	27%	1	1%
Metal Chimney Liner	25	14%	16%	64%	16%	17	19%	8	9%

Table IV-13 displays the percent of clients who received plumbing, sewer, and electrical repairs. About one third of the clients received plumbing repairs, largely funded through REACH and sources other than WAP.

Table IV-13
Plumbing, Sewer, and Electrical Measures

	All Jobs					CHN Jobs		BA Jobs	
	Measure Installed		Funding			Measure Installed		Measure Installed	
	#	%	REACH	WAP	Other	#	%	#	%
Plumbing Repair	56	32%	55%	5%	41%	37	41%	19	22%
Sewer Repair	24	14%	29%	17%	54%	21	23%	3	4%
Electrical Repair	14	8%	36%	50%	36%	7	8%	7	8%

Table IV-14 displays data on health and safety measures focused on air quality. The table shows that about half of the participants received smoke alarms and CO monitors, mostly funded through WAP and other sources.

Table IV-14
Health and Safety – Air Quality Measures

	All Jobs					CHN Jobs		BA Jobs	
	Measure Installed		Funding			Measure Installed		Measure Installed	
	#	%	REACH	WAP	Other	#	%	#	%
Smoke Alarm	88	50%	2%	14%	86%	82	90%	6	7%
CO Monitor	96	55%	7%	85%	7%	89	98%	7	8%

Table IV-15 shows the percent of clients who received repair to their walls, floor, foundation, and ground vapor barrier. The table shows that about 10 to 20 percent of participants received these measures and that the majority of these measures were funded through REACH.

Table IV-15
Other Health and Safety – Structural Improvements

	All Jobs					CHN Jobs		BA Jobs	
	Measure Installed		Funding			Measure Installed		Measure Installed	
	#	%	REACH	WAP	Other	#	%	#	%
Wall Repair	37	21%	59%	11%	32%	32	35%	5	6%
Floor Repair	18	10%	67%	6%	33%	13	14%	5	6%
Foundation Repair	32	18%	75%	3%	19%	26	29%	6	7%
Ground Vapor Barrier	34	19%	38%	59%	0%	21	23%	13	15%

Table IV-16 shows the percent of clients and funding for gutter or downspout repair and grading of the lot, measures intended to move water away from the home and prevent moisture and mold problems. The table shows that over half of the clients received gutter or downspout repair and nearly 40 percent had their lot graded. The majority of these measures were funded through REACH.

Table IV-16
Other Health and Safety – Water Movement Measures

	All Jobs					CHN Jobs		BA Jobs	
	Measure Installed		Funding			Measure Installed		Measure Installed	
	#	%	REACH	WAP	Other	#	%	#	%
Gutter or Downspout Repair	96	55%	89%	7%	4%	81	89%	15	18%
Grading of Lot	67	38%	82%	7%	10%	60	66%	7	8%

Other measures intended to address safety for participants were stair repairs, bathroom grab bars, and non skid material in the bathtub. Table IV-17 shows that a small percentage of clients received these measures. The stair repairs and grab bars were likely to be funded through REACH.

Table IV-17
Other Health and Safety – Safety Improvements

	All Jobs					CHN Jobs		BA Jobs	
	Measure Installed		Funding			Measure Installed		Measure Installed	
	#	%	REACH	WAP	Other	#	%	#	%
Stair Repair	12	7%	75%	8%	37%	5	5%	7	8%
Grab Bar in Bathroom	5	3%	60%	0%	20%	1	1%	4	5%
Non Skid Material in Bathtub	2	1%	0%	100%	0%	2	2%	0	0%

Table IV-18 displays data on environmental improvements provided through the program. While none of the clients received lead abatement, 70 percent received environmental cleanings and a few received other environmental improvements. Most of these services were provided with REACH funding.

Table IV-18
Other Health and Safety – Environmental Improvements

	All Jobs					CHN Jobs		BA Jobs	
	Measure Installed		Funding			Measure Installed		Measure Installed	
	#	%	REACH	WAP	Other	#	%	#	%
Lead Abatement	0	0%	0%	0%	0%	0	0%	0	0%
Asbestos Containment	3	2%	0%	33%	0%	3	3%	0	0%
Removal or Safe Storage of Household Poisons	3	2%	33%	67%	0%	2	2%	1	1%

	All Jobs					CHN Jobs		BA Jobs	
	Measure Installed		Funding			Measure Installed		Measure Installed	
	#	%	REACH	WAP	Other	#	%	#	%
Pest Extermination	7	4%	100%	0%	0%	1	1%	6	7%
Environmental Cleaning	124	70%	99%	0%	1%	87	96%	37	44%

Table IV-19 displays other health and safety measures that were provided. These measures were almost always funded through REACH. The most common named measures were mold cleaning and dryer venting.

Table IV-19
Other Health and Safety – Other Measures

	All Jobs					CHN Jobs		BA Jobs	
	Measure Installed		Funding			Measure Installed		Measure Installed	
	#	%	REACH	WAP	Other	#	%	#	%
Mold Cleaning	31	18%	100%	0%	3%	29	32%	2	2%
Moldy Item Removal	7	4%	100%	0%	0%	7	8%	0	0%
Dryer Vent	6	3%	100%	0%	0%	6	7%	0	0%
Basement Moisture Repair	2	1%	100%	0%	0%	2	2%	0	0%
Waterproofed Walls	2	1%	50%	0%	50%	2	2%	0	0%
Condensate Pump	1	1%	100%	0%	0%	1	1%	0	0%
Basement Storage Shelving	1	1%	100%	0%	0%	1	1%	0	0%
Regrade Soil	1	1%	100%	0%	0%	1	1%	0	0%
Dehumidify	1	1%	100%	0%	0%	0	0%	1	1%
Central AC Repair	1	1%	100%	0%	0%	0	0%	1	1%
Other	46	26%	98%	2%	37%	4	4%	42	49%

C. Summary

This section examined the measures provided through the program and the funding sources for those measures. The data displayed shows that the program achieved several of its goals.

- Leveraging funds – In addition to the measures provided by REACH and WAP, many of the measures were funded by other sources.
- REACH funding of important health and safety measures – Many of the health and safety measures were largely funded through REACH, including air conditioner repair and

replacement, exhaust fans, HEPA air filters, plumbing repairs, structural improvements, gutter and downspout repair and grading of the lot, pest extermination, mold cleaning, and environmental cleaning.

- WAP funding of typical weatherization measures – WAP measures including air sealing and insulation were routinely provided in conjunction with the REACH health and safety focused measures.

V. On-Site Client Interviews

APPRISE staff visited clients in the Cleveland and Columbus areas who had been served by REACH to evaluate the impact of the program on client health and comfort. APPRISE visited 16 homes in the Cleveland area in May 2009 and 17 homes in the Columbus area in June 2009. Two APPRISE staff members visited each home to interview the clients and record information about the program services that they recalled and the impact of those services. Each visit and interview lasted approximately one hour.

Table V-1
Evaluation Visits to Cleveland and Columbus

	Number of On-Site Interviews	Interview Dates
Cleveland	16	May 18-22
Columbus	17	June 15-19
Total	33	

A. Measure Recall

REACH, in conjunction with WAP, provided a large number of measures in clients' homes to improve the energy efficiency and health and safety of the home. It is important for clients to have an understanding of the measures that were provided as part of taking an active role in increasing the health and safety of their home. The first issue that was addressed in each of the on-site client interviews was to ask the client to report the measures that were provided by the program. APPRISE staff were instructed not to prompt the client and to record measures even if the client was unsure whether the measures were installed through REACH or through another program.

Most of the clients recalled many measures that were installed by the program. The mean number of measures recalled by clients in Cleveland was 13 and the mean number of measures recalled by clients in Columbus was 9. Eleven of the 16 clients in Cleveland who were interviewed recalled 11 or more measures and six of the 17 clients who were interviewed in Columbus recalled 11 or more measures.

Table V-2A
Statistics on Number of Recalled Measures

	Number of Recalled Measures			
	Mean	Median	Minimum	Maximum
Cleveland	13	13	5	22
Columbus	9	9	3	16
All Interviews	11	11	3	22

Table V-2B
Tabulation of Number of Recalled Measures

	Number of Clients		
Number of Measures Recalled	Cleveland	Columbus	Total
<=5	1	2	3
6-10	4	9	13
11-15	7	5	12
16 or More	4	1	5
Total Clients	16	17	33

Table V-3 displays the heating, air conditioning, and hot water measures that clients recalled. The table shows that 14 clients in Cleveland and 16 clients in Columbus recalled at least one of these measures. Many clients reported heating system work, receipt of a humidity and temperature gauge, and furnace replacement.

Table V-3
Heating, AC, and Hot Water Measures

	Heating, AC, and Hot Water		
	Number of Clients Who Recalled The Measure		
	Cleveland	Columbus	Total
Number of Clients Who Reported At Least One of These Measures	14	16	30
Heating System Work	9	8	17
Humidity/Temperature Gauge	6	7	13
Furnace Replacement	6	7	13
Duct Work	4	2	6
Central AC Replacement	1	4	5
Hot Water Heater Wrap	3	2	5
Hot Water Heater Replacement	2	2	4

	Heating, AC, and Hot Water		
	Number of Clients Who Recalled The Measure		
	Cleveland	Columbus	Total
Thermostat Replacement	1	3	4
Furnace Filter	2	1	3

Table V-4 displays the insulation and air sealing measures that clients recalled. The table shows that 14 clients in Cleveland and 15 clients in Columbus recalled at least one of these measures. Many clients reported wall insulation, air sealing, and attic insulation.

Table V-4
Insulation and Air Sealing Measures

	Insulation and Air Sealing		
	Number of Clients Who Recalled The Measure		
	Cleveland	Columbus	Total
Number of Clients Who Reported At Least One of These Measures	14	15	29
Wall Insulation	13	9	22
Air Sealing	7	9	16
Attic Insulation	4	10	14
Attic Door Insulation	3	1	4
Duct Sealing or Insulation	1	0	1
Floor Insulation	0	1	1

Table V-5 displays the ventilation measures that clients recalled. The table shows that 14 clients in Cleveland and 9 clients in Columbus recalled at least one of these measures. Many clients reported a bathroom exhaust, dryer vent, or attic insulation.

Table V-5
Ventilation Measures

	Ventilation		
	Number of Clients Who Recalled The Measure		
	Cleveland	Columbus	Total
Number of Clients Who Reported At Least One of These Measures	14	9	23
Bathroom Exhaust	11	3	14
Dryer Vent	6	6	12
Attic Ventilation	4	6	10

	Ventilation		
	Number of Clients Who Recalled The Measure		
	Cleveland	Columbus	Total
Kitchen Exhaust	4	1	5

Table V-6 displays the flood prevention and leak-related measures that clients recalled. The table shows that 15 clients in Cleveland and 12 clients in Columbus recalled at least one of these measures. Many clients reported plumbing work, mold remediation, and work on gutters and/or downspouts.

Table V-6
Flood Prevention and Leak Related Measures

	Flood and Leak Related		
	Number of Clients Who Recalled The Measure		
	Cleveland	Columbus	Total
Number of Clients Who Reported At Least One of These Measures	15	12	27
Plumbing Work	9	7	16
Mold Remediation	9	6	15
Gutters/Downspouts	7	4	11
Other Flood Prevention Work	3	3	6
Soil Grading	4	0	4
Leak Fixed	3	0	3
Window Well Cover	2	0	2

Table V-7 displays the air quality-related measures that clients recalled. The table shows that 8 clients in Cleveland and 4 clients in Columbus recalled at least one of these measures. Many clients probably received environmental cleanings but did not recall this measure. This can be examined further when complete weatherization data are received from CHN and the Breathing Association.

Table V-7
Air Quality Related Measures

	Air Quality		
	Number of Clients Who Recalled The Measure		
	Cleveland	Columbus	Total
Number of Clients Who Reported At Least One of These Measures	8	4	12

	Air Quality		
	Number of Clients Who Recalled The Measure		
	Cleveland	Columbus	Total
CO Detector	5	0	5
Environmental Cleaning	4	0	4
Mattress Pad Cover	0	3	3
Vapor Barrier	2	1	3

Table V-8 displays the other measures that clients recalled. The table shows that 12 clients in Cleveland and 12 clients in Columbus recalled at least one of these measures. Many clients reported health and safety related work such as moved or additional lighting, stair repair, and locks installed. Other common additional measures were electrical work, CFLs, and shelving.

Table V-8
Other Measures

	Other Measures		
	Number of Clients Who Recalled The Measure		
	Cleveland	Columbus	Total
Number of Clients Who Reported At Least One of These Measures	12	12	24
Health and Safety – Lighting, Stairs, Locks	6	6	12
Electrical Work	5	3	8
CFLs	3	4	7
Shelving	6	1	7
Door Replaced	1	2	3
Refrigerator Replacement	3	0	3
Window Repair	3	0	3
Aerator	0	2	2

Table V-9 displays clients' reports of satisfaction with the measures that they recalled. The table shows that on average clients were very satisfied with 70 percent of the measures, somewhat satisfied with 12 percent of the measures, somewhat dissatisfied with eight percent of the measures and very dissatisfied with seven percent of the measures.

Table V-9
Measures Satisfaction

	Satisfaction With Recalled Measures				
	Mean Percent of Measures With Each Rating				
	Very Satisfied	Somewhat Satisfied	Somewhat Dissatisfied	Very Dissatisfied	Don't Know
Cleveland	65%	12%	10%	11%	3%
Columbus	74%	13%	7%	2%	3%
All Interviews	70%	12%	8%	7%	3%

B. Change in the Way the Home is Used

One of the goals of the Ohio REACH program was to educate clients to use their homes in a way that improves their health. Examples of such behaviors are to stop smoking in the home, use exhaust fans to reduce or eliminate the growth of mold, and use less toxic household cleaners.

When clients were interviewed, they were asked to report how they had changed the use of their homes as a result of the program. Table V-10 shows that 19 of the 33 clients interviewed reported that they made at least one change in the way that they use their homes as a result of the program. The mean number of changes reported was 1.2 per client and the mean number of effective changes, those expected to have an impact on client health, was 0.8.

Table V-10
Number of Clients Who Changed the Way they Use their Homes

	Change in the Way the Home is Used		
	Number Who Reported at Least One Change	Mean Number of Changes Reported	Mean Number of Effective Changes Reported
Cleveland	11	1.3	1.1
Columbus	8	1.2	0.5
All Clients	19	1.2	0.8

Table V-11 displays the number of clients who reported that they made certain changes in the way that they use their home as a result of the program. The table shows that four clients reported that they use exhaust fans provided by the program, four reported that they check the humidity gauge and make adjustments, and four reported that they keep the home cleaner. Some clients reported that they no longer allow smoking in the home or change the furnace filter.

Table V-11
Number of Clients Who Made Specified Changes
In the Way they Use their Home

	Changes in the Way the Home is Used		
	Number of Clients Who Reported the Change (Unprompted)		
	Cleveland	Columbus	Total
Use exhaust fans that were provided	3	1	4
Check and adjust for humidity level	3	1	4
Keep home cleaner	3	1	4
No longer allow smoking in the home	1	1	2
Change furnace filter	1	0	1

Clients were also asked about the impact of the program on energy usage. Table V-12 shows that 20 of the 33 clients reported at least one change in the way that they use energy as a result of the program. On average clients reported 1.4 changes in the way they use energy and 1.1 effective changes that are expected to reduce the amount of energy used.

Table V-12
Number of Clients Who Changed the Way they Use Energy

	Change in the Way Energy is Used		
	Number Who Reported at Least One Change	Mean Number of Changes Reported	Mean Number of Effective Changes Reported
Cleveland	11	2.1	1.6
Columbus	9	0.8	0.6
All Clients	20	1.4	1.1

Table V-13 displays the number of clients who made some specified changes in the way they use energy. The table shows that ten clients reported that they keep their home at a lower temperature in the winter, eight reported that they are more likely to turn off their lights, and three reported that they keep their home at a higher temperature in the summer. Other changes that were reported were purchasing and installing additional CFLs, taking shorter showers, using a timer on the television, line drying clothes, and discarding an old freezer.

Table V-13
Number of Clients Who Made Specified Changes
In the Way They Use Energy

	Changes in the Way Energy is Used		
	Number of Clients Who Reported the Change (Unprompted)		
	Cleveland	Columbus	Total
Lowered the winter temperature	5	5	10
Turn lights off	7	1	8
Increased the summer temperature	1	2	3
Installed CFLs	3	0	3
Shorter showers	1	0	1
Use timers for television	1	0	1
Line dry clothes	1	0	1
Discard freezer	1	0	1

C. Health Issues

The Ohio REACH program specifically targeted clients with health problems. During the on-site interviews, clients were asked to report health problems that were faced by household members. Table V-14 shows that the most commonly reported health problems were asthma, heart disease, high blood pressure, allergies, and diabetes. However, many other health problems were also faced by the clients.

Table V-14
Reported Health Problems

	Health Issues in the Home		
	Number of Clients Who Reported the Health Issue (Unprompted)		
	Cleveland	Columbus	Total
Asthma	11	7	18
Heart Disease	3	7	10
High Blood Pressure	3	4	7
Allergies	4	2	6
Diabetes	2	4	6
Arthritis	3	2	5
COPD	0	4	4
Emphysema	1	3	4
Sinus Issues	3	1	4

	Health Issues in the Home		
	Number of Clients Who Reported the Health Issue (Unprompted)		
	Cleveland	Columbus	Total
Cancer	2	1	3
High Cholesterol	2	1	3
Bronchitis	2	0	2
Blind	0	1	1
Deaf	0	1	1
Headaches	1	0	1
In Wheelchair	0	1	1

Clients were asked to report any impacts that they believe the program had on their health. Table V-15 shows that 15 of the clients reported a positive health impact and one client reported a negative health impact from the program.

Table V-15
Health Impacts of the Program

	Health Impacts of the Program	
	Number Who Reported Positive Impact	Number Who Reported Negative Impact
Cleveland	8	1
Columbus	7	0
All Clients	15	1

Table V-16 displays the specific health impacts that clients reported. The table shows that seven clients felt that they are able to breathe better since receiving program services, four reported a reduced frequency of hospital visits, and four reported that they faced fewer asthma attacks since receiving program services. Other health impacts were an ability to reduce the amount of medication taken, fewer sinus issues, an ability to work more, and a reduced number of trips to the doctor.

Table V-16
Specific Health Impacts of the Program

	Health Impacts of the Program		
	Number of Clients Who Reported the Health Impact (Unprompted)		
	Cleveland	Columbus	Total
Able to Breathe Better	1	6	7
Reduced Frequency of Hospital Visits	2	2	4

	Health Impacts of the Program		
	Number of Clients Who Reported the Health Impact (Unprompted)		
	Cleveland	Columbus	Total
Fewer Asthma Attacks	4	0	4
Able to Reduce Medication	1	2	3
Fewer Sinus Issues	2	0	2
Able to Work More	1	0	1
Reduced Doctor Visits	1	0	1

D. Expected Measures

One of the sources of dissatisfaction in weatherization programs is when clients do not receive all of the measures that they expect. This is a common problem when clients hear about the program from friends or have heard about a particular measure that they are interested in. Table V-17 shows that 14 of the Cleveland clients and 9 of the Columbus clients reported at least one measure that they expected to receive from the program but did not receive.

Table V-17
Clients Who Expected Measures that They Did not Receive

	Expected Measures that Were Not Received
	Number Who Reported at Least One Measure
Cleveland	14
Columbus	9
All Clients	23

One of the most common measures mentioned by the Ohio REACH clients that they expected but did not receive were window repair or replacement. Table V-18 shows that eight clients reported that they expected window repair or replacement but did not receive it. Other items that were mentioned by a few clients were a replacement mattress or mattress cover, a replacement thermostat, porch repair, and roofing work. There were several other measures that were only mentioned by one client. However, expectation of additional work was not a major problem in this program.

Table V-18
Expected Measures that Were Not Received

	Expected Measures that Were Not Received		
	Number of Clients Who Reported the Measure (Unprompted)		
	Cleveland	Columbus	Total
Window Repair or Replacement	5	3	8
Mattress or cover	0	4	4
Thermostat	2	2	4
Porch repair	1	2	3
Roofing Work	2	1	3
Electrical Work	2	0	2
Flooring Work	2	0	2

E. Program Satisfaction

Clients were asked to report how satisfied they were with the program. Table V-19 shows that the majority of the clients who were interviewed reported that they were very satisfied with the program. Only three of the 33 clients who were interviewed expressed any level of dissatisfaction with the program.

Table V-19
Program Satisfaction

	Overall Program Satisfaction		
	Number of Clients With Each Satisfaction Level		
	Cleveland	Columbus	Total
Very Satisfied	11	12	23
Somewhat Satisfied	2	3	5
Somewhat Dissatisfied	1	1	2
Very Dissatisfied	1	0	1
Don't Know	1	1	2
Total	16	17	33

Matching the program satisfaction ratings, there were many more positive comments than negative comments. Some of the specific comments that were made provide greater insight on the level of appreciation and satisfaction that clients had for the program.

- The client was very pleased with the program. The client stated “I had no knowledge of the changes that needed to be made.” The program made the client aware that his home

had issues. The program was “priceless” and he tells everyone he knows about the program.

- “It helped me a lot with the health issues. It helped with my energy bills. I have recommended the program to others.”
- “They provided more than I expected. It was a blessing. Everybody that came over was very nice. I appreciate everything they did... happy, really happy. They treated me swell.”
- The workers were friendly and knew what they were doing. They talked to the client about the work. CHN was very prompt. “The workers were really good with the work they did.”
- “I think the program is extraordinary. I don’t know what I would have done without it. [The worker – name omitted] from CHN is just wonderful. He’s been great from day one.”
- “We are much healthier. It feels good to be clean. It’s real good in here.”
- “Wonderful people! They explained what they were doing.”
- It is a wonderful program. “It helped with things that older folks could not do ourselves.”
- The client felt better about the home. She had a peace of mind that her home had been fixed. She feared that she would need to move if the work was not done. “I think it’s wonderful. I’d like to thank you.”
- “I’m glad they have this program.” There are lots of seniors and disabled people that can’t afford to get things in the home fixed. “I thank the Lord for it”.
- “[The work] probably saved my life. It was the difference between being dead and not dead. It was a blessing.”
- I was very happy that the mold in the basement was gone since my children play there. All of the people involved explained things about the work. [Name deleted] of the Breathing Association kept me very informed. They were very flexible with my schedule.
- If the measures weren’t done to the house, the client’s brother may have needed to go to a nursing home. The client is glad he can continue to live the way he used to.

- I was dissatisfied with the time that it took. But the contractors were thorough, friendly, and good about keeping the home clean and dust-free. The client was thankful for the work.
- They were all nice, friendly, efficient, and professional. They came on time and left after the work was done.
- There are a lot of people who can't afford these upgrades. They were much appreciated here. They did a wonderful job.
- The contractors were very nice and thorough and cleaned up after themselves. The house is "much more livable" and the client wants to thank the program very much.

There were some very negative comments that were made as well. Some are listed below. However, it is important to emphasize that the number of positive comments greatly exceeded the number of negative comments.

- "If I had to do it all over again, I would ask for the assistance..." But I was dissatisfied with the shoddy contractors and because they provided no written notes on the work that was provided.
- Several teams performed work on the home. Some were great and some were horrible.
- They did not follow up on the work. They didn't effectively correct the problems that occurred at the core of the household. I reached out to CHN to try to have these problems resolved. Workers came back to do mold clean-up but the mold returned.
- The contractors did not clean their shoes before coming in the home and they smoked inside the home.
- The client was very dissatisfied with the contractors. The contractors did their job as if they were doing a personal favor and had a condescending attitude.

Clients were asked if they had recommendations for improving the program. Table V-20 shows that 16 of the clients provided at least one recommendation for program improvement.

Table V-20
Recommendations for Program Improvement

	Recommendations
	Number Who Reported at Least One Recommendation
Cleveland	9

	Recommendations
	Number Who Reported at Least One Recommendation
Columbus	7
All Clients	16

Table V-21 shows some of the recommendations that were made by a few of the clients. The table shows that four clients suggesting using better contractors and four suggested that the program provide additional information about the services.

Table V-21
Specific Recommendations for Program Improvement

	Recommendations		
	Number of Clients With Each Recommendation		
	Cleveland	Columbus	Total
Use Better Contractors	2	2	4
Provide Additional Program Information	2	2	4
Do Additional Work in the Home	2	1	3
Improve Work Quality	2	0	2

F. Summary

Overall, the on-site interviews provided some very positive information about the Ohio REACH program. Some of the important findings are summarized below.

- *Understanding of Program Measures:* Many of the clients appeared to have a good understanding of the measures that were installed by the program. They were able to show the interviewers the work that was done, both inside and outside the home. Many clients also seemed to have a good understanding of why the different measures were installed. This is a notable accomplishment of the program, given the advanced age and illnesses of many of the clients who were served.
- *Behavioral Changes:* Many of the clients reported important changes in the way that they use their home and in the way that they use energy. These changes should lead to improve health and more affordable energy bills.
- *Health Impact:* Many clients perceived that the program had positive impacts on the health, resulting in reduced trips to the hospital, improved breathing, and reduced need for medication.

- Satisfaction: For the most part, clients expressed high levels of satisfaction with the work that was provided by the program.

VI. Client Pre and Post Treatment Survey

The goal of the Ohio REACH project was to improve the health and safety of the home and the occupants. Therefore, a pre/post survey was included in the evaluation plan to assess the impact of the program.

APPRISE attempted to conduct pre-treatment surveys with all clients prior to the delivery of any program services, and post surveys with clients one year later, whether or not they had been treated by the program. Because home conditions are related to the weather and the time of the year, it was important that these surveys be conducted at approximately the same time of year.

Managers at the Breathing Association and at Cleveland Housing Network send APPRISE clients who were prescreened for services, APPRISE conducted the surveys, and then informed the agencies that the clients had been surveyed so that program service delivery could begin.

This section summarizes key findings from the pre and post treatment client surveys. The survey instrument is contained in Appendix C of this report.

A. *Healthy Home Basics*

This section provides information on basic healthy home issues. Table V-1A shows that 83 percent of all clients reported that they felt there was a condition in their home that was unsafe or unhealthy prior to treatment. While 85 percent of those who received services said that there was an unsafe condition in the home prior to service delivery, 38 percent who received services said there was an unsafe condition one year later, a statistically significant decline of 47 percentage points. While 80 percent of those who did not receive services said there was an unsafe or unhealthy condition in the home at the pre survey, 59 percent said that there was an unsafe condition in the home in the post period, a decline of 21 percentage points.

**Table V-1A
Unsafe Condition Exists in Home**

Do you believe there is any condition in your home that is unsafe or unhealthy?						
	Pre Survey Results				Post Survey Results	
	Total	Services Received	Services Received Post Survey	No Services Received Post Survey	Services Received	Services Not Received
Responses	195	114	93	59	93	59
Yes	83%	84%	85%	80%	38%	59%
No	16%	14%	14%	19%	60%	41%
Don't know	2%	2%	1%	2%	2%	0%
Total	100%	100%	100%	100%	100%	100%

Table V-1B summarizes the change for the treated and untreated clients and the differences-in-differences result that compares the change for the treated to the change for the untreated, a measure of the net impact of the program. The table shows that this impact is a decline of 26 percentage points. The change for the treated clients and the net change are both statistically significant at the 99 percent level.

Table V-1B
Change in Percent Who Reported Unsafe Home Condition

	Treated Clients (N=93)			Untreated Clients (N=59)			Net Change (Percentage Points)
	Pre	Post	Change (Percentage Points)	Pre	Post	Change (Percentage Points)	
% Who Reported Unsafe or Unhealthy Home Condition	85%	38%	47**	80%	59%	21**	26**

**Indicates statistically significant difference at the 99 percent level.

Respondents were asked to describe what they felt that was unhealthy in their home. The most common responses were mold, drafts, and heating equipment problems. Table V-2 shows that 55 percent of the treated reported mold prior to service delivery and 16 percent of that group reported mold one year later, a statistically significant difference of 39 percentage points. This compares to 49 percent of the untreated who reported mold in the pre-treatment survey and 20 percent who reported mold one year later, a statistically significant decline of 29 percentage points. While 18 percent of the treated group said that their home was drafty prior to service delivery, only six percent said it was drafty one year later, a statistically significant decline of 12 percentage points, and also a statistically significant net change of 12 percentage points.

Table V-2
Unsafe Condition in the Home

What do you feel is unhealthy in your home?						
	Pre Survey Results				Post Survey Results	
	Total	Services Received	Services Received Post Survey	No Services Received Post Survey	Services Received	Services Not Received
Responses	195	114	93	59	93	59
Mold	52%	55%	55%	49%	16%	20%
Drafty	16%	16%	18%	15%	6%	15%
Heating Equipment	6%	4%	4%	7%	3%	5%
Leaks	2%	3%	3%	0%	4%	5%
Drainage	2%	2%	0%	2%	2%	2%
Roof	1%	0%	0%	2%	0%	0%

What do you feel is unhealthy in your home?						
	Pre Survey Results				Post Survey Results	
	Total	Services Received	Services Received Post Survey	No Services Received Post Survey	Services Received	Services Not Received
Humidity	1%	1%	0%	0%	0%	3%
Dust	1%	1%	1%	2%	0%	2%
Carbon Monoxide	1%	1%	1%	2%	1%	0%
Structural Problems	0%	0%	0%	0%	4%	7%

Respondents were also asked about several behaviors that could lead to an unhealthy home environment. Results shown in Table V-3 are highlighted below:

- Smoking in the home – The treated clients were not less likely to do so, but the untreated clients were more likely to do so.
- Use bathroom exhaust fan while showering – The treated clients were less likely to say that they do not use the bathroom exhaust when showering. Fifty-eight percent said they did not use the exhaust prior to services and 34 percent said they did not use the exhaust after services. The untreated clients had no significant change in this behavior. The net impact is a statistically significant decline of 26 percentage points.
- Use kitchen exhaust fan while cooking – The treated clients were less likely to say that they did not use the kitchen exhaust when cooking. While 57 percent said they did not use the kitchen exhaust when cooking prior to services, 46 percent said they did not use the kitchen exhaust one year later. However, this net change is not statistically significant.
- Warm up car in attached garage – There was no significant decline in this behavior.
- Use kitchen stove or oven to heat home – The treated clients were much less likely to say that they used their kitchen stove for heating. While 37 percent said they did so prior to services, only eight percent said they did so one year later, a statistically significant decline of 29 percentage points. The percent of the untreated was 32 percent at the pre survey and 25 percent at the post survey. The net change is statistically significant.

Table V-3
Unhealthy Home Practices

	Pre Survey Results				Post Survey Results	
	Total	Services Received	Services Received Post Survey	No Services Received Post Survey	Services Received	Services Not Received
Responses	195	114	93	59	93	59
Smoke inside the house	25%	24%	27%	22%	26%	27%
Do not use fan when showering	64%	59%	58%	73%	34%	75%
Do not use fan when cooking	57%	54%	57%	59%	46%	54%
Warm up car in attached garage	3%	4%	4%	0%	5%	2%
Use kitchen stove or oven to heat home	35%	33%	37%	32%	8%	25%

B. Common Household Problems

Respondents were asked whether they have seen mold in their home in the past year. Table V-4 shows that 69 percent of the treated said that they saw mold prior to service delivery and 27 percent of this group said that they saw mold one year later, a statistically significant decline of 42 percentage points. This compares to 63 percent of the untreated who said that they saw mold in the home at the pre survey and 39 percent who said they saw mold one year later, a statistically significant decline of 24 percentage points. The net change, a decline of 18 percentage points is also statistically significant. The greatest decline in mold was in the bathroom and the basement.

Table V-4
Mold in the Home

	Pre Survey Results				Post Survey Results	
	Total	Services Received	Services Received Post Survey	No Services Received Post Survey	Services Received	Services Not Received
Responses	195	114	93	59	93	59
Any Mold	67%	71%	69%	63%	27%	39%
Kitchen	8%	8%	5%	10%	3%	7%
Bathroom	40%	42%	42%	37%	13%	20%
Basement	50%	54%	51%	47%	15%	29%

Respondents were asked whether they had seen pests in their home in the past year. Table V-5 shows that clients who did and did not receive treatment both had about the same

decrease in the likelihood of having pests in the home. However, the untreated clients had a greater decrease in likelihood of still having poison in the home.

Table V-5
Pests in the Home

	Pre Survey Results				Post Survey Results	
	Total	Services Received	Services Received Post Survey	No Services Received Post Survey	Services Received	Services Not Received
Responses	195	114	93	59	93	59
Pests	70%	73%	69%	71%	51%	54%
Used baits or poison	55%	58%	53%	53%	33%	36%
Poison still in the home	25%	24%	20%	25%	15%	12%

The survey included questions about the respondents' perception of the summer home humidity level. Table V-6 shows that while 22 percent of treated clients said that their home was just right prior to service delivery, 53 percent said that the home was just right one year later, a statistically significant increase of 31 percentage points. Twenty-seven percent of the untreated clients said their summer home humidity was just right at the pre-survey, and 46 percent said it was just right one year later, a statistically significant increase of 19 percentage points. The net impact was an increase of 12 percentage points in the percent who said their summer home humidity level was just right.

Table V-6
Summer Home Humidity

	Pre Survey Results				Post Survey Results	
	Total	Services Received	Services Received Post Survey	No Services Received Post Survey	Services Received	Services Not Received
Responses	195	114	93	59	93	59
Too Moist	23%	25%	25%	17%	11%	14%
Too Dry	32%	32%	31%	37%	18%	36%
Just Right	25%	23%	22%	27%	53%	46%
Don't Know	20%	20%	23%	19%	18%	5%
Total	100%	100%	100%	100%	100%	100%

Table V-7 shows that while 22 percent of the treated clients said that their winter humidity level was just right prior to service delivery, 44 percent said it was just right one year later, a statistically significant increase of 22 percentage point. This compares to 25 percent of the non-treated clients who said it was just right at the pre-survey and 34 percent who said it was

just right one year later, an increase of 9 percentage points. The net change for the treated of 13 percentage points is statistically significant as well.

Table V-7
Winter Home Humidity

	Pre Survey Results				Post Survey Results	
	Total	Services Received	Services Received Post Survey	No Services Received Post Survey	Services Received	Services Not Received
Responses	195	114	93	59	93	59
Too Moist	15%	16%	16%	10%	10%	8%
Too Dry	40%	37%	37%	51%	25%	39%
Just Right	25%	24%	22%	25%	44%	34%
Don't Know	20%	24%	26%	14%	22%	19%
Total	100%	100%	100%	100%	100%	100%

C. Health Issues

Respondents were also asked about health issues for the individuals in their home. Table V-8 shows that the program did not have a significant impact on the percent of clients who had asthma or had symptoms of the illness.

Table V-8
Asthma

	Pre Survey Results				Post Survey Results	
	Total	Services Received	Services Received Post Survey	No Services Received Post Survey	Services Received	Services Not Received
Responses	195	114	93	59	93	59
Someone in the home has asthma	55%	57%	56%	58%	53%	53%
Visited doctor for asthma in past year	50%	51%	49%	53%	45%	47%
Emergency room for asthma in past year	26%	25%	22%	25%	20%	24%

Table V-9 shows the change in respondents experiencing symptoms of allergies. The table shows that the non-treated had greater drops in some of the symptoms of allergies than the treated group did. The net change for the non-treated group in the need to take medications for allergies was greater than for the treated group.

Table V-9
Allergies

	Pre Survey Results				Post Survey Results	
	Total	Services Received	Services Received Post Survey	No Services Received Post Survey	Services Received	Services Not Received
Responses	195	114	93	59	93	59
Someone in the home has allergies	72%	72%	70%	73%	66%	63%
Takes medicine for allergies	56%	54%	52%	61%	49%	47%
Someone always seems to have cold, runny nose, wheezing, coughing, burning eyes, or headaches	76%	76%	76%	81%	59%	58%

Table V-10 shows that the non-treated group had a greater drop in the percent who went to the emergency room for symptoms of bronchitis or lung disease.

Table V-10
Bronchitis

	Pre Survey Results				Post Survey Results	
	Total	Services Received	Services Received Post Survey	No Services Received Post Survey	Services Received	Services Not Received
Responses	195	114	93	59	93	59
Someone in home has chronic bronchitis or other lung disease	44%	45%	43%	47%	41%	42%
Went to emergency room for bronchitis or lung disease	20%	19%	18%	24%	16%	14%

Table V-11 shows that while 48 percent of the treated said that they were somewhat or very healthy prior to service delivery, 64 percent said that they were somewhat or very healthy one year later, a statistically significant increase of 16 percentage points. While 44 percent of the untreated said that they were somewhat or very healthy at the pre survey, 56 percent said that they were somewhat or very healthy one year later, a statistically significant increase of 12 percentage points.

Table V-11
Health Rating

How do you rate the health of your household members overall?						
	Pre Survey Results				Post Survey Results	
	Total	Services Received	Services Received Post Survey	No Services Received Post Survey	Services Received	Services Not Received
Responses	195	114	93	59	93	59
Very healthy	6%	7%	8%	3%	18%	12%
Somewhat healthy	42%	41%	40%	41%	46%	44%
Somewhat unhealthy	39%	39%	39%	42%	26%	39%
Very unhealthy	12%	12%	14%	14%	10%	5%
Total	100%	100%	100%	100%	100%	100%

D. Home Comfort

Respondents' home comfort ratings are shown in Table V-12. The table shows that 69 percent of the treated clients said that their home was somewhat or very comfortable prior to service delivery and 87 percent said it was somewhat or very comfortable one year later (with the increase coming in those who said their home was very comfortable.) This was a statistically significant increase of 18 percentage points. By comparison, 72 percent of the untreated said their home was somewhat or very comfortable at the pre-survey, and 80 percent said it was somewhat or very comfortable one year later. The net change for the treated, an increase of 10 percentage points is statistically significant.

Table V-12
Home Comfort

How do you rate the comfort of your home?						
	Pre Survey Results				Post Survey Results	
	Total	Services Received	Services Received Post Survey	No Services Received Post Survey	Services Received	Services Not Received
Responses	195	114	93	59	93	59
Very comfortable	11%	8%	9%	19%	29%	19%
Somewhat comfortable	57%	59%	60%	53%	58%	61%
Somewhat uncomfortable	25%	25%	24%	22%	10%	14%
Very uncomfortable	6%	8%	8%	5%	2%	3%
Don't Know	1%	0%	0%	2%	1%	3%
Total	100%	100%	100%	100%	100%	100%

Table V-13 shows that while 83 percent of treated clients said their home was drafty in the winter prior to service delivery, 52 percent said it was drafty one year later, a statistically significant decline of 31 percentage points. Seventy-six percent of the untreated clients said their home was draft at the pre-survey, compared to 66 percent one year later. The net change for the treated, of 21 percentage points is statistically significant.

**Table V-13
Winter Comfort**

	Pre Survey Results				Post Survey Results	
	Total	Services Received	Services Received Post Survey	No Services Received Post Survey	Services Received	Services Not Received
Responses	195	114	93	59	93	59
Drafty in the winter	82%	84%	83%	76%	52%	66%
Cannot heat home to comfortable temperature	25%	26%	27%	22%	18%	15%
Home was uncomfortably cold in past year	44%	45%	41%	42%	35%	32%

Table V-14 displays data on summer comfort. The table shows that the treated group had larger decreases in the percent who said they could not cool their home to a comfortable temperature and that the home was uncomfortably warm than the comparison group. While 52 percent of the treated clients said their home was uncomfortably warm prior to treatment, 38 percent said it was so one year later, a statistically significant decline of 14 percentage points. The net change was a statistically significant 15 percentage points.

**Table IV-14
Summer Comfort**

	Pre Survey Results				Post Survey Results	
	Total	Services Received	Services Received Post Survey	No Services Received Post Survey	Services Received	Services Not Received
Responses	195	114	93	59	93	59
Have air conditioner	82%	83%	85%	85%	84%	78%
Cannot cool home to comfortable temperature	24%	28%	29%	19%	14%	12%
Home was uncomfortably warm in past year	53%	53%	52%	46%	38%	47%

E. Summary

Table V-15 provides a summary of the results that were shown in the tables above. The gross changes for the treatment and comparison groups that are statistically significant are

highlighted. The table shows that the treatment group had significant improvements in home safety, healthy home behaviors, mold, pests, humidity, household health, home comfort, and winter and summer temperatures. Net changes were statistically significant with respect to unsafe home conditions, healthy home behaviors, mold, humidity, home comfort, winter drafts, and summer home temperature. The non-treated had better outcomes with respect to reduced pest poisons in the home, need to use medication for allergies, and the need to visit the emergency room for bronchitis.

Table V-15
Summary

	Treated Clients (N=93)			Untreated Clients (N=59)			Net Change (Percentage Points)
	Pre	Post	Change (Percentage Points)	Pre	Post	Change (Percentage Points)	
Reported unsafe or unhealthy home condition	85%	38%	47**	80%	59%	21**	26**
Unsafe condition (unprompted) - mold	55%	16%	39**	49%	20%	29**	10
Unsafe condition (unprompted) - drafty	18%	6%	12**	15%	15%	0	12**
Smoke in home	27%	26%	1	22%	27%	-5	6**
Do not use exhaust fan when showering	58%	34%	24**	73%	75%	-2	26**
Do not use exhaust fan when cooking	57%	46%	11*	59%	54%	5	6
Warm up car in garage	4%	5%	1	0%	2%	2	-1
Use kitchen stove or oven to heat home	37%	8%	29**	32%	25%	7	22**
Any mold	69%	27%	42**	63%	39%	24**	18*
Mold in kitchen	5%	3%	2	10%	7%	3	-1
Mold in bathroom	42%	13%	29**	37%	20%	17**	12 [#]
Mold in basement	51%	15%	36**	47%	29%	18**	18*
Pests	69%	51%	18**	71%	54%	17**	1
Used baits or poison	53%	33%	20**	53%	36%	17**	3
Poison still in home	20%	15%	5	25%	12%	13**	-8**
Summer home humidity – just right	22%	53%	31**	27%	46%	19**	12
Winter home humidity – just right	22%	44%	22**	25%	34%	9	13 [#]
Has asthma	56%	53%	3	58%	53%	5	-2
Asthma – visited doctor	49%	45%	4	53%	47%	6	-2
Asthma – visited emergency room	22%	20%	2	25%	24%	1	1
Allergies	70%	66%	4	73%	63%	10	-6

	Treated Clients (N=93)			Untreated Clients (N=59)			Net Change (Percentage Points)
	Pre	Post	Change (Percentage Points)	Pre	Post	Change (Percentage Points)	
Allergies – medicine	52%	49%	3	61%	47%	14*	-11*
Allergies - symptoms	76%	59%	17**	81%	58%	23**	-6
Bronchitis or lung disease	43%	41%	2	47%	42%	5	-3
Bronchitis – visited emergency room	18%	16%	2	24%	14%	10*	-8*
Household health – somewhat or very healthy	48%	64%	16**	44%	56%	12 [#]	4
Home comfort – somewhat or very comfortable	69%	87%	18**	72%	80%	8	10 [#]
Drafty in winter	83%	52%	31**	76%	66%	10	21**
Cannot heat home to comfortable temperature	27%	18%	9*	22%	15%	7	2
Home was uncomfortably cold	41%	35%	6	42%	32%	10 [#]	-4
Have air conditioner	85%	84%	1	85%	78%	-7	8 [#]
Cannot cool home to comfortable temperature	29%	14%	15**	19%	12%	7 [#]	8
Home was uncomfortably warm	52%	38%	14**	46%	47%	-1	15**

**Indicates statistically significant difference at the 99 percent level.

*Indicates statistically significant difference at the 95 percent level.

[#]Indicates statistically significant difference at the 90 percent level.

VII. Pre/Post Client Assessment

Program implementers were asked to gather data about participant behaviors, home condition, and health at intake and one year later at a post assessment. The form used is shown in Appendix B. These data were not collected for all clients and only some of the data were collected by the Breathing Association for the one year post assessment. CHN did not collect post assessment data. Some of the data for which pre and post assessment information were available are displayed in this section. We focus on the subset of homes for which pre and post assessment data are available.

Table VI-1 displays the provider rating of the dwelling condition. The table shows that there was a significant increase in the percent of homes that were rated as good. The percentage increased from 33 percent in the pre-assessment to 48 percent in the post assessment.

Table VI-1
Dwelling Condition

	Pre Assessment Results				Post Assessment Results
	BA	CHN	All	BA with Post Results	Services Received
Responses	112	91	203	64	64
Excellent	2%	1%	1%	5%	3%
Good	29%	24%	27%	33%	48%
Average	42%	52%	46%	44%	41%
Below Average	21%	9%	15%	16%	6%
Poor	6%	14%	10%	3%	2%

*Highlighted difference is statistically significant at the 95% level

Table VI-2 shows that clients were more likely at the post-assessment to report that they changed their filter every three months than they were at the pre-assessment.

Table VI-2
Frequency With Which Client Changes Furnace Filter

	Pre Assessment Results				Post Assessment Results
	BA	CHN	All	BA with Post Results	Services Received
Responses	114	90	204	65	65
Every 3 Months	54%	70%	61%	60%	80%
Every 6 Months	21%	14%	18%	15%	9%

	Pre Assessment Results				Post Assessment Results
	BA	CHN	All	BA with Post Results	Services Received
Once per Year	12%	7%	10%	12%	5%
< Once per Year	2%	1%	1%	0%	0%
Never	11%	8%	9%	12%	6%

*Highlighted difference is statistically significant at the 99% level

Table VI-3 shows that providers were much more likely to say that there was no mold in the home at the post assessment than at the pre assessment.

**Table VI-3
Presence of Mold**

	Pre Assessment Results				Post Assessment Results
	BA	CHN	All	BA with Post Results	Services Received
Responses	116	91	207	66	66
None	28%	0%	16%	24%	74%
Minor	28%	49%	38%	33%	18%
Significant	28%	33%	30%	29%	5%
Severe	15%	18%	16%	14%	3%

*Highlighted difference is statistically significant at the 99% level

Table VI-4 shows that providers were also more likely at the post assessment than at the pre assessment to report that there were no pests in the home.

**Table VI-4
Presence of Pests**

	Pre Assessment Results				Post Assessment Results
	BA	CHN	All	BA with Post Results	Services Received
Responses	113	91	204	63	63
None	51%	42%	47%	51%	68%
Minor	35%	34%	34%	32%	25%
Significant	11%	16%	13%	14%	5%
Severe	4%	8%	5%	3%	2%

*Highlighted difference is statistically significant at the 99% level

Table VI-5 displays the clients' reports of home winter comfort at the pre assessment and the post assessment. The table shows while none of the clients reported that their home comfort level was excellent at the pre assessment, 25 percent reported that their home comfort level was excellent at the post assessment.

**Table VI-5
Winter Comfort**

	Pre Assessment Results				Post Assessment Results
	BA	CHN	All	BA with Post Results	Services Received
Responses	105	90	195	60	60
Excellent	1%	2%	2%	0%	25%
Good	12%	21%	16%	17%	38%
Satisfactory	41%	53%	46%	42%	28%
Unsatisfactory	46%	23%	36%	42%	8%

*Highlighted difference is statistically significant at the 99% level

Table VI-6 displays the clients' reports of their summer home comfort levels at the pre assessment and the post assessment. The table shows the same increase in the percent of clients who reported that their summer home comfort level was excellent.

**Table VI-6
Summer Comfort**

	Pre Assessment Results				Post Assessment Results
	BA	CHN	All	BA with Post Results	Services Received
Responses	105	91	196	63	63
Excellent	1%	7%	4%	0%	25%
Good	18%	16%	17%	21%	33%
Satisfactory	45%	47%	46%	49%	25%
Unsatisfactory	36%	30%	33%	30%	16%

*Highlighted difference is statistically significant at the 99% level

Table VI-7 displays the clients rating of their air quality level at the pre assessment and the post assessment. The table shows that there was an increase in the percent of clients who said that their air quality was good.

Table VI-7
Air Quality

	Pre Assessment Results				Post Assessment Results
	BA	CHN	All	BA with Post Results	Services Received
Responses	105	91	196	57	57
Excellent	0%	1%	1%	0%	2%
Good	20%	20%	20%	23%	54%
Satisfactory	44%	43%	43%	46%	32%
Unsatisfactory	36%	36%	36%	32%	12%

*Highlighted difference is statistically significant at the 99% level

Table VI-7 displays the clients rating of their home health at the pre assessment and the post assessment. The table shows that there was not a change in this indicator.

Table VI-8
Household Member Health

	Pre Assessment Results				Post Assessment Results
	BA	CHN	All	BA with Post Results	Services Received
Responses	105	91	196	63	63
Excellent	1%	3%	2%	2%	5%
Good	20%	12%	16%	21%	22%
Satisfactory	45%	30%	38%	48%	48%
Unsatisfactory	34%	55%	44%	30%	25%

While much of the pre and post assessment data were missing, the analysis of the available data showed that the results from the pre and post assessment analysis were consistent with the results of the pre and post client survey. The program seems to have positive impacts on home comfort and safety, but it did not appear to impact client health.

VIII. Summary and Recommendations

This report presented the findings from the evaluation of The Ohio REACH Project. The Ohio REACH project targeted additional resources to low income weatherization to go beyond energy use and energy bill reduction and more comprehensively address the needs of low-income households. This project sent energy professionals and health professionals to the homes of clients at the same time. Each professional was responsible for conducting an assessment of the needs in the home. Together, they prioritized the health and energy investments so that they complement each other, rather than work at cross purposes. The expected outcome of the program was that the household energy systems are able to deliver the energy services needed by the home in a way that is energy efficient and healthy. The goal was to ensure that all households that have vulnerable individuals who receive services through the weatherization program have adequate energy services and a healthier home environment after the completion of service delivery.

The evaluation consisted of both process and impact evaluation research. The process evaluation research documented how the activities were implemented and developed an understanding of barriers to implementation and potential modifications that could allow for improved execution or enhanced outcomes. The outcome evaluation research measured the impact of the services provided on the safety of the household environment and the health of the occupants.

There were two key program challenges. The first was that some of the program partners were not comfortable with the proposed approach to service delivery. Based on their experience with another healthy home program, they felt it was not feasible to address issues in the home with the planned level of funding. To allow for greater costs of program measures, the REACH program dollars, with approval from HHS, were reprogrammed to increase the average home spending and reduce the number of treated homes. The second challenge was working with the agencies to deliver the REACH program in conjunction with HWAP, as designed, instead of as a post-HWAP service delivery system to provide additional services that HWAP could not provide.

However, the lead agency managers felt that the REACH program worked well. While it took some time for the agencies to develop the many partnerships that they needed, they saw that the partnerships eventually were worked out, and then served the program quite well. The REACH program allowed the agencies to help households in ways that other programs had not allowed.

While the REACH program faced many challenges and the service delivery was not implemented according to original plans, there were several accomplishments.

- *Service delivery:* 180 homes received REACH services.
- *Underserved households:* The lead agencies noted that the Ohio REACH program allowed them to serve households that otherwise could not receive weatherization.

- *Program coordination:* The Cleveland Housing Network and the Breathing Association both worked diligently to leverage funds from all available programs and to provide comprehensive services to REACH participants.
- *New partnerships:* In addition to leveraging funds, the REACH program also leveraged human capital to help assist the households served by the program.
- *Capacity building:* Weatherization and health staff worked together to conduct joint assessments of the needs of participating households. This cooperation helped to build the skills of both groups.

An analysis of program measures and funding shows that the measures that were primarily funded through REACH focused on health and safety-related issues, as designed, that most commonly included exhaust fans, HEPA air filters, gutter or downspout repair, and environmental cleanings. The typical weatherization measures, such as air sealing and insulation, were primarily funded through WAP.

A pre/post client survey found that the program had positive and significant impacts on unsafe home conditions, healthy home behaviors, mold, humidity, home comfort, winter drafts, and summer home temperature. However, the program did not appear to impact specific health conditions, such as asthma, allergies, and bronchitis.

While much of the pre and post assessment data were missing, the analysis of the available data showed that the results from the pre and post assessment analysis were consistent with the results of the pre and post client survey. The program seems to have positive impacts on home comfort and safety, but it did not appear to impact client health. Positive changes were measured in the dwelling condition, the presence of mold and pests, and the client's perception of winter and summer comfort and air quality.

The REACH program showed that WAP can leverage additional funds to provide beneficial health, safety, and comfort impacts for program participants. While it was challenging to have program providers deliver services in a way that differed from their normal methods, the providers did succeed in integrating additional health and safety measures into their established WAP procedures. These additional measures had a beneficial impact for the clients. The benefits were measured through the pre/post client surveys and the pre/post client assessment.

The WAP program in Ohio should consider using LIHEAP funding to continue to provide these ancillary services to WAP participants. They should attempt to find the most efficient ways to integrate these measures with WAP agencies' current service delivery practices. Because agencies throughout the state implement WAP in different ways, there may be different models that work better with different agencies' current procedures. The new health and safety measures should be implemented in a flexible way, to take advantage of current partnerships that different agencies have and to create the greatest benefit for program participants.

Appendix A. Weatherization Summary

CLIENT NAME:	
PHONE NUMBER:	ZIP CODE:
START DATE:	COMPLETE DATE:
AUDITOR:	
TOTAL COST (=LABOR+MATERIAL):	
TOTAL LABOR COST:	
TOTAL MATERIAL COST:	
TOTAL REACH COST:	

WEATHERIZATION MEASURES						
		No	Yes	Funded		
		1	2	REACH	WAP	OTHER
AIR SEALING						
AS1	General house caulking and weatherstripping (e.g. doors, windows)	☐	☐	☐	☐	☐
AS2	House air sealing emphasizing bypasses – leaks identified without blower door	☐	☐	☐	☐	☐
AS3	House air sealing emphasizing bypasses – leaks identified with blower door	☐	☐	☐	☐	☐
AS4	Duct sealing and repair	☐	☐	☐	☐	☐
AS5	Other non-window non-door air sealing work	☐	☐	☐	☐	☐
INSULATION						
INSUL6	Attic insulation	☐	☐	☐	☐	☐
INSUL7	Wall insulation	☐	☐	☐	☐	☐
INSUL8	Floor insulation	☐	☐	☐	☐	☐
INSUL9	Duct insulation	☐	☐	☐	☐	☐
INSUL10	Other insulation	☐	☐	☐	☐	☐
SPACE HEATING SYSTEMS						
SH11	11. New space heating system	☐	☐	☐	☐	☐
SH12	12. Space heating system repair	☐	☐	☐	☐	☐
SH13	13. Space heating system tune-up	☐	☐	☐	☐	☐
AIR CONDITIONING						
AC14	14. New window air conditioner	☐	☐	☐	☐	☐
AC15	15. New central air conditioner	☐	☐	☐	☐	☐
AC16	16. Air conditioner repair	☐	☐	☐	☐	☐
AC17	17. Air conditioner recharge/tune-up	☐	☐	☐	☐	☐
AC18	18. Ceiling or whole-house fan installation	☐	☐	☐	☐	☐
VENTILATION						
VENT19	19. Exhaust fan in bathroom	☐	☐	☐	☐	☐
VENT20	20. Exhaust fan in kitchen	☐	☐	☐	☐	☐
VENT21	21. Whole house ventilation system	☐	☐	☐	☐	☐
VENT22	22. Other ventilation system improvements	☐	☐	☐	☐	☐
HVAC ACCESSORIES						
HVAC23	23. New programmable thermostat	☐	☐	☐	☐	☐
HVAC24	24. New standard thermostat	☐	☐	☐	☐	☐
HVAC25	25. Standard air filter	☐	☐	☐	☐	☐
HVAC26	26. HEPA air filter	☐	☐	☐	☐	☐
HVAC27	27. Other HVAC accessories	☐	☐	☐	☐	☐

WEATHERIZATION MEASURES						
		No	Yes	Funded		
		1	2	REACH	WAP	OTHER
WATER HEATING SYSTEM						
WH28	28. New water heater	☐	☐	☐	☐	☐
WH29	29. Water heating system repair	☐	☐	☐	☐	☐
WH30	30. Water heater tank insulation wrap	☐	☐	☐	☐	☐
WH31	31. Pipe insulation	☐	☐	☐	☐	☐
WH32	32. Water heater temperature reduction	☐	☐	☐	☐	☐
WH33	33. Other water heating system measure	☐	☐	☐	☐	☐
OTHER BASELOADS						
BASE34	34. Indoor lighting	☐	☐	☐	☐	☐
BASE35	35. Outdoor lighting	☐	☐	☐	☐	☐
BASE36	36. Refrigerator	☐	☐	☐	☐	☐
BASE37	37. Other baseload measures – specify _____	☐	☐	☐	☐	☐
OTHER HEALTH AND SAFETY						
HS38	38. Smoke alarm	☐	☐	☐	☐	☐
HS39	39. CO monitor	☐	☐	☐	☐	☐
HS40	40. Attic ventilation	☐	☐	☐	☐	☐
HS41	41. Roof repair	☐	☐	☐	☐	☐
HS42	42. Wall repair	☐	☐	☐	☐	☐
HS43	43. Floor repair	☐	☐	☐	☐	☐
HS44	44. Foundation repair	☐	☐	☐	☐	☐
HS45	45. Ground vapor barrier	☐	☐	☐	☐	☐
HS46	46. Gutter or downspout repair	☐	☐	☐	☐	☐
HS47	47. Grading of lot	☐	☐	☐	☐	☐
HS48	48. Plumbing repair	☐	☐	☐	☐	☐
HS49	49. Sewer repair	☐	☐	☐	☐	☐
HS50	50. Electrical repair	☐	☐	☐	☐	☐
HS51	51. Stair repair	☐	☐	☐	☐	☐
HS52	52. Grab bar in bathroom	☐	☐	☐	☐	☐
HS53	53. Non skid material in bathtub	☐	☐	☐	☐	☐
HS54	54. Metal chimney liner	☐	☐	☐	☐	☐
HS55	55. Lead abatement	☐	☐	☐	☐	☐
HS56	56. Asbestos containment	☐	☐	☐	☐	☐
HS57	57. Removal or safe storage of household poisons	☐	☐	☐	☐	☐
HS58	58. Pest extermination	☐	☐	☐	☐	☐
HS59	59. Environmental cleaning	☐	☐	☐	☐	☐
HS60	60. Other Health and Safety – specify _____	☐	☐	☐	☐	☐

Appendix B. Pre/Post Client Assessment

CLIENT NAME:						☐ PRE	☐ POST
CLIENT PHONE NUMBER:			CLIENT ZIP CODE:				
DATE:							
AUDITOR:							
Demographics							
Sex	☐ Male	☐ Female					
Marital	☐ Married	☐ Single					
Disability	☐ Yes	☐ No					
Education	☐ 0-8	☐ 9-12	☐ HS Grad/GED	☐ 12+	☐ College Degree		
Employed	☐ Full time	☐ Part time	☐ Student	☐ Unemployed	☐ Retired		
# children 5 or under							
# children 18 or under							
# 60 or older							
# with disability							
Family Type	☐ Male S/P	☐ Female S/P	☐ Two Parent	☐ Couple	☐ Single	☐ Other	
Housing							
Age of Home							
Housing	☐ Rent	☐ Own	☐ Subsidized	☐ Other			
Dwelling Type	☐ Single Family	☐ 2-4 Units	☐ 5+ Units				
# Floors in Home							
Home Type	☐ Slab	☐ Crawl space	☐ Basement - block	☐ Basement - stone	☐ Basement - concrete		
Primary Heating Fuel	☐ Natural Gas	☐ Electricity	☐ Fuel Oil	☐ Propane	☐ Other _____		
Dwelling Condition	☐ Excellent	☐ Good	☐ Average	☐ Below average	☐ Poor		

CLIENT KNOWLEDGE AND BEHAVIOR					
			No	Yes	Comments
			1	2	
HOMESMOKE	1. Do you allow smoking in your home?		☐	☐	
EXHAUST_BATH	2. Do you use your bathroom exhaust fan when showering or bathing?		☐	☐	
EXHAUST_KITCHEN	3. Do you use your kitchen exhaust fan when using your stove?		☐	☐	
FILTER	4. Do you change your furnace filter?		☐	☐	
FILTER_OFTEN	If yes, how often	☐ Every 3 months ☐ Every 6 months ☐ Once per year ☐ Less than once per year			
			No	Yes	
UNVENTED	5. Do you use unvented gas or kerosene space heaters?		☐	☐	
FIREPLACE	6. Do you use a fireplace?		☐	☐	
STOVE	7. Do you use your kitchen stove or oven to provide heat?		☐	☐	
GRILL	8. Do you use charcoal grills inside your home?		☐	☐	
GARAGE	9. Do you warm up your car inside your garage?		☐	☐	

CLIENT HOME CONDITIONS					
			No	Yes	Comments
			1	2	
ILL_HOT	1. Did you become ill in the past year because your home was too hot and you could not cool it?		☐	☐	
ILL_COLD	2. Did you become ill in the past year because your home was too cold and you could not heat it?		☐	☐	
TEMP	3. Did you keep your home at a temperature that you felt was unsafe or unhealthy in the past year?		☐	☐	
MOLD	4. Have you seen mold in your home in the past year?		☐	☐	
MOLD_RATE	If yes, rate	☐ minor ☐ significant ☐ severe			
MOLD_WHERE	If yes, where was the mold seen?				
PESTS	5. Have you seen pests in your home in the past year?		☐	☐	
PESTS_RATE	If yes, rate	☐ minor ☐ significant ☐ severe			
BASE_DRY	6. Is your basement dry?		☐	☐	
BASE_FLOOD	7. Does your basement flood?		☐	☐	
HUMIDIFIERS	8. Do you use humidifiers?		☐	☐	
DEHUMIDIFIERS	9. Do you use dehumidifiers?		☐	☐	

CLIENT HEALTH				
		No	Yes	Comments
		1	2	
ASTHMA	1. Does anyone in the home have asthma?	☐	☐	
ASTHMA_NUM	If yes, how many attacks has the person with the worst case had in the past month?			Number ____
ALLERGIES	2. Does anyone in the home have allergies?	☐	☐	
ALLERGY_MED	If yes, has allergy medication been used in the past month?	☐	☐	
LUNG	3. Does anyone in the home have chronic bronchitis or another lung disease?	☐	☐	
LUNG_MED	If yes, has any medication been used to treat these conditions in the past month?	☐	☐	
DISEASE1	4. Does anyone in the home have heart disease or diabetes or has had a stroke?	☐	☐	
PROBLEM1	5. Does anyone in the home always seem to have a cold, a runny nose, wheezing, coughing, burning eyes, or headaches?	☐	☐	
MED	6. Has anyone in the home had difficulty getting needed medications? (Breathing Assoc. Only)	☐	☐	
DIAGNOSIS	7. What diagnoses have household members received from their doctors?			

TESTING RESULTS				
	Level	Comments		
1. Ambient CO				
2. Furnace flue CO				
3. Water heater CO				
4. Gas leak	CHECK BOX: ☐ none ☐ minor ☐ significant ☐ severe			
5. Mold	CHECK BOX: ☐ none ☐ minor ☐ significant ☐ severe			
6. Humidity - ambient				
7. Humidity - floor				
8. Humidity - walls				
9. Home temperature				
10. Peeling paint	CHECK BOX: ☐ none ☐ minor ☐ significant ☐ severe			

CLIENT SUMMARY					
	Have client rate on a scale from 1-4 (highest to lowest)	Excellent	Good	Satisfactory	Unsatisfactory
		1	2	3	4
WINTER_COMFORT	1. Comfort of your home in the winter	☐	☐	☐	☐
SUMMER_COMFORT	2. Comfort of your home in the summer	☐	☐	☐	☐
AIR_QUALITY	3. Home air quality	☐	☐	☐	☐
HEALTH	4. Household member health	☐	☐	☐	☐

Appendix C. Pre Treatment Client Survey

OHIO REACH Baseline Survey Instrument

Client Name _____
Client Phone _____
Client Zipcode _____
Survey Date _____

Introduction:

Hello. My name is (INTERVIEWER) and I'm calling from APPRISE in Princeton, New Jersey. I'm calling for (NAME) regarding the Ohio Weatherization Assistance Program. You are scheduled to receive services this week.

IF (NAME) IS NOT AVAILABLE TO SPEAK, ASK a)

a) When can I call back to speak with (NAME)? _____
{ Interviewer Note: Write date and time for callback. }

IF (NAME) IS NOT ABLE TO SPEAK, ASK b):

b) Is there another person in the home who is familiar with the program and household?
{ Interviewer Note: If answer is yes, proceed to interview this person. }

IF (NAME) IS AVAILABLE TO SPEAK, BEGIN SURVEY NOW.

A. Introduction

A1. How did you find out about the Weatherization Assistance Program?

- 01 COMMUNITY AGENCY
- 02 LIHEAP
- 03 FRIEND OR RELATIVE
- 04 CHURCH
- 05 OTHER _____
- 97 DON'T KNOW
- 98 REFUSED

A2. Why did you apply for the Weatherization Assistance Program?

- 01 REDUCE ENERGY BILLS/USAGE
- 02 MAKE HOME MORE COMFORTABLE
- 03 RECEIVE FREE SERVICES
- 04 OTHER _____
- 97 DON'T KNOW
- 98 REFUSED

B. Healthy Home Basics

B1. Do you believe that there is any condition in your home that is unsafe or unhealthy?

01 YES

02 NO

97 DON'T KNOW

98 REFUSED

(Ask B2 if B1=01, YES)

B2. What do you feel is unhealthy in your home?

01 HEATING EQUIPMENT

02 MOLD

03 PESTS

04 SMOKING

05 DRAFTY

06 OTHER _____

97 DON'T KNOW

98 REFUSED

B3. Does anyone smoke inside the house?

01 YES

02 NO

97 DON'T KNOW

98 REFUSED

B4. Do you use your bathroom exhaust fan when you are showering or bathing?

01 YES

02 NO

03 DO NOT HAVE A BATHROOM EXHAUST FAN

97 DON'T KNOW

98 REFUSED

B5. Do you use your kitchen exhaust fan when you are cooking?

01 YES

02 NO

03 DO NOT HAVE A KITCHEN EXHAUST FAN

97 DON'T KNOW

98 REFUSED

B6. Do you have a garage that is attached to your home?

- 01 YES
- 02 NO
- 97 DON'T KNOW
- 98 REFUSED

(Ask B7 IF B6=01, YES)

B7. Do you warm up your car in the garage?

- 01 YES
- 02 NO
- 97 DON'T KNOW
- 98 REFUSED

B8. Have you used your kitchen stove or oven to heat your home in the past year?

- 01 YES
- 02 NO
- 97 DON'T KNOW
- 98 REFUSED

C. Common Household Problems

C1. Have you seen mold in your home in the past year?

- 01 YES
- 02 NO
- 97 DON'T KNOW
- 98 REFUSED

(Ask C2-C6 if C1=01, YES)

C2. Have you seen mold in the kitchen?

- 01 YES
- 02 NO
- 97 DON'T KNOW
- 98 REFUSED

C3. Have you seen mold in the bathroom?

- 01 YES
- 02 NO
- 97 DON'T KNOW
- 98 REFUSED

C4. Have you seen mold in the basement?

- 01 YES
- 02 NO
- 97 DON'T KNOW
- 98 REFUSED

C5. Where else have you seen mold?

- 01 LIVING ROOM
- 02 DINING ROOM
- 03 HALLWAY
- 04 PORCH
- 05 BASEMENT
- 06 OTHER _____
- 97 DON'T KNOW
- 98 REFUSED

C6. What have you done about the mold?

- 01 NOTHING
- 02 CLEANED WITH BLEACH
- 03 CLEANED WITH MOLD REMOVER
- 04 OTHER _____
- 97 DON'T KNOW
- 98 REFUSED

C7. Have you seen pests (cockroaches, ants, mice, rats...) in your home in the past year?

- 01 YES
- 02 NO
- 97 DON'T KNOW
- 98 REFUSED

(ASK C8 if C7=01, YES)

C8. What have you done about the pests?

- 01 NOTHING
- 02 USED BAIT/POISON
- 03 HIRED AN EXTERMINATOR
- 97 DON'T KNOW
- 98 REFUSED

(ASK C9 if C8=02, BAIT/POISON)

C9. Is the bait/poison still in the home?

01 YES

02 NO

97 DON'T KNOW

98 REFUSED

C10. Does your home seem too moist, too dry, or just right in the summer?

01 TOO MOIST

02 TOO DRY

03 JUST RIGHT

97 DON'T KNOW

98 REFUSED

C11. Does your home seem too moist, too dry, or just right in the winter?

01 TOO MOIST

02 TOO DRY

03 JUST RIGHT

97 DON'T KNOW

98 REFUSED

C12. Do you check the humidity level in your home?

01 YES

02 NO

97 DON'T KNOW

98 REFUSED

C13. What do you think is a safe home humidity level?

01 <30%

02 30-50%

03 >50%

97 DON'T KNOW

98 REFUSED

D. Health Issues

D1. Does anyone in the home have asthma?

01 YES

02 NO

97 DON'T KNOW

98 REFUSED

(Ask D2-D3 if D1=1, YES)

D2. Has anyone in the home gone to the doctor for the asthma in the past year?

01 YES

02 NO

97 DON'T KNOW

98 REFUSED

D3. Has anyone in the home gone to the emergency room for asthma in the past year?

01 YES

02 NO

97 DON'T KNOW

98 REFUSED

D4. Does anyone in the home have allergies?

01 YES

02 NO

97 DON'T KNOW

98 REFUSED

(Ask D5 if D4=01, YES)

D5. Does anyone in the home take medicine for the allergies?

01 YES

02 NO

97 DON'T KNOW

98 REFUSED

D6. Does anyone in the home have chronic bronchitis or another lung disease?

01 YES

02 NO

97 DON'T KNOW

98 REFUSED

(ASK D7 IF D6=1, YES)

D7. Has anyone in the home gone to the emergency room in the past year because of chronic bronchitis or lung disease?

01 YES

02 NO

97 DON'T KNOW

98 REFUSED

D8. Does anyone in the home always seem to have a cold, a runny nose, wheezing, coughing, burning eyes, or headaches?

01 YES

02 NO

97 DON'T KNOW

98 REFUSED

E. Home and General Comfort and Health

E1. How do you rate the comfort of your home?

01 VERY COMFORTABLE

02 SOMEWHAT COMFORTABLE

03 SOMEWHAT UNCOMFORTABLE

04 VERY UNCOMFORTABLE

97 DON'T KNOW

98 REFUSED

E2. Is your home drafty in the winter?

01 YES

02 NO

97 DON'T KNOW

98 REFUSED

(Ask E3 if E2=01, YES)

E3. How drafty is your home in the winter?

01 EXTREMELY DRAFTY

02 SOMEWHAT DRAFTY

03 NOT VERY DRAFTY

97 DON'T KNOW

98 REFUSED

E4. What temperature do you keep you home in the winter when you are doing things around the house?

- 01 TEMPERATURE _____
- 97 DON'T KNOW
- 98 REFUSED

E5. Does your heating system heat your home to a comfortable temperature?

- 01 YES
- 02 NO
- 97 DON'T KNOW
- 98 REFUSED

E6. Was there any time in the past year that your home was uncomfortably cold and you could not afford to heat it?

- 01 YES
- 02 NO
- 97 DON'T KNOW
- 98 REFUSED

E7. Do you have an air conditioner?

- 01 YES
- 02 NO
- 97 DON'T KNOW
- 98 REFUSED

(Ask E8 if E7=01, YES)

E8. Do you have a central air conditioner, or a window or wall air conditioner?

- 01 CENRTAL AIR CONDITIONER
- 02 WINDOW AIR CONDITIONER
- 03 WALL AIR CONDITIONER
- 04 NO AIR CONDITIONER
- 97 DON'T KNOW
- 98 REFUSED

(ASK E9 IF E8=01, CENTRAL AIR CONDITIONER

E9. What temperature do you set your air conditioner on when you are doing things around the home in the summer?

01 TEMPERATURE _____

97 DON'T KNOW

98 REFUSED

E10. Does your air conditioner cool your home to a comfortable temperature?

01 YES

02 NO

97 DON'T KNOW

98 REFUSED

E11. Was there a time in the past year that your home was uncomfortably warm and you could not afford to cool it?

01 YES

02 NO

97 DON'T KNOW

98 REFUSED

E12. How do you rate the health of your household members overall?

01 VERY HEALTHY

02 SOMEWHAT HEALTHY

03 SOMEWHAT UNHEALTHY

04 VERY UNHEALTHY

That was my last question. Thank you very much for your time and cooperation. Have a pleasant day/evening.