Energy Efficiency and Health

A Guide for Public Health and Health Care Professionals on Connecting Medically Vulnerable Residents with Energy Efficiency Services

ramp
REGIONAL ASTHMA MANAGEMENT & PREVENTION

CONTRA COSTA HEALTH SERVICES

Housing conditions play a significant role in health

Public health and health care professionals can help residents and communities have healthier housing and better health by connecting them with weatherization and energy efficiency programs. This document provides guidance for successfully establishing a referral program for people receiving health services to receive weatherization and energy efficiency services.

Public health has long recognized the nexus between housing and health. The roots of public health can be traced back to 19th century efforts to address the health impacts of run-down tenements.[1] Public health practitioners have developed various programs to directly address the relationship between health and housing. For example, lead poisoning prevention programs support the safe removal of lead paint hazards from homes, while asthma home visiting programs identify and remediate housing conditions that worsen asthma, such as pest infestations. More recently, public health practitioners have developed alliances with non-traditional partners to address the intersection of health and housing through such approaches as the development of land use guidelines on the placement of housing or the use of green building approaches in housing construction and renovation.[2]

There is an opportunity with which many public health and health care professionals (hereinafter referred to as "health professionals") can be engaged: weatherization/energy efficiency (EE) and renewable energy services. Recognized for reducing energy use and greenhouse gas emissions while lowering energy bills, these services also have significant health benefits.[3] Health professionals in the state can systematically connect low-income Californians with EE services. This can be done both by professionals that conduct home visits (e.g. public health nurses, community health workers, Meals on Wheels, etc.) and other clinicians and staff reaching vulnerable populations (e.g. community clinics, health management organizations (HMOs), school-based health staff, Head Start, Special Supplemental Nutrition Program for Women, Infants, and Children [WIC], Black Infant Health programs, etc.).

This guidance document is intended to share information with health professionals about why—and importantly, how—to leverage EE services to improve the health of communities.

Why would health professionals connect with weatherization/ energy efficiency programs?

The housing and health connection

Housing conditions play a significant role in health. It is estimated that Americans spend over 90% of their time indoors, and the majority of that time is in homes.[4] Healthy homes are dry, clean, safe, well- ventilated, pest and contaminant-free, well-maintained, and thermally controlled.[5] Deficiencies in any of these areas can lead to adverse health impacts. For example:

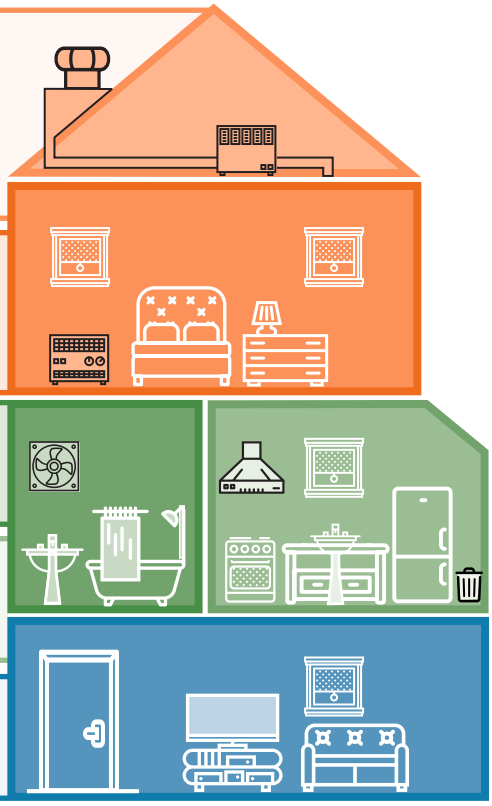
Inadequate ventilation, which increases exposure to indoor and outdoor air pollution and increases moisture and mold, is associated with an increased risk of respiratory symptoms, cardiovascular disease, and cancer;[7]

Improper heating and cooling combine with temperature extremes from climate change that can exacerbate illnesses or cause death;[9]

Indoor moisture and mold contribute to respiratory diseases, such as asthma;[6]

Pests, such as cockroaches and rodents, are connected to a range of communicable and respiratory diseases;[8]

Stress from unhealthy housing conditions can have mental health impacts, including depression.[10]



Residential weatherization/EE programs aimed at reducing energy use and/or greenhouse gas emissions associated with climate change can improve housing conditions and health in many ways. Common EE measures, such as adding or replacing insulation, air sealing, and improving heating and cooling systems can reduce humidity and moisture that contribute to mold and pest problems, help stabilize temperatures, and create a more comfortable living environment overall.[11]

Two systematic reviews of the academic literature studying the health impacts of EE improvements found significant health benefits from EE work. "HomeRx: The Health Benefits of Home Performance: A Review of the Current Evidence"[12] and "Occupant Health Benefits of Residential Energy Efficiency"[13] found evidence that EE upgrades improved:

- **Reports of overall health**;
- **Respiratory health**, including reduced COPD (chronic obstructive pulmonary disease) symptoms and asthma-related symptoms, hospitalizations, and medication use;
- **Allergies**, colds, and sinus infections;
- **Headaches**;
- **Blood pressure** and other cardiovascular conditions; and
- **Mental health**.

These studies showed significant exposure reductions related to most indoor contaminants; however, some contaminants (e.g. radon, formaldehyde) showed mixed results. In some cases, exposures were reduced and in other instances, increases were reported. While health impacts of these exposures were not studied, it is important to note there may be some level of health risk for some contaminants as a result of EE improvements.[14] Recognizing that "home energy retrofit activities might negatively affect indoor air quality" the U.S. Environmental Protection Agency developed "Healthy Indoor Environment Protocols for Home Energy Upgrades." The protocols provide practical guidance on improving or maintaining indoor air quality and indoor environments during home energy upgrades, retrofits, or remodeling. These are voluntary protocols, but if used, could mitigate or eliminate the negative results identified in some of the studies.

EE and health inequities

Perhaps most significant for health professionals, these reviews and studies point out that the health benefits of EE are greatest among those with pre-existing health conditions linked to housing risk, such as respiratory or cardiovascular diseases. By understanding which residents or clients benefit the most from housing improvements, health professionals can serve as a bridge connecting those residents and clients to EE services in their community.

Given that many public health professionals focus program goals on reducing health inequities, it is important to note that low-income communities and communities of color may benefit most from EE services. In California, 65% of African Americans and 57% of Latinos rent their homes in contrast to 36% of whites.[15] This is significant because rental housing is more likely to be in substandard condition than owner-occupied housing.[16] Additionally, low-income communities and communities of color are more likely to have pre-existing conditions that are affected by housing, such as asthma.[17] A health impact assessment conducted by the San Francisco Department of Public Health showed that targeting energy upgrades to homes with the worst air quality would eliminate health inequities related to indoor housing exposures in San Francisco.[18]

EE and climate change

In addition, as climate change increases the severity and frequency of temperature extremes, severe rainfall, and flooding events, low-income communities and communities of color will be at greater risk.[19] As just one example, low-income communities and communities of color are likely to be located in "urban heat islands" where temperatures may be as much as 22 degrees higher than surrounding areas.[20] Extreme heat results in excess death and illness through heat stroke, heat exhaustion, and exacerbations of chronic illness.[21] Improving cooling systems through weatherization and EE programs can help significantly mitigate these impacts.[22] Reducing energy use and switching to clean renewable energy such as solar (both changes that may be supported by EE programs) also significantly reduce air pollution and greenhouse gas emissions associated with energy production and use and associated health impacts.[23]

EE and financial impacts

In addition to the potential health benefits of EE programs, and the mitigation of climate impacts, there are also potential health benefits that can accrue for people with low income when they save money on their energy bills as a result of EE services. Low-income households spend a significantly larger percentage of their income on their energy bills than people with higher incomes.[24] The term "energy poverty" is used in reference to households that spend 10% or more of their income on energy-related expenses.[25] Reducing this expense could have tangible health impacts for individuals and families with low income, such as having more money to pay for food, medicine and medical care; reduced stress related to covering all their expenses; and being able to afford to turn on their heat or air conditioning to avoid extremely hot or cold conditions that can impact health. One study showed a 30% decline in acute multi-night hospitalizations for young children in homes receiving financial assistance for energy.[26]

What are the current weatherization/ EE services available to low-income Californians?

The California Department of Community Services and Development (CSD) is charged with administering most state and federal investments in weatherization and energy efficiency for qualifying low-income Californians. Through a variety of programs, CSD works with a network of community partners (non-profits, community action agencies, and local governments) to provide energy efficiency and weatherization services to low-income households.[27] The partners conduct an assessment or energy audit of the residence to identify specific measures to improve energy efficiency. Based on the results of the assessment, weatherization/ EE improvements may include: sealing the holes and cracks around windows, doors and pipes; installing proper levels of insulation; fixing or replacing windows; fitting an insulated blanket to the water heater; and replacing or repairing heating and air conditioning (or installing new window air conditioners or evaporative cooling units).

CSD administers multiple programs using multiple funding sources including California Climate Investments funds through the Low-Income Weatherization Program (LIWP), federal Low-Income Home Energy Assistance Program (LIHEAP) funds, federal Weatherization Assistance Program (WAP) funds, and other similar resources to promote energy savings and the health and safety benefits of weatherization services to low-income families.[28] The programs have different eligibility criteria and allow for the provision of different services. The two largest programs (LIWP and LIHEAP) are described in detail, followed by a brief description of the WAP program, as well as a program run by the California Public Utilities Commission.

Low-Income Weatherization Program (LIWP)[i]

The Low-Income Weatherization Program (LIWP) currently installs solar panels, solar hot water heaters, and energy efficiency measures in low-income single-family and multi-family dwellings in disadvantaged communities (DACs) to reduce greenhouse gas (GHG) emissions through energy savings.[29] As a California Climate Investments Program funded by the state's Cap-and-Trade Program, LIWP makes investments within DACs identified by the California Environmental Protection Agency (CalEPA) through the CalEnviroScreen tool. This tool uses geographic, socioeconomic, public health, and environmental hazard criteria to identify communities disproportionately burdened by multiple sources of pollution. In October 2014, CalEPA designated the 25 percent of census tracts with the highest CalEnviroScreen scores as DACs for the purpose of investing Cap-and-Trade proceeds. These DACs are comprised of 1,993 individual census tracts, containing 9.4 million people, and distributed among 29 California counties. Only the DAC-designated census tracts in these counties are currently eligible for LIWP.

In addition to being located within a DAC, residents must meet other qualifications (see table, page 7). LIWP funds are delivered through two programs with different program designs:

1) **Single-Family Program** which services single-family and mobile home properties; and,
2) **Multi-Family Program** which services multi-family properties.

Low-Income Home Energy Assistance Program (LIHEAP)

Low-Income Home Energy Assistance Program (LIHEAP) provides services to eligible low-income households through three different programs. The most relevant to health professionals interested in EE services is the LIHEAP Weatherization Program, which provides services that help to reduce heating/cooling costs and improve household energy efficiency, while improving the health and safety of the occupants. Examples of services provided include: attic insulation, weather stripping, minor housing repairs, and related energy conservation measures. Eligibility is based on income level; financial information must be provided by applicants.[30]

The table on the following page clarifies the commonalities and differences between the LIWP and LIHEAP programs.

i *The research for this report was completed in 2017. Since that time, the budget for LIWP was reduced and there are program changes with a focus on farmworker housing and multi-family housing for 2018/19. If funding is restored in the future, the program may return to its original structure. As each annual budget change (at both the state and federal levels) can lead to program changes, health professionals should stay aware of such changes and be flexible in how to combine funding streams to meet the needs of medically vulnerable clients.*

	LIWP	LIHEAP
Source of funds	California Climate Investments (funded by Cap-and-Trade auction proceeds)	U.S. Department of Health & Human Services
Total amount available in CA	$74.7 million in 2015-16 State Budget[ii]	$191.1 million in FY 2018 federal budget supporting the three programs within LIHEAP, one of which is weatherization[iii]
Main purpose of funds	Greenhouse gas reductions	Health and safety; reduce energy costs
Eligibility requirement: Income	Residents' income must be less than 60 percent of State Median Income or 80 percent of Area Median. Categorical eligibility may be used in lieu of income eligibility to determine eligibility for households to receive services. The categories are: Bureau of Indian Affairs General Assistance, Low-Income Home Energy Assistance Program, Energy Savings Assistance Program, Medi-Cal, Medi-Cal for Families, National School Lunch Program, Federal Supplemental Nutritional Assistance Program, CALFRESH, Temporary Assistance for Needy Families, Tribal Head Start, Women, Infants and Children.	Residents' income must be less than 60 percent of State Median Income. U.S. citizenship is verified by local service providers that are public agencies[iv]
Eligibility requirement: Citizenship	No requirement: Recipients do not need to be U.S. Citizens. Recipients must be California residents.	U.S. citizenship required – this is verified by counties.
Eligibility requirement: Address	LIWP services are currently limited to residents in DACs identified through CalEnviroScreen 2.0.	Services are provided statewide.
Type of housing	Single family housing, mobile homes, multi-unit housing (with a focus on affordable housing, providing services to the whole building)	Single family housing, mobile homes, multi-unit housing (including providing services to individual units within any building)
Services provided	Services provided by each program are included in appendix A. Please note that the following services are not automatically provided. A home assessment must be completed first and there may be additional requirements (e.g. an energy audit assessment or diagnostic tests).	

ii *Annual appropriations by the legislature vary.*

iii *Health professionals may want to know about the other two programs, which could also benefit residents. The LIHEAP Home Energy Assistance Program provides financial assistance to offset heating and/or cooling costs for low-income households. The LIHEAP Energy Crisis Intervention Program provides assistance to low-income households in a crisis situation, such as receiving a notice to disconnect or terminate utility services, a life-threatening energy-related crisis caused by a household's heating/cooling system or an energy-related emergency created by a natural disaster.*

iv *Local service providers that are private, non-profit organizations do not have to verify citizenship; however, if they are made aware that an applicant is not a citizen, they have to deny services.*

For both programs, eligibility (with regard to criteria such as income level and citizenship) is based on the tenant, not the property owner. Renters can reach out directly to weatherization/EE service providers to have an assessment conducted. However, services must be approved by the landlord, and there is an agreement that both the tenant and the landlord must sign.

In addition to LIWP and LIHEAP, CSD also runs a much smaller program called the Weatherization Assistance Program (WAP). WAP is program of the Department of Energy, which awarded CSD funds to run WAP in California. WAP has long served as a core program for delivering energy conservation services to low-income Californians (200% of the federal poverty level). WAP reduces the heating and cooling costs for low-income families by improving the energy efficiency of their homes and ensuring their health and safety. Among low-income households, the program focuses on those with elderly residents, individuals with disabilities, and families with children.

The California Public Utilities Commission also runs an EE program, called the Energy Savings Assistance Program (ESA), which provides no-cost weatherization services to low-income households who meet the income guidelines (200% of the Federal Poverty Line[31]). Services include attic insulation, energy efficient refrigerators, energy efficient furnaces, weatherstripping, caulking, low-flow showerheads, water heater blankets, and door and building envelope repairs which reduce air infiltration. Unlike the programs run by CSD, the ESA program is administered by the Investor-Owned Utilities (Pacific Gas & Electric, Southern California Edison, San Diego Gas & Electric, Southern California Gas, Alpine Natural Gas, Bear Valley Electric, Liberty Utilities, PacifiCorp, Southwest Gas, and West Coast Gas[32]). In a recent decision, for the first time in the history of the ESA program, the commission adopted an energy savings goal and allocated $80 million in new funds to residents living in rent-assisted multi-family apartments. To learn more, visit: http://www.cpuc.ca.gov/esap/

Given the robust level of funding and broad array of services/programs, it is an opportune time to create linkages between these programs and health programs. Health professionals can help improve the health of communities by connecting vulnerable residents with these energy efficiency services that may result in health improvements.

How can health professionals find the weatherization/EE service providers in their county?

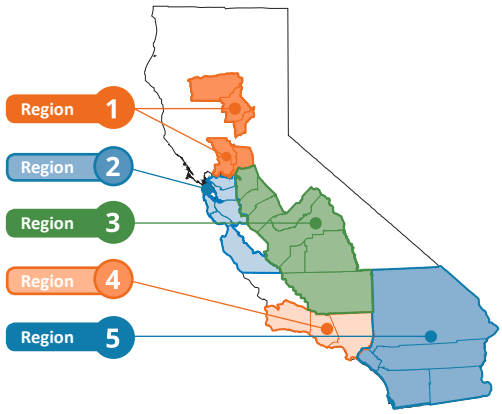
CSD administers energy efficiency and weatherization programs for qualifying low-income Californians funded by both state and federal monies through a variety of partners (http://www.csd.ca.gov). The work is provided by contracted organizations. The first step is to understand which contracted organizations are providing services in the same geographic area that is being served by the health professionals.

It is important to note that since LIWP and LIHEAP programs may provide some different services (for example, LIWP provides solar panels whereas LIHEAP does not), clients may indeed receive services from both programs in order to have their full array of needs met (if eligible for both programs).

For LIWP services:

Single family or mobile homes

For energy efficiency services for single family and mobile homes, CSD has partnered with four non-profit organizations who will administer the program in five regional areas. These regional administrators work with contractors providing home energy services through training, technical assistance, quality assurance, and financial administration and reimbursement for the services.[33] Outreach to these regional administrators is a good first step towards exploring coordination and partnership opportunities. You can identify your regional administrator using the table below.



Region	Counties with DAC census tracts (and # of tracts within each county)	Regional Administrator
1	**Northern California** Butte (3), Sacramento (43), Solano (2), Tehama (1), Yolo (3) and Yuba (3)	**Community Resource Project, Inc.** www.cresource.org
2	**San Francisco Bay Area** Alameda (32), Contra Costa (23), Monterey (7), San Francisco (3), San Mateo (2), Santa Clara (23), and Santa Cruz (1)	**Build It Green** betterhomeliwp.org
3	**Central Valley** Fresno (131), Kern (73), Kings (14), Madera (13), Merced (36), San Joaquin (64), Stanislaus (50), Tulare (50)	**Community Action Partnership of Orange County** www.capoc.org
4	**Los Angeles Metropolitan** Los Angeles (1,018), Santa Barbara (1), Ventura (8)	**Build It Green** betterhomeliwp.org
5	**Southern California** Imperial (13), Orange (86), Riverside (104), San Bernardino (160), San Diego (26)	**La Cooperativa Campesina de California** www.lacooperativa.org

Multi-family dwellings

For energy efficiency retrofit/weatherization services to large multi-family dwellings in DACs, the Association for Energy Affordability, Inc. (AEA) is the service provider selected by CSD for the entire state. AEA works directly with property owners to identify opportunities for energy efficiency, solar photovoltaic (PV) systems, and solar hot water systems. Property owners who participate in the program can receive financial incentives for installing these measures in their buildings. AEA will provide property owners with procurement assistance, on-site energy assessments, energy modeling and customized work scope development, construction management assistance, and post-construction quality assurance, verification, and training support. http://aea.us.org/

In addition to identifying the service providers, health professionals can confirm that an address is located in a DAC (disadvantaged community) by using the address look-up tool available at: http://www.arb.ca.gov/cc/capandtrade/auctionproceeds/535top25map.htm.

For LIHEAP services:

All counties in California have service providers that administer LIHEAP's weatherization program because LIHEAP does not have any geographic restrictions. CSD has contracted with over 40 community partners (non-profits, community action agencies, and local governments) to administer the LIHEAP program throughout California. Find county LIHEAP agencies by using this interactive map on the CSD website: http://www.csd.ca.gov/Services/FindServicesinYourArea.aspx (also includes information for WAP).

For services provided as part of the ESA Program, contact the local Investor Owned Utility Company. A list and phone numbers can be found here: http://www.cpuc.ca.gov/esap/.

How can health professionals connect vulnerable residents with the weatherization/EE services in their county?

Before referring people to these services, health professionals can first establish a relationship with the weatherization service providers in order to better understand the program and best practices for referrals (by reaching out to the LIWP administrator listed above or the LIHEAP agency listed on this website http://www.csd.ca.gov/Services/FindServicesin-YourArea.aspx). To best serve residents, it is important to create a streamlined process for families that avoids confusion and prevents delays. Thus, health professionals can talk to weatherization service providers about the best referral process, whether and how they coordinate with other weatherization service providers in the county (if the county has LIWP services in addition to LIHEAP, for example), and their timeline for providing services once a referral is started.

Health professionals who are interested in setting up a system to connect vulnerable residents with weatherization/EE services can look to other models described in this document to guide their work.

Below is a description of a pilot project that was developed to increase access to EE services for vulnerable residents in Contra Costa County. This was launched in April 2017 and closely tracked to inform the development of this guidance document; the project is still ongoing. While supporting the pilot project, Regional Asthma Management & Prevention (RAMP) identified additional programs that have sought similar outcomes, and they are also described below.

The Contra Costa Pilot Project

Contra Costa Health Services' (CCHS) Climate Action Team has long been interested in linking weatherization services to residents with health conditions that would benefit from such services. In 2016, after talking with public health nurses in the Public Health Department and the county's weatherization services provider, staff in the Climate Action Team were able to get the project off the ground. The goal was a small-scale pilot project in Contra Costa County aimed at developing and documenting a process for increasing coordination across programs to ensure weatherization services for people with health conditions that could benefit from those services.

To initiate the pilot, CCHS Climate Action Team staff began by connecting with Contra Costa's Director of Public Health Nursing. The program has 60 public health nurses who conduct home visits with low-income residents to treat a variety of health conditions. With their knowledge of the clients' health and their firsthand view of housing conditions, these nurses were perfectly positioned to identify people who may benefit from weatherization services. Climate Action Team staff worked with the Contra Costa County Department of Conservation and Development, which administers the LIHEAP services for the county, to conduct a training for the nurses about weatherization services available in the county, how these services may benefit their clients, and how to refer eligible people that would benefit from these services. The pilot project was designed with two options: the nurses could work directly with the clients to fill out the application and submit it to the Department of Conservation and Development; or they could refer the client to Climate Action Team staff who would work with the client to complete the application. Once the completed application is received, the Department of Conservation and Development contacts the resident to schedule services within two or three days.

For counties that have only LIHEAP, the model could be this simple. But, for counties that have DACs, and thus LIWP services, there are more opportunities to provide energy efficiency and weatherization to residents, but often, this also comes with additional complexities around coordination.

The partnership between the public health nurses and the Department of Conservation and Development provided a great start. Contra Costa County includes 23 DACs eligible for LIWP services. To access LIWP resources, it became essential to coordinate with the LIWP Regional Administrator, Build It Green. All involved wanted to expand the pilot project to ensure that residents would be able to receive any and all housing-related services for which they were eligible. That meant coordination with other organizations. One of the challenges with coordinating is that each program has its own funder-mandated requirements (e.g., numbers of people/households served, savings realized, etc.). So, in cases where residents qualify for both LIHEAP and LIWP, there may be some inherent competition about which organization gets to serve as the first point of contact and thus, provide services. Fortunately, in this case, both parties were eager to collaborate and to overcome this challenge in order to meet shared goals. They designed a coordinated cross-referral process as illustrated through a flow chart (See Appendix) and had regular check-ins to assess and improve the process as necessary.

After some initial presentations to the public health nurses, the Climate Action Team received several referrals, but that dropped off and soon the referrals stopped altogether. Climate Action Team staff met with the Director of Public Health Nursing to brainstorm solutions. One step was to increase the frequency of trainings and reminders for the public health nurses and to emphasize the research demonstrating health impacts of EE services.

The other was to create a formal assessment tool that the nurses would use during home visits. With guidance from the Department of Conservation and Development, six questions were developed to help the nurses identify clients who should be referred to Climate Action Team staff. The Director of Public Health Nursing added a question to their electronic intake system, called "Persimmony". The question is: "Did you screen for weatherization and energy savings potential?" That then takes them to a screen with the following information:

Please answer the six questions below to determine if your patient's unit could potentially benefit from weatherization and energy savings improvements. If you answer yes to any of these questions, please refer the patient to Climate Action Team staff who can assist the patient in filling out an application to potentially receive weatherization improvements.

1. Does the client have a health condition that makes him/her vulnerable to heat/cold? **Yes/No**
2. Are there any obvious cracks/gaps in the windows/door/house? **Yes/No**
3. Is the client uncomfortable in the home during very hot or very cold days? **Yes/No**
4. Does the client have difficulty paying his/her gas or electric bill? **Yes/No**
5. Are there broken appliances (water heater, furnace, stove, refrigerator)? **Yes/No**
6. Is the home missing carbon monoxide or smoke detectors? **Yes/No**

This approach was very successful. 32 clients were referred by public health nurses and 17 different public health nurses made the referrals.

A more in-depth look at the Contra Costa pilot project can be found in Appendix B.

The following is a case study demonstrating the impact of the project on one person.

Case Study from Contra Costa Pilot Project

Veronica has been a Public Health Nurse with Contra Costa Health Services since 2014. She sees patients who have been discharged from the hospital wherever they may be living now, whether that is in a home or on the street. She provides preventative care, connects patients with resources, makes sure they get their vaccinations, and ensures that they get to their medical appointments.

Veronica learned about weatherization services at a staff meeting, at which Michael Kent, Contra Costa Health Services Climate Action Team staff member, presented about the benefits of the weatherization program and explained how to refer clients to the County's free weatherization program for low-income clients. She was immediately interested: "Our patients are very sick, so if there are any resources that can help them have a better quality of life, we want to connect them."

One of her patients is David, a man in his late fifties with respiratory failure, congestive heart failure, and renal failure.[v] He has a history of homelessness but was recently housed in an apartment in Antioch. He had been in and out of the emergency room due to breathing problems resulting from the heat. Veronica decided to suggest free weatherization services to David. When she described the weatherization services, he figured he'd "give them a chance and see what they could do."

v *We changed the patient's name to protect his identity.*

Veronica contacted Michael Kent to let him know that David was open to receiving weatherization services. Michael went to David's apartment to help him fill out the application, which can sometimes be daunting. Veronica describes that Michael "was able to help quickly and effectively".

The Contra Costa County Department of Conservation and Development sent out weatherization service providers as part of their Low Income Home Energy Assistance Program (LIHEAP). The weatherization service providers conducted an assessment and installed an air conditioning unit and assisted with the windows (which had been painted shut and can now be opened). Also, because the weatherization service providers did a full assessment, a rodent issue was brought to the attention of the landlord. The whole process moved quickly.

Veronica noticed an immediate impact from the services. "[David] has a better environment and can breathe easier." She describes that before the weatherization services, he was on oxygen 24/7. Now he is off oxygen part of the time. "The quality of his breathing got a lot better," she says.

David has also noticed improvements to his health: "I'm getting a little stronger. I just started back walking three days ago." During the summer, he ran the air conditioning and that helped make him more comfortable.

However, he expressed concerns about other aspects of his housing. The rodents are still a problem and he is concerned that the overall conditions of his housing may be contributing to the fact that he keeps getting sick. He shared, "It cooled off, but what about the other stuff?" David's frustration speaks to the reality of the segmentation of healthy housing services. The weatherization service providers are not allowed to use grant funds to address the full array of housing problems they may notice, such as mold, pests, or lead contamination. This underscores the importance of coordination and cross-referrals.

When asked whether she'll continue to refer patients to the program, Veronica answered with a resounding "Yes! The program helps keep patients comfortable in their homes."

Fresno County Department of Public Health

Around 2014, Rose Mary Rahn, Director of Public Health Nursing for the Fresno County Department of Public Health, was contacted by Valerie Tran and Angela Wan, two students at a Master's of Public Health program. They wanted to create a project that would address the very real health impacts of climate change that people in Fresno are experiencing. The students applied for and received a small grant from Health Care Without Harm to engage public health nurses in assessing residents' climate risks during home visits. Rose Mary describes herself as an "old public health nurse" from a time when home environmental assessments were a part of the job. Now, with categorical funding, that comprehensive approach is no longer supported, so she was enthusiastic to make this connection.

Together, they launched a project called Nurses for Cool and Healthy Homes, in which public health nurses conducting home visits would use a brief Home Assessment Tool to assess the residents' risk to extreme heat and other health impacts of climate change. Included in this checklist are items such as window condition, presence of working air conditioner, maintenance of comfortable temperature in the home, and barriers to paying utilities. With technical assistance from their partner Pacific Gas & Electric Company (PG&E), they refined the checklist to include information

that makes it easy for nurses to make appropriate energy assistance referrals and health referrals based on client responses. They would then provide referrals to appropriate services, such as cooling centers, energy rate reduction programs, and weatherization services.

They began by developing the assessment tool and then training the nurses. After using the tool for a while, they updated it in response to feedback. Some of the public health nurses were initially reluctant because it was yet another assessment they had to conduct. But, other nurses were pleased that this program gave them a new tool to address problems they identified during home visits. The project has been in place since 2015, during which time it switched from paper to an electronic medical record, which has made it easier for all involved. They have systematized this program; all new clients receive an assessment at their first home visit and it is then repeated annually.

In one year (during which evaluation data were collected), 57% of the home assessments resulted in a referral. The initial referral for weatherization services instructed clients to contact PG&E about specific services. While only 16% of families who received a referral contacted PG&E, in those cases, PG&E helped families navigate the options based on household income and housing type. Clients do not need to own their own homes in order to qualify for most services. In fact, only 7% of the clients own their own homes.

Carbon monoxide safety is also part of the program—nurses assess the presence of working carbon monoxide detectors in their clients' homes and offer carbon monoxide inspections when there seems to be a risk for poor ventilation in the home. Nearly 1 in 5 clients lack a functioning carbon monoxide detector and 11 clients have received an inspection from PG&E as a result of this program.

Central California Asthma Collaborative

Also in Fresno, as well as several other counties across the San Joaquin Valley (Merced, Madera, Kings, and Tulare), the Central California Asthma Collaborative (CCAC) is linking families affected by asthma with weatherization services. Their asthma home visiting program employs Community Health Workers (CHWs) who provide asthma education to families in their homes. They also conduct environmental trigger assessments, provide products and education for reducing exposure to those triggers, and refer to professional remediation services as needed, for issues such as mold and pest infestations. They also refer to weatherization service providers.

In order to navigate the array of weatherization service programs and providers, they determined that the best solution was to simply learn the goals, requirements, and conditions each program and contractor has for enrollment. The CCAC Director, Kevin Hamilton, explained that they lean heavily on LIWP since that program does not require U.S. residency and many of the families to whom they provide services are undocumented. He explained that "We assist the family to enroll….This often requires the CHWs to conference the moms or dads in with the agency to get things set up. If the family is really uncomfortable with it, we go to the first appointment with the contractor." Given the unique trust that CHWs generally establish with their clients, this is a great role that leverages their skills and that relationship.

The following is a brief step-by-step process based on these programs' experience and lessons learned. Based on the Contra Costa Pilot Project and other programs' experience, we recommend that health professionals pursue the following steps.

Steps for setting up a system to connect vulnerable residents with EE services

1. **Develop Relationships**. Find out which organizations provide weatherization/EE services in your county and reach out to them.
2. **Ask the weatherization service providers how they protect indoor air quality (IAQ)**. Weatherization and other energy efficiency upgrades can have negative impacts on occupant health and safety if not accompanied by appropriate IAQ protections. To avoid such problems, weatherization practitioners can all follow the protocols developed by the U.S. Environmental Protection Agency, "Healthy Indoor Environment Protocols for Home Energy Upgrades."
3. **Identify the health professionals who will be asked to refer residents who might benefit from weatherization services**. It is ideal to identify not only providers that conduct home visits (e.g. public health nurses, community health workers, Meals on Wheels, etc.) but also other clinicians and staff reaching vulnerable populations (e.g. community clinics, health management organizations (HMOs), school-based health staff, Head Start, Special Supplemental Nutrition Program for Women, Infants, and Children [WIC], Black Infant Health programs, etc.).
4. **Train the health professionals** about why and how they can refer residents to weatherization services, emphasizing the health benefits of these services. Also make sure they understand that all residents may be eligible for services—even those who are renters and people who are undocumented.
5. **Systematize a way for the health professionals to identify the people who would benefit** (e.g. adding assessment questions to their intake forms).[vi]
6. **Establish a referral process** that includes a friendly hand-off of the case from the health professional to the weatherization/energy efficiency provider, rather than relying on the resident or client to proactively call or follow up.[vii] For example, this could involve a public health or clinic staff person calling the weatherization/energy efficiency administrator, to assure that the opportunity for services is pursued.
7. **In counties that have multiple weatherization service providers, work with them to establish a referral and cross-referral process** that reduces confusion and multiple "touches" for the client, while getting them the maximum number/type of services. Weatherization service providers can also refer their clients to public health and health care programs. Public health and weatherization programs can work together to come up with referral systems that are easy for any health or weatherization staff member to use.
8. **Establish a system for the weatherization service providers to report back to the health professionals** when services are complete.

vi *See the Appendix to view the assessment questions added to the intake forms for the Contra Costa pilot project.*
vii *See the Appendix to view the flow chart that was developed for the Contra Costa pilot project*

To implement the above steps, you need a champion—someone who takes the initiative to improve public health services and provide the coordination required for success. The amount of time required necessitates neither a new staff position nor the requisition of new resources. It can be done with your existing staff and budgets. However, in the ideal process, relationships and cross-referrals would be established not just with weatherization service providers, but also with the full array of healthy housing programs (e.g. lead hazard reduction, asthma trigger control, injury prevention). The best-case scenario may include a single intake form and/or an organization/agency that serves as a coordinating body. This requires staff time dedicated to the coordination role.

How can health professionals streamline access to all available housing services?

The steps and programs described above address the core purpose of this guide—connecting vulnerable residents with weatherization/EE services—and can generally be done with limited resources. It's worth noting, however, that with additional resources some programs have been able to provide a more comprehensive approach. The complex connection between housing and health extends well beyond weatherization services. Ideally, health professionals could connect clients with one point of contact who could assess and address multiple aspects of housing that affect health and safety—weatherization; remediation of lead, mold, asbestos, and other environmental hazards; updates of unsafe electrical systems; provision of integrated pest management; removal of unvented combustion appliances, etc. There are some existing models of organizations and programs that offer an integrated approach to housing services:[viii]

One Touch: Creating Healthy and Energy Efficient Homes

One Touch® builds local collaborations among energy, health, and home visiting programs to increase family access to health and energy services. Partners that "touch" homes use a common home assessment and electronic referral system to identify conditions triggering referrals or changes to the services they deliver. The Vermont Weatherization Program is currently using One Touch during energy audits, and connecting families to local health resources for lead, asthma, smoking cessation, and early child development. Over 1,500 single-family homes in Vermont's weatherization program have participated and roughly 25% of the assessments have triggered a health or housing referral. The Department of Housing and Urban Development selected the Vermont One Touch for their 2017 Healthy Homes collaboration award. One Touch® was developed by Tohn Environmental Strategies and is operating in a number of cities and states including Omaha, NE; Kansas City, MO and KS; Vermont; New Hampshire, and Rhode Island.

For additional information, visit www.onetouchhousing.com

The Green and Healthy Homes Initiative (GHHI)

GHHI was established in 2008. It operates in a range of locations assisting local programs to braid energy, housing, and health resources to provide an integrated home response. They use a single application for families to find and access the home intervention services they need, thus reducing the burden on the family and leading to increased efficiency and streamlined data sharing for service providers. A comprehensively trained assessor visits the home to triage the need and identify the services that should be provided, and then coordinates among the various service providers to address a range of concerns including asthma triggers, moisture and mold, VOCs, lead paint, asbestos, carbon monoxide leaks, fire hazards, and pests.

For additional information, visit www.greenandhealthyhomes.org

viii *Several of these program descriptions came directly from: E4 The Future. Occupant Health Benefits of Residential Energy Efficiency. November 2016. https://e4thefuture.org/wp-content/uploads/2016/11/Occupant-Health-Benefits-Residential-EE.pdf.*

Weatherization Plus Health

Weatherization Plus Health: Weatherization Plus Health was launched in 2003 by the Opportunity Council, a Community Action Agency (CAA) that operates in Northwestern Washington State. It was developed to give clients added home repairs to address lead hazards, asthma risks, and other housing based health threats, in addition to receiving weatherization services. Agency staff estimate that roughly 15% of clients with young children can benefit from additional measures to improve the home environment beyond basic weatherization, including: enhanced ventilation; moisture repairs; lead hazard repairs; pest exclusion; removal of dust mite habitats; distribution of high-efficiency particulate absorber (HEPA) vacuums, walk-off mats, and mattress covers. State legislation directed the Washington Department of Commerce to allow state funding provided to weatherization programs to offer this Weatherization Plus Health model statewide to clients with a respiratory disease or who are at risk for falling. The state is currently tracking changes in Medicaid costs for those enrolled in the current Weatherization Plus Health program.

For additional information, visit: https://www.wxplushealth.org/

The Leading Innovation for a Green and Healthy Tomorrow (LIGHT) Program

In Baltimore, MD, the Baltimore City Health Department's Community Asthma Program utilizes Community Health Workers to conduct asthma home visits. When they identify any housing-related problems, they can refer to one organization, Baltimore Housing, which runs the Leading Innovation for a Green and Healthy Tomorrow (LIGHT) Program. The LIGHT Program believes that residents' health and well-being depend on multiple factors that no single Baltimore City agency or outside organization is able to address on its own. LIGHT assists residents in obtaining a variety of no- and low-cost services, and coordinates and manages the delivery of those services, including weatherization/energy efficiency, lead hazard reduction, fall/injury prevention, asthma reduction, and other healthy home improvements.

For additional information, visit: http://www.baltimorehousing.org/ghsh_light

Rutland VT Healthy Homes Initiative

Initiated in April 2016, the Healthy Homes Initiative is a collaboration between NeighborWorks of Western Vermont (NWWVT) and their local hospital, Rutland Regional Medical Center, to deliver an integrated energy and home rehabilitation program for patients identified by the hospital with asthma, COPD, or home mobility concerns. Asthma referrals are initiated by the hospital community health worker after a home visit and determination that home repairs or energy upgrades are needed. The program will leverage the expertise of NWWVT's Heat Squad and home rehabilitation programs and weatherization services provided by the local community action agency to design a new integrated service for clients with health concerns in single family homes.

For more information, see www.nwwvt.org/2016/06/20/healthcare-and-housing-coalesce-to-helpthose-suffering-from-chronic-health-problems

Challenges and recommendations

Unfortunately, more often than not, funding streams related to EE and healthy housing support specific activities and typically do not allow others. Additionally, the service providers that have funding vary from service to service. Sometimes this results in disjointed coordination of services. In December 2016, the State Energy Commission released a report as mandated by Senate Bill 350 (de Leon, Chapter 547, Statutes of 2015)(SB 350), which declared that there is insufficient information to fully realize the potential of solar photovoltaic energy generation to serve low-income customers, including those in disadvantaged communities.[34] It also declared that there is insufficient understanding of the barriers for low-income customers to access all forms of renewable energy being generated in the state and energy efficiency investments. SB 350 therefore required the Energy Commission to complete and publish a study on the following topics. Included in that report are recommendations for the State to streamline services and align funding for healthy housing. When these recommendations are fully achieved, they will improve coordination efforts at the local level. In the meantime, we recommend the following for local programs to overcome coordination challenges:

- **Establish cross-referrals between weatherization and health**, including public health nursing, lead poisoning, asthma home visiting programs, and other programs focused on vulnerable residents in their homes. While this paper focused on health professionals referring to EE programs, it's also important to train EE professionals to identify health concerns and refer to public health programs.
- **Develop common intake tools** that assess for and cross-refer to health and weatherization/EE programs.
- **Seek grant funds** to address problems that cannot be covered through existing EE programs. For example, if a LIHEAP or LIWP provider goes into a home and discovers a mold problem, they cannot use the funds to remediate the mold and they cannot provide weatherization services as long as the mold problem exists. Thus, the provider is left unable to provide the intended services, the resident is left with an unhealthy situation (mold), and the resident is unable to receive the weatherization services for which s/he is eligible, unless other funds can be identified.
- **Document barriers at the local level**, which can be used to guide ongoing improvements at the state and federal level.

Conclusion

Given the clear nexus between housing and health, as well as the range of well-established benefits, referrals to energy efficiency services available to low-income residents can be an important tool for health professionals. With just a few straightforward steps (assessment, referral, and coordination), health professionals can serve as a bridge connecting vulnerable residents and clients to EE programs in their communities. These steps can achieve multiple goals of improving health, reducing costs for low-income residents, and improving the environment. Health professionals and weatherization/energy efficiency providers can work together over time to change systems of service provision and funding to provide an integrated array of services to create healthy homes for clients.

Appendix A

Services Provided through LIWP and LIHEAP

The list of measures below are offered through one or more programs - Department of Energy Weatherization Assistance Program (DOE WAP), Low-Income Home Energy Assistance Program (LIHEAP) and the state-funded Low-Income Weatherization Program (LIWP). The feasibility of these measures is determined by a trained assessor who is guided by the Department of Community Services and Development's weatherization standards and policies. Feasibility of each measure is dependent upon several criteria including the overall condition of the home, appliance operability and potential energy efficiency gains. Identified health and safety concerns are addressed if the work is within the scope of the programs. No home will qualify for every measure.

Weatherization Measures

- Alarm, Carbon Monoxide
- Alarm, Smoke
- Attic/Crawl Space Cover
- Caulking
- Ceiling Fan
- Compact Fluorescent Lamps
- Cooking Appliance Repair or Replacement
- Cooling System Repair or Replacement
- Cover Plate Gasket
- CVA Venting
- Door Repair or Replacement (exterior/sliding glass door)
- Duct Insulation
- Duct Repair and Replacement
- Efficient Fan Controller
- Exterior Water Pipe Wrap
- Filter Replacement
- Fireplace Glass Door
- Fluorescent Torchiere Lamp Replacement
- Glass Replacement
- Heating System Repair or Replacement
- Hot Water Flow Restrictor, Low-Flow Showerhead, Thermostatic
- Insulation (Ceiling, floor, kneewall, and wall)
- Kitchen Exhaust Installation, Repair & Replacement
- Kitchen Exhaust Damper
- LED Night Lights
- LED Replacement Bulbs
- Microwave Oven
- Power Strip, Tier 2 Advanced
- Refrigerator Replacement
- Shadescreens
- Shutters
- Storm Windows
- Thermostat, Manual
- Thermostat, Smart
- Timer, Electric Water Heater
- Tinted Window Film
- Vacancy Sensor Switch
- Vent Cover, Interior
- Venting (Attic, floor foundation)
- Water Heater Insulation
- Water Heater Pipe Insulation
- Water Heater Repair or Replacement
- Weatherstripping
- Whole House Fan
- Window Repair or Replacement
- Solar PV/Solar Water Heating (LIWP ONLY)
- Window Repair and Replacement

Appendix B

An In-Depth Look at the Contra-Costa Pilot Program

Background and purpose

Contra Costa Health Services' Climate Action Team had long been interested in developing a pilot project to provide weatherization services to residents with health conditions that would benefit from such services. In 2016, after talking with public health nurses in the Public Health Department and the county's weatherization services provider, the Climate Action Team was able to get the project off the ground. The goal was a small-scale pilot project in Contra Costa County aimed at developing and documenting a process for increasing coordination across programs to ensure weatherization services for people with health conditions that could benefit from those services. At the same time that Contra Costa Health Services was launching the pilot project, the California Department of Public Health was pursuing its own interest in this topic and commissioned Regional Asthma Management & Prevention (RAMP) to provide coordination assistance to the pilot project and to share lessons learned in a guidance document.

Launching the project

The first step for the Climate Action Team was to connect with the Director of Public Health Nursing. The Public Health Nursing program has 60 public health nurses who conduct home visits to treat low-income residents with health conditions. With their knowledge of the patients' health and their firsthand view of housing conditions, these nurses were perfectly positioned to identify patients who may benefit from weatherization services. The Climate Action Team worked with the Contra Costa County Department of Conservation and Development (DCD), which administers the Low Income Home Energy Assistance Program (LIHEAP) funds for the county to conduct a training for the nurses about weatherization services available in the county, how these services may benefit their patients, and how to refer eligible patients that would benefit.

The pilot project was set up so that the nurses could either work directly with the patients to fill out the LIHEAP application and submit it to DCD, or refer the patient to Climate Action Team staff who would work with the patient to complete the application. Once DCD staff receive an application, they contact the resident to schedule services within two to three days. This "warm handoff" or "high touch" aspect of the model was particularly important. In cases where the patient is simply instructed to call the weatherization provider, the follow-through rate tends to be quite low.

The model could be as simple as this in counties where LIHEAP is the only low-income weatherization program. But some counties also have the Low Income Weatherization Program (LIWP). As a California Climate Investments Program funded by the state's Cap-and-Trade Program, LIWP makes investments within disadvantaged communities (DACs) identified by the California Environmental Protection Agency (CalEPA) through the CalEnviroScreen tool. This tool uses geographic, socioeconomic, public health, and environmental hazard criteria to identify communities disproportionately burdened by multiple sources of pollution. In October 2014, CalEPA designated the 25 percent of census tracts with the highest CalEnviroScreen scores as DACs for the purpose of investing Cap-and-Trade proceeds. Because there are many DACs in Contra Contra Costa County, residents in the county have access to both LIHEAP and LIWP services. This means that there are more opportunities to provide weatherization services to residents and thus, more complexities around coordination.

Expanding partnerships and opportunities

The partnership between the public health nurses and DCD provided a great start, but all parties involved wanted to expand the pilot project to ensure that residents would be able to receive any housing-related services for which they were eligible, as the different programs have different eligibility requirements and provide different services. This required coordination with other organizations. Regional Asthma Management & Prevention convened discussions among the Climate Action Team, the Department of Conservation and Development, and Build It Green, the regional administrator of the LIWP funds for the Bay Area region, which includes 23 disadvantaged communities (DACs) in Contra Costa County. All parties agreed on two shared goals for this partnership:

1. **Getting the maximum amount of weatherization services to people** with health conditions that would benefit from such services.
2. **Reducing multiple points of contact with different service providers,** and confusion for residents.

Fine-tuning coordination

One of the challenges is that each program (Department of Conservation and Development and Build It Green) has its own funder-mandated requirements around numbers of people/households served, eligibility, savings realized, how to measure impact (cost, energy, or greenhouse gas reductions), and program delivery. In cases where residents qualify for both LIHEAP and LIWP, there may be some competition about which organization gets to serve as the first point of contact and thus, provide services. Fortunately, in this case, both organizations were eager to collaborate and to overcome this challenge in order to meet shared goals. The team had regular check-in calls to discuss challenges and make changes to the process, as needed. After some trial and error, the following referral process was found to be the most efficient and effective.

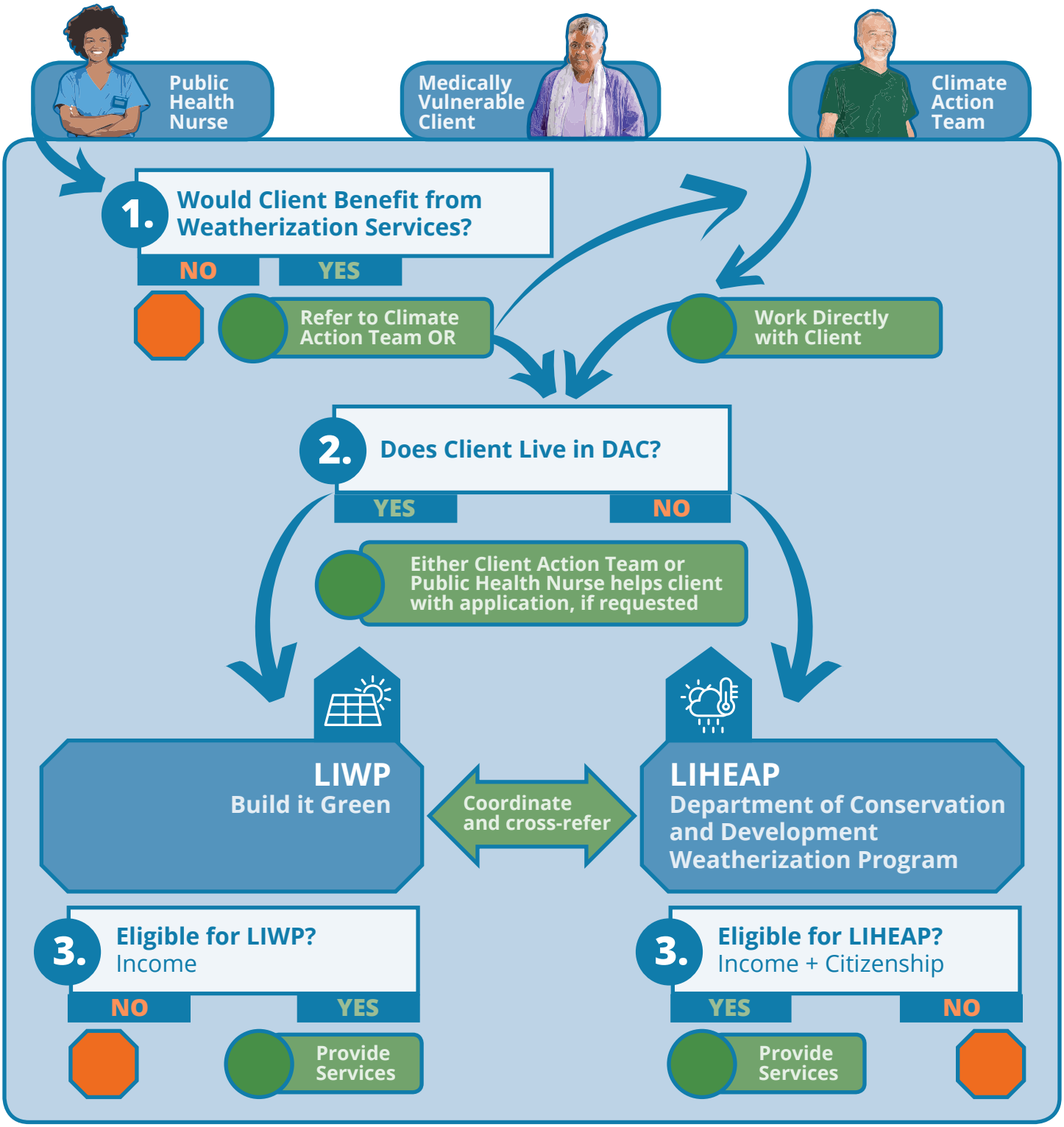
When public health nurses identify a client who may benefit from and be eligible for free weatherization services, they can pursue one of two paths. One path is to contact the Climate Action Team. The Climate Action Team staff quickly determine whether the client should fill out the application for Build It Green/LIWP or for the Department of Conservation and Development/LIHEAP. If the client lives in a DAC, they were given the application for Build It Green/LIWP; if not, they were given the application for the Department of Conservation and Development/LIHEAP. The client would complete the application form (often with the help of Climate Action Team staff) and, initially, work with the landlord to complete the landlord's portion of the application. The other path is that the nurses could determine whether the client should fill out the application for Build It Green/LIWP or for the Department of Conservation and Development/LIHEAP, provide the client with the appropriate application and help them complete it, if necessary.

At a team check-in in January 2018, a slight change was made to the process. The team discussed the challenge of getting applications completed. Delays often occurred if the clients needed to have their landlords complete a portion of the application. So, the team agreed that—moving forward—when clients finishes their portion of the application, they will give it to Build It Green or the Department of Conservation and Development. The program will then work directly with the landlords to explain the benefits of these programs and help them complete their portions of the applications.

In some cases, clients are eligible for and may benefit from both LIHEAP (provided by the Department of Conservation and Development) and LIWP (provided by Build It Green) as there are some differences in the services each can provide. For these cases, residents may need a combination of services, so the two organizations have ongoing open dialogue to coordinate services. Additionally, while the pilot project was happening, both Build It Green and the Department of Conservation and Development received completed applications through other sources (that is, the client learned about the energy efficiency services from somewhere other than the Public Health Nursing Program). In these cases, coordination and cross-referrals were necessary.

In addition to weatherization services, one component of the LIHEAP program is the Home Energy Assistance Program (HEAP), which provides one-time financial assistance to help offset an eligible household's energy costs (utility bill). Anyone receiving weatherization services through LIHEAP (in Contra Costa county, through the Department of Conservation and Development) who needs one-time financial assistance for their utility bill goes through a streamlined process with California Department of Community Services and Development through which their LIHEAP weatherization application counts for both weatherization and utility assistance. However, that is not the case with LIWP participants. If someone is receiving weatherization services through LIWP and needs one-time financial assistance for their utility bill, they must fill out a new application for LIHEAP. In order to reduce the additional burden on the resident, Climate Action Team staff offered assistance with both applications.

Contra-Costa County Pilot Program Flow Chart



Increasing referral numbers

After the initial trainings of the public health nurses, several referrals were received right away, but that dropped off and then stopped altogether. Climate Action Team staff met with the Director of Public Health Nursing to brainstorm solutions. One step was to increase the frequency of trainings for the public health nurses and to emphasize the research demonstrating health benefits of energy efficiency services. The other was to create a formal assessment tool that the nurses would use during home visits. With guidance from DCD to help identify the best questions, six questions were developed to help the nurses identify clients that should be referred to the Climate Action Team. These questions are now integrated into their electronic intake process so that they are addressed with each and every client seen by the Contra Costa County Public Health Nurses.

The Director of Public Health Nursing added a question to their electronic intake system. The question is: "Did you screen for weatherization and energy savings services?" That question directs them to a survey, which includes the following instructions and questions:

Please answer the six questions below to determine if your patient's residence could potentially benefit from weatherization and energy savings improvements. If you answer yes to any of these questions, please refer the patient to Climate Action Team staff who can assist the patient in filling out an application to potentially receive weatherization improvements.

1. Does the client have a health condition that makes him/her vulnerable to heat/cold? **Yes/No**
2. Are there any obvious cracks/gaps in the windows/door/house? **Yes/No**
3. Is the client uncomfortable in the home during very hot or very cold days? **Yes/No**
4. Does the client have difficulty paying his/her gas or electric bill? **Yes/No**
5. Are there broken appliances (water heater, furnace, stove, refrigerator)? **Yes/No**
6. Is the home missing carbon monoxide or smoke detectors? **Yes/No**

This approach was very successful. 32 clients were referred by 17 different public health nurses.

The role of the local health department

One goal of this project was to identify simple ways that local health departments can increase access to weatherization services for medically vulnerable residents without requiring a new program or source of funds. That would make this pilot project replicable and scalable. The following activities were conducted by the Climate Action Team:

- **It took a champion to get this project started.** A Climate Action Team member took the lead on this project. He reached out to the public health nurses and the weatherization program to explore interest, facilitate a connection, and conduct trainings.
- **He conducted a number of outreach visits and eight trainings** in order to get the buy-in and engagement of all involved.
- **He worked directly with some clients to complete the complex applications.** While a time-consuming activity for him, it provided an important service to the clients and ensured completion of the applications.
- **Team check-ins were held every couple of months** to discuss the process and any new challenges that had arisen. This required an ongoing commitment by the public health department.

Outcomes and evaluation

The original goal of the pilot project was to support the provision of weatherization services for 20 residents. As of September 2018, 32 clients were referred, but only 8 completed the full process and received services. Clients did not complete the process for a variety of reasons:

- One lived in a mobile home that was too damaged to proceed with services.
- One was ineligible due to income being too high.
- One was ineligible because s/he was not a citizen and did not live in a DAC. (Had the person lived in a DAC, LIWP could have provided services regardless of residency status. LIHEAP services require U.S. citizenship).
- A few moved or were no longer interested.
- For the remaining clients, which was the majority, securing the landlord's permission was an impediment.

When the project was launched, Regional Asthma Management & Prevention created surveys for the patients and nurses to better understand the impact of this work. The patient and public health nurse surveys are as follows:

Patient survey

A brief patient survey is administered by the public health nurses two to three months after weatherization services have been completed. The questions are:

1. Please describe any changes in your physical health (which includes physical illness and injury) or behavioral health (which includes stress or depression) since receiving weatherization services. (If there have been none, write "none".)
2. Do you feel there were any other benefits from receiving the weatherization services? Examples might be: increased comfort, reduced gas or electric bills, etc. If yes, please explain.

Please complete the table below indicating your level of satisfaction with different aspects of the weatherization services you received:

	Very dissatisfied	Dissatisfied	Neither satisfied nor dissatisfied	Satisfied	Very satisfied
Final condition of the home					
Comfort of the home					
Energy savings achieved after having the home weatherized					
Overall weatherization program					
Ease of completing the application					

Nurse survey

Nurse survey: The Public Health Nurse completes a brief survey about each client two to three months after weatherization services have been provided. The survey questions are:

1. Please describe any changes in your client's physical health (which includes physical illness and injury) or behavioral health (which includes stress or depression) since receiving weatherization services. (If there have been none, write "none".)
2. Did you perceive any benefits to your client from receiving weatherization services? Examples might be: increased comfort, reduced costs, etc. If yes, please explain.
3. Please describe your experience in referring this client for weatherization services. What worked well and what didn't work well?

In the end, only two client surveys and two nurse surveys were completed. As described above, far fewer than anticipated clients actually completed the process and received weatherization services. Additionally, in an effort to not burden the public health nurses, Climate Action Team staff agreed to only request evaluation forms once and to not burden the nurses with additional requests. Public health nurses already have so much to cover during each visit, across the realm of health issues (smoking, eating, basic needs such as housing, etc.) and often already feel overburdened before adding additional programmatic alignment like this pilot project. Had this been a funded research study, Climate Action Team staff would have established agreements with the nurses before implementation and pursued evaluation more proactively. Future projects in other counties may establish such agreements upfront.

Both clients who completed the survey reported immediate improvements in their ability to breathe and the nurses also noted that the clients' health improved and their utility bills were lowered.

Challenges

- **A significant challenge was the inability to secure landlord support to proceed with applications filled out by many tenants.** The reasons for this were not explored as part of the pilot project but need to be better understood and should be addressed as part of future efforts.
- **Another challenge inherent in this work relates to the complex connection between housing and health that extends beyond the scope of what is currently provided in weatherization services.** Ideally, public health practitioners would connect patients with one service provider that would assess and address multiple aspects of housing that affect health and safety—weatherization; remediation of lead, mold, asbestos, and other environmental hazards; updates of unsafe electrical systems; provision of integrated pest management; removal of unvented combustion appliances, etc. Unfortunately, existing funding streams support specific activities and don't allow others.

Additionally, the service providers that have funding vary from service to service and from county to county. For example, if a LIHEAP or LIWP provider goes into a home and discovers a mold problem, they cannot use the funds to remediate the mold and they cannot provide weatherization services as long as the mold problem exists. Thus, the provider is left unable to provide the intended services, the client is left with an unhealthy situation (mold), and the client is unable to receive the weatherization services for which s/he is eligible. Indeed, one client in the pilot project fell into this position. His mobile home was in such a state of disrepair that DCD could not provide weatherization services.

Successes

Although the goal of providing services to 20 clients was not met, there were a number of successes of this pilot project:

- **Public health nurses were engaged in connecting clients to energy efficiency services that may improve health:** At the beginning of this project, most of the nurses were not familiar with the health benefits of weatherization services nor the availability of free weatherization services for their clients. By the end of the project, 17 nurses had begun referring clients to receive weatherization services.
- **Systems were developed to coordinate across an array of service providers.** While coordination was an ongoing process that was improved numerous times, by the end, the organizations administering LIHEAP and LIWP within Contra Costa County were successfully coordinating on cases. Additionally, during the last team call, Climate Action Team staff brought in the Association for Energy Affordability Inc. (AEA), which administers the LIWP program for larger multi-family properties (LIHEAP provides for single family homes). Bringing in this partner will allow the public health nurses to refer even more of their clients for free services.
- **Additional home visiting programs may refer clients for healthy housing services.** The pilot project is just the beginning of efforts to align health and weatherization within Contra Costa County. Contra Costa Health Services has committed to continue this work and was able to host an intern who be able to support Michael Kent in his role as liaison. A few new clients were referred at the end of this pilot project, and the Climate Action Team will see their applications and services through to completion. Additionally, Climate Action Team staff continue to train the broad array of home visitors within the health department. The Contra Costa Health Services programs for Adult Protective Services and Meals on Wheels are both interested in this program and there are numerous other programs within the county that may benefit from engagement. The Climate Action Team's goal is to systematically improve referrals across the health department for weatherization services and other healthy housing services to support their clients.

The lessons learned from this pilot project can support action beyond Contra Costa County. Over the course of this pilot project, it became clear that both public health and energy efficiency organizations are interested in exploring this connection. The energy efficiency providers recognize that public health partners can help reach low-income clients and improve uptake of these services. And the public health professionals are interested in supporting their clients with any free services that can improve health outcomes.

Endnotes

1 Fukuzawa David D. and Karnas Fred. Environmental Justice. June 2015, 8(3): 86-94. https://doi.org/10.1089/env.2015.0006

2 As examples: http://www.opr.ca.gov/docs/OPR_COMPLETE_7.31.17.pdf and https://archive.epa.gov/greenbuilding/web/html/

3 U.S. Department of Energy. *Home Rx: The Health Benefits of Home Performance: A review of Current Evidence*. December 2016. https://www.energystar.gov/sites/default/files/asset/document/Home%20Rx%20The%20Health%20Benefits%20of%20Home%20Performance%20-%20A%20Review%20of%20the%20Current%20Evidence_FINAL.pdf and E4 The Future. *Occupant Health Benefits of Residential Energy Efficiency. November 2016*. https://e4thefuture.org/wp-content/uploads/2016/11/Occupant-Health-Benefits-Residential-EE.pdf.

4 US EPA(d). 1989. Report to Congress on indoor air quality: Volume 2. EPA/400/1-89/001C. Washington, DC.

5 U.S. Department of Housing and Urban Development Office of Lead Hazard Control and Healthy Homes. *Eight Tips for Keeping a Healthy Home*. https://portal.hud.gov/hudportal/documents/huddoc?id=HH8Tips.pdf. Accessed July 2017.

6 California Department of Public Health. Indoor Air Quality Section. https://www.cdph.ca.gov/Programs/CCDPHP/DEODC/EHLB/IAQ/Pages/Mold.aspx#HealthEffects. Accessed October 2, 2018.

7 National Center for Healthy Housing. Ventilation and Indoor Air Quality. https://nchh.org/information-and-evidence/learn-about-healthy-housing/health-hazards-prevention-and-solutions/ventilation-and-indoor-air-quality/. Accessed October 2, 2018.

8 U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Environmental Health. *Healthy Housing Reference Manual*. 2006. https://www.cdc.gov/nceh/publications/books/housing/housing.htm/

9 U.S. Global Change Research Program. *The Impacts of Climate Change on Human Health in the United States: A Scientific Assessment*. https://health2016.globalchange.gov/. Accessed October 2, 2018.

10 Krieger J and Higgins D Housing and Health: Time Again for Public Health Action. *American Journal of Public Health*. 2002 May; 92(5): 758–768.

11 E4 The Future. *Occupant Health Benefits of Residential Energy Efficiency*. November 2016. https://e4thefuture.org/wp-content/uploads/2016/11/Occupant-Health-Benefits-Residential-EE.pdf.

12 U.S. Department of Energy. *Home Rx: The Health Benefits of Home Performance: A review of Current Evidence*. December 2016. https://www.energystar.gov/sites/default/files/asset/document/Home%20Rx%20The%20Health%20Benefits%20of%20Home%20Performance%20-%20A%20Review%20of%20the%20Current%20Evidence_FINAL.pdf

13 E4 The Future. *Occupant Health Benefits of Residential Energy Efficiency*. November 2016. https://e4thefuture.org/wp-content/uploads/2016/11/Occupant-Health-Benefits-Residential-EE.pdf.

14 U.S. Environmental Protection Agency. Healthy Indoor Environment Protocols for Home Energy Upgrades. https://www.epa.gov/sites/production/files/2014-12/documents/epa_retrofit_protocols.pdf. 2011.

15 California Department of Housing and Community Development. California's Housing Future: Challenges and Opportunities; Public Draft-Statewide Housing Assessment 2025. January 2017.

16 ChangeLab Solutions. Healthy Housing Through Proactive Rental Inspection: A Summary & Guide for Implementing PRIs. 2014..

17 Centers for Disease Control and Prevention. Morbidity and Mortality Weekly Report. 2013;62(Suppl 3)

18 Saving Energy, Improving Health: Potential Impacts of Energy Efficiency Program Design on Noise and Air Pollution Exposure. San Francisco Department of Public Health. 2013. http://www.pewtrusts.org/en/~/media/assets/external-sites/health-impact-project/savingenergyimprovinghealth_finalhia.pdf.

19 Center for Climate Change and Health. Public Health Institute. A Physician's Guide to Climate Change, Health, and Equity. September 2016.

20 Gronlund, Carina J. Racial and socioeconomic disparities in heat-related health effects and their mechanisms: a review Curr Epidemiol Rep. 2014 Sep 1; 1(3): 165–173.

21 Center for Climate Change and Health. Public Health Institute. A Physician's Guide to Climate Change, Health, and Equity. September 2016

22 E4 The Future. Occupant Health Benefits of Residential Energy Efficiency. November 2016. https://e4thefuture.org/wp-content/uploads/2016/11/Occupant-Health-Benefits-Residential-EE.pdf.

23 Center for Climate Change and Health. Public Health Institute. A Physician's Guide to Climate Change, Health, and Equity. September 2016

24 Chandler, Adam. Where the Poor Spend More Than 10 Percent of Their Income on Energy. The Atlantic. June 8, 2015.

25 Chandler, Adam. Where the Poor Spend More Than 10 Percent of Their Income on Energy. The Atlantic. June 8, 2015.

26 Frank DA et al. "Heat or eat: the Low Income Home Energy Assistance Program and nutritional and health risks among children less than 3 years of age." Pediatrics. 2006 Nov;118(5):e1293-302.

27 California Department of Community Services and Development. http://www.csd.ca.gov/Services/ResidentialEnergyEfficiencyServices.aspx. Accessed October 2, 2018.

28 California Department of Community Services and Development. http://www.csd.ca.gov/Services/ResidentialEnergyEfficiencyServices.aspx. Accessed October 2, 2018.

29 California Department of Community Services and Development. http://www.csd.ca.gov/liwp.aspx. Accessed October 2, 2018.

30 California Low Income Home Energy Assistance Program. https://www.benefits.gov/benefits/benefit-details/1540. Accessed October 2, 2018.

31 PG&E Energy Savings Assistance Program. https://www.pge.com/en_US/residential/save-energy-money/help-paying-your-bill/energy-reduction-and-weatherization/energy-savings-assistance-program/energy-savings-assistance-program.page. Accessed October 2, 2018.

32 California Public Utilities Commission. Internal Audit Unit Energy Savings Assistance (ESA) Program October 2017.

33 California Department of Community Services and Development. http://www.csd.ca.gov/LIWP/EEProviders.aspx. Accessed October 2, 2018.

34 SB 350 Barriers Report. https://www.energy.ca.gov/sb350/barriers_report/. Accessed October 2, 2018.

Energy Efficiency and Health

A Guide for Public Health and Health Care Professionals on Connecting Medically Vulnerable Residents with Energy Efficiency Services

This paper was developed by Regional Asthma Management & Prevention (RAMP), a project of the Public Health Institute, in 2017 under Agreement #16-11001 with the California Department of Public Health, Office of Health Equity. The authors extend appreciation to the following reviewers for their insights and contributions: Michael Kent, Contra Costa Health Services; Amy Dryden, Build It Green; Linda Rudolph, Public Health Institute; Kathy Andry, California Department of Community Services and Development; Ellen Tohn, Tohn Environmental Strategies; Laura Glass, Contra Costa County Department of Conservation and Development.

ramp
REGIONAL ASTHMA
MANAGEMENT & PREVENTION

CONTRA COSTA
HEALTH SERVICES