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Climate Solutions are Health Solutions:

An Evaluation of PUSH Green's Home Energy Efficiency Program

PARTNERSHIP FOR THE PUBLIC GOOD

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Executive Summary

Beginning in 2020, cities around the country grappled with how to address the twin pandemics of COVID and systemic racism and the vast health inequities the pandemic both revealed and exacerbated. At the same time, the climate crisis continues to expose deep socioeconomic and racial inequities, and highlights disparities in health outcomes due to extreme weather conditions and unequal access to safe and well-maintained housing. In this landscape of intersectional, complex problems, innovative and multi-system interventions are needed.

PUSH Green, a program of People United for Sustainable Housing (PUSH) in Buffalo, New York, is one such intervention, addressing housing, health and climate needs all at the same time. PUSH Green links homeowners and renters with low-cost or no cost home energy improvements, which reduce the household's use of fossil fuels and in turn save money on utility bills. The primary environmental and economic benefits of weatherization programs have been apparent for decades; however, it is only recently that attention has been paid to the potential for these programs to improve the overall health and safety of the household, and for housing and climate issues to be seen through the lens of health equity and environmental and racial justice.

In Buffalo, NY, a city characterized by significant residential segregation, accumulated disinvestment in residential and neighborhood infrastructure, and significant racial disparities in rates of poverty and health outcomes, the impact of COVID was severely felt, especially in neighborhoods of color. On top of the health risks of the virus, Buffalo has some of the oldest housing stock in the country, which leads to unsafe housing conditions for many. Due to stay-at-home orders, many residents found themselves confined indoors for long periods of time, at times further exacerbating mental and physical health problems. Old homes can pose health risks from toxins like lead, mold, and asbestos, and they can also be drafty and difficult to heat and cool to safe indoor temperatures. However, a growing body of research shows that weatherizing a home by adding insulation and more efficient heating and cooling systems, for example, is associated with a range of health benefits, including related to asthma, hypertension, allergies, and existing conditions like diabetes, obesity, and inflammation. The cost savings from weatherization also impact health by allowing a household with extremely high energy bills to redirect some of their energy spending to other needs such as food, medication, and other basic necessities.

PUSH Green responds to complex challenges by pursuing a "triple bottom line"-- green jobs that pay a living wage, increased home comfort and health,

and positive environmental impacts. By engaging community members in defining and driving the work, PUSH is able to improve the health and safety of communities while strengthening the capacity of residents to advocate for themselves. Specifically, PUSH Green facilitates collaboration among residents, contractors, job training programs, and other local and state weatherization programs to offer:

(1) home energy assessments,
(2) energy efficiency and advocacy education,
(3) basic structural and safety repairs,
(4) free and/or subsidized home weatherization services, and
(5) employment linkages between neighborhood residents and local contractors.

Between its inception in 2012 through the end of 2019, PUSH Green has provided 700 homes with weatherization services through New York State Energy Research and Development Authority (NYSERDA) energy efficiency programs, and health and safety improvements through the Green and Healthy Homes Initiative and PUSH's Warm and Dry on the West Side program.

PUSH Green has faced significant challenges, such as inconsistent funding streams, tensions between the business interests of contractors and residents' needs, changing practices by NYSERDA that shifted the role PUSH could play as an intermediary between residents and contractors, and less capacity than matches the local need. Still, PUSH has strong relationships with several local contractors that allow them to serve as helpful intermediaries between contractors and residents to ensure services are delivered, and staff is able to engage in extensive outreach and education.

In 2019, PUSH Buffalo, Partnership for the Public Good, and the University at Buffalo School of Architecture and Planning were granted funding from the Robert Wood Johnson Foundation Climate and Health Solutions program to study the health, housing, and climate impacts of the PUSH Green program. The research team interviewed PUSH Green participants and staff, conducted focus groups and analyzed program data provided by NYSERDA to document, understand, and evaluate the cumulative impacts of PUSH Green on health equity, climate change, and the uniqueness of its community-based, integrated approach by looking at key indicators related to individual health and wellness, community well-being, energy bill savings, and climate change mitigation.

The evaluation process was impacted significantly by COVID, by limiting researchers' ability to engage in person with residents and due to major life disruptions that impeded some residents' ability to participate. However, the findings together underscored the importance of providing safe and healthy housing.

KEY FINDINGS:

- Due to job and income losses, the stress of social isolation, new childcare responsibilities, and the uncertainty of health risks for oneself and others, the COVID-19 pandemic has increased overall anxiety and exacerbated poor mental health. This was the number one theme that emerged in our interviews.
- People with pre-existing health conditions had more difficulty paying energy bills during the pandemic.
- Participants reported spending more time in their homes, discussed the importance of weatherization, and indicated that comfort at home promoted their sense of self-reliability.
- PUSH Green's weatherization services have made homes more comfortable, safe, and affordable, according to interview and focus group participants.
- Appreciation for more stable and comfortable indoor temperatures after weatherization through PUSH Green was common.
- PUSH Green participants save an average of $388 per year on their energy bills after weatherization.
- In total, between 2012-2019, PUSH Green leveraged over $4.56 million in investments into energy-efficiency retrofits and saved Buffalo residents a combined $1.9 million in energy costs.
- PUSH Green reduced greenhouse gas emissions by 1.19 metric tons per household per year through the EmPower NY program and by 2.87 metric tons per household per year through the Home Performance with Energy Star program.

The present study generated a variety of actionable insights that can be applied across multiple levels. The report includes recommendations for community-based organizations (CBOs) in cities facing similar challenges related to an aging housing stock, costly energy inefficiencies, limited living-wage workforce opportunities, and historic underinvestment in low-income neighborhoods and communities of color. It also outlines recommendations for policy makers across the city, county, and state levels interested in implementing equitable clean energy policies that more effectively meet the needs of local communities.

KEY RECOMMENDATIONS:

- Ensure that current and future state programs prioritize authentically collaborative relationships with local CBOs.
- Take a collaborative and cross-disciplinary approach to policy making around weatherization and health equity programs.
- Invest significantly more in integrated programs that seek to address housing safety, health equity, energy efficiency, and building electrification.
- Invest in generating more research on the relationship between weatherization and health.
- Establish more stable, long-term funding streams to enable the success of these weatherization and health equity programs.
- Establish a more coordinated and streamlined process for providing multiple needed repairs concurrently, and work in partnership with CBOs to braid different available programs together.
- Cities and state agencies should more effectively utilize and leverage the existing social capital and community expertise of CBOs like PUSH. If programs wish to genuinely and sustainably provide services that meet the needs of local communities, they must engage and listen to residents and neighborhood-level organizations that work most closely with them.
- Weatherization efforts should be viewed as more than simply energy efficiency programs, but also as neighborhood health initiatives.

Collectively, we have learned a lot from the COVID-19 pandemic about the disproportionate impact of crises and disasters on already marginalized communities, and it is critical to harvest these lessons intentionally as we anticipate the longer-term effects of climate change in communities. Specifically, we need to invest in resilience measures for predictable challenges related to temperature extremes, an increasing number of intense weather events, and air quality—all of which we know will disproportionately impact those with the fewest resources and the greatest pre-existing health risks. Importantly, in order to meaningfully and effectively address challenges, efforts must emerge from and be driven by impacted communities themselves.

Glossary

Green Jobs Green NY (GJGNY) - a state law passed in 2009 that established NYSERDA and funding for the workforce development and energy-efficiency programs it administers.

NYSERDA - acronym for the New York State Energy Research and Development Authority, the state authority responsible for administering home energy efficiency programs and subsidies across New York State.

EmPower NY - a free residential energy-efficiency program administered by NYSERDA to income-qualified homeowners and renters.

Assisted Home Performance with Energy Star (AHP) - a residential energy-efficiency program administered by NYSERDA that provides weatherization services at 50% of the cost for income-qualified residents.

Home Performance with Energy Star (HPwES) - a residential energy-efficiency program administered by NYSERDA that provides a free home energy audit and access to low-interest loans for weatherization services for homeowners who do not income-qualify for the other subsidized programs.

PUSH Green - an arm of PUSH Buffalo (People United for Sustainable Housing) that connects residents with energy-efficiency and home repair programs and provides education, support and advocacy for energy affordability and climate justice alongside residents.

Warm and Dry on the West Side (WDWS) - a home repair program administered by PUSH Green to provide necessary health and safety improvements to homes in need of weatherization services, specifically for low-income homeowners in Buffalo's 14213 zip code.

Green and Healthy Homes Initiative (GHHI) - a national home repair program locally administered by the Community Foundation for Greater Buffalo that integrates health and energy-efficiency home improvements targeted at pairing weatherization with reducing lead poisoning and asthma.

Social determinants of health (SDOH) - a wide range of social and environmental factors that significantly impact people's health, development, and well-being. As outlined by the U.S. Department of Health and Human Services, there are five main domains into which the SDOH are grouped: (1) economic stability, (2) education access and quality, (3) health care access and quality, (4) neighborhood and built environment, and (5) social and community context.

Introduction: Health, Climate, and Housing in Buffalo

Buffalo, New York, is one of the Rust Belt cities along the Great Lakes that shares a familiar history with other post-industrial cities of the Midwest and Northeast. One of the most prosperous cities in the country at the turn of the 20th century, Buffalo was known as the Queen City of the Lakes. Buffalo boasted the most millionaires per capita in the United States in the early 1900s, due to a bustling Erie Canal and a booming manufacturing industry which lasted until the 1950s. As manufacturing jobs left the area and factories such as Bethlehem Steel closed, the city began to lose population, shrinking from over 500,000 residents in 1950 to about half that size today. Racial discrimination in the form of redlining and mortgage discrimination resulted in a starkly segregated city, and white flight led to the growth of surrounding suburbs through the 1970s.

Today the overall population of Erie County is 1 million people, with a poverty rate equivalent to the rest of the country, around 14%. Inside the city of Buffalo, however, poverty is concentrated and racialized. In zip codes on the East and West Sides of the city, poverty rates exceed 30% and the health, economic, educational and employment disparities between Black and white residents are stark.[1,2,3] In a city built for a population twice its current size, maintaining quality infrastructure and solid housing stock was impossible with a reduced tax base, and the city in recent decades has taken to demolishing vacant houses in disrepair, leaving vast tracts of empty lots in some neighborhoods on the East Side of Buffalo. City officials have relied on increased fines and fees to balance city budgets, which puts extra hardship on residents who are already struggling to get by.

The housing stock in Buffalo is some of the oldest in the country, with over 60% of houses built before 1940.[4] Living in an old home is financially draining due to the near-constant maintenance required, and most homes were not built to be energy efficient. When most Buffalo homes were built, the primary fuel source was coal, which was cheap at the time, and therefore the majority of homes had no insulation. Today, most households heat by burning methane gas. In 2021, the average Buffalo household will spend over $700 on winter heating bills.[5] Many Buffalo residents struggle to keep the heat on and must make hard decisions each month about which bills they can afford to pay - gas, electric, rent, food, or medicine. When it is impossible to pay all expenses in full, choosing between necessities becomes a balancing act from month to month. Utility shut-offs, evictions and missed medical care are common experiences.

"In that house we'd have bills that would go to over **$200 in the winter for a small apartment,** which is crazy. Our current house I think the bills have been more… reasonable? They've been lower for nearly double the square footage. But it still seems like they're quite high."

-"Melissa," 39

*Note: We have changed the names of interview participants to protect their privacy. All quotes are taken directly from real interviews.

This struggle to survive has an impact on residents' health, as is evidenced by the health disparities between wealthier majority white neighborhoods in Buffalo compared to lower-wealth communities of color.[6] Indeed, when mapping neighborhood level data on various measures of unhealthy behaviors (including smoking, no physical activity, obesity, and sleep less than 7 hours per day), health outcomes (including arthritis, asthma, high blood pressure, high cholesterol, diabetes, kidney disease, COPD, heart disease, stroke, mental health, and physical health), and use of preventive services (including access to health insurance, doctor visits, taking medications, and various preventative screenings), geographic divides are striking and blatant.[7]

Health problems are also caused and exacerbated by poor quality housing conditions due to the age of the housing, intermittent maintenance, and willful neglect of homes by unaccountable landlords. Rates of childhood lead poisoning in rental housing in some Buffalo zip codes are among the worst in the country. Other health problems are caused by toxins such as asbestos and radon, by pest infestations such as rodents, and due to water leaks in roofing and basement flooding, which lead to mold growth. Respiratory illness can be exacerbated by mold and dust from plaster and dirt in air ducts or old heating equipment. Older people living in homes with uneven floors and tripping hazards are at risk of falling. Finally, the struggle to adequately heat homes during the winter can lead to dangerous conditions due to poorly maintained heating equipment or to dangerous work-arounds; carbon monoxide poisoning and fires have led to deaths when people have attempted to heat their homes using an oven, a portable space heater or a malfunctioning furnace. Fires are especially dangerous and have led to loss of life due to most homes being constructed of wood prior to modern fire codes.

The COVID-19 pandemic both highlighted and exacerbated the inequities in health and housing in Buffalo. While staying at home to avoid the virus was an option for some community members, many had to risk their own health and that of their family by continuing to work in essential positions. At the same time, staying at home increased already burdensome heating and electricity costs and exacerbated health issues, both mental and physical, caused by poor quality housing. Poor housing conditions can worsen asthma or other respiratory problems, exacerbate chronic disease symptoms, and can sometimes lead to serious illnesses, all of which put people at higher risk of complications from COVID if contracted.

"Well we have a **terrible terrible problem with rats.** The one bedroom we use for storage, so over the winter I didn't bother going in there; I had no reason, and I went in a few weeks ago, and they had eaten through the wall and ruined clothes and a whole bunch of other things I had to throw out. In the basement I have traps and stuff, but there's just so many rats around here. And **I don't have money to have all the foundation fixed.**"

-"Margaret," 68

The Impact of Weatherization on Health

A growing base of empirical research suggests that a wide range of social and environmental factors—often collectively referred to as the social determinants of health (SDOH)—significantly impact people's health, development, and well-being.[8] As outlined by the U.S. Department of Health and Human Services, there are five main domains into which the SDOH are grouped:
(1) economic stability,
(2) education access and quality,
(3) health care access and quality,
(4) neighborhood and built environment, and
(5) social and community context.[9]

Specifically, this research focuses on how the SDOH impact a variety of chronic health conditions, such as respiratory diseases (i.e., asthma, COPD), heart disease and stroke (i.e., hypertension, cardiovascular disease), and mental health and mental disorders (i.e. depression, anxiety).[10] Critically, this research suggests that if community groups and policy makers turn attention to the variety of interconnected conditions that impact people's health outcomes and risk factors in synergistic ways, they can more effectively promote positive health outcomes and lessen the massive health disparities and inequities that currently characterize the country.

Within this framework, PUSH Green's efforts to weatherize homes are primarily designed to target two of the SDOH: neighborhood and built environment, and economic stability.

Most directly, PUSH Green's weatherization efforts address the pervasive health effects of the neighborhood and built environment on residents. Weatherization Assistance Programs were first established at the federal level in 1976. Research since then on the non-energy impacts of weatherization has consistently demonstrated that it is directly associated with reduced carbon monoxide poisoning from appliances, lower incidences of home fires, and improvements in air quality.[11] Specifically, by identifying issues with faulty appliances, improving home insulation and temperature regulation, and by reducing dust/improving air quality through air sealing, replacing air filters, ensuring appropriate home ventilation, and implementing lead-safe practices, weatherization can have a variety of positive impacts on residents' health and well-being.[12] Additionally, researchers are now reporting on the mutually reinforcing positive effects of weatherization and building electrification strategies in improving indoor air quality.[13]

Photo: Dennis Schroeder, NREL

As the fields of environmental epidemiology and exposure science reinforce the links between health and housing,[14] there is an increasing amount of research that links outdoor air pollution with increased incidences of asthma, heart disease, lung cancer, strokes,[15] and breast cancer;[16] worsening diabetes,[17] obesity,[18] and inflammation;[19] pre-term and low-birth-weight births;[20] and impeded neurodevelopment in children.[21] Additionally, exposure to toxic indoor air pollutants—often transmitted through dust—has been associated with asthma, inflammation, dysregulation of autonomic functions (e.g., heart rate, blood pressure, sweating), thrombosis (i.e., blood clots), oxidative stress, pneumonia in children, multiple sclerosis, male infertility, hypertension, strokes, and impaired neurodevelopment in children.[22] Insulation mitigates both sources of pollutants by improving the building shell and indoor air quality at the same time.

Graphic: Department of Energy, "Typical Weatherization Measures"

While this list of health conditions relevant to weatherization efforts is long and more research is needed to more clearly establish direct links between each of these conditions and weatherization projects specifically, one of the most robust and consistent findings in the research to date is that weatherization does effectively reduce the number of asthma-related hospitalizations by reducing common asthma triggers (i.e., allergens, mold, dust mites, and temperature fluctuations).[23,24] Given that asthma is the most common pediatric disease in the United States and that low-income homes are disproportionately affected,[25] weatherization programs are critical to addressing health inequity and can have generational impacts.

Additionally, in the context of climate change and increasingly extreme temperatures, weatherizing homes and investing in appropriate insulation is an increasingly pressing priority. Research shows that individuals with existing chronic health conditions such as cardiovascular or respiratory diseases, diabetes, obesity, mental disorders, and mobility challenges are at significantly higher risk of temperature-related mortality, and elderly people, pregnant people, and infants are at increased risk, as well.[26]

Put into concrete financial terms, according to a recent study by the American Council for an Energy Efficient Economy (ACEEE),

weatherization programs that effectively reduce just four of the most common health risks associated with housing--asthma, falls, exposure to extreme heat, and exposure to extreme cold--could result in a cost savings of over $228 million in averted healthcare costs.[27]

As described previously, PUSH Green's weatherization work also seeks to directly impact the SDOH of economic stability by reducing costly utility bills for low-income residents, and, in turn, decreasing the likelihood of utility shut-offs due to inability to pay. Economic instability is associated with higher levels of stress, and it is well-established that stress contributes to a range of serious health conditions including heart disease, high blood pressure, diabetes, and mental disorders.[28] Health issues themselves are also significant causes of life stress, which can lead to additional health challenges in a vicious cycle.[29] As we examine the ill-effects of life stress, it is important to note that research shows that the negative health and well-being effects of additional life stressors are exponential. In other words, the more life stressors people have, the cumulative impact of these stressors on health and well-being becomes significantly greater than the sum of each individual stressor's impact alone.[30]

Clearly, both environmental factors and economic/life stress can cause a wide variety of health issues. In turn, seeking treatment for health issues can be extremely--sometimes prohibitively--costly for families. Because research suggests that weatherization efforts directly contribute to reductions in hospitalizations for asthma and other respiratory ailments triggered by thermal stressors and environmental allergens,[31] investing in cost-saving weatherization projects can also help reduce non-energy related financial stressors on families in ways that promote their overall health and well-being.

People with chronic health issues often have more difficulty securing and maintaining gainful employment, which further perpetuates and compounds the detrimental health effects of economic instability.[32] Indeed, preliminary research on the non-energy impacts of weatherization suggests that weatherization projects are associated with a reduction in missed days at work, and even increased productivity at work.[33] Further research on these indirect effects of weatherization will help make a clearer case for the broader societal and economic benefits of weatherization initiatives.

Finally, it is important to note that by using weatherization projects to increase employment opportunities for neighborhood residents, PUSH Green is also working to promote more economic stability within the community.

Examining the Nexus of COVID-19, Climate Change, and Equity Issues

As we look at the impacts of energy efficient sustainable housing, examining the disproportionate impacts of COVID-19 provides a helpful learning opportunity. In many ways, the impact of COVID-19 is a logical proxy for examining the current and impending effects of climate change. In both the pandemic and in the wake of climate-related weather changes and disasters, people in low-income households and communities are considered to be at greatest risk, as are people of color (who disproportionately reside in under-resourced, under-developed neighborhoods, and in areas with more environmental toxins),[34,35] people with pre-existing health conditions, and elderly populations.[36,37]

Examining the effects of COVID-19 helps us better understand who is impacted by large scale threats, the many ways that they are impacted, and why they are most vulnerable to these threats. Looking at the pandemic as a case study, we can also begin to imagine creative ways of building community resilience and recovery in the face of big challenges—like climate change-related shifts in weather patterns—on the horizon.

EXAMINING THE UNEQUAL IMPACT OF COVID-19

COVID-19 is perhaps the most universally impactful global challenge of our time, and yet the impacts are extremely unevenly borne. The pandemic has illustrated how interconnected so many diverse factors are in shaping the quality and stability of people's lives. In the face of societal crises like COVID-19, the many challenges faced by people who are already at greater risk tend to impact one another like falling dominoes. This not only has direct consequences for the lives of those who are most vulnerable to the destabilizing effects and dangers of large-scale events and crises, it also has reverberating social and economic costs for society as a whole.

During the pandemic, it quickly became apparent that people from low-income households are more likely to work in jobs that cannot be done remotely and to rely on public transportation, and this confronted families with the choice between increasing risk of COVID-19 exposure through work or facing loss of needed income.[38] People in low-wage sectors were also the first to be laid off or furloughed in the first months of the pandemic.[39] There is a well-established connection between income and health, in which people from lower-income households are more likely to have pre-existing health conditions and to experience poor health outcomes.[40]

Research also shows that there is a connection between housing quality--specifically in terms of appropriate insulation that maintains livable indoor temperatures and proper ventilation--and the incidence of many chronic

"In regard to sheltering in place, I can handle most things like a heat wave, I have fans. My biggest concern is that my boiler, my furnace, is on its last leg and I feel like it's in intensive care. So it's really really bad and that gives me a sense of panic because sometimes **it gets a little cold and I don't know whether it's going to kick on and work.** So I worry about that, especially as next year comes along, a cold wave might come and my husband is sick and what have you, that the cold would affect him because of the furnace."

-"Beatriz," 66

health conditions like asthma and hypertension,[41] which has a direct effect on people's risk of contracting and dying from COVID-19. People from low-income households are also less likely to have access to paid sick leave and high-quality healthcare in the event that they do get sick.[42] In the context of COVID-19, this meant that the people forced to expose themselves to the virus were the same people who were more likely to have health risk factors, and less likely to have access to needed health treatment and care.

People with limited incomes who were able to remain at home during the pandemic often faced unmanageable energy bills due to more time spent at home. They commonly faced prolonged exposure to the kinds of housing issues which exacerbate the very health issues that make them more susceptible to COVID-19: extreme heat and cold due to poor insulation, limited access to heating and cooling appliances, and mold and other allergens due to poor ventilation.[43]

This list of ways that low-income families were particularly impacted by the pandemic could be much longer—factors like housing density, crowded living arrangements, more limited access to critical cleaning supplies (like washers and dryers), childcare, exposure limiting services (such as grocery delivery), etc. Still, this list shows how deeply intertwined risk factors are in determining who is impacted by crises, how they are impacted, and why they are disproportionately impacted. It also demonstrates how the impacts of large-scale crises reverberate in many ways throughout communities. To draw the connection to the effects of climate change, like COVID-19, people who are most likely to be exposed to the detrimental effects of extreme weather are also most likely to have health risk factors, least likely to have access to quality healthcare, and least likely to be able to afford the costs of higher utility bills.

In Buffalo specifically, where the median household income for Black families is approximately half of the median income for white families ($33,000 vs. $62,000), the disparate impacts of COVID-19 fell along starkly racial lines--especially in the first months of the pandemic.[44] Not only were there more job losses and layoffs in low-wage sectors--which disproportionately employ workers of color--but Black people made up a disproportionately large percentage of COVID fatalities during the initial peak in hospitalizations. Black people comprise 14% of the overall population in the region, but made up 21% of all fatalities in April 2020.[45] This disparity was attributed largely to the disproportionately high incidence of pre-existing health conditions among Black residents that put people at increased risk of contracting and dying from the virus, combined with a higher likelihood of working in frontline and essential jobs that increased exposure. The disparities were also attributed to geography-based limitations on access to healthcare; Buffalo remains one of the most segregated cities in the country, with 85% of Black residents living east of

Main Street in neighborhoods that lack accessible healthcare providers.[46,47]

Understanding the ways in which COVID-19 impacted people--as well as the reasons for its disproportionate impact on low-income individuals and people of color--helps us identify specific points of entry for lessening the effects of such catastrophes in the future. While perhaps the most glaring takeaway is the importance of addressing profound income inequality and the effects of systemic racism, this report also highlights the value of investing in strategies that provide people with equitable access to a healthier and more sustainable built environment to promote better health outcomes and reduce health risks. It also makes clear the importance of providing access to cost-cutting programs that reduce financial strains on families who live on a tight budget.

ANTICIPATING THE UNEQUAL IMPACT OF CLIMATE CHANGE IN BUFFALO: HOUSING SAFETY, HEALTH, AND THE RISK OF DISPLACEMENT

Like COVID-19, the impending effects of changing weather patterns demand large scale preparatory and preventative measures. Across New York State and within Erie County specifically, average annual temperatures are projected to rise by approximately 10 degrees Fahrenheit over the next 60 years, and with this rise in temperatures comes a host of related changes in weather patterns.[48] The region has already experienced a greater frequency of extreme heat waves and cold snaps. Researchers project that these temperature extremes will occur with greater frequency and duration in the coming years in Western New York. It is also projected that rising temperatures across New York State will increase the frequency, intensity, and duration of severe storms, as well as severe winter storms with increased snowfall.[49] With rising regional temperatures, researchers also expect an increase in pests and invasive species that can carry disease and disrupt local ecosystems.[50]

Given that Buffalo has some of the oldest housing stock of any major city in America--with 64.1% of homes built before 1940[51]--it is especially important to proactively invest in weatherization measures as we anticipate the consequences of more extreme weather in the coming years. Substantial research points to the detrimental effects of indoor temperature extremes on physical health, including increased risk of developing and exacerbating existing asthma and hypertension.[52, 53, 54, 55]

Indoor air quality is a particular concern. Research suggests that poor air quality is associated with a vast array of health concerns, including asthma, heart disease, multiple forms of cancer, diabetes, obesity, inflammation, preterm births, low birth weights, and impeded neurodevelopment in children.[56] Even before COVID-19, research shows that Americans spent an average of 90% of their time indoors,[57] and that indoor air can have up

to 10 times as many pollutants as outdoor air.[58] With Americans spending even more time inside their own homes due to social distancing measures, it is vitally important that home environments are safe, stable, secure places that do not worsen health concerns. Moreover, weatherization and energy efficiency efforts have to be especially careful not to worsen indoor air quality by decreasing ventilation too much or making a home too "tight" with air sealing measures if there are any health or safety problems (gas leaks, mold, carbon monoxide), because doing so could mean trapping more humidity, allergens, or toxins in a home and putting occupants at risk.

In the context of COVID-19, all of these health conditions are dangerous risk factors that increase the likelihood of contracting and dying from the virus.[59] There is also a risk that people with critical health concerns such as these will avoid seeking needed medical attention because they are avoiding hospitals due to increased risk of exposure to the virus. In other words, exposure to poor housing conditions can create and worsen health issues. These health issues can deepen and perpetuate socio-economic divides by increasing the likelihood of needing expensive medical care and by exposing people to greater risk of premature death. The necessity of investing in healthy, livable housing is clear.

Addressing the affordability of needed weatherization is critical. U.S. Census data shows that over half (55%) of households in Buffalo currently cannot afford their rent or mortgage payments (defined as needing to spend over 30% of income on gross housing costs). Twenty-three percent (23%) of Buffalo households pay over 50% of their income on housing.[60] Energy costs are also already an overwhelming expense for many families--even before the anticipated worsening of temperature extremes--and they contribute significantly to the burdensome costs of housing. In Erie County, among those who are at or below 50% of the federal poverty level, energy costs alone make up 76.6% of household income.[61] Notably, homes in New York State already consume 15% more energy than the national average.[62]

Failure to proactively invest in preventative housing resilience measures will also increase the risk of costly weather related damage. Based on analyses of past weather events, researchers estimate that each individual severe winter storm in Western New York costs a total of $1.54 million in damaged infrastructure. Each severe storm costs an estimated $290,000, and each episode of severe flooding costs $860,000.[63]

Many people herald the ways in which Buffalo is expected to be spared some of the most destructive and dangerous effects of climate change caused by hurricanes, earthquakes, and wildfires. In 2019, Mayor Brown declared that Buffalo would be a "climate change refuge" city in the future.[64] However, to date, the City of Buffalo has no climate action, adaptation, or resilience plan in place; our region is unprepared to manage the impending and consequential changes in climate.

Additionally, the idea that Buffalo could attract climate migrants has significant consequences for communities that are already systematically under-resourced.[65] If an increasing number of climate migrants arrive in Buffalo, there is a risk of displacing existing families and renters as housing demand increases and as newcomers bring the capacity to afford more expensive homes and amenities. Unchecked gentrification could leave current residents struggling even more to find and maintain safe, stable, affordable housing. If an increasing number of climate refugees resettle in Buffalo, there is also a risk of concentrating and compounding economic inequalities if systems are not in place to support weatherization and housing affordability measures for low-income individuals and families.

BUILDING RESILIENCE: HARVESTING LESSONS FROM COVID-19

The data on the disproportionate consequences of COVID-19 and the impending threat of climate change can be demoralizing. However, it is important to acknowledge the unique opportunity to learn from the challenges and unequal effects of the pandemic to be better prepared to prevent and respond to large-scale but predictable crisis situations in the future. There is also a need to prioritize equity goals so that future crises do not compound and perpetuate existing inequalities, as COVID-19 has done.

Fortunately, throughout COVID, the value of building and investing in collective social networks and mutual aid infrastructures became obvious.[66] PUSH Buffalo embodies this ethos, and is well positioned to support the creation of sustainable, safe, affordable housing through community-based collaborative efforts. Research on increasing climate change resilience similarly points to the importance of whole-community approaches that integrate infrastructure adaptations with education and pathways to economic growth.[67]

Photo: John Bono, PUSH Buffalo

Additionally, research shows a wide range of proactive, effective resilience strategies that we can implement now before the most severe effects of climate change impact Western New York. Improving the thermal performance of windows can significantly reduce the cost of utility bills while also improving the comfort, health, and safety of occupants.[68] Similarly, investing in insulation--a high priority in Western New York especially--can improve the liveability and safety of indoor temperatures while also reducing dangerous ice dams in the winter, mold growth in the warmer months, and the overall energy costs for households.[69] Investing in building ventilation and indoor air quality improvements can help reduce the incidence of health conditions that worsen the risks associated with extreme temperatures, and which detrimentally impact people's ability to work.[70] Roof covering and drainage interventions can also increase the energy efficiency of homes while improving liveable indoor temperatures,

preventing dangerous accumulation of snow and ice, and preventing water leakage that can lead to mold growth.[71] Retrofitting homes to withstand high winds can prevent much more costly damage during severe storms.[72]

In brief, the more we invest in promoting healthy living through safe, sustainable housing, the more we prevent consequential and costly health issues, and the more we prevent compounding challenges from deeper social and economic inequality.

History of PUSH Green

In 2005, the co-founders of PUSH Buffalo set out to comprehensively address the challenges of unhealthy and unaffordable housing on Buffalo's West Side. To begin, they knocked on doors and talked to residents about what they wanted for their neighborhood. One common theme that emerged from these conversations was the proliferation of vacant properties under the control of a private real estate investment scheme endorsed by the state. One of PUSH's first campaigns was nailing plywood over the doors of abandoned problem properties with a spray-painted outline of then-Governor George Pataki, drawing attention to neglect and disinvestment by the state. The effort eventually worked, and numerous properties later were transferred to PUSH to become the first affordable housing rehabs in what became the Green Development Zone (GDZ).

Photo: PUSH Buffalo

The GDZ is a 25-block radius on the West Side of Buffalo, where in 2007 PUSH held a community congress to co-envision what residents wanted to see in their neighborhood. Along with affordable rent and less vacancy, residents wanted lower utility bills, well-paying jobs and neighborhood amenities like parks, gardens and green space. To this end, PUSH advocated for and won the passage of the Green Jobs Green NY (GJGNY) Act in 2009, state legislation that committed $112 million of regional greenhouse gas cap and trade auction proceeds for greater investment in energy efficiency and workforce development pathways in the green building sphere. Specifically, GJGNY set a mandate for the New York State Energy Research and Development Authority (NYSERDA) to partner with community-based organizations to dramatically scale-up delivery of state-funded energy-efficiency and workforce development programs and to make the industry more accessible to contracting businesses owned and operated by people of color and women.

In the midst of the place-based community planning work that gave rise to the GDZ and the policy advocacy and organizing underway to win passage of GJGNY, PUSH was waging a local organizing campaign against the regional gas utility, National Fuel, and the state Public Service Commission (PSC) to demand changes to National Fuel's Conservation Incentive Program (CIP).[73] The program was responsible for funneling a disproportionate amount of utility ratepayer-funded, high-efficiency

furnace rebates to affluent suburban households while limiting access to no-cost weatherization improvements for low-income households in the City of Buffalo.[74] The campaign successfully demonstrated the need across many of Buffalo's neighborhoods for robust investments in weatherization to best address the root causes of the energy affordability crisis. It also drew into sharp focus the ways that corporate utility companies and state utility regulators can fail to equitably deliver targeted benefits to residents most in need, and why community-based approaches are so critical.

In 2011, PUSH Green was born. Near the end of that year, the first PUSH Green staff were hired as Community Energy Advocates. As community-based organizations (CBOs) like PUSH came under contract with NYSERDA to implement GJGNY in 2012, many of the progressive elements in the original vision for GJGNY had been transformed or eliminated through legislative and bureaucratic processes. Originally, the primary goals of GJGNY combined workforce development with assistance to low-and-moderate income households. Though GJGNY used the language of "high road" economic practices, in reality it was difficult to convince employers to hire the community members who were being identified by the CBOs as job seekers. PUSH convinced NYSERDA to get more involved in the details and authorize community benefit agreements between local contractors and CBOs; this meant that NYSERDA endorsed agreements between contractors and CBOs for the first time. The agreements stated that in exchange for a "bundle" of homes that were weatherization-ready, the contractor would agree to certain labor practices such as paying a living wage and hiring at least 60% of workers from target populations. Under these conditions, PUSH signed agreements with eight contracting companies.

At PUSH, this bundling process was called "Friends and Neighbors." If five households who wanted weatherization got together, they would each receive a 5% discount on their project (five households was the minimum per bundle). If ten households formed a bundle, they would receive 10% off. Once a bundle had been formed, PUSH would submit that bundle to one of the participating NYSERDA contractors who had signed an agreement to operate under high-road labor principles to begin weatherization work. PUSH started outreach for Friends and Neighbors in the village of Kenmore, a first-ring, mostly working class suburb of Buffalo, by hosting public events and canvassing the neighborhood. Soon PUSH connected with the village mayor who was supportive of the effort and sent letters to constituents encouraging them to participate. PUSH relied on the "snowflake model" or an "each one, reach one" model which was dependent on social networks--by supporting a leader to reach their network, a whole block, family, church group or other social circle could sign up for weatherization services together. PUSH helped those who were interested host house parties, where the "house captain" would invite

their friends and family using postcards with testimonials provided by PUSH. PUSH provided food and drinks for the house party. PUSH Green Energy Advocates supplied hosts with a facilitation guide and would come to speak directly with the group about weatherization and the Friends and Neighbors program. A "share the savings" incentive also provided gift cards to households who referred a friend to the program who later completed an energy audit.

One of the first homes weatherized by PUSH Green was Denis and Mary Uminski's in 2012. An older couple living in Kenmore, the Uminskis said that before weatherization the house would be very cold at night and unevenly heated during the day. It turned out there was no insulation in the walls or attic floor, which not only made the house drafty and cold but meant the fuel bills were high every winter. As PUSH Green staff made their way through the Kenmore community going door-to-door, one Community Energy Advisor at the time, Rachelle Moses, knocked on the Uminskis door and told them about the new opportunities through NYSERDA. When the energy audit showed the lack of insulation, the Uminskis were able to take advantage of NYSERDA's programs to insulate the walls, attic and second floor ceiling as well as air-seal around doors and windows. The couple was very satisfied with the work and with the help of PUSH Green. "As a result, the house has been warmer this winter. I don't have the drafts I had before, and I'm very happy with what they did," said Denis. He continued, "(PUSH Green) is not only selling you on the program, but they're following up. You have the assurance that you're not the only one dealing with your contractor. If there was an issue I didn't see, Rachelle would see it." Ultimately the Uminskis were so happy with the program, they recommended it to their daughters, two of whom bought homes nearby and received weatherization services through PUSH Green as well.

Photo: Mark Sommer, The Buffalo News

Aggregating groups of customers through the Friends and Neighbors program was intended to increase the number of homes being weatherized by utilizing social networks, and to have leverage with contractors about hiring practices. At the time, PUSH viewed customer aggregation as a key strategy for realizing economies of scale, coordinating and managing retrofit activities, and achieving so-called "triple bottom line benefits"--enhanced energy cost savings and healthier homes for poor and working class households; jobs for disadvantaged workers and contractors; and environmental benefits related to energy conservation and greenhouse gas emission reduction. But there were challenges to this approach and to achieving those lofty aims. According to PUSH Green staff, bundling was

not done geographically, so it was rare to have people who knew each other going through the process at the same time. Instead, a bundle would draw from interested customers across the county or region in order to submit requests for services to NYSERDA in a timely way. However, customers were still left waiting for long periods of time while a bundle was formed. For example, if you were the first household to sign up for a new bundle, your bundle would not be submitted until there were at least four other interested households, often more, so you might be waiting months for the project to be submitted and then waiting for the work to begin.

Bundling projects did not always result in the intended effect with contracting companies either. In 2013, PUSH started the Hiring Hall, which is a workforce training and social enterprise model for local workers interested in learning building trades, including home weatherization. After laborers completed trainings through the Hiring Hall, PUSH would work to place trainees in local construction jobs. For several years, PUSH worked hard to hold participating contractors accountable for their labor practices by convening bi-weekly meetings to talk through current projects together, and by issuing "contractor scorecards" which scored companies on things such as project turnaround time, the number of women employed, the number of BIPOC employees, and the number of projects completed. These efforts helped create job opportunities for a small number of disadvantaged workers, however, not at the scale originally envisioned.

One reason was a culture clash between predominantly white, male-owned suburban construction companies and the pool of aspiring workers that PUSH recruited from low-income neighborhoods across the city. Another reason was that even with bundling projects and delivering those bundles to companies, it was difficult for PUSH to generate a high enough volume of customers to justify hiring additional workers. Changes at the companies disrupted the process too. For example, one of the companies that more closely shared PUSH's values, Buffalo Energy, changed their business model and were no longer a partner with PUSH. Another contractor, a nonprofit weatherization firm called New Buffalo Impact, was forced out of business when NYSERDA and the local utility companies changed the way they referred income eligible, high energy consuming customers in 2017. The bundling and contractor negotiation approach lasted for the first five years of PUSH Green's operations.

In 2017, the Hiring Hall started receiving new sources of earned revenue which allowed PUSH to diversify the skills that workers were trained in, and allowed workers to be placed into a wider array of jobs, from solar installation to commercial demolition and environmental remediation. PUSH Green's strategic focus underwent several changes at the same time. A big shift was the launch of Warm and Dry on the West Side (WDWS), a program to address health and safety repairs in homes that would otherwise not be eligible for weatherization due to unsafe conditions.

Through funding from the Affordable Housing Corporation, a subsidiary of the NYS Department of Homes and Community Renewal, PUSH was able to assist income eligible homeowners in its own backyard (zip code 14213) with making necessary repairs that made their homes weatherization-ready. The scale of the work required on these projects was much larger than traditional NYSERDA program improvements, and required more coordination with multiple contractors for months at a time. This meant that one of the three full-time PUSH Green staff became primarily dedicated to managing WDWS projects.

That same year, NYSERDA made programmatic changes that restricted the ability of CBOs to monitor projects from beginning to end, and changed the goals for CBOs from completing projects to garnering "opportunities." Previously, PUSH Green staff and participating contractors had access to a database called CRIS which tracked the status of all projects from application to post-installation test-out. Staff were able to follow up with contractors, troubleshoot complaints from participants, and overall be more hands-on in advocating for customers and ensuring that projects were completed smoothly and on-time.

In 2017 however, NYSERDA restricted CBOs' access to the CRIS database and directed them instead to use a separate database from the one contractors used. This created data access and reliability issues that make coordinating project management activities between CBOs and contractors inherently more difficult. Staff have to continually call the household or the contractor for updates, which is tedious, disruptive and often a waste of time, since there is no incentive for contractors to report back to PUSH Green. With CRIS, PUSH staff could track projected energy savings in kilowatts and hundreds of cubic feet (CCF) of electricity and gas, but now staff have to follow up with households and ask for a copy of a gas or electric bill months after the fact in order to have a sense of how much the energy burden was reduced by a particular project.

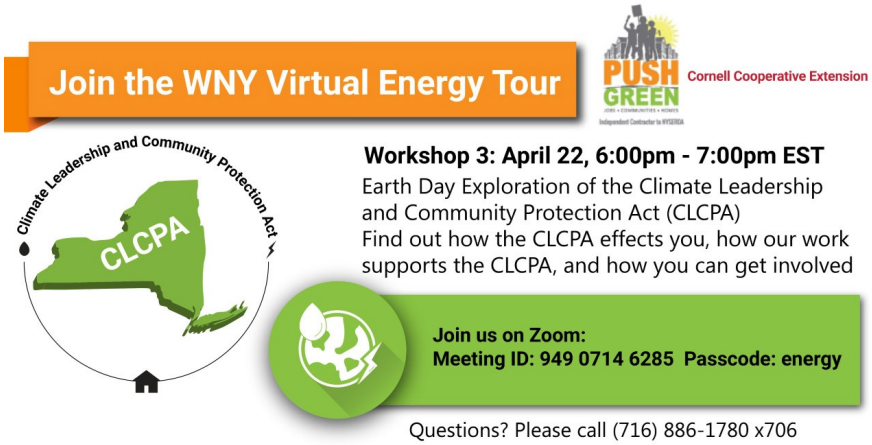
In short, changes made by NYSERDA made it harder to track results and complicated collaborative project management and communications between CBOs and residents, and CBOs and contractors. Instead, CBOs were encouraged to simply focus on outreach and getting people to complete applications for weatherization. Since 2017, PUSH Green has become responsible for conducting outreach to all five counties of Western New York, a huge geographic area. Funding, partnership and support with the state is determined by the quantity of outreach efforts performed rather than the quality of completed projects. In some ways this undermines the original intention of PUSH Green to be a go-between for households, contractors, and the state, and lessens their ability to advocate for customers and ensure positive results.

Today, PUSH Green staff describe their relationships with contractors

as less adversarial and more relational, with a "we're in this together" attitude. One thing that has helped to build more collaborative relationships were requirements that PUSH Green placed on contractors to participate in community health worker training, which helped contractors better understand the needs and experiences of different populations and increased cultural competency. Today there are fewer local contractors in the NYSERDA pool, and only four work with NYSERDA's programs for low-income households. With closer relationships between PUSH staff and the remaining contractors there is more dialogue, less formality, and more useful interactions. PUSH staff feel that there is more trust now and more of a team mentality, which is evidenced by the casual conversations that are common between contractors and PUSH staff and better problem-solving, like finding a customer's new phone number.

Community health workers are people of and from a community who are trained in trauma-informed, culturally relevant health and wellness care, to bridge divides that often separate communities from health and social service systems. The Community Network for Engagement, Connection and Transformation (CoNECT) is a Buffalo-based non-profit that since 2010 has administered community health worker trainings with frontline workers in all fields. The trainings include information on the social determinants of health, strength-based approaches to care, privilege and power, and more. For more information, visit: www.chwbuffalo.org/training-and-education

Because PUSH Green is less focused on leveraging contractors to meet employment goals and results tracking, most of PUSH Green staff time is spent managing the WDWS program and on outreach activities such as monthly DIY home energy workshops, social media outreach, door-to-door canvassing, and videos such as contractor "live" Q&A on Facebook and interviews with tenant rights advocates.



"I've done a lot of work on my house – a lot of contracting – and I think that the difference with PUSH is [having] an advocate. I think the work that was done was done at a much higher level because they were coordinating and holding contractors accountable. **Having PUSH as an intermediary made it a much better experience and got much better quality work done on my house.**"

-"Katie," 35

Luz

Luz Velez knows firsthand the health impacts of living in an old home in Buffalo and the positive health changes that can result from weatherization. Luz bought her four-bedroom home on the West Side of Buffalo in 1998. At the time, Luz was parenting her five-year-old son Felipe and working as the Director of Senior Services at a local non-profit, Hispanics United of Buffalo. She was relieved to have a home of her own after being forced to move nine times from apartments that were dangerously toxic for herself and her young child with lead and other contaminants. However, eight years after buying her own home Luz became seriously ill and was forced to leave her job. She developed non-descript respiratory lung infections that puzzled her doctors, and left her feeling like she had a permanent cold or allergies. As her health deteriorated, doctors told her she had six months to a year left to live, which sent her into depression. She says, "I physically, emotionally, and spiritually lost my voice."

Photo: National Academies of Medicine, "Communities Driving Health Equity - PUSH Buffalo"

"They helped me find my inner strength and regain my voice."

Finally, doctors determined the source of the infection was environmental factors due to mold and air pollution. Because her home, like most homes in Buffalo, was quite old, it became difficult and expensive to maintain. And because Luz had lost her job due to disabling health conditions, she was unable to afford to make the repairs that would have made her well. Luz didn't know what to do, and describes feeling a lot of shame. Having once been the person who helped others, she now feared losing her home to gentrification or to failing a health and safety inspection. She most feared that she could lose custody of her son who was now a teenager, if authorities were to find out the unhealthy condition of the home. She became increasingly isolated, and her physical, mental and emotional health spiraled.

One Saturday, Luz heard on the radio about a program that would help repair roofs, PUSH Buffalo's Warm and Dry program. By Monday, she met a canvasser from PUSH going door-to-door in the neighborhood, and she quickly set up an appointment for an energy audit.

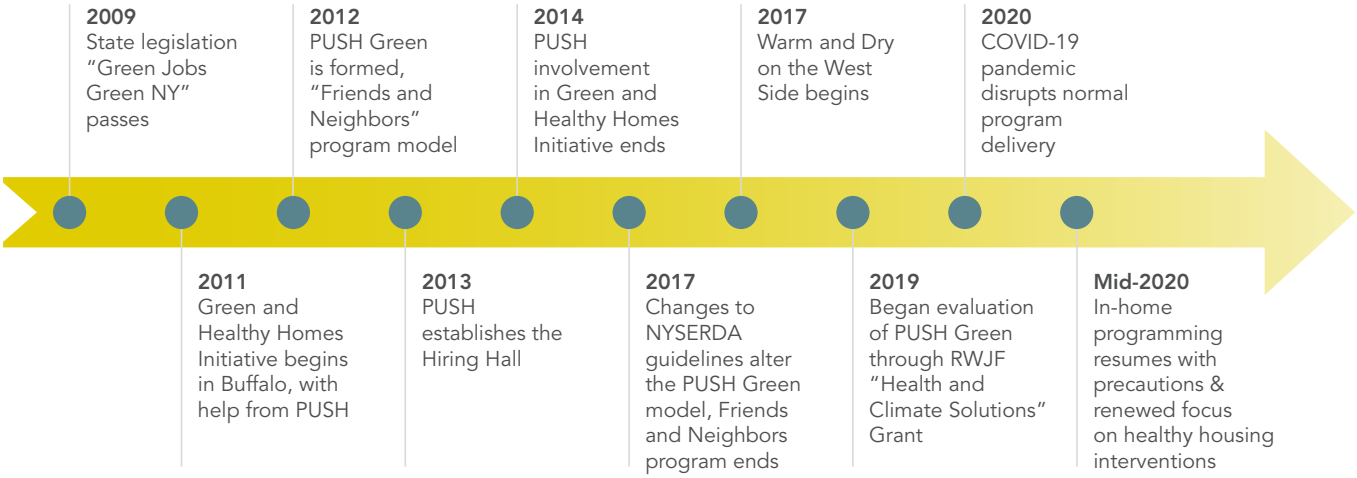
Photo: National Academies of Medicine, "Communities Driving Health Equity - PUSH Buffalo"

She said, "After completing some paperwork I was placed on a waiting list for services. I'll never forget the day the phone rang, and I learned it would be a matter of weeks before contractors would enter my home to assess the problems and work with PUSH to come up with solutions that I believe would save my life and save my home."

The contractors who completed the assessment quickly learned how serious the problems were. The roof in the back of the house had collapsed. Because of the roof damage, there was black mold throughout the back of the house. It had permeated into the walls and into the HVAC system, which was old and decrepit– the existing furnace hadn't been serviced since 1972. The hot water heater also had to be replaced, and workers found that there was no insulation in the whole house. For years Luz and Felipe had been shivering in a cold house and adapted by using portable space heaters and layering clothes, but the heating and electric bills were relentlessly high. Additionally, the bathtub on the second floor had leaked and caused extensive water damage and rot in the kitchen ceiling, and plaster was crumbling from the walls around the staircase. "It was a hot mess to say the least," according to Luz. All of these issues contributed to Luz's respiratory problems, strained her mental health, and threatened her life.

When all the repairs had been made, Luz said, "PUSH Buffalo provided a holistic solution that healed both me and my home. They made me feel comfortable in choosing a contractor that looked like me, that was from my community, made me feel comfortable in my own home, and that didn't judge me. PUSH spent a lot of time talking with me and listening. They helped me find my inner strength and regain my voice." Addressing the problems in the home worked. After weatherization and health and safety repairs, Luz started feeling better and some of her symptoms disappeared. She stopped needing to see four doctors and started going to two, and went from 12 medications down to four. Most importantly, four years later, she is still alive today, and not just alive but active and using her voice to call for environmental justice and investment in her community. Luz founded PUSH Silver, a branch of PUSH's senior members who advocate for the older population in the community.

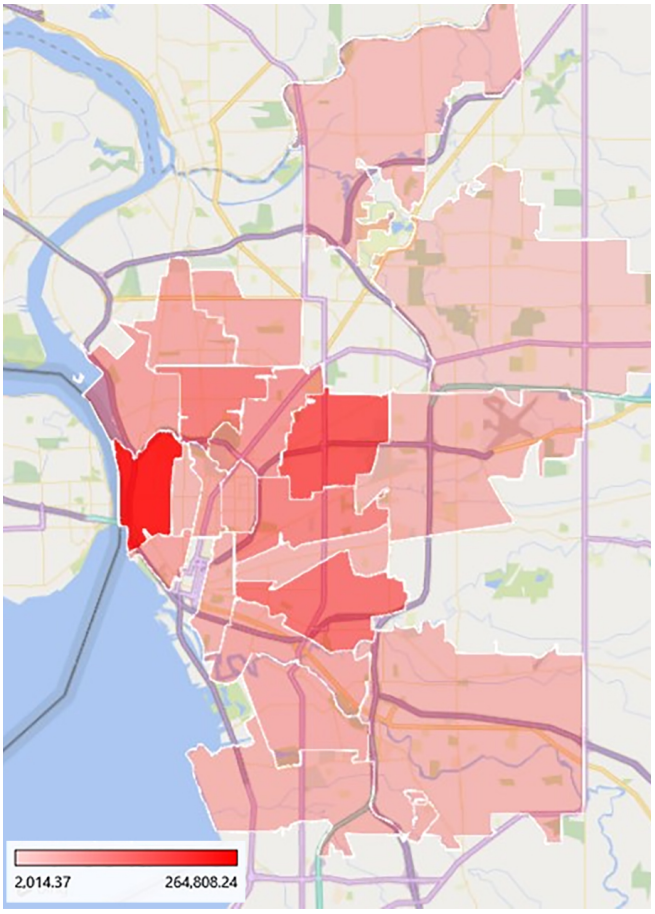
PUSH GREEN TIMELINE



The Impact of PUSH Green

HOUSEHOLD AND COMMUNITY-LEVEL IMPACTS

Between the first time a community energy advocate knocked on a door and 2020, PUSH Green has connected 700 households throughout Western New York with energy-efficiency audits and upgrades. The highest concentration of homes served are in zip code 14213, where PUSH began, where the offices are still located today, and where the Green Development Zone was formed. Farther north, North Buffalo and the Village of Kenmore also had a high concentration of homes weatherized through PUSH Green, due to focused outreach in those areas during the early "Friends and Neighbors" and share the savings programs. Today, as NYSERDA program guidelines have changed, PUSH Green staff conduct outreach in all five counties of Western New York which has greatly diffused the geography of homes being weatherized and increased the demographic diversity of households that connect with PUSH Green.



The map shows the total amount of EmPower NY spending by NYSERDA by zip code. The zip code that utilized the most EmPower funds was 14213, the home base and area of focus for PUSH Green.

The most common home energy improvements made through PUSH Green's programs are insulating attics, walls, and basement rim joists, upgrading or replacing furnaces or boilers with efficient equipment, replacing inefficient light bulbs with CFLs, installing carbon monoxide detectors and smoke alarms, and sometimes replacing very old refrigerators with newer, more efficient units. The first step after applying and being approved is for an auditor to conduct a thorough energy assessment of the house. The audit typically takes several hours, as the auditor tests for gas leaks and carbon monoxide, evaluates the heating equipment, ducts, and thermostat, checks for insulation in every floor of the house, changes out light bulbs and assesses the airflow of the house by running a door blower test. In this test, the auditor closes all the windows and doors of the house except the front door, and installs a plastic sheet that seals the door except for a fan that blows air out of the house. A gauge measures the airflow through the fan which gives a measurement of the overall draftiness of the house. After improvements have been installed, the same test is run again to compare how much tighter the home is before and after. Also during the audit, the PUSH Green energy advocate educates the resident about ways to save energy through lifestyle changes; for example, programming a thermostat to lower the temperature in the house at night or when no one is home.

"I had called to find out if I qualified for any programs to help update my home so it was more energy efficient. And I had just purchased the home at that time, knowing from the sight of the furnaces--because they were gigundous--that they were probably old. And they were extremely loud. And I wanted to know...what to do next, even if I didn't qualify for any assistance, what would I do. So a gentleman came out--very knowledgeable, very nice--and kind of walked me through the home, and said, 'Okay, this is something to look at, this is why you need this type of insulation.' I didn't realize in the basement, when you had to look up...like the rafters--I call them rafters, but I know that's in the attic; I don't know what you call them in the basement--he said, here's air pockets, and that's why you're losing energy. I was like, oh...I just never knew in the basement that you do anything but glass block windows. And he told me about the furnaces and that, you know, the energy efficient, even though it costs more up front, the longevity of it, the cleaner energy that you get...your heating bill actually would be less. So that was good. We talked about tankless water heaters...it was just really helpful, and how the information was presented was in a very comfortable educational format versus, like, 'you don't know, and you just bought a house? How could you do that?!' I really kind of liked the step-by-step, and then, um, he connected me to another person from PUSH that had the application, and I worked with her in getting my documents and things together. I really appreciated that; I thought that was beyond helpful. I mean, the woman was really patient, really nice, but just very, like, this is what we do next, not pushy or not condescending...just really helpful." - "Martha," 55

Photo: Dennis Schroeder, NREL

Weatherization

A home can not be weatherized until issues of lead, mold, and asbestos have been addressed.

Ensure that your insulation is up to current building code standards, and that you have smoke and carbon monoxide detectors.

Add weatherstrip or caulk around doors and windows to air seal your home.

Grow your own fruits, vegetables, and herbs, or try to buy fresh foods local.

Reduce, Reuse, Recycle, and Compost! Visit buffalorecycles.org to find out what can be recycled.

Energy

Many old houses have out of date electric wiring, making them inefficient. Aging knob and tube wiring poses a fire hazard.

Solar panels can be used as an alternative energy source.

Use LED light bulbs & turn them off when you leave the room.

Install power vented high efficiency furnaces and hot water heaters.

Use energy star rated windows and appliances to reduce energy use.

Most Buffalo houses are built of wood.

GHG Emissions

The design of our region prioritizes personal vehicle use over other forms of transportation.

Consider using alternative methods of transportation for commuting to work or running daily errands.

Buffalo Doubles

Most doubles were built between 1890 and 1929.

Many properties have shifted from owner-occupied to rentals with out of town ownership, leaving them unmaintained.

Buffalo doubles are often bought by two separate families to create equity.

POLICY AND PROGRAMMATIC IMPACTS

PUSH Green's community-driven approach continues to have policy and programmatic impacts in NYS. Most recently, PUSH has uplifted core elements of its strategic orientation to community benefits, resource braiding across and between healthy affordable housing and clean energy and energy efficiency, and targeted outreach to disadvantaged communities into an emerging vision for a statewide network of regional clean energy hubs. Working with other advocates and CBOs in NY, PUSH played a lead role in not only developing a vision for a regional hubs model but in calling on NYSERDA to actively endorse and participate in a regional clean energy hubs program co-design process. In 2020, NYSERDA answered the call and convened a first of its kind co-design process with advocates and CBOs that resulted in a long-term funding commitment for a new Region Clean Energy Hubs program at NYSERDA - a $53 million investment over four years with a commitment to continue funding the program an additional four years. NYSERDA is now soliciting proposals from CBOs and is expected to launch the program in Summer 2022. The program will ultimately empower and resource CBOs and regional partners to expand and deepen education, outreach, program navigation, and capacity building efforts to and within Disadvantaged Communities (DACs) across the state as determined by New York's new economy-wide climate law, the Climate Leadership and Community Protection Act.

The Climate Leadership and Community Protection Act is a landmark, first in the nation legislative climate victory. PUSH, as part of a statewide coalition called NY Renews, advocated for and won the passage of the act in 2019, which sets clear benchmarks such as 100% renewable electricity generation by 2040 and mandates that 40% of climate investments are made in environmental justice communities. For more on the CLCPA, visit: www.nyrenews.org/what-we-do

George

For George, a teacher and single father of two, PUSH Green's program made necessary home energy improvements more affordable and accessible for him and his kids. Through PUSH Green's work to connect George to Buffalo Energy, he qualified for a low interest loan and a reduced cost, energy-efficient hot water tank and furnace combination unit, as well as home insulation.

As a result of these improvements, George reports that his heating bill went down 35-40%, and his electric bill decreased by at least 30% annually. He and his kids have noticed that the heat throughout the house is much more comfortably balanced. Overall, George says, "it's nice to have had it done. Peace of mind is nice."

PUSH Green Programs

NYSERDA

Funding for much of the energy efficiency improvements comes from utility ratepayer funds administered by NYSERDA. NYSERDA administers many different energy efficiency programs, but the three most common programs that PUSH Green helps residents apply to are EmPower NY, Assisted Home Performance with Energy Star, and Home Performance with Energy Star. In all three programs, applicants receive a free home energy audit, home energy education, and a list of recommended improvements ordered by importance of what will save the most energy. Applicants who have a household income over 120% of the Area Median Income are eligible for the Home Performance with Energy Star program which offers a 10% discount on home energy improvements and low-interest financing options. Assisted Home Performance offers the same services, but applicants who qualify based on their income for this program receive a 50% subsidy on eligible energy improvements. Finally, the EmPower NY program is available to income-eligible households (below 60% AMI). It covers 100% of the cost of recommended improvements.

Deborah

For Deborah, the benefit of PUSH Green was not only what got repaired in her home, but how the PUSH team inspired trust and confidence in her throughout the process.

Like other homeowners profiled in this report, Deborah is an older woman who lives alone in her home. While her house was in significant need of weatherization updates and repairs, Deborah was wary of the fact that predatory contractors can take advantage of older people who lack background knowledge of repair costs and requirements. With PUSH Green, Deborah's mind was put to rest. Deborah emphasizes the value of her relationship with and trust in PUSH Green, and how much of a difference it made to have PUSH's local team screen potential vendors and make in-person introductions with the home repair workers.

Through the PUSH Green program, Deborah received a new roof, drywall repair, insulation, and the installation of an air conditioning unit. Prior to these repairs, Deborah had issues with her leaky roof. Her home was also almost unlivable during periods of extreme heat and cold, which have been increasingly common occurrences over the past several years. She would often have to move from her upstairs bedroom to the downstairs couch at night during the "sweltering" heat of summer, and given vision and mobility concerns, this was not safe for her. Beyond the fall-risk Deborah specifically voiced, research also consistently shows the significant potential health consequences of extreme temperatures for older people, including exacerbated cardiovascular and respiratory problems and increased risk of premature death.[75]

Since the PUSH Green repairs—which, Deborah says, would have been financially impossible for her without this program—Deborah's home is significantly more comfortable and safer for her. Moreover, her gas bills decreased by over a third since the weatherization updates. Given her limited income, the cost savings of $500-600 per year make a "noticeable" difference in her life. Particularly during the stay-at-home orders due to Covid-19, Deborah said that without the cost-saving repairs provided by PUSH Green, it would have been difficult financially to manage staying home more often.

In Deborah's own words, "I wouldn't have been able to do any of [the weatherization and repairs] without PUSH. Once it was done, it's done, and I don't have to think about it ever again!"

While the various energy efficiency programs offered through NYSERDA are excellent at reducing the energy used by a household, in many circumstances a home requires additional repairs before the weatherization work can be completed. For example, leaking roofs, unstable foundations, old electrical wiring, or interior plumbing problems that create leaks or standing water can all undermine the practicality of making energy improvements because, for example, installing insulation in a house with these problems could create a fire hazard or would be ruined in a short time by water seepage. In some homes where there are health or safety hazards like mold, weatherizing the house and reducing the airflow could lead to worse health for the occupant by trapping in toxins. Therefore, unless the homeowner is able to make the necessary health and safety improvements or structural improvements, PUSH Green is unable to make the energy efficiency upgrades. One interviewee spoke about the old wiring that prevented him from receiving the full package of upgrades recommended by NYSERDA:

"(The) house had no insulation... I think there was a basement ceiling that was a part of it, and then it was all of the walls of the double… of a big double (a common style of home in Buffalo with two apartment units). All the exterior walls and the attic ceiling on the 2nd floor, I don't know how to describe it. And so it was a major…the contractor said they'd never seen such a large package approved by NYSERDA. Unfortunately when they went to do the insulation, the electric was, uh, so old that the type of insulation they wanted to use posed a fire hazard if they were to do it in the walls. So we weren't able to complete all of the weatherization that would've been essentially covered by NYSERDA. Um, which is a bummer. And then the electrician we spoke with too was not interested in…changing the electric in order to accommodate the new insulation because it would've been so tedious and it would've been expensive for us but also so tedious for them that they didn't want to do it. And I was concerned that if they don't do it to 100% then they'd effectively be adding a fire hazard to the house."- "Melissa," 39

Because of the age of Buffalo homes, there are many households that face these barriers. Since the inception of PUSH Green, two programs have sought to address this problem.

GREEN AND HEALTHY HOMES INITIATIVE

The Green and Healthy Homes Initiative (GHHI)[76] is a national program focused on the intersection of health and housing, with a focus on improving health by making strategic improvements in a home, such as remediating lead hazards, alleviating asthma triggers, reducing fall hazards and making energy efficiency improvements. PUSH was one of the first community partners involved in bringing GHHI to Buffalo, along with the Community Foundation for Greater Buffalo which continues to facilitate the program today. The inception of GHHI in Buffalo came about due to a $2 million air pollution settlement fund from the New York Attorney General's office in 2011.

PUSH Green, with its focus on energy-efficiency and NYSERDA program enrollment, provided direct assistance in the first few years of the program by locating homeowners who needed energy efficiency and healthy home improvements. PUSH Green would help the homeowner enroll in the appropriate NYSERDA program, and a contractor, at the time New Buffalo Impact, would perform the repairs while GHHI, through the Community Foundation of Greater Buffalo, would provide funding for additional health and safety improvements. GHHI has a workforce development mission too, which meant that training on lead hazard control, pest mitigation and other healthy home interventions would sometimes be offered, and PUSH would funnel interested community members into these trainings and then offer their skills to contractors as work-ready.

In 2013, PUSH and New Buffalo Impact jointly received extra funding from the federal Weatherization Assistance Program through a one-time expansion of the program administered by NYS Homes and Community Renewal, the state housing agency. This allowed PUSH to focus resources on homes in the Green Development Zone that needed extra repairs. Through this collaboration PUSH referred several Hiring Hall participants to New Buffalo Impact for weatherization installer jobs. Together, PUSH and New Buffalo Impact completed retrofit work on 80 units of housing in the GDZ.

PUSH Green's participation in the GHHI and WAP programs helped to catalyze a targeted healthy homes strategy in subsequent years in ways that responded directly to the needs of West Side residents and PUSH members.

WARM AND DRY ON THE WEST SIDE

Warm and Dry on the West Side (WDWS) was created by PUSH Green in 2016 in response to the needs of so many households in the immediate neighborhood suffering from home-based health and safety issues and high energy bills. The program, which continues to this day, is restricted to low-income, owner-occupied households in the 14213 zip code. As housing costs in the neighborhood rise, and gentrification pressures intensify, the Warm and Dry program is helping to stabilize property conditions and keep homes affordable for long-time residents who otherwise might experience displacement. PUSH Green serves about 10-15 homes a year, since projects tend to be fairly large and costly. The most common need is a new roof, followed by windows and interior damage from roof leaks, but foundation work and HVAC projects are very common too. By design, the program can be fairly flexible to address a range of health and safety issues, such as mitigating lead hazards, or making a home more accessible and safe for disabled or elderly residents by leveling uneven floors or adding grab bars.

Typically a project will start with a conversation with the homeowner about their priorities. Then, the wishes of the homeowner are balanced with PUSH's assessment of the home and the funder's requirement of prioritizing what will make the most impact on energy use and health. In order to qualify for WDWS there must be at least some need for energy-efficiency improvement, such as insulation, HVAC upgrades or fixing gas leaks--which is not a barrier for most homes. For example, one homeowner was cited by the city for chipping and peeling paint and wanted PUSH to paint the exterior of the home. While this might be a cosmetic issue, (or in some homes could be a lead hazard), for this homeowner it could have resulted in being brought to housing court and potentially losing the home due to an inability to comply with the housing code. PUSH found a compromise by painting just the front of the home as part of their overall WDWS project to avoid further citations. In almost every home the guaranteed fixes are installing smoke and carbon monoxide detectors, remediating any lead paint hazards and installing bathroom exhaust fans to improve ventilation. Project cost is typically held to around $20,000 per home, though some projects need less and will cost $12,000-$15,000, while a few may be as high as $30,000. Some homes need so much repair that PUSH has to refer the homeowner to other city, county, or non-profit housing programs to avoid draining program resources on just one house.

PUSH does not advertise the WDWS program because the level of need, even in just one zip code, is so high that the waiting list can get unmanageable just by word of mouth. At one point the waitlist had over 80 households, which would have meant waiting about 8 years for service. PUSH Green started to cap the list at about 50 households so that expectations of how long to wait can be kept more realistic.

"Well, the furnace makes a lot of noise, and when it rains a lot, because we have driveways on each side of the house, water goes into the basement. It just makes the floor damp; it doesn't fill up so you have to wear boots down there or anything, so, I guess being an old house from like the 1890s, it has things that need repair, like foundation and other things... It needs a tear-off and a new roof. We've been here 32 years and whoever owned it before that, I don't know the last time it had a roof, it's in desperate need of a roof."

-"Cheryl," 60

Maria and her Family

For Maria, the weatherization supports provided by PUSH Green have enabled her and her family to remain in their home safely and comfortably. In the context of significant health challenges and the uncertainty caused by COVID-19, maintaining a secure home base has made a significant difference in her life, and in the lives of her two sons and other live-in relatives.

"I am very grateful... Everything now is a whole lot different."

Maria is a 59-year-old Puerto Rican woman whose primary language is Spanish. She currently suffers from a wide range of substantial health concerns, including asthma, sleep apnea, diabetes, arthritis, fibromyalgia, herniated disks in her spine, and allergies. Maria also struggles to manage her anxiety, and sometimes experiences panic attacks. The added stresses caused by her old roof, her lack of insulation, and accessibility issues in the home significantly impeded her quality of life prior to PUSH Green's intervention.

After connecting with PUSH Green's team, Maria's home was approved for roof replacement, home insulation, and handicap accessible modifications that allowed her to remain living independently despite her physical challenges. Thanks to the improvements and repairs made to Maria's home, she no longer needs to worry about shingles continuing to fly off her roof during bad weather. Maria and her family can keep the house at a comfortable, livable temperature throughout the year, which is particularly important for Maria given that many of her health concerns are exacerbated by extreme temperatures and fluctuations in temperature. The combination of the roof replacement, insulation, and mold removal also protect Maria from other allergens that are dangerous for her given her pre-existing conditions. PUSH Green's installation of a handicap accessible bathroom on her first floor also reduces the risk of further injury for Maria and gives her greater independence. Finally, with the weatherization improvements, Maria is consistently able to afford her utility bills. Taken together, in addition to the physical health benefits of these improvements, Maria emphasizes what a difference these repairs have made on her general level of stress and anxiety.

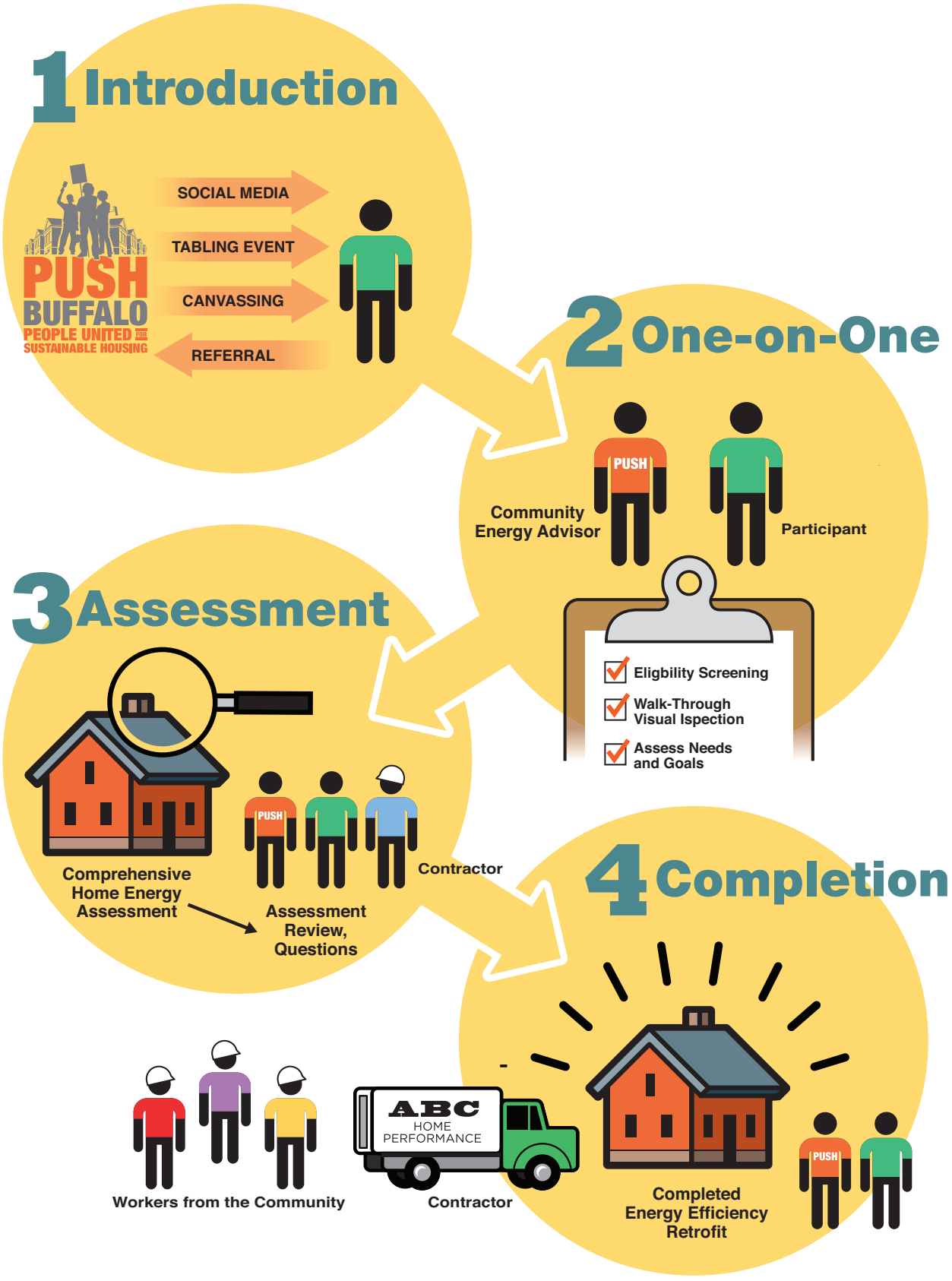
Throughout the Covid-19 pandemic, Maria has remained almost entirely confined to her home outside of periodic doctor's visits. Consequently, the improvements provided by PUSH Green have been especially impactful for her regular quality of life. In Maria's words, "I am very grateful…. Everything now is a whole lot different."

PUSH Green staff periodically call through the names on the waitlist and remove households that are no longer reachable or eligible. Staff often hear from residents in other parts of the city who need the same services, and are seeking grants to expand the program to more areas. Staff are also moving towards installing metal roofs instead of shingles because they last so much longer and require less maintenance.

Interest-free and forgivable financing is provided by the Affordable Housing Corporation to cover the cost of the health and safety repairs, while grant-based NYSERDA programs cover the cost of weatherization improvements after the home is made sound. Because of the scale of the investment in the house, only income eligible homeowners can participate in WDWS. As a homeowner's name comes to the front of the waiting list, a PUSH staff member will set up an appointment for a walk-through of the home, discuss the homeowner's priorities, take pictures, collect the past year's utility bills and income documents and fill out applications for NYSERDA programs and the WDWS program. The homeowner must agree to a 10-year lien on the property, if the house is sold before the 10-year period is up then a portion of the project cost must be paid back. Alternatively the home can be transferred to an income eligible family member with no penalty. As of 2020, in three years of program operation just one household had to pay back their loan to clear the lien.

The next step after intake is to complete an energy audit with a participating NYSERDA contractor to scope the energy efficiency improvements that can be made, unless there is a major roof leak, foundation problem or electrical hazard in which case the energy audit will be postponed for these repairs to be made. Then, energy improvements are made through the EmPower and/or Assisted Home Performance program. For the Assisted Home Performance program, WDWS covers the homeowner's 50% contribution. For additional repairs and renovations, PUSH retains the services of local Minority and Women-owned Business Enterprise (MWBE) contractors that employ disadvantaged workers from the surrounding neighborhoods. MRBS Inc., a Black-owned general contracting business located on the West Side of Buffalo, routinely performs work on WDWS projects and is a valued partner of PUSH's Hiring Hall. After all the work is completed, the energy contractor will "test-out" the home by running a second blower-door test and checking all the measures to ensure that the improvements were made correctly and safely, and to get new energy data for the home to gauge the estimated savings and new utility usage for the home. PUSH will also collect new utility bills to compare the energy savings before and after.

To date, 125 out of the 700 homes, or about 18%, weatherized through PUSH Green have had some type of healthy home repairs through GHHI or WDWS.


1 Introduction
PUSH BUFFALO
PEOPLE UNITED FOR SUSTAINABLE HOUSING
SOCIAL MEDIA
TABLING EVENT
CANVASSING
REFERRAL
2 One-on-One
PUSH
Community Energy Advisor
Participant
Eligbility Screening
Walk-Through Visual Ispection
Assess Needs and Goals
3 Assessment
PUSH
Contractor
Comprehensive Home Energy Assessment
Assessment Review, Questions
4 Completion
Workers from the Community
ABC HOME PERFORMANCE
Contractor
PUSH
Completed Energy Efficiency Retrofit

PUSH Green Evaluation

In 2019, PUSH Green was selected by the Robert Wood Johnson Foundation as one of seven grantees of the Health and Climate Solutions project. The purpose of the Health and Climate Solutions grant is to evaluate and uplift climate solutions that appear to have integrated health benefits, such as regenerative agriculture, wastewater treatment, urban tree planting, or in PUSH Green's case, energy-efficient home improvements. The purpose of the grant for PUSH Green was to evaluate the impact of PUSH Green on resident health by looking for physical and mental health changes due to weatherization and examining how the program holistically affected household health by making energy costs more affordable. The project also focused on how the PUSH Green model as community-based and culturally relevant may contribute to its effectiveness and how PUSH Green impacts neighborhoods as a whole.

The overall goals of the evaluation were to document and evaluate the mechanisms and strategies for effective, integrated climate and health action of PUSH Green and to understand the cumulative impact of PUSH Green's work on key indicators related to individual health and wellness, health equity, the health impacts of climate change, community wellbeing, energy bill savings, and climate change mitigation, and to understand the uniqueness of its community-based, integrated approach.

The proposed evaluation of PUSH Green had several components, some which had to be changed at the onset of the COVID-19 pandemic in early 2020. First, the evaluation was intended to be completed using a participatory action research design, where community members and directly impacted individuals took part in designing the research questions, carrying out the research tasks, and making decisions about how to best share the findings and use the data. In August 2019, a steering committee was formed to carry out these steps. Members of the steering committee included PUSH Green staff, community health workers, community residents who participated in PUSH Green programs, faculty members and graduate students of the Community Resilience Lab of the University at Buffalo School of Architecture and Urban Planning, a community researcher from Partnership for the Public Good, and the project co-directors from Partnership for the Public Good and PUSH Buffalo.

The steering committee's overall tasks were to develop interview questions for past PUSH Green participants, conduct interviews, plan and facilitate community workshops, compile the data collected through both methods and draft a final report of the findings. Along the way, findings and stories would be shared through blog posts, radio show spots, podcasts and other communications. Quantitative data about PUSH Green would also be requested and collected from internal data and from NYSERDA for inclusion in the findings. The overall research questions that guided the

development of the evaluation were as follows:

1. How well does the approach of PUSH Green work and why?
2. How effectively does PUSH Green address health impacts of climate change?
3. How effectively does PUSH Green advance health equity?

The research set out to understand how PUSH's emphasis on community-based leadership development might add to the success of PUSH Green, and any outcomes from its integrated approach to health equity and climate change. It also sought to find out if the PUSH Green team, contractors, and workers demonstrate a cultural competency and respect for neighborhood context that is not present in other weatherization programs. In addition, a research goal was to look at the impact of PUSH Green on living-wage green workforce opportunities and any impact that these jobs had on the health of individuals and families.

More specifically the evaluation sought to focus on the impact of the program on residents' utility burdens and overall financial health, to see if "energy poverty" was reduced among participants and if there was any impact on resident demand for energy or reliance on fossil fuels. Moreover, it sought to understand the program's effect on resilience to climate change, such as greater fluctuations of heat and cold or protection from extreme weather events.

Finally, in terms of the health impact, the evaluation was designed to seek out information on the impact of PUSH Green on asthma, lead exposure, allergies, or other housing-related health conditions. More broadly, a goal was to see if there was an impact on local health systems, hospitalizations, visits to medical providers or specific outcomes for certain populations like elders or children, or for workers employed by PUSH Green.

INTERVIEWS

- Contacted past PUSH Green participants and those on waitlist
- Conducted 39 interviews over telephone or video conferencing in Spring 2020
- Interview questions included demograiphics, housing characteristics, COVID-19 and housing conditions, experiences wiith PUSH Green, energy costs, and physical and mental health

FOCUS GROUPS

- Conducted 4 focus groups in Fall 2020 with 12 participants total, recruited from pool of interviewees
- Questions focused on themes that had emerged in interviews around COVID-19 and housing, the effectiveness of the PUSH Green model, and improvements to home thermal comfort after weatherization

CLIMATE CARNIVAL

- In August 2021, PUSH, PPG and Ujima Theater Company hosted a climate carnival at a park on the West Side
- Goals were: popular education about climate & health, community building and celebrating resilience
- 15 climate and health organizations attended, all with an activity, game or giveaway to participants
- Over 100 community members attended

COVID-19 HIGHLIGHTS THE IMPORTANCE OF HEALTHY HOUSING

As planned, the steering committee was formed and convened in the fall of 2019 and set about creating a detailed research plan, formulating interview questions, and requesting program data from NYSERDA to be analyzed. Recruitment for participation in the steering committee was effective: there were two community members who had been through the Warm and Dry program, two community health workers from the Buffalo Prenatal Perinatal Network, two graduate students from the University at Buffalo School of Architecture and Planning, as well as the PUSH Green staff, project co-directors, and a community researcher from Partnership for the Public Good. The original interview script focused on the PUSH Green model, health, and housing characteristics and drew questions from the National Weatherization Assistance Program survey (Appendix A). The interview script was finalized in mid-February 2020, and the steering committee began to plan outreach efforts to recruit participants.

In early March 2020 it quickly became clear that the COVID-19 pandemic would have dramatic impacts on the project. After consulting with technical advisors from UCLA School of Public Health, the steering committee decided to revisit the interview questions to include questions about how COVID-19 and the stay-at-home guidance was affecting participant's mental and physical health, and how the home's physical characteristics were affecting the household's time in quarantine, particularly after weatherization work had been completed. Questions were also added about the household's resilience to extreme weather events and how the household was adapting to stressors from COVID. The interview questions were changed to include questions from validated

health assessments like Cohen's Stress Index and the SF-12 Health Survey (Appendix B). At this time, it also became impossible for some members of the steering committee to continue their participation due to pandemic-related hardships affecting their jobs or families. The team shrunk to include just one community member, as the community health workers and other past program participants were unable to continue. Later in the project, as plans came together to share preliminary findings with community members, a trained community health worker and Program Director at Ujima Co., a local multi-racial and inter-generational theater collective, joined the project steering committee.

Administering the interviews also became a question, since in-person interviews at the participant's home would no longer be a safe option. Outreach to all past participants of the Warm and Dry program, all households on the waiting list for Warm and Dry, all households on the waiting list for traditional PUSH Green services, and all past PUSH Green program participants who received subsidized weatherization work since 2016 valued at $3,500 or more was done by phone and mail. Interviews were scheduled by phone and were performed by phone or on Zoom, depending on the participant's technological capabilities. Thirty-nine (39) interviews were conducted from March to May of 2020 with an overall 16% response rate. Seventy-five percent (75%) of respondents identified as women, 75% were born in the United States, 68% identified their race as white, 9% identified as Asian and less than 7% identified as either American Indian/Alaska Native or Black. The remainder identified their race as "Other," and twenty-one percent (21%) identified their ethnicity as Latinx. Three interviews were conducted in Spanish and the remainder in English. Each interview lasted approximately an hour and participants received a $50 check for participating. A short follow-up survey was sent by mail each week for four weeks following completion of the interview (Appendix C). Interview notes were coded for initial themes using Dedoose software and subsequently interviews were transcribed and the transcriptions coded again for additional themes.

Initially, the research plan was to host several community workshops after the interviews were complete, to share some of the findings and to continue to gather information from community members about their experiences with PUSH Green, weatherization, housing conditions and health. However, due to the pandemic, in-person workshops were out of the question. Instead, the research team conducted four virtual focus groups with interviewees to go deeper into the initial themes that had been identified in the interviews (Appendix D). The focus groups were held in September and October of 2020 with 12 participants total. Notes and transcripts from the focus groups were also coded for themes.

As the research entered a phase of more intensive analysis and writing, and as nearly all interactions became virtual, the community-based

and participatory aspects of the project became difficult to implement or envision. However, the steering committee wanted to have at least one in-person opportunity to share the research and interact with the community, so a Climate Carnival was planned in August 2021 at Massachusetts Avenue Park in the heart of the GDZ, with safety measures in place. The purpose of the Climate Carnival was to build community, celebrate the resilience of the neighborhood coming through COVID, and engage in popular education around the themes of health, climate change and housing.

Fifteen community organizations dedicated to health and climate set up booths with interactive games, displays or giveaways, and local musicians and DJs performed, while kids made crafts and all attendees enjoyed rice, beans, pastelillos and pernil from a local Puerto Rican-owned food truck. Over 100 community members attended and said that some of the highlights of the day included trying an electric bicycle for the first time, learning about composting and receiving a free compost bucket from the City of Buffalo Recycling booth, taking home free local organic produce from the Providence Farm Collective, making renewable energy-powered pinwheels with Ms. Luz Velez, and playing climate-themed carnival games at the Erie County Climate Action Committee booth. Of course, PUSH Green also had a table with information on weatherization, findings from this evaluation, and an energy efficiency demonstration. One of PUSH Green's contracting partners, a Black-owned weatherization company, participated as well and gave away free home weatherization kits.

STUDY LIMITATIONS

Several factors caused by COVID-19 lead to unforeseen limitations on the present study. Safety precautions meant that interviews could not be conducted in person as planned, and home visits were impossible. To adapt, all interviews were conducted over the phone or through video-conferencing, but this led to several complications. First, some people refused to participate once they were told that the interview could take up to an hour and would be over the phone, because they simply did not want to spend that long on the phone, whereas they may have been willing to participate in person. The research team also suspects that conducting the interviews remotely may have fatigued the participants more quickly than in person, leading to shorter responses to questions and perhaps less detailed answers. Without the ability to develop rapport face-to-face and communicate using body language, it was more difficult for the interviewer to build trust with the participant.

It also appears there was a higher response rate for older, white homeowners than is representative of the PUSH Green program and is not representative of the demographic composition of the West Side of Buffalo. This may reflect the effect of the pandemic as well, in that this population had more time and willingness to participate compared to other households who may have been struggling more to adapt to disruptive lifestyle changes (new childcare responsibilities, demands on essential workers, access to wifi and broadband technology, etc.) that may have affected more marginalized groups. Along the same lines, contacting past program participants by phone, email, and mail was a more reliable way of reaching homeowners and higher-income households who tend to be more stably housed than many renters or lower-income households, who may move more frequently and may have different phone numbers or be less likely to use email. Additionally the interviews took place during the first few months of the pandemic, in April and May. Many participants were more stressed or anxious than perhaps they would have been otherwise, which may have influenced the response rate and the responses given. A final limitation of the study is that significant gaps in the data reported by PUSH Green from early periods of the program and from data provided by NYSERDA meant that energy savings and other measures detailed in the findings are rough estimates only.

Findings

Taken as a whole, the findings across interviews highlight the deep and reciprocal relationship between economic instability and health. In general, difficulty paying utility bills tended to go hand in hand with a greater incidence of health and safety concerns. While the qualitative findings do not make any direct causal inferences, interviews clearly highlighted there is an important and consequential relationship between economic factors and health, and made clear the reverberating importance of mitigating energy costs for families, as well as the importance of making homes safer and more liveable. Findings reported below therefore highlight the extent of energy savings and reduced carbon use that resulted from the PUSH Green weatherization initiative based on available data. Findings also reflect the reported social and economic consequences of COVID-19 on people's health, stress, and well-being.

PUSH GREEN, HEALTH AND COVID-19

Interview participants expressed pandemic-related anxiety and stress, associated with a lack of control, fear for the health and safety of themselves and their loved ones, social isolation, and employment-related risks. People already grappling with depression found their mental health conditions exacerbated by the stress of potentially encountering health dangers when leaving. Some participants who provide care for loved ones with health difficulties have experienced greater challenges in doing so under the conditions of the pandemic. Others expressed concern for their children who experience exposure to long hours of screen time, reduced physical activities, and social isolation.

"I feel like a prisoner. We have had to maintain ourselves in the house because I am disabled, my spouse is disabled, and my brother is disabled. So you're dealing with three people who have health conditions... I worry about that I have to go shopping, that I have to go get my spouse medicine...uh, things of that nature worry me because we have to have food in the house...and it's hard when you cannot just walk out your door and go to the store and find what you want, because there's nothing in the shelves!" - "Pedro," 73

Sections of the interview script asked open-ended questions such as "Does your house have any problems that you worry might affect your health or safety?" and multiple-choice questions such as "In the past 3 months have you had shortness of breath when lying down, waking up, or with light work or light exercise?" Altogether the health-focused questions covered topics related to shortness of breath, asthma, headaches, chronic illness, mental health and housing-related illness like lead poisoning and carbon monoxide poisoning. Additional questions were specific to COVID-19.

All photos: Clarke Gocker, PUSH Buffalo

Edna

Edna, a 66-year-old woman who lives alone and relies on her fixed Social Security income to support herself, had a somewhat mixed experience with PUSH Green's services. However, although the process of completing the home repairs presented challenges for Edna, the overall benefits of the home improvements have been significant—especially in the context of the Covid-19 pandemic.

Due to a variety of health issues including multiple sclerosis, COPD, and arthritis, Edna's mobility is restricted. Edna has also been essentially limited to her home since Covid-19 began due to her additional health risk factors. Together, these circumstances have made ensuring the safety and comfort of her home an especially significant part of her overall well-being.

Edna received a roof replacement, ceiling repairs, and new windows through PUSH Green which have made her home significantly safer and more comfortable, and alleviated stress associated with her leaky roof. Edna reports that prior to the roof replacement, she used to have to put out pots and pans to collect the significant water leaks, and the water damage resulted in the destruction of her ceilings. It was physically challenging for Edna to lift the pots and pans to dump out the collected water, and the stress of worrying about the damage was wearing on her. She also used to have to cover all her windows in plastic to reduce the blowing of cold air during the winter months. Since the repairs provided through PUSH Green, Edna is more able to remain safely in her home without worrying about whether her home can withstand the weather, and without worrying as much about ensuring a safe, comfortable, and livable indoor temperature. According to Edna, thanks to the PUSH Green services, "I feel 99% better. There's always that 1% that's like, 'Could it go wrong?' But I feel confident."

While the outcome of the home updates was positive for Edna, the process of receiving the roof replacement was challenging. The first contractor commissioned by PUSH Green made errors that resulted in additional internal damage to the home and the destruction of some of Edna's personal belongings. PUSH Green had to commission a new contractor to re-do the entire roof replacement for Edna's home and to make additional repairs, which cost Edna additional time and stress, and added to the expense of the project for PUSH Green. After this unfortunate experience, however, Edna was extremely satisfied with the second roofing contractor and with the window replacements.

Beyond the services Edna received already through PUSH Green, she has expressed the need for additional supports. She reports that her home is currently not insulated, and although she says that she is able to keep her house at a comfortable temperature, she also continues to struggle to pay her monthly utility bills. Edna still frequently needs to decide whether to pay the gas or electric bill—especially during the winter months—and she is often behind on her payments. She has benefitted from the Home Energy Assistance Program (HEAP), and this has helped her get by during times where she could not afford heating costs. Additional weatherization supports may be necessary though to ensure that Edna can consistently pay her heating costs on her fixed income.

Of the 39 people interviewed, 10 (about 25%) reported experiencing shortness of breath in the past 3 months and the same number reported having a chronic illness or condition affecting their lungs or breathing. Nine interviewees (about 25%) reported respiratory allergies and 8 people (21%) reported new, more frequent or more severe headaches within the last 3 months. We found that people who self-reported having a shortness of breath were more likely to:

- also report having a very difficult or difficult time paying energy bills and,
- make a trade-off between paying for an energy bill or paying for another expense at least once within the previous 12 months

In contrast, those interviewed who did not report experiencing shortness of breath were much more likely to report never having to struggle to pay the whole amount of an energy bill compared to those who reported shortness of breath.

Of the 39 people interviewed, 6 people (16%) had asthma. On average, those with asthma had visited a doctor for a routine asthma checkup 2.33 times in the previous 12 months. People who reported having asthma were more likely to:

- report making tradeoffs to pay energy bills, and
- report receiving a disconnect or shut-off notice at least once in the previous 12 months.

Those without asthma were more likely to report never experiencing the inability to afford paying the whole energy bill.

"(Our) daughter has severe asthma. She does daily breathing treatments via a nebulizer and albuterol. She has a main one and we have on hand a rescue one in case she comes down with something. With respiratory illness, things can take a turn within less than 24 hours. She could become cyanotic and destaurated. Her oxygen levels can go down pretty quick, so there's no time to... She has been doing her inhalers, so she hasn't had any issues with her asthma. If she catches like a regular cold, it's landed her in the hospital before. The last couple of years have been better." - "Mark," 45

In response to questions related to mental health, the effects of the ongoing pandemic and current stay-at-home orders were obvious.

- 29 people (76%) reported that they did work or activities less carefully than they usually would as a result of any emotional problems.
- 24 people (63%) reported that in the past 4 weeks they accomplished less than they would like as a result of any emotional problems

"I would say that the first three weeks of the stay-at-home order, I probably had increased depression… like frequent depression, feeling unmotivated, very like… not wanting to get up in the morning, not wanting to get dressed, not seeing any reason to… you know… to get started." - "Emily," 48

However, the most common response to being asked, "How often in the past 4 weeks have you felt calm and peaceful?" was "Most of the time," with 17 people (45%) choosing this response. Therefore it appears that while the pandemic was causing some stress, most of those interviewed were able to maintain a calm and peaceful attitude most or all of the time (56%). Another response that may have been influenced by the pandemic were those to the question, "How much of the time during the past 4 weeks did you have a lot of energy?" Just over half (53%) said they had a lot of energy "all,""most," or "a good bit" of the time, the remaining 47% said they had a lot of energy only "some,""a little," or "none of the time."

Very few people (2) reported lead poisoning or carbon monoxide poisoning.

FINDINGS: PUSH GREEN, EQUITY AND COVID-19

Participants reported spending more time in their homes, discussed the importance of weatherization, and indicated that comfort at home promoted their sense of self-reliability. With more time spent indoors, others expressed an interest in improving the condition of their home, concern for the impacts of isolation, and uncertainty about the potential to expose family members to COVID-19. While some participants live in doubles where they are able to isolate from one another, others reported that physical separation would be difficult given that household members share a bathroom or kitchen. One participant described their self-isolation from the rest of their family, especially their daughter who is high risk. They use a plastic divider to separate portions of the house, and the parent only sees their family outside from a distance.

Some participants describe a cycle of trading monthly payments for energy, water bills, and credit card bills, depending on the terms of payment and—in the case of energy bills—the terms of shut off. As one resident put it, "every month I steal from Peter to pay Paul." These terms of payment impact residents' comfort in their homes, and overall health and well-being. In addition we found that overall, houses that had participated in the Warm and Dry program tended to have a harder time paying energy bills when compared to other households.

In addition, interviewees reported:

- 12 of 39 interviewees (or 33%) have paid less than was owed on an energy bill in the previous 12 months due to inability to pay the whole bill

- 11 of 39 interviewees (or 30%) received a disconnect, shut-off or non-delivery notice at least once in the previous 12 months
- 10 of 39 interviewees (or 27%) find it difficult or very difficult to pay energy bills
- 9 of 39 interviewees (or 24%) paid a heat or electricity bill late or not at all due to cost at least once in the previous 12 months
- 8 of 39 interviewees (or 21%) have not paid an energy bill in order to pay a different bill at least once in the previous 12 months
- 3 of 39 interviewees (or 8%) reported using a short-term high-interest loan to assist with paying energy bills at least once in the previous 12 months
- 1 of 39 interviewees (or 3%) had their electricity or gas disconnected within the previous 12 months because they were unable to pay an energy bill

In addition, 27% of those interviewed reported that it was difficult or very difficult to afford enough quality food.

"Back in the day, we used to play that game. That's a game. Because if you have an income that's in-between, and you don't receive SNAP, you have to wait for a shut-off notice before you can receive a HEAP benefit. And it's a stupid game and I don't like it. But we did play the game. Because we were in a situation where 'if you pay this then you can't pay this'... But the water company and the water bill has been over the years a big problem and there have been times when the water was shut off... When they shut your water off, you could be paying like $100 a month but owe $600 but you can only pay so much, you can make an arrangement but if you mess up on the arrangement they tell you 'we could come anytime and shut your water off.' Whether you have children, an illness, or whatever and they just show up they shut your water off the next thing you know you are turning the water on, starting the laundry and there is no water. And then it's 72 hours before they turn the water back on and you're like, 'hey neighbor can we use your hose?'... It's just terrible when the water gets shut off for whatever reason and there's like nobody to appeal to. You're just stuck." - "Cheryl," 60

In spite of the livability benefits and cost savings associated with weatherization through PUSH Green, these interviews illustrate that energy poverty remains a significant issue, especially for participants in the Warm and Dry on the West Side (WDWS) program. Given that eligibility for WDWS is based on having extremely limited income, under 60% of the area median, it is not surprising that these families continue to struggle to pay their monthly energy bills. While PUSH Green's interventions represented a benefit for these families, it ultimately was not enough to ensure families can consistently afford their bills. The data we collected also points to the extent to which multiple expenses compound and accumulate over time when families cannot afford to pay them off.

PUSH GREEN AND HOUSING

One of the main themes that interview and focus group participants brought up is that PUSH Green's weatherization services have made homes more comfortable, safe, and affordable. In terms of affordability, PUSH Green participants save an average of $388 per year on their energy bills after weatherization. The savings are higher for non-subsidized households (households in NYSERDA's Home Performance with Energy Star program) at $475 per year compared to subsidized households (households in NYSERDA's EmPower NY program) at $308 saved per year, most likely due to the level of intervention in the home being more substantial for non-subsidized projects. For example, EmPower NY projects are largely limited to HVAC cleaning and updates, insulation, air sealing and CFL lightbulb replacement, whereas a homeowner in the non-subsidized program has more flexibility to perform a larger scope of work on the house because they are paying for the updates. This is reflected in the average cost of a retrofit in each program; HPwES households average retrofit cost is $7,165 while an EmPower NY average retrofit cost is $3,163, a difference of $4,000 or over 50%.

TABLE 1: HOME PERFORMANCE WITH ENERGY STAR PROGRAM

	Total Home Performance With EnergyStar Retrofits	Average Annual Energy Savings ($)	Total Annual Energy Savings ($)	Average Retrofit Cost ($)	Total Retrofit Cost ($)
PUSH Green	337	$475	$160,110	$7,165	$2,414,477
NYSERDA Total	8,228	$535	$4,400,407	$6,772	$55,719,448

TABLE 2: EMPOWER PROGRAM

	Total EmPower Retrofits	Average Annual Energy Savings ($)	Total Annual Energy Savings ($)	Average Retrofit Cost ($)	Total Retrofit Cost ($)
PUSH Green	363	$308	$111,782	$3,163	$1,148,002
NYSERDA Total	18,478	$315	$5,821,871	$2,616	$48,334,713

TABLE 3: PUSH GREEN TOTALS

	Total Retrofits	Average Annual Energy Savings ($)	Total Annual Energy Savings ($)	Average Retrofit Cost ($)	Total Retrofit Cost ($)
PUSH Green	700	$388	$271,892	$5,520	$3,562,479
NYSERDA Total	26,706	$421	$10,222,278	$5,063	$104,054,161

Compared to all NYSERDA projects, which is data gathered from participating homes across New York State, PUSH Green households demonstrate an overall higher average cost to retrofit and slightly lower energy savings per year. This is most likely due to the age of the housing stock in Buffalo, where the majority of homes were built before 1940. In fact, according to NYSERDA data, homes weatherized by PUSH Green are on average nearly 30 years older than the average home weatherized by NYSERDA across New York State.

One interviewee spoke about a common occurrence in many old Buffalo homes, where walls have been insulated with newspaper or built with unconventional materials.

"Well like I said, this house is over 100 and something years old, and I've been bringing it up to life... I'm trying to keep what is left….when you take a board from your house, and the board was from before it became your house, it was a milk crate. How do you feel about that, young lady? I mean I don't know how much you like antiques...I like beautiful old things. I was tearing up my porch and I turned a board around and it was from a wine crate. Somebody took a wine crate, took it home, tore it up, and made this piece of wood to make his house. A lot of history here, huh?" - "Pedro," 73

In total, as of the end of 2019, in 7 years of operating PUSH Green has connected 700 households with NYSERDA weatherization services, saving households a combined estimated $1.9 million in utility costs and funneling over $3.56 million into energy efficient home repairs across Western New York. On top of this, houses that were repaired through the Warm and Dry on the West Side program received additional investment of approximately $1 million since 2017 from the Affordable Housing Corporation.

Evan

Evan, a single man who lives alone in his home, first connected with PUSH Green around its inception back in 2013. According to him, the home energy improvements that he was able to make through the program have significantly improved the livability of his home. Throughout the process—including the initial engagement and subsequent needed repairs to his furnace—he found that the PUSH staff was "responsive, timely, and organized."

After PUSH Green did an initial home energy assessment, he was referred to a contractor who replaced his furnace, hot water tanks, and added home insulation. Thanks to these improvements, Evan says his home is "definitely much more comfortable—both cool in the summer and warm in the winter." After getting this new furnace, he noticed changes in his mental and physical health, and this was especially important throughout the long periods of quarantine throughout the pandemic.

Additionally, Evan's utility bills are lower thanks to his more efficient furnace and insulation, and he also reports that his indoor air quality has been better. While some additional repairs have been needed since his original services, Evan has commissioned the services of the PUSH Green recommended contractor multiple times and has been very happy with their services.

PUSH GREEN AND CLIMATE CHANGE

Neither NYSERDA or PUSH Green track, as part of their routine data collection and reporting, information related to the carbon emissions or fossil fuel reduction impacts of their energy efficiency programs. Therefore in order to gain a sense of what may be some of the climate impacts of the PUSH Green program, it was necessary to extrapolate from the data using pre-existing measures to come to an estimate of greenhouse gas emission reductions. We used figures provided by the U.S Energy Information Administration and a calculator provided by the EPA to convert the estimated saved electricity (in kwH) and natural gas (in mmBTUs) to pounds of CO_2. Using this metric, we estimate that PUSH Green households enrolled in the Home Performance with Energy Star Program reduce their greenhouse gas emissions by 2.87 metric tons per home per year, and households enrolled in the EmPower NY Program through PUSH Green reduce their emissions by 1.19 metric tons per home per year. This figure is comparable to that of the federal Weatherization Assistance Program which estimates that weatherization through that program reduces 2.65 metric tons of carbon dioxide equivalent per home per year.[77] Together, through the PUSH Green program, household greenhouse gas emissions have been reduced by nearly 1,400 metric tons per year, which is the equivalent of taking approximately 304 cars permanently off the road.[78]

TABLE 4: ESTIMATED GREENHOUSE GAS EMISSION REDUCTIONS PER PUSH GREEN HOUSEHOLD

	Home Performance with Energy Star Program	EmPower Program
From Methane Gas*	5,860 lbs/year	350 lbs/year
From Electricity**	464 lbs/year	2,265 lbs/year
Total	6,324 lbs (2.87 metric tons)	2,615 lbs (1.19 metric tons)

**https://www.eia.gov/environment/emissions/co2_vol_mass.php*

***https://www.epa.gov/energy/greenhouse-gases-equivalencies-calculator-calculations-and-references*

FINDINGS SPECIFIC TO COVID-19

After coding interviews for themes, the number one theme that emerged was that due to job and income losses, the stress of social isolation, new child care responsibilities, and the uncertainty of health risk for one's self and others, the COVID-19 pandemic has increased overall anxiety and exacerbated poor mental health.

One person who was interviewed in the first months of the pandemic had lost her income when she had to shut down her small business, and spoke of the stress of having to go to different places each day to try to access benefits or find resources:

"Yeah I'm hoping we can get unemployment. We should get it. If we get it, we don't need to worry about when we reopen. Right now there's no unemployment benefits and no income at all. That is a really really bizarre situation. That is why we go out everyday, we're looking to find money - how to get it, how to apply. I go out to try and try and apply everyday where I can get it...Because other people get it, $600 every week, but right now we don't get anything. It's not fair." - "Lin," 58

Another homeowner, "Jessica," 48, was worried about bills accumulating because she had to help family members who had serious health problems and who had lost jobs:

"I have been trying to help them as much as I could because I know they're going through what they're going through. Not knowing how they're going to pay their stuff, so I try especially with my mom and my brother both being disabled and both being in the hospital – I do help them financially so that's been taking less out of my house. So then I don't want to burden them and tell them, "Oh, I can't help you because then how am I going to pay my electric bill?" I haven't just totally ignored my bills – I've put something on them but my fear is when this is all over I couldn't make that full payment which I'm so used to doing now, so that's just going to accumulate and it doesn't disappear. It's just gonna end up hitting me real big at the end. I get nervous... Foreclosure, I see it happen all the time over water bills you know what I mean? I just dipped out of one bill to make sure I pay that one in full. It's been hard. Since this whole pandemic started it's been very hard for me." - "Jessica," 48

It was clear that the mental stress of so many anxieties was taking its toll on community members. On top of personal struggles, many of those interviewed were also trying to take care of loved ones, even if their own circumstances were hard. Jessica was also worried about her daughter who was also facing hardship due to having lost her job:

"She's not totally lost but she's able to only work so much from home, she doesn't have the full thing. And her rent is $1300 and she's got 2 small kids, one with autism. And she doesn't get any government assistance for her, the baby or anything, it's just her paycheck and she's a single mom. I try to help her as much as I can, she has just enough to cover the rent." - "Jessica", 48

Parents and caregivers were hit especially hard when childcare became unavailable. Another mom spoke about having to care for her young son with cancer without much support:

"Yeah, it's stressful being this isolated. I've lost all of my childcare when COVID hit and so that's been really difficult. I've been maintaining my wages but I've been on paid family leave, so I have not worked full time since COVID hit and a lot of that is 'cause lack of childcare in addition to his treatment. So not being able to be around friends and family is difficult for all of us. And the only person I can see is my ex-husband who is like not my first choice for person I'd pick for my quarantine so that's stressful for us as a family as well." - "Katie," 35

Katie and Micah

For Westside homeowner Katie, PUSH Green's weatherization efforts have significantly impacted the quality of life for her and her young son, Micah, during an extremely challenging time. Micah was just three years old when he was diagnosed with brain cancer. As a single mom working part time while managing her son's ongoing treatment, the last thing Katie needed was to worry about the safety and livability of her home. For Katie, ensuring that the house was up to date with a reliable and safe furnace, the windows were sealed and lead-free, the home could maintain a healthy temperature, and utility bills were affordable meant more than just convenience—it was a matter of ensuring Micah's health and well-being as he undergoes treatment. Moreover, stress was taking a toll on Katie, who was experiencing significant tension in her neck and back that was impacting her quality of life.

Through PUSH Green, Katie and Micah's home received a new efficient furnace and thermostat, a new hot water tank, their flimsy and lead-covered windows were replaced, and their crawl space was insulated and sealed to prevent drafts. Since these weatherization repairs took place, Katie reports that the house is much warmer and more comfortable, it is less drafty, more parts of the house are useable regardless of the outside temperature, utility bills have gone down by almost half, and even the aesthetic of her home is better. In particular, she emphasizes the stress relief she has experienced as a result of the weatherization. Katie often worried about the risk of break-in through her old windows, the ability of her windows to withstand extreme weather conditions after some shattered in past windstorms, the reliability and safety of her 30-year-old furnace, and affording her utility bills.

As a result of these weatherization improvements, Katie shared that she feels significantly less physical tension and pain in her neck and back, and that she has a general sense of ease and comfort now that she can affordably keep her home warmer. She also was aware of the compounding health risks associated with lead and other toxic substances in her home for Micah, and she can breathe easier now knowing that her windows are lead-free and her home is overall better sealed to protect from other pollutants. While Katie had worked with other contractors for home repairs in the past, she says that working with PUSH Green was a much more positive experience because PUSH could advocate on her behalf and hold contractors accountable for the quality of the work.

Overall, Katie and Micah's story highlights the reverberating effects of having a safe, comfortable, and affordable home for the overall health and well-being of a family. Removing the added stresses of maintaining a healthy home environment has helped support Katie and Micah's ability to face and navigate other challenges in their life.

Parents also worried about how the pandemic was affecting their children and their children's mental health.

"We are concerned about mental health...my daughter, being 11, she's a very social creature. So we do let her chat with her friends and her cousins as much as possible, you know, but there's still not there's not as many replacements… We do have a garden, fortunately that, you know, we make her go out and get some fresh air and she's been allowed a lot more screen time lately. Considering the circumstances, we've allowed a lot more than we used to, just to try to keep her happy, and it seems to help her deal with things. So, you know, making adjustments, we're necessarily trying to keep everybody's mental health on the up and up. Seems to be the most critical thing now, at this point." - "Mark," 45

The second most common theme that emerged from interviews was that the pandemic has enhanced people's awareness of the conditions of their home. Regarding a question about how a resident's experience following the stay-at-home orders would have been different without the PUSH intervention, one interviewee stated:

"Yes, I think it's made it much easier to deal with the Buffalo winters, you know, just in terms of being generally comfortable at home. And having to spend long periods of time there for quarantine, it would've been essential. And honestly the furnace had broken previous to the energy efficiency program so I didn't even have heat for the month before the program started." - "Evan, 40"

Appreciation for more stable and comfortable indoor temperatures after weatherization through PUSH Green was common. One interviewee was especially grateful for a newfound freedom to turn up the heat if she was cold:

"I don't have colds as much, and the second part is, if I am cold, I don't have a hesitation to turn up the heat, because ultimately, I'm not paying nearly what I was paying before on a heat bill. And now I got a programmable thermostat too, so that makes a difference... Drafty and cold is not comfortable for a work environment, or a living environment...And I didn't think insulation would make such a difference, but oh my gosh, such a difference! It's not drafty. I didn't realize how drafty it was until I didn't have to worry about it being drafty, and my heat bill definitely went down a great amount, and it just was SO much more comfortable. And quieter too." - "Martha," 55

Martha

For Martha, a single woman living alone in her home, she says she could never have anticipated what a difference the PUSH Green insulation service would make on her overall quality of life.

Prior to being approved for insulation and furnace replacement through PUSH Green, Martha had grown accustomed to compromising her daily comfort to make sure that her energy bills didn't run too high. She tolerated the cold drafts throughout her home during winter months and learned to live with the nagging stress that her old, loud furnace might give out any day.

After PUSH Green contractors completed the repairs in her home, she couldn't believe how nice it was to no longer have a constant cold draft. Martha has noticed that she gets sick with colds much less often since her weatherization repairs, and her mental health is improved now that she is less stressed about the costs of utility bills and the possibility of her furnace breaking. Indeed, Martha's heating bills have gone down significantly. Another surprising benefit for Martha has been the reduction in outdoor noise that she can hear inside her home.

Especially during the Covid-19 pandemic and work-from-home orders, Martha says the repairs made a big difference. In her words, "Without the services, it would have been drafty and cold—not good for a working or living environment."

In addition to appreciating the benefits of her weatherization services, Martha has now begun attending more PUSH Buffalo educational workshops related to energy and the environment. She is interested in learning about home energy, as well as the impact of energy use on the environment and the viability of solar energy.

Others spoke of a new appreciation for outdoor spaces like backyards and gardens, and porches that allowed people to visit safely outdoors with friends and neighbors. Peace of mind was also provided by PUSH Green interventions when formerly stress-causing home conditions were alleviated. Jessica spoke about her relief at having a new roof:

"Two years ago in November they gave me a new roof. And the weatherization program gave me insulation... I'm so grateful for that. They were able to give me the roof and insulation, and they made an adjustment to the furnaces...I was happy when they did it, I guess you could say mental health-wise. There were less stressors cause I was worried about the roof. So that took a lot of anxiety and stressors off of me – having the new roof put in." - "Jessica," 48

Recommendations

The present study generated a variety of actionable insights that can be applied across multiple levels. Below, we outline lessons learned through the implementation process for PUSH Green specifically, particularly in light of the COVID-19 pandemic, followed by recommendations for policy makers across the city, county, and state levels interested in implementing equitable clean-energy policies that more effectively meet the needs of local communities. We also outline recommendations for community-based organizations (CBOs) in cities facing similar challenges related to an aging housing stock, costly energy inefficiencies, limited living-wage workforce opportunities, and historic disinvestment/underinvestment in low-income neighborhoods and communities of color.

FOR PUSH GREEN

While the above recommendations represent a broad set of generally applicable insights from this study that could be applied in any number of communities, we also learned several important lessons specific to Buffalo and to PUSH.

The proposed project was originally designed as a participatory action research study, and the intention was to use this study as an opportunity to both further develop neighborhood leadership capacity and capture insights grounded in resident experiences and knowledge. The study as implemented did collect a wide range of narratives of residents' lived experiences, and researchers were able to learn more about how barriers related to race, culture, language, and socio-economic status affect health and climate solutions in Buffalo. However, COVID-19 significantly impacted researchers' ability to faithfully implement a full participatory action research process. It was impossible to host the planned in-person workshops, and it was clearer than ever to the research team the importance of having face-to-face interactions with residents as part of relationship and trust building. Moreover, the pressures and challenges of COVID-19 significantly impacted residents' capacity to engage in the research process and on the steering committee. Indeed, the challenges residents faced during COVID-19 underscored the vast racial and socioeconomic disparities in the extent to which the pandemic impacted and disrupted everyday life, and the disparities in the level of health risk based on pre-existing health conditions.

Given that COVID-19 also led to many residents spending significantly more time confined to their homes, the pandemic also highlighted the critical importance of proactively implementing climate resilience interventions. Many homeowners experienced the effects of both extreme high temperatures and low temperatures more acutely when confined to their homes during lockdowns. Homes that had other issues, such as

mold, also put residents at greater risk for health issues that, in turn, put them at greater risk of contracting and dying from COVID-19. In short, this demonstrated that even in moments of collective crises, those who are greater risk to begin with are disproportionately more affected in ways that compound. In light of predictable changes in our climate, and in light of the fact that Buffalo leaders see the city as a "climate refuge" in years to come, proactive and targeted climate resilience measures are essential.

This study also made clear the need for significantly greater investment in capacity building. The level of need for weatherization services far exceeds PUSH Green's current capacity, and many residents who would be eligible for services are not able to access the support they need. At present, PUSH Green is pursuing more funding to expand the WDWS program to provide services to 15 more homes and serve another zip code, though ultimately they would like to be able to serve all zip codes in the city with healthy home improvements.

Along similar lines, PUSH Green sees the benefit of integrating all the different basic safety repair and weatherization programs with one dedicated contractor. This would streamline the process of making repairs and energy efficiency improvements, result in cost efficiency savings, simplify and shorten the process for residents, simplify the management process for PUSH Green staff, and also help establish a more consistent, stable partnership with a contractor who can commit to both being available for needed projects and to hiring local residents in living wage jobs.

FOR POLICY MAKERS AT THE CITY, COUNTY, AND STATE LEVELS

CITY-LEVEL AND COUNTY-LEVEL POLICY RECOMMENDATIONS

Engage with primary care physicians, local community health workers, and city inspectors to help refer and enroll eligible program participants. These efforts can mirror similar efforts to identify and remediate lead in homes.

Cities—especially cities that purport to be climate refuge cities, like Buffalo—need to create climate resilience and mitigation plans that include investments in resilience measures for private homes. Given the magnitude of historical segregation and disinvestment in neighborhoods, these climate plans should include target zones/neighborhoods, rather than taking an individualized approach to needed climate resilience repairs.

Cities should establish a rental registry with required registration periodically (preferably annually) and mandatory, periodic whole-house inspections every 3-4 years. This includes inspection for lead-based paint and other health hazards, assessment of building energy performance and GHG emissions, and tracking of rental costs as an enforcement mechanism

for preventing the rise in rent after home improvements are made. These results should be publicly disclosed through a database and/or in the form of building labeling. Milwaukee is currently implementing a program like this, utilizing American Rescue Plan funds. In Buffalo, a similar program but with a special focus on lead is in the early stages of implementation.

Additionally, cities should establish mold inspection and remediation standards that are attached to the rental inspection requirement, and that also automatically allow tenant complaints to trigger action.

Cities should establish an automatic mechanism in which, when residents are at risk of having their utilities shut off, they are enrolled in direct energy bill assistance and weatherization services. A policy of this kind would ensure that households most urgently in need receive access to available resources. A program like this exists in Detroit, Michigan and could serve as a model for implementation elsewhere.

STATE-LEVEL RECOMMENDATIONS

Ensure that current and future state programs prioritize authentically collaborative relationships with local CBOs. NYSERDA used to have a more holistic and collaborative approach to the role of CBOs, and this enabled local CBOs to more effectively bridge communications with residents and state programs, to advocate for resident needs, and to promote more equitable practice. Since 2017, NYSERDA has limited information sharing and collaboration with CBOs, and this has negatively impacted the reach and impact of programs locally.

Take a collaborative and cross-disciplinary approach to policy making around weatherization and health equity programs. Engage Departments of Housing, Energy, Environment, and Public Health in collaborative policy efforts to align funding and increase capacity for addressing interconnected issues.

States should establish a limited income energy consumption savings target for the state ratepayer-funded energy efficiency programs. This kind of program would ensure that limited income households benefit from energy consumption reductions, lowered energy bills, and healthier, more comfortable home environments. Similarly, NYS should take more aggressive steps to enforce and realize its own energy affordability goals--household energy burdens of 6% or less of household income.

States and localities should establish and fund weatherization and electrification readiness programs to ensure that residents of substandard housing can receive resources that will enable participation in the clean energy transition. For a model of this kind of program, Michigan has established a housing repair fund to address health and safety barriers to weatherization.

States should implement a policy that requires a mandatory inspection, including for lead-based paint, prior to the sale/transfer of property. This is a proposed extension of HUD Title X, which only requires disclosure of lead-based paint hazards if they are known.

BROAD CROSS-LEVEL POLICY RECOMMENDATIONS

Invest significantly more in integrated programs that seek to address housing safety, health equity, and energy efficiency. The magnitude of need far exceeds the current capacity of local programs, as evidenced by the long waiting list even without advertising, and the cost savings that could come with more effectively providing preventative services are potentially significant. Specifically, there is a significant need for greater investment in basic structural repairs that have profound health and safety impacts, including mold remediation, attic insulation, furnace and water heater replacements, and roof repairs. In Western New York, the current "Warm and Dry" initiative only has the capacity to serve approximately 10 homes per year, but the need is enormous and wait lists are many years long. In addition, investments in basic structural repairs will be needed to prepare the state's housing for a massive transition toward electrification and decarbonization and away from fossil fuel energy sources and combustion technologies.

Invest in generating more research on the relationship between weatherization and health. Clearly establishing, documenting, and evaluating the relationship between housing quality and health will inform future program development and allow CBOs and communities to seek more diverse sources of funding and partnerships to support the work in the long term. More data—and more high quality data—is needed to establish proof of concept and to inform future policy making across levels.

Establish more stable, long-term funding streams to enable the success of these weatherization and health equity programs. With the current reliance on short-term cycles of unpredictable grant funds, programs cannot develop consistent partnerships with the contractors needed to provide these weatherization services. Not only does this impact the ability to provide weatherization, but it also makes it more challenging to use weatherization programs as a way to support stable green workforce development opportunities. NYSERDA's new Regional Clean Energy Hubs program is a step in the right direction and was made possible through an intentional program co-design process that made space for CBOs and frontline communities.

Establish a more coordinated and streamlined process for providing multiple needed repairs concurrently, and work in partnership with CBOs to braid different programs together. By separating out the application processes and eligibility requirements for various levels of home repair,

many families with the greatest level of need are forced to stretch out critical repairs over a long period of time, and repairs could be provided significantly more efficiently with more coordination.

Cities and state level entities should more effectively utilize and leverage the existing social capital and community expertise of CBOs like PUSH. If programs wish to genuinely and sustainably provide services that meet the needs of local communities, they must engage and listen to residents and the organizations that work most closely with residents.

Invest in ongoing utility debt forgiveness programs and proactively communicate with eligible customers to ensure they are aware of available resources in time to utilize them. COVID made it clearer than ever that unexpected reductions in income or unexpected expenses can have reverberating effects on households, and that the more debt that people accumulate, the less able they are to dig out. Utility debt forgiveness programs can help people re-establish regular payments without the accumulated burden of paying off past debts and additional fees, while also cultivating a more positive relationship between customers and utility companies, and reducing the costs to utilities associated with collecting unpaid balances that households are not able to pay off. In two water and sewer debt forgiveness pilot programs in Oakland and Louisville, 96% of debt amnesty recipients were able to remain current on subsequent bills.[79]

FOR COMMUNITY-BASED ORGANIZATIONS

Weatherization efforts should be viewed as more than simply energy efficiency programs, but also as neighborhood health initiatives. Qualitative data from this study and others shows that weatherization efforts have a significant positive impact on residents' health and well-being. When documenting, evaluating, publicizing, and seeking funding for weatherization initiatives, CBOs should make a clear linkage between weatherization and broader health equity outcomes. When considering the return on investment of such programs, CBOs should seek to articulate the preventative cost savings.

To equitably and substantively engage neighborhood residents, CBOs should ensure there are available language access services, including translation of materials and interpretation at public meetings. Housing and energy equity focused CBOs should leverage partnerships with other local CBOs who can provide language access services, bridge cultural differences, and help cultivate relationships and trust with communities with limited English proficiency.

CBOs should seek out partnerships with a wide range of local service providers who can identify eligible families and provide referrals. Cultivating partnerships with community health workers, primary care

physicians, schools, community centers, and local landlords can help increase local awareness of programs and increase reach and impact.

Invest in developing local leadership capacity through skill building workshops and accessible educational opportunities. Continued policy advocacy is especially critical in the context of inconsistent and largely short-term funding streams, as well as the magnitude of need across communities.

Next steps

"I love my home. If I won a million dollars I'd fix it up but I wouldn't move." -"Margaret," 68

The lessons learned from the evaluation process will continue to be shared with the community and with policymakers to further communicate the links between health, housing, and climate and to better understand how programs impact the lives of residents. Besides sharing this report with policymakers, the research team and PUSH Green held several workshops and panel discussions in early 2022 and developed a "zine" to creatively communicate the links between health, housing and weatherization in an artistic way. These zines are illustrated and shared with PUSH Green participants to help explain why weatherization is not just an energy-saving measure, but a health intervention too. PUSH also made a stop-motion video which visually illustrates Luz's story, as she told it to the Center for Story-Based Strategy in 2021. Discussion of the project took place on PPG radio shows, and a panel discussion on the idea of Buffalo as a climate refuge in February 2022 included discussion about housing quality in Buffalo and the work of PUSH Green.

As policymakers at all levels of government debate strategies for combating climate change and health inequities, the experiences and insights of the PUSH Green program offer lessons in what works and what needs to evolve in the overlapping spheres of energy efficiency, healthy housing, climate resilience and racial and economic equity. It has become increasingly apparent that programs operating in silos can miss or exacerbate problems, and triple-bottom-line solutions such as PUSH Green are needed more than ever.

Appendix A

HOUSING SPECIFICATIONS

1. **Which of the following do you believe best describes your current home? Is it a… (NWAP)**
   - ◯ Single-family detached
   - ◯ Single-family attached
   - ◯ Apartment building with 2-4 units
   - ◯ Apartment building with 5 or more units
   - ◯ Mobile home
   - ◯ Don't know/not sure

2. **Do you rent or own your current residence?**
   - ◯ Rent
   - ◯ Own
   - ◯ Other (specify)
   - ◯ Don't know/not sure

3. **Which type of heating equipment provides most of the heat for your home? This can include portable heaters, fireplaces, heating stoves and cooking stoves. Choose one response only. (NWAP)**
   - ◯ Heat pump
   - ◯ Central furnace with ducts to individual rooms
   - ◯ Steam/hot water system with radiators or pipes in each room
   - ◯ Built-in electric units in each room installed in walls, ceilings, baseboards, or floors
   - ◯ Built-in floor/wall pipeless furnace
   - ◯ Built-in room heater burning gas, oil, or kerosene
   - ◯ Heating stove burning wood, coal, or coke
   - ◯ Portable heaters
   - ◯ Fireplace
   - ◯ Cooking stove used to heat your home as well as to cook
   - ◯ Some other equipment: _____
   - ◯ Don't know/not sure

4. **What is the main fuel used for heating your home? That is, which fuel is the one that provides the most heat for your home? Choose one response only. (NWAP)**
   - ◯ Electricity
   - ◯ Natural gas from underground pipes
   - ◯ Propane (bottled gas)
   - ◯ Fuel oil
   - ◯ Kerosene
   - ◯ Wood
   - ◯ Biomass
   - ◯ Solar or wind
   - ◯ Geothermal
   - ◯ District steam
   - ◯ Some other fuel: _____
   - ◯ Don't know/not sure

5. **How old is the main source of heating equipment? (NWAP)**
   - ◯ Less than 5 years old
   - ◯ 5-10 years old
   - ◯ 11-16 years old
   - ◯ 17-25 years old
   - ◯ More than 25 years old

6. **When was the last time your heating equipment received maintenance service by a contractor to ensure optimum and safe operation? (NWAP)**
   - ◯ _____ months
   - ◯ _____ years
   - ◯ Never
   - ◯ Don't know/not sure

7. What other types of heating equipment did you use in the past 12 months? Check all that apply. (**NWAP**)

- ◯ No other equipment
- ◯ Heat pump
- ◯ Central furnace with ducts to individual rooms
- ◯ Steam/hot water system with radiators or pipes in each room
- ◯ Built-in electric units in each room installed in walls, ceilings, baseboards, or floors
- ◯ Built-in floor/wall pipeless furnace
- ◯ Built-in room heater burning gas, oil, or kerosene
- ◯ Heating stove burning wood, coal, or coke
- ◯ Portable heaters
- ◯ Fireplace
- ◯ Cooking stove used to heat your home as well as to cook
- ◯ Some other equipment:

_____

- ◯ Don't know/not sure

8. Does your home have working service connections to the following utilities? Check all that apply. (**NWAP**)

- ◯ Gas or other heating fuel
- ◯ Electricity
- ◯ Water
- ◯ Sewer
- ◯ Telephone
- ◯ Internet

9. How many smoke detectors are currently working? (**NWAP**)

- ◯ _____
- ◯ Don't know/not sure
- ◯ Don't have one

10. Is your CO (or carbon monoxide) monitor currently working? (**NWAP**)

- ◯ Yes
- ◯ No
- ◯ Don't know/not sure
- ◯ Don't have one

11. Is your radon monitor currently working? (**NWAP**)

- ◯ Yes
- ◯ No
- ◯ Don't know/not sure
- ◯ Don't have one

PROGRAMMING SPECIFICATIONS

12. How did you learn about or hear about PUSH Green?

_____
_____
_____
_____

13. Why did you apply for PUSH Green programming?

_____
_____
_____
_____

14. What types of changes were made to your house through PUSH Green?

_____
_____
_____
_____

15. When were these changes made?

_____
_____
_____
_____

EXPERIENCE WITH UTILITIES AND HOME ENVIRONMENT

[Research question being addressed: How effectively does PUSH Green address health impacts of climate change?]

16. How hard is it to pay your heating and electricity bills? (NWAP)

- ◯ Very hard
- ◯ Hard
- ◯ Neither hard or not hard
- ◯ Not hard
- ◯ Not hard at all
- ◯ Don't know

17. How has the program impacted your utility bills?

_____
_____
_____
_____

18. Has your energy consumption changed since your home has been weatherized? In what ways?

_____
_____
_____
_____

19. In the last 12 months, how often did your household reduce or forego expenses for basic household necessities, such as medicine or food, in order to pay an energy bill? (UB survey)

- ◯ Almost every month
- ◯ Some months
- ◯ 1 or 2 months
- ◯ Never
- ◯ Don't know/not sure

20. Did you find yourself choosing between utility bills and other expenses before receiving services from PUSH Green?

_____
_____
_____
_____

21. When home energy bills are not paid on time, it is common for energy utilities and suppliers to send late notices. If the bill is very late, they will send a disconnect, shut-off, or non-delivery notice. In the past 12 months, how often did you receive a disconnect, shut-off, or non-delivery notice? (NWAP)

- ◯ Almost every month
- ◯ Some months
- ◯ 1 or 2 months
- ◯ Never
- ◯ Don't know/not sure

22. In the past 12 months were you ever unable to use your main source of heat because you were unable to pay your utility bill and utilities were disconnected? (NWAP)

- ◯ Yes
- ◯ No
- ◯ Don't know/not sure

23. Please think about the indoor temperature of your home during the winter. Is it typically: (NWAP)

- ◯ Very cold
- ◯ Cold
- ◯ Comfortable
- ◯ Hot
- ◯ Very hot
- ◯ Other _____
- ◯ Don't know/not sure

24. How were the temperature and humidity levels in your home affected by weatherization? How so?

_____
_____
_____
_____

25. Has your experience during severe weather changed since your home has been weatherized? How so?

_____
_____
_____
_____

26. During the past 12 months, how often have you or other members of your household found your home too drafty? Would you say. (NWAP)

- ◯ All the time
- ◯ Most of the time
- ◯ Some of the time
- ◯ Never
- ◯ Don't know/not sure

27. Within the past 12 months, was there ever a time when you or any household member did not perform one of the following activities due to your home being too cold? Check all that apply.

- ◯ Bathing or showering
- ◯ Washing clothing or dishes
- ◯ Utilizing certain rooms
- ◯ Other activities (please list):

_____

28. Within the past 12 months if your home was too cold, which of the following did you do to keep warm? Check all that apply.

- ◯ Turned on oven for warmth
- ◯ Stayed in bed
- ◯ Put on extra clothes or blankets
- ◯ Drank hot drinks
- ◯ Went to a warm public place
- ◯ Visited friends or family with warmer homes
- ◯ Other: _____

29. Are there any things that you do now after weatherization that you didn't do before? Are there any things that you have stopped doing that you had to do before your home was weatherized?

_____
_____
_____
_____

30. Does your home frequently have a mildew odor or musty smell? (NWAP)

- ◯ Yes
- ◯ No
- ◯ Don't know/Not sure

31. Have you seen mold in your home in the past 12 months? (NWAP)

- ◯ Yes
- ◯ No
- ◯ Don't know/not sure

32. How often do you observe standing water anywhere in your home? Examples of standing water include wet carpet, puddles, plumbing or roof leaks or flooding in the home. (**NWAP**)

- ◯ Never
- ◯ Rarely
- ◯ Sometimes
- ◯ Often
- ◯ Always
- ◯ Don't know/not sure

HEALTH EXPERIENCE

[Research question being addressed: How effectively does PUSH Green advance health equity?]

33. In the past 12 months how often did your household keep your home at a temperature that you felt was unsafe or unhealthy? (**NWAP**)

- ◯ Almost every month
- ◯ Some months
- ◯ 1 or 2 months
- ◯ Never
- ◯ Don't know/not sure

34. Have you noticed any difference in your mental or physical health before and after receiving services from PUSH Green? In what ways? What about for other household members?

_____
_____
_____
_____

35. Has weatherization affected your ability to go to school or work in any way? What about for other household members?

_____
_____
_____
_____

36. In the past 12 months, has anyone in the household needed medical attention because your home was too cold? (**NWAP**)

- ◯ Yes
- ◯ No
- ◯ Don't know/not sure

37. In the past 12 months, has anyone in the household been poisoned by breathing in carbon monoxide, and therefore went to see a medical professional? (**NWAP**)

- ◯ Yes
- ◯ No
- ◯ Don't know/not sure

38. Have you or any other household members seen any changes in the number of times you visit the doctor or hospital for medical care after weatherization?

_____
_____
_____
_____

39. How infested is your home with cockroaches or other insects or spiders? (NWAP)

- ◯ Extremely infested
- ◯ Very infested
- ◯ Somewhat infested
- ◯ Hardly infested
- ◯ Not infested at all
- ◯ Don't know/not sure

40. What have you done about the cockroaches, other insects or spiders? Check all that apply. (NWAP)

- ◯ Nothing
- ◯ Used insecticides, bug sprays, or poison
- ◯ Hired an exterminator or other professional
- ◯ Other. Please specify._____
- ◯ Don't know/not sure

41. How infested is your home with rats or mice? (NWAP)

- ◯ Extremely infested
- ◯ Very infested
- ◯ Somewhat infested
- ◯ Hardly infested
- ◯ Not infested at all
- ◯ Don't know/not sure

42. What have you done about the rats or mice? Check all that apply. (NWAP)

- ◯ Nothing
- ◯ Used bait or poison
- ◯ Hired an exterminator or other professional
- ◯ Other. Please specify._____
- ◯ Don't know/not sure
- ◯ There aren't any pests present

PUSH GREEN APPROACH

[Research question being addressed: How well does the approach of PUSH Green work and why?]

43. Besides PUSH Green, have you participated in any other programs to help reduce your energy costs such as:

- ◯ HEAP (Home Energy Assistance Program)
- ◯ WAP (Weatherization Assistance Program)
- ◯ National Fuel Neighbor-for-Neighbor Heat Fund
- ◯ Emergency Assistance grants or loans from Social Services
- ◯ Other: _____

44. How were you able to connect with PUSH Green staff? Were they accessible/approachable/helpful/knowledgeable? Did PUSH Green advocate for you and your needs? How?

_____
_____
_____
_____

45. Describe your experience working with contractors who performed work at your home.

_____
_____
_____
_____

46. If you are a renter, how was your relationship with your landlord affected by participating in PUSH Green?

_____
_____
_____
_____

47. Did working with PUSH Green expand your knowledge of weatherization and its benefits, including health, safety, climate change, and your house as a system?

48. Did PUSH Green help you to understand your options and support you to make a decision?

49. After participating in PUSH Green, have you become a PUSH member? Why or why not?

50. Did you become more involved in environmental, social or community issues after working with PUSH Green? If yes, what does that involvement look like for you?

51. What features of PUSH's approach did you appreciate or find most helpful? What about PUSH's approach was not helpful?

52. Please think about inviting guests to spend time in your home. Does thinking about this feel:

- ◯ Very uncomfortable
- ◯ Uncomfortable
- ◯ Comfortable
- ◯ Very comfortable

53. Why? Did you feel the same way before receiving programming from PUSH Green?

54. How else has the program impacted your life? What about your neighborhood as a whole?

Appendix B

COVID-19 INTERVIEW SCRIPT

Participant ID: _____Date: _____

Interviewers: _____

INTERVIEW REMINDERS:

- Explain the key points of the informed consent form (e.g. the purpose of the study, the components of the study, the benefits and risks of participating in the study, participation in the study is voluntary, the participant can answer "I don't know" or "I prefer not to answer" to any question). See the interview tutorial document for more information.
- Takes notes on everything and as close to verbatim as possible.
- Treat the short-answer section as a discussion. Use the prompts to encourage more conversation and back-and-forth dialogue.
- When topics of interest related to the study surface during the interview, even in the multiple-choice section, ask the participant to expand on them. The more clarity we have on the participant's experiences, the better.
- Spend a few minutes debriefing after the interview (after the participant hangs up) to clarify any points of confusion and discuss ways to improve the interview.

SECTION 1: DEMOGRAPHICS/HOUSING

In this section, you will be asked standard demographic questions about yourself. Please answer to the best of your ability.

1. **Were you born in the United States or in a different country?**
   - ◯ Born in the U.S
   - ◯ Born in a foreign country
   - ◯ Don't know/not sure
   - ◯ Prefer not to answer

   Notes:_____

2. **Please identify your gender.**
   - ◯ Woman
   - ◯ Man
   - ◯ Non-binary/third gender
   - ◯ Prefer to self-describe
   - ◯ Don't know/not sure
   - ◯ Prefer not to answer

   Notes: _____

3. **What is your age?**

   _____
   - ◯ Don't know/not sure
   - ◯ Prefer not to answer

   Notes: _____

4. **Do you consider yourself to be of Hispanic or Latinx origin, such as Mexican, Puerto Rican, Cuban, or other Spanish background?**
   - ◯ Yes
   - ◯ No
   - ◯ Don't know/not sure
   - ◯ Prefer not to answer

   Notes: _____

5. **Which of these groups do you most closely identify as? You may choose more than one category.**
   - ◯ White or of European descent
   - ◯ Black or African-American
   - ◯ American Indian or Alaska Native
   - ◯ Asian
   - ◯ Native Hawaiian or Other Pacific Islander
   - ◯ Other (specify _____)
   - ◯ None of the above
   - ◯ Don't know/not sure
   - ◯ Prefer not to answer

   Notes: _____

6. How many people of each age category live in the household? Do not include household members away at college, in the military, or otherwise not regularly present in the home.

_____ adults over 65

_____ adults age 18-64

_____ children age 6-17

_____ children under 6 years old

◯ Don't know/not sure

◯ Prefer not to answer

Notes: _____

7. Is the primary wage earner in the household:

◯ Employed for wages

◯ Self-employed

◯ Currently out of work

◯ A homemaker

◯ A student

◯ Retired

◯ Unable to work

◯ Don't know/not sure

◯ refer not to answer

Notes: _____

8. In the past 12 months did anyone in the household receive income or benefit from any of the following sources? Check all that apply.

◯ Wages from a full or part-time job

◯ Earned income from self-employment or rental property

◯ Supplemental Security Income (SSI)

◯ SNAP or WIC benefits (food stamps)

◯ Section 8 voucher or other housing assistance

◯ Temporary Assistance or cash assistance

◯ Veteran's payments (VA Benefits)

◯ Unemployment Compensation

◯ Child support or alimony

◯ Social Security retirement benefits, pension, or other retirement income

◯ Social Security Disability (SSD, SSDI) or other disability payments

◯ Other: _____

◯ Don't know/not sure

◯ Prefer not to answer

Notes: _____

9. Some household income categories are listed below. Please choose a category which represents the total combined income before taxes for all the people in your household last year.

◯ $20,000 and under

◯ $20,001 – 40,000

◯ $40,001 – 60,000

◯ $60,001 – 80,000

◯ $80,001 – 100,000

◯ $100,001 – 120,000

◯ $120,001 – 140,000

◯ $140,001 – 160,000

◯ $160,001 – 180,000

◯ $180,001 – 200,000

◯ More than $200,000

◯ Don't know/not sure

◯ Prefer not to answer

Notes: _____

10. Do you rent or own your current residence?

◯ Rent

◯ Own

◯ Other (specify _____)

◯ Don't know/not sure

Prefer not to answer

Notes: _____

11. How long have you lived in your current home?

_____ years

◯ Don't know/not sure

◯ Prefer not to answer

Notes:_____

12. Which of the following do you believe best describes your current home? Is it a . . .

◯ Single-family detached house (i.e. a single family home that does not share any walls with another household)

◯ Single-family attached house (e.g. townhouse, row house, duplex)

◯ Apartment building

◯ Mobile home

◯ Don't know/not sure

◯ Prefer not to answer

Notes:_____

(Skip if they do not live in an apartment building)

13. How many units are in the apartment building?

_____ units

◯ Not applicable

◯ Don't know/not sure

◯ Prefer not to answer

Notes:_____

14. How many bedrooms do you have in your home? Include bedrooms in finished attics or finished basements.

_____ bedrooms

◯ Don't know/not sure

◯ Prefer not to answer

Notes:_____

15. How many bathrooms do you have in your home? Include bedrooms in finished attics or finished basements.

_____ bathrooms

◯ Don't know/not sure

◯ Prefer not to answer

Notes:_____

16. Now think about other rooms in your home besides bedrooms and bathrooms. Not including unfinished areas, hallways, and closets, how many other rooms are there in your home?

_____ other rooms

◯ Don't know/not sure

◯ Prefer not to answer

Notes:_____

17. What is the square footage of your home?

_____ square feet

◯ Don't know/not sure

◯ Prefer not to answer

Notes:_____

18. In what year was your home built?

_____

◯ Don't know/not sure

◯ Prefer not to answer

Notes:_____

19. Is your home insulated?

◯ Yes

◯ No

◯ Don't know/not sure

◯ Prefer not to answer

Notes:_____

20. Does your home have any of the following characteristics? Check all that apply.

- ◯ A leaking roof
- ◯ Drafty windows/doors
- ◯ A malfunctioning or underperforming furnace, boiler, or other heating system
- ◯ None of the above
- ◯ Don't know/not sure
- ◯ Prefer not to answer

Notes:_____

SECTION 2: SHORT ANSWER

For all interview participants:
(Skip if they are not employed or in school)

21. Can you explain in more detail what types of jobs the members of the household have, or what type of schooling is being pursued?

_____
_____
_____

22. Have you been able to stay home to avoid COVID-19? Why or why not?

_____
_____
_____

23. How often do you leave the house and why? (Due to conditions in the house? To get necessities? For other health reasons?)

_____
_____
_____

24. Does anything about your home or living situation affect your ability to follow the recommendations to stay home? Do any of your home's physical characteristics affect your ability to follow the recommendations to stay home?

[For example: Does your home have all the equipment and supplies you need, like water, electricity, heat, and phone or internet connection?]

_____
_____
_____

25. Is your house comfortable to be in for long periods of time? Why or why not?

[For example: Are you able to keep your home at a comfortable temperature during both the summer and winter? Does your home have enough space for movement?]

_____
_____
_____

26. Does your house have any problems that you worry might affect your health or safety?

[For example: Does your home have any pests or mold? Does your home have any hazardous materials, like lead or asbestos? Does your home have any leaks or holes to the outside? Are there any tripping or falling hazards in your home?]

_____
_____
_____

27. Have you noticed any changes to your physical health since the stay-at-home order began? What kind of changes? Do you think any of these changes in your health might be caused by conditions inside your home?

_____
_____
_____

28. **What about your mental health? Do you think any of these changes in your health might be caused by conditions inside your home?**

29. **If someone in your household got sick with coronavirus, would you be able to isolate them? Why or why not?**

30. **Based on your current experience sheltering in place, would you feel safe staying home during an extreme weather event, such as a heat wave, cold wave, blizzard, or heavy rain? Why or why not?**

For past PUSH Green customers:
(Skip if they are not/have not been a PUSH Green customer)

31. **Which program did you participate in through PUSH Green and what changes were made to your home? When? How was your experience with this program?**

32. **Has your home ever received weatherization or energy efficiency installations through an organization other than PUSH Green? If yes, what type of installations? When? By who?**

33. **If you think about your home before you received services from PUSH Green, has your experience in your home changed? Would your experience staying at home now have been different if you hadn't gotten these services?**

34. **Has your health or well-being changed since participating in PUSH Green? How?**

For those who are not past PUSH Green customers:
(Skip if they have received services from PUSH Green)

35. **Do you know if your home has ever received weatherization or energy efficiency installations? If yes, what type of installations? When? By who?**

SECTION 3: MULTIPLE CHOICE

That concludes the open-ended questions. Now, we will switch over to some multiple choice questions related to energy costs and health.

ENERGY COSTS

First, let's discuss your experience with paying utility bills.

36. **How difficult is it to pay your energy bills?**

- ◯ Very difficult
- ◯ Difficult
- ◯ Neither difficult or not difficult
- ◯ Not difficult
- ◯ Not difficult at all
- ◯ Don't know/not sure

◯ Prefer not to answer

Notes:_____

37. Over the past 12 months, how often has your household not paid a utility bill in order to pay other utility bills? Utilities include gas, electric, water, sewage, telephone, secondary energy fuel, etc.

◯ Every month
◯ Every other month
◯ Every few months
◯ Every six months
◯ Once in twelve months
◯ Never
◯ Don't know/not sure
◯ Prefer not to answer

Notes:_____

38. In the past 12 months how often did your household pay an amount less than what you owed on your home energy bill because you were unable to afford the whole home energy bill?

◯ Almost every month
◯ Some months
◯ 1 or 2 months
◯ Never
◯ Don't know/not sure
◯ Prefer not to answer

Notes:_____

(Skip if they never paid an amount less than they owed)

39. Over the last 12 months, what utility bills were not paid, partially paid, or were paid late due to cost? Check all that apply.

◯ Heat
◯ Electric
◯ Water
◯ Sewage
◯ Telephone
◯ Secondary energy fuel type
◯ Other (Specify_____)
◯ Not applicable
◯ Don't know/not sure
◯ Prefer not to answer

Notes:_____

40. In the past year, have you used any of the following to assist with paying your energy bill?

◯ Payday loan
◯ Loan from family or friend
◯ Tax Refund Anticipation Loan
◯ Car Title Loan
◯ Other type of short term, high-interest loan
◯ Pawn shop
◯ None of the above
◯ Don't know/not sure
◯ Prefer not to answer

Notes:_____

41. When home energy bills are not paid on time, it is common for energy utilities and suppliers to send late notices. If the bill is very late, they will send a disconnect, shut-off, or non-delivery notice. In the past 12 months, how often did you receive a disconnect, shut-off, or non-delivery notice?

◯ Almost every month
◯ Some months
◯ 1 or 2 months
◯ Never
◯ Don't know/not sure
◯ Prefer not to answer

Notes:_____

42. In the past 12 months, was your electricity or natural gas ever disconnected because you were unable to pay your home energy bill?

- ◯ Yes
- ◯ No
- ◯ Don't know/not sure
- ◯ Prefer not to answer

Notes:_____

43. How difficult is it to afford enough quality food?

- ◯ Very difficult
- ◯ Difficult
- ◯ Neither difficult or not difficult
- ◯ Not difficult
- ◯ Not difficult at all
- ◯ Don't know/not sure
- ◯ Prefer not to answer

Notes:_____

44. Over the past 12 months, how often did members of your household make a tradeoff between paying a utility bill and filling a prescription or taking a full dose of a prescribed medicine?

- ◯ Every month
- ◯ Every other month
- ◯ Every few months
- ◯ Every six months
- ◯ Once in twelve months
- ◯ Never
- ◯ Don't know/not sure
- ◯ Prefer not to answer

Notes:_____

45. Have you had any other experiences related to paying energy bills that you would like to share with us?

_____

_____

_____

HEALTH

That was the last question about utility bills. In this final section, we'll ask you about your health and the health of other household members.

46. In the past 3 months, have you had . . .

- ◯ Shortness of breath when lying down, waking up, or with light work or light exercise?
- ◯ Headaches that are either new or more frequent or severe than ones you have had before?
- ◯ None of the above
- ◯ Don't know/not sure
- ◯ Prefer not to answer

Notes:_____

47. In the past 12 months, were you or anyone else in the household diagnosed or under a doctor's care for the following conditions?

- ◯ Lead poisoning
- ◯ Any chronic illness or condition affecting your lungs or breathing
- ◯ Other chronic illness such as diabetes, high blood pressure, heart disease or cancer
- ◯ Any kind of respiratory allergy
- ◯ Three or more ear infections
- ◯ Flu
- ◯ Persistent cold symptoms lasting more than 14 days. Symptoms include coughing, sore throat, sneezing, sinus pain, congestion, fever, fatigue, and headache.
- ◯ Sinus infection or Sinusitis
- ◯ Bronchitis

- ◯ None of the above
- ◯ Don't know/not sure
- ◯ Prefer not to answer

Notes:_____

48. Do you have asthma? Symptoms of asthma include coughing, wheezing, shortness of breath, chest tightness or phlegm production when you have a cold or respiratory infection.

- ◯ Yes
- ◯ No
- ◯ Don't know/not sure
- ◯ Prefer not to answer

Notes:_____

(Skip if they do not have asthma)

49. How long has it been since you last had any symptoms of asthma?

- ◯ Never
- ◯ Less than one day ago
- ◯ 1-6 Days ago
- ◯ 1 week to less than 3 months ago
- ◯ 3 months to less than 1 year ago
- ◯ 1 year to less than 3 years ago
- ◯ 3 years to 5 years ago
- ◯ More than 5 years ago
- ◯ Not applicable
- ◯ Don't know/not sure
- ◯ Prefer not to answer

Notes:_____

(Skip if they do not have asthma)

50. During the past 12 months, how many times did you see a doctor or health professional for a routine checkup for your asthma?

Enter number _____

- ◯ Not applicable
- ◯ Don't know/not sure
- ◯ Prefer not to answer

Notes:_____

(Skip if they do not have asthma)

51. During the past 12 months did you have to stay overnight in the hospital or go to an emergency room because of asthma?

- ◯ Yes
- ◯ No
- ◯ Not applicable
- ◯ Don't know/not sure
- ◯ Prefer not to answer

Notes:_____

52. In the past 12 months, has anyone in the household been poisoned by breathing in carbon monoxide, and therefore went to see a medical professional?

- ◯ Yes
- ◯ No
- ◯ Don't know/not sure
- ◯ Prefer not to answer

Notes:_____

53. During the past 4 weeks, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?

Accomplished less than you would like

- ◯ Yes
- ◯ No
- ◯ Don't know/not sure
- ◯ Prefer not to answer

Did work or activities less carefully than usual

- ◯ Yes
- ◯ No
- ◯ Don't know/not sure
- ◯ Prefer not to answer
- ◯ Did work or activities less carefully than usual

Notes:_____

54. How much of the time during the past four weeks…

Have you felt calm and peaceful?

- ◯ All of the time
- ◯ Most of the time
- ◯ A good bit of the time
- ◯ Some of the time
- ◯ A little of the time
- ◯ None of the time
- ◯ Don't know/
- ◯ not sure
- ◯ Prefer not to answer

Did you have a lot of energy?

- ◯ All of the time
- ◯ Most of the time
- ◯ A good bit of the time
- ◯ Some of the time
- ◯ A little of the time
- ◯ None of the time
- ◯ Don't know/
- ◯ not sure
- ◯ Prefer not to answer

Have you felt down-hearted and blue?

- ◯ All of the time
- ◯ Most of the time
- ◯ A good bit of the time
- ◯ Some of the time
- ◯ A little of the time
- ◯ None of the time
- ◯ Don't know/
- ◯ not sure
- ◯ Prefer not to answer

Notes:_____

55. In the past 12 months, have you been employed or attending school?

- ◯ Employed
- ◯ Attending school
- ◯ Both
- ◯ Neither
- ◯ Don't know/not sure
- ◯ Prefer not to answer

Notes:_____

(Skip if they are not employed)

56. In the past 12 months, about how many days of work did you miss at a job or business because of illness or injury. Do not include maternity leave.

Enter Number ____

- ◯ None

◯ Not applicable

◯ Don't know/not sure

◯ Prefer not to answer

Notes:_____

(Skip if they are not in school)

57. In the past 12 months, about how many days of school have you missed because of illness or injury?

Enter Number ____

◯ None

◯ Not applicable

◯ Don't know/not sure

◯ Prefer not to answer

Notes:_____

(Skip if there are no children in the household)

58. Are there any preschool or school aged children in the household?

◯ Preschool aged child(ren)

◯ School aged child(ren)

◯ Both

◯ Neither

◯ Don't know/not sure

◯ Prefer not to answer

Notes:_____

(Skip if there are no preschool-aged children in the household)

59. Please tell us about the preschool aged child who has missed the most school days due to illness or injury in the past 12 months. How many days of school did that child miss?

Enter number ____

◯ None

◯ Not applicable

◯ Don't know/not sure

◯ Prefer not to answer

Notes:_____

(Skip if there are no school-aged children in the household)

60. Please tell us about the school aged child who has missed the most school days due to illness or injury in the past 12 months. How many days of school did that child miss?

◯ Enter number ____

◯ None

◯ Not applicable

◯ Don't know/not sure

◯ Prefer not to answer

Notes:_____

61. Do you feel especially at risk to the coronavirus? This could be due to your health, how much you are exposed to the public, or other reasons. Why or why not?

_____

_____

_____

62. Have you had any other health-related experiences that you would like to share with us?

_____

_____

_____

That was the last question of this interview. Thank you so much for dedicating your time to this study. Is there anything else you would like to add, or do you feel like we didn't ask something that we should have?

Appendix C

PUSH BUFFALO COVID-19 STUDY

FOLLOW-UP SURVEY WEEK 4

1. **Why did you leave your house this week? (Check all that apply)**
   - ◯ I did not leave the house at all
   - ◯ To get groceries, medicines or medical care
   - ◯ I had to work
   - ◯ For exercise
   - ◯ To visit friends or relatives
   - ◯ To sit outside, garden or work on the outside of my house
   - ◯ Other reasons (please specify): _____
   - ◯ Prefer not to answer

2. **Compared with last week, have you noticed any changes in your physical health this week? Would you say your health is:**
   - ◯ A lot better
   - ◯ A little better
   - ◯ About the same
   - ◯ A little worse
   - ◯ A lot worse
   - ◯ Prefer not to answer

3. **Compared with last week, have you noticed any changes in your mental health this week? Would you say your health is:**
   - ◯ A lot better
   - ◯ A little better
   - ◯ About the same
   - ◯ A little worse
   - ◯ A lot worse
   - ◯ Prefer not to answer

4. **Which of the following describes the interior conditions of your house? Would you say your house is: (check all that apply)**
   - ◯ Crowded with too many people
   - ◯ Lonely with not enough people
   - ◯ Too noisy
   - ◯ Too quiet
   - ◯ Too hot inside
   - ◯ Too cold inside
   - ◯ Inside air is too dry
   - ◯ Inside air is too humid/damp
   - ◯ Unsafe. Please specify what makes your home unsafe: _____
   - ◯ Unhealthy. Please specify what makes your home unhealthy: _____
   - ◯ Comfortable
   - ◯ Safe
   - ◯ Healthy
   - ◯ Prefer not to answer

5. Have you experienced any of the following since the stay-at-home order began? Please check all that apply.

- ◯ Loss of employment, benefits or other income
- ◯ Loss of health insurance
- ◯ Disruption of mental or physical healthcare or treatment
- ◯ Difficulty paying for rent, mortgage or other housing costs
- ◯ Eviction, foreclosure or other involuntary housing loss
- ◯ Difficulty paying for food, medicine, or utilities
- ◯ Utility shut-off
- ◯ Difficulty paying for other expenses
- ◯ Difficulty getting food, medicines or other necessities for reasons other than cost
- ◯ Loneliness
- ◯ Worsening mental health
- ◯ Loss of a friend or family member to COVID-19
- ◯ Other hardships or difficulties not listed: _____
  _____
  _____
  _____
  _____
- ◯ None of the above

Participant ID: _____

Please return this survey in the enclosed envelope.
Thank you!

Appendix D

FOCUS GROUP QUESTIONS

We'll ask follow up questions about your experience with PUSH Green, the COVID-19 pandemic, and conditions in your home and neighborhood. Your participation will help us understand even better how we can improve the PUSH Green program for others in our community.

THE PUSH GREEN MODEL

Can read aloud or silently the newspaper article about a PUSH Green house in Kenmore

1. **After hearing about the Uminski family's experience, we'd like you to think about how their experience of PUSH Green compares to your own, including your own thoughts about having a community energy advocate, your experience with contractors, and the PUSH Green program model. How was your experience of PUSH Green similar or different to theirs?**

2. **What do you think PUSH Green could do differently to improve the program?**

3. **How has the program impacted your life or your neighborhood as a whole? Did working with PUSH Green expand your knowledge of weatherization and its benefits, including health, safety, climate change, and your house as a system? Did you become more involved in environmental, social or community issues after working with PUSH Green?**

IDENTIFYING CAPACITIES AND CHALLENGES

(In interviews, people described mental and physical health challenges, risks associated with being frontline workers, stress from condition of home and energy appliances, policy-related challenges like govt response to pandemic and energy policy, thermal discomfort in the home, losing employment, losing other services due to unemployment, using public and outdoor spaces as a break from home, thermal comfort due to PUSH services, mutual aid and volunteerism)

4. **What is protecting us and keeping us comfortable during the pandemic? How has PUSH-Green contributed to this?**
   In our homes?
   In our communities?
   Inside and outside?

5. **What are the biggest challenges in our households and communities?**
   In our homes?
   In our communities?
   Inside and outside?

VISION

6. **What would a COVID-safe and comfortable home look like for you?**
7. **What would a COVID-safe and comfortable community look like?**
8. **What do we need to know to ensure that our homes and communities are COVID-safe and comfortable?**

(People expressed lack of information about COVID, and about PUSH's programs, PUSH-involvement in work that was done to their home)

TAKING THE NEXT STEPS

9. **What could be done to make us safer and more comfortable?**
   In our homes?
   In our communities?
   Inside and outside?

10. **How could PUSH play a role in this?**

Sources

1 Erie County, Department of Health, accessed October 4, 2021, *Erie County, New York Community Health Assessment 2019-2022*, http://www2.erie.gov/health/sites/www2.erie.gov.health/files/uploads/pdfs/cha.pdf, 27-28.

2 Greater Buffalo Racial Equity Roundtable, June 2018, *The Racial Equity Dividend: Buffalo's Great Opportunity* (report), https://racialequitybuffalo.org/racial-equity-dividend-report/download-full-report/.

3 PolicyLink and the University of Southern California Program for Environmental and Regional Equity, accessed October 4, 2021, *Advancing Health Equity and Inclusive Growth in Buffalo* (report), https://www.policylink.org/resources-tools/advancing-health-equity-and-inclusive-growth-in-buffalo.

4 Jeff Preval, "Buffalo housing stock named the oldest in the country," *WGRZ News*, March 27, 2019, https://www.wgrz.com/article/news/local/buffalo-housing-stock-the-oldest-in-the-country/71-5c470297-533f-4180-ab84-f7980c2bfa90.

5 David Robinson, "Why you'll pay more to heat your home this winter-but still less than a decade ago." *The Buffalo News*. October 7, 2021, https://buffalonews.com/business/local/why-youll-pay-more-to-heat-your-home-this-winter-but-still-less-than-a/article_fc3381a4-2776-11ec-b1b0-0f49ac30d72d.html

6 PolicyLink and the University of Southern California Program for Environmental and Regional Equity, *Advancing Health Equity and Inclusive Growth in Buffalo*, 67-85.

7 Robert Wood Johnson Foundation, Centers for Disease Control and Prevention (CDC), and CDC Foundation, *500 Cities Project--Local Data for Better Health 2014: Buffalo, NY*, (report, n.p., 2016), https://ppgbuffalo.org/files/documents/health/500_cities_project-_local_data_for_better_health__buffalo__ny.pdf

8 U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion (ODPHP), accessed September 9, 2021, *Tools for Action: Browse Evidence-Based Resources*, https://health.gov/healthypeople/tools-action/browse-evidence-based-resources.

9 U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion (ODPHP), accessed September 9, 2021, *Social Determinants of Health*, https://health.gov/healthypeople/objectives-and-data/social-determinants-health.

10 U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion (ODPHP), accessed September 9, 2021, *Tools for Action: Browse Evidence-Based Resources*, https://health.gov/healthypeople/tools-action/browse-evidence-based-resources

11 Bruce Tonn, Erin Rose, Beth Hawk, and Brian Conlon, September 2014, *Health and Household-Related Benefits Attributable to the Weatherization Assistance Program (ORNL/TM-2014/345)*, (report, Oak Ridge, Tennessee: Oak Ridge National Laboratory, 2014), https://weatherization.ornl.gov/wp-content/uploads/pdf/WAPRetroEvalFinalReports/ORNL_TM-2014_345.pdf, 2.

12 Tonn et al., 10.

13 Brady Seals and Andy Krasner, 2020, "Gas Stoves: Health and Air Quality Impacts and Solutions." Rocky Mountain Institute. https://rmi.org/insight/gas-stoves-pollution-health.

14 Tonn et al., 2.

15 Tonn et al., 8.

16 Peggy Reynolds, Susan Hurley, Erika Garcia, Debbie Goldberg, Andrew Hertz, and David O. Nelson, 2013, "Hazardous Air Pollutants and Risk of Breast Cancer Among a Cohort of California Teachers." Paper presented at the *International Society for Environmental Epidemiology's Annual Meeting, Environment and Health – Bridging South, North, East and West, Basel, Switzerland, August 19-23, 2013.* https://ehp.niehs.nih.gov/doi/10.1289/isee.2013.P-2-05-15.

17 Hong Chen, Richard T. Burnett, Jeffrey Kwong, Paul J Villeneuve, Mark Goldberg, Robert Brook, Aaron van Donkelaar, Michael Jerrett, Randall V. Martin, Jeffrey Brook, and Ray Copes, 2013, "Risk of Incident Diabetes in Relation to Long-term Exposure to Fine Particulate Matter in Ontario, Canada." Paper presented at the *International Society for Environmental Epidemiology's Annual Meeting, Environment and Health – Bridging South, North, East and West, Basel, Switzerland, August 19-23, 2013.* https://ehp.niehs.nih.gov/doi/10.1289/isee.2013.O-1-26-02.

18 Ying-Ying Meng, Susan Babey, Melissa Pickett, and Joelle Wolstein, 2013, "Do Air Pollution Exposure and Food Environment Impact Overweight/Obesity?" Paper presented at the *International Society for Environmental Epidemiology's Annual Meeting, Environment and Health – Bridging South, North, East and West, Basel, Switzerland, August 19-23, 2013.* https://ehp.niehs.nih.gov/doi/10.1289/isee.2013.O-2-38-01.

19 Taina Siponen, Tarja Yli-Tuomi, Minna Aurela, Risto Hillamo, Maija-Riitta Hirvonen, Kati Huttunen, Juha Pekkanen, Raimo O Salonen, Pauliina Taimisto, Pekka Tiittanen, and Timo Lanki, 2013, "Sources of Fine Particulate Air Pollution and Systemic Inflammation." Paper presented at the *International Society for Environmental Epidemiology's Annual Meeting, Environment and Health – Bridging South, North, East and West, Basel, Switzerland, August 19-23, 2013.* https://ehp.niehs.nih.gov/doi/10.1289/isee.2013.P-2-06-16.

20 Deborah A. Frank, 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* 118, no. 5 (2006): e1293-e1302, https://doi.org/10.1542/peds.2005-2943.

21 Eunjeong Kim, HyeSook Park, Yun Chul Hong, Mina Ha, Yangho Kim, Boong-Nyun Kim, Byung-Mi Kim, Eun-Kyo Park, and Eun-Hee Ha, 2013, "Prenatal PM10 and NO2 on infant neurodevelopment at 6, 12 and 24 months of age: Mothers and Children's Environmental Health (MOCEH) study." Paper presented at the *International Society for Environmental Epidemiology's Annual Meeting, Environment and Health – Bridging South, North, East and West, Basel, Switzerland, August 19-23, 2013.* https://ehp.niehs.nih.gov/doi/10.1289/isee.2013.O-3-08-02.

22 Charles Weschler, 2013, "Physical-chemical properties governing the distribution of organic compounds in indoor environments." Paper presented at the *International Society for Environmental Epidemiology's Annual Meeting, Environment and Health – Bridging South, North, East and West, Basel, Switzerland, August 19-23, 2013.* https://ehp.niehs.nih.gov/doi/10.1289/isee.2013.S-1-15-01.

23 Tonn et. al., 16.

24 Erin Rose, et.al., September 2015, Exploring Potential Impacts of Weatherization and Healthy Homes Interventions on Asthma-Related Medicaid Claims and Costs in a Small Cohort in Washington State (ORNL/TM-2015-213), (report, Oak Ridge, Tennessee: Oak Ridge National Laboratory, 2015), https://weatherization.ornl.gov/wp-content/uploads/pdf/WAPRecoveryActEvalFinalReports/ORNL_TM-2015_213.pdf

25 Tonn et. al., 26.

26 Centers for Disease Control (CDC), 2005, "Hypothermia related deaths—United States, 2003-2004." *Morbidity and Mortality Weekly Report,* (February 2005), https://www.cdc.gov/mmwr/preview/mmwrhtml/mm5407a4.htm.

27 Sara Hayes, Cassandra Kubes, and Christine Gerbode. *Making health count: Monetising the health benefits of in-home services delivered by energy efficiency programs,* (report, Washington, DC: American Council for an Energy-Efficient Economy, 2020), www.aceee.org/researchreport/h2001.

28 National Institutes of Health, National Institute of Mental Health (NIMH), accessed September 9, 2021, *Five Things You Should Know About Stress, Publication No. 19-MH-8109,* https://www.nimh.nih.gov/sites/default/files/documents/health/publications/stress/19-mh-8109-5-things-stress.pdf

29 Tonn et. al., 10.

30 Christine Liddell, 2013, "Tackling Fuel Poverty: Mental Health Impacts and Why These Exist." Paper presented at the *Roundtable on the Health and Well-Being Impacts of Energy Efficiency Improvements, Copenhagen, Denmark, April 18-19, 2013.* https://www.iea.org/events/roundtable-on-the-health-well-being-impacts-of-energy-efficiency-improvements

31 Tonn et. al., 11.

32 U.S. Department of Health and Human Services, Office of Disease Prevention and Health Promotion (ODPHP), accessed September 9, 2021, *Economic Stability,* https://health.gov/healthypeople/objectives-and-data/browse-objectives/economic-stability.

33 Tonn et. al., 58.

34 Isaac Chotiner, "The Interwoven Threads of Inequality and Health," *The New Yorker,* April 14, 2020, https://www.newyorker.com/news/q-and-a/the-coronavirus-and-the-interwoven-threads-of-inequality-and-health.

35 Vann R. Newkirk, II, "Trump's EPA Concludes Environmental Racism Is Real," *The Atlantic,* February 28, 2018, https://www.theatlantic.com/politics/archive/2018/02/the-trump-administration-finds-that-environmental-racism-is-real/554315/.

36 David M. Dutler, Adriana Lleras-Muney, and Tom Vogl, "Socioeconomic Status and Health: Dimensions and Mechanisms," *National Bureau of Economic Research,* Working Paper (September 2008), https://www.nber.org/papers/w14333

37 Bruce Tonn, Erin Rose, Beth Hawk, and Brian Conlon, September 2014, *Health and Household-Related Benefits Attributable to the Weatherization Assistance Program (ORNL/TM-2014/345),* (report, Oak Ridge, Tennessee: Oak Ridge National Laboratory, 2014), https://weatherization.ornl.gov/wp-content/uploads/pdf/WAPRetroEvalFinalReports/ORNL_TM-2014_345.pdf.

38 Chotiner, "Interwoven Threads".

39 Kim Mackrael, "Black Workers in Buffalo Face a Bigger Share of Coronavirus Impact," *The Wall Street Journal,* August 18, 2020, https://www.wsj.com/articles/black-workers-in-buffalo-face-bigger-share-of-coronavirus-impact-11597570201.

40 David M. Dutler, Adriana Lleras-Muney, and Tom Vogl, "Socioeconomic Status and Health: Dimensions and Mechanisms," 4-10.

41 Philippa Howden-Chapman, Anna Matheson, Julian Crane, Helen Viggers, Malcolm Cunningham, Tony Blakely, Chris Cunningham, Alistair Woodward, Kay Saville-Smith, Des O'Dea, Martin Kennedy, Michael Baker, Nick Waipara, Ralph Chapman, and Gabrielle Davie, "Effect of insulating existing houses on health inequality: Cluster randomised study in the community," *BMJ* 334, no. 7591 (2007): 460, https://doi.org/10.1136/bmj.39070.573032.80.

42 Olivia Goldhill, "Coronavirus prevention is far more accessible for the rich," *Quartz,* March 16, 2020, https://qz.com/1818862/coronavirus-prevention-is-far-more-accessible-for-the-rich/

43 Howden-Chapman et al., "Effect of insulating existing houses on health inequality."

44 Mackrael, "Black Workers in Buffalo."

45 Jeff Preval, "COVID-19 health disparity gap for Blacks in Erie County closes," *WGRZ News,* June 18, 2020, https://www.wgrz.com/article/news/health/coronavirus/covid-19-health-disparity-gap-for-blacks-in-erie-county-closes/71-2701d7aa-5419-47b0-a912-93f0c342c878

46 Anna Blatto, *A City Divided: A Brief History of Segregation in Buffalo,* (white paper, Buffalo, NY: Partnership for the Public Good, 2018), https://ppgbuffalo.org/files/documents/data-demographics-history/a_city_divided__a_brief_history_of_segregation_in_the_city_of_buffalo.pdf.

47 Buffalo Center for Health Equity, *Building a Culture of Health & Ending African American Health Disparities 2019 Report,* (report, Buffalo, NY: Buffalo Center for Health Equity, 2019), https://static1.squarespace.com/static/5e02325015c09a59a2d0355a/t/5e335ca58a2c1a258db47003/1580425685702/2019Report.pdf.

48 Michael E. Tuzzo, Elizabeth Gilman, Nicholas B. Rajkovich, Bartholomew Roberts, Ellen Cousins, Sean Daigneault, and Stefan Cecelski, *New York State Climate Hazards Profile,* (report number 18-11a, Buffalo, NY: NYSERDA and University at Buffalo School of Architecture and Planning, June 2018), http://archplan.buffalo.edu/content/dam/ap/PDFs/NYSERDA/New-York-State-Climate-Hazards-Profile.pdf, 22.

49 Ibid., 14-16, 22-25.

50 Ibid., 26.

51 Jeff Preval, "Buffalo housing stock named the oldest in the country," *WGRZ News,* March 27, 2019, https://www.wgrz.com/article/news/local/buffalo-housing-stock-the-oldest-in-the-country/71-5c470297-533f-4180-ab84-f7980c2bfa90.

52 Philippa Howden-Chapman, Anna Matheson, Julian Crane, Helen Viggers, Malcolm Cunningham, Tony Blakely, Chris Cunningham, Alistair Woodward, Kay Saville-Smith, Des O'Dea, Martin Kennedy, Michael Baker, Nick Waipara, Ralph Chapman, and Gabrielle Davie, " Effect of insulating existing houses on health inequality: Cluster randomized study in the community," *British Medical Journal* 334 no. 7591 (2007), 460, https://www.bmj.com/content/334/7591/460.full.

53 Philippa Howden-Chapman, Nevil Pierse, Sarah Nicholls, Julie Gillespie-Bennett, Helen Viggers, Malcolm Cunningham, Robyn Phipps, Mikael Boulic, Pär Fjällström, Sarah Free, Ralph Chapman, Bob Lloyd, Kristin Wickens, David Shields, Michael Baker, Chris Cunningham, Alistair Woodward, Chris Bullen, and Julian Crane, "Effects of improved home heating on asthma in community dwelling children: randomised controlled trial," *British Medical Journal* 337 (2008), a1411, https://doi.org/10.1136/bmj.a1411.

54 Ralph Chapman, Philippa Howden-Chapman, H Viggers, D O'dea, and Martin Kennedy, "Retrofitting houses with insulation: A cost-benefit analysis of a randomized community trial," *Journal of Epidemiology & Community Health* 63 no. 4 (2009), 271-277, http://dx.doi.org/10.1136/jech.2007.070037.

55 Philippa Howden-Chapman, Louise Signal, and Julian Crane, "Housing and health in older people: Ageing in place," *Social Policy Journal of New Zealand* 13 no 13, (1999), 14-30, https://www.researchgate.net/publication/286633515_Housing_and_health_in_older_people_Ageing_in_place

56 Bruce Tonn, Erin Rose, Beth Hawk, and Brian Conlon, September 2014, *Health and Household-Related Benefits Attributable to the Weatherization Assistance Program (ORNL/TM-2014/345),* (report, Oak Ridge, Tennessee: Oak Ridge National Laboratory, 2014), https://weatherization.ornl.gov/wp-content/uploads/pdf/WAPRetroEvalFinalReports/ORNL_TM-2014_345.pdf, 8-10.

57 United States, Environmental Protection Agency, accessed October 4, 2021, *Indoor Air Quality: What are the trends in indoor air quality and their effects on human health?*, https://www.epa.gov/report-environment/indoor-air-quality

58 U.S. Environmental Protection Agency. 1989. Report to Congress on indoor air quality: Volume 2. EPA/400/1-89/001C. Washington, DC.

59 United States, Centers for Disease Control and Prevention, accessed October 4, 2021, *COVID-19: People with Certain Medical Conditions,* https://www.cdc.gov/coronavirus/2019-ncov/need-extra-precautions/people-with-medical-conditions.html.

60 Sam Magavern, *Poverty in Buffalo-Niagara,* (brief report, Buffalo, NY: Partnership for the Public Good, February 2018), https://ppgbuffalo.org/files/documents/poverty_low_wage_work_income_inequality/poverty_buffalo_brief_final.pdf, 5.

61 Sam Magavern, *Poverty in Buffalo-Niagara,* 5.

62 Nicholas B. Rajkovich, Michael E. Tuzzo, Nathaniel Heckman, Krista Macy, Elizabeth Gilman, Martha Bohm, and Harlee-Rae Tanner, *Climate Resilience Strategies for Buildings in New York State* (report number 18-11, Buffalo, NY: NYSERDA and University at Buffalo School of Architecture and Planning, June 2018), http://archplan.buffalo.edu/content/dam/ap/PDFs/NYSERDA/Climate-Resilience-Strategies-for-Buildings.pdf, 42.

63 Paul Ray, Nicholas B. Rajkovich, Michael E. Tuzzo, Martha Bohm, and Bart Roberts, *Regional Costs of Climate-Related Hazards for the New York State Building Sector* (report number 18-11b, Buffalo, NY:NYSERDA and University at Buffalo School of Architecture and Planning, June 2018), http://archplan.buffalo.edu/content/dam/ap/PDFs/NYSERDA/Regional-Costs-of-Climate-Related-Hazards.pdf, 22.

64 Ethan Sacks and Nicole Acevedo, "Move to Buffalo? With Earth Warming, Northern Cities Could Become Oases," *NBC News,* January 24, 2020, https://www.nbcnews.com/science/environment/buffalo-oasis-scientists-say-warmer-earth-could-make-colder-cities-n1113711.

65 Anna Marandi and Kelly Leilani Main, "Vulnerable City, recipient city, or climate destination? Towards a typology of domestic climate migration impacts in US cities," *Journal of Environmental Studies and Sciences* 11 (2021), 465-480, https://link.springer.com/content/pdf/10.1007/s13412-021-00712-2.pdf

66 Kimiko de Freytas-Tamura, "How Neighborhood Groups are Stepping In Where the Government Didn't," *New York Times,* March 3, 2021, https://www.nytimes.com/2021/03/03/nyregion/covid-19-mutual-aid-nyc.html.

67 Nicholas B. Rajkovich et al,, *Climate Resilience Strategies for Buildings in New York State,* 44.

68 Ibid., 14.

69 Ibid., 42.

70 Ibid., 48-50.

71 Ibid, 34-36.

72 Ibid., 16.

73 For a more in-depth review of PUSH's campaigns against National Fuel Gas, see https://ppgbuffalo.org/files/documents/environment/air_pollution_climate_change_energy/environment-_energy_poverty_in_buffalos_west_side.pdf

74 Ibid.

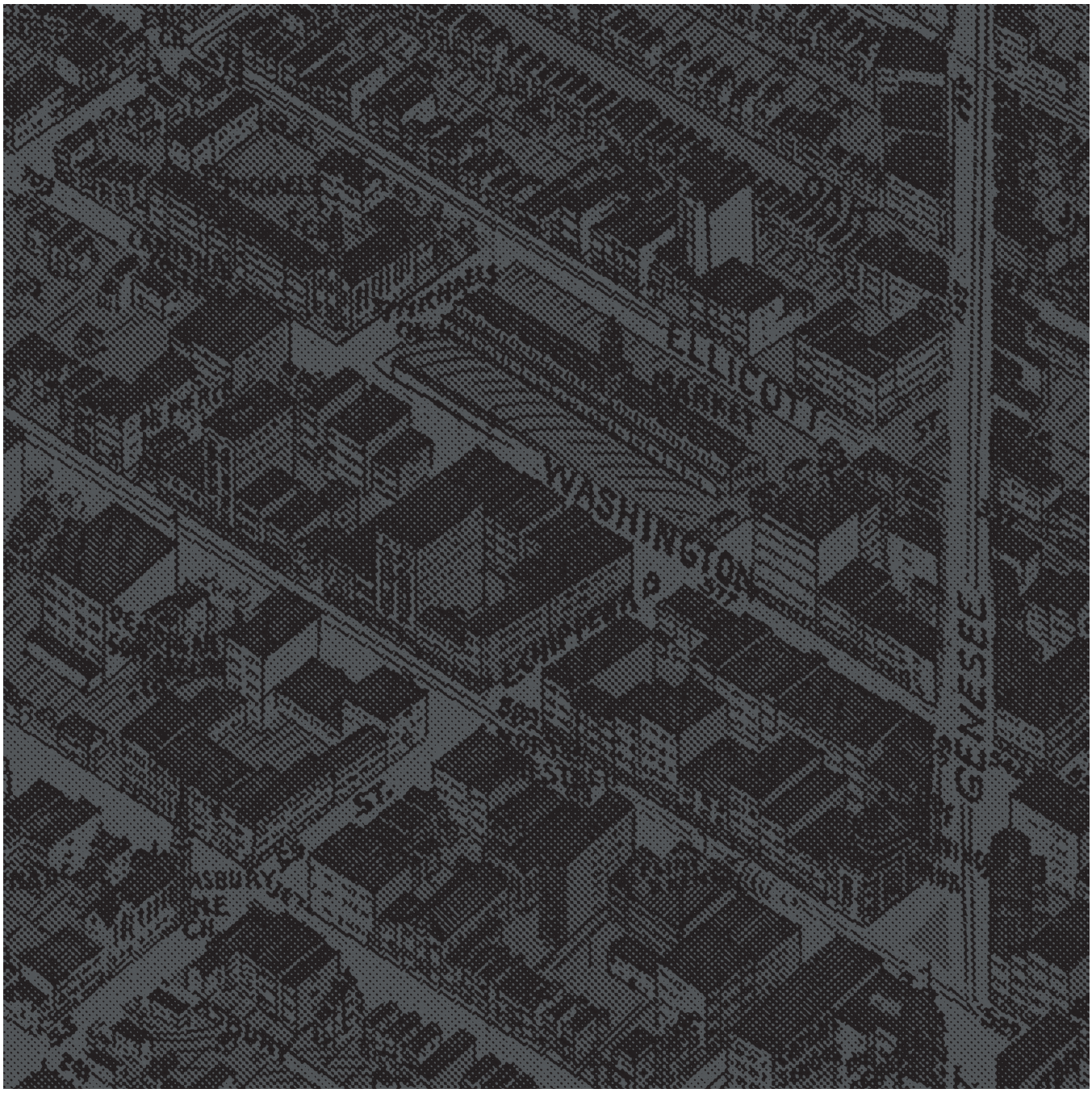
75 Bruce Tonn, Erin Rose, Beth Hawk, and Brian Conlon, September 2014, *Health and Household-Related Benefits Attributable to the Weatherization Assistance Program (ORNL/TM-2014/345*), (report, Oak Ridge, Tennessee: Oak Ridge National Laboratory, 2014), https://weatherization.ornl.gov/wp-content/uploads/pdf/WAPRetroEvalFinalReports/ORNL_TM-2014_345.pdf, 5-6.

76 See https://www.greenandhealthyhomes.org/

77 U.S Department of Energy, "Weatherization Assistance Program," available from https://www.nrel.gov/docs/fy11osti/51242.pdf

78 United States Environmental Protection Agency, *"Greenhouse Gas Emissions from a Typical Passenger Vehicle,"* accessed December 22, 2021: https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle#:~:text=typical%20passenger%20vehicle%3F-,A%20typical%20passenger%20vehicle%20emits%20about%204.6%20metric%20tons%20of,around%2011%2C500%20miles%20per%20year.

79 Michael Mroziak, "City to use ARP money to offer water bill debt relief to qualified households," *WBFO-NPR,* July 2, 2021, https://www.wbfo.org/local/2021-07-02/city-to-use-arp-money-to-offer-water-bill-debt-relief-to-qualified-households



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