



# POWERING OUR HEALTH

## How the Pandemic Impacted Medically Vulnerable Households in Philadelphia

**The Energy Rights Project**  
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Alison Kenner, Morgan Sarao, Andrew  
Rosenthal, Briana Leone, James Adams



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# EXECUTIVE SUMMARY

Reliable and consistent access to electricity is a necessity for medically vulnerable households, or households where someone lives with a chronic disease condition or disability which puts them at an increased risk of harm due to inadequate individual and communal resources. In many cases, medically vulnerable households rely on electric-powered medical devices and technologies that regulate indoor temperature and air quality to care for a person's disease or disability. In Philadelphia, where 21% of children have been diagnosed with asthma, humidifiers and air purifiers are used to ensure good air quality, fans and air conditioning to maintain comfort, and in some cases, nebulizers are used for medication treatments. Caring for other chronic conditions, such as diabetes and hypothyroidism, also requires consistent home electricity access: medications like insulin for treatment of diabetes require refrigeration, and heating and cooling systems are used to help those with hyperthyroidism thermally regulate. Situations that threaten a household's access to electricity, such as unpaid utility bills and subsequent shut-offs or utility service outages, can exacerbate otherwise manageable disease symptoms and push medically vulnerable household members into health crises

This report is based on data collected by the Energy Rights Project; research is funded by the National Science Foundation to study household energy insecurity in Philadelphia. Drawing on data from semi-structured and open-ended interviews, we found that households with individuals who use an electric-powered device to care for a medical condition (EMD) or have temperature related health conditions (TRC) are more likely to experience energy insecurity, and work harder to address their vulnerabilities than other households. In this report we highlight the overlap between energy insecurity and medical vulnerability, and show how the pandemic and climate change exacerbate these compounded vulnerabilities in Philadelphia. We also provide policy suggestions that will help to protect vulnerable households under increasingly precarious and unknown futures.

<sup>1</sup> Community Engagement Core, "A Look at Children's Environmental Health in Philadelphia," October 8, 2020, <https://ceet.upenn.edu/a-look-at-childrens-environmental-health-in-philadelphia/>

# BACKGROUND

Philadelphia is a late industrial city that suffers from high rates of household energy burden, which is defined as the percentage of gross household income spent on energy costs.<sup>2</sup> According to a study conducted by Greenlink Analytics, Philadelphia experiences energy burdens 86% higher than the national average (3.1%); Philadelphian households spend on average around 6.7% of their income on energy. This phenomena can be traced in part to the city's aged housing stock and infrastructural disinvestment in redlined neighborhoods that has produced widespread household energy inefficiency. According to the US Census, 72% of Philadelphia's current housing stock was built more than 60 years ago, and 40% was built before 1940.<sup>3</sup> Other factors contributing to household energy burden include high poverty rates in Philadelphia, with many households living on limited or fixed incomes. Research has also shown that households in predominantly Black neighborhoods also experience higher energy burdens.<sup>4</sup>

As an analytic category, however, “energy burden” only accounts for economic dynamics. Many more households experience energy insecurity, which is defined as the variable circumstances and processes that lead to barriers for households to access sufficient and affordable energy.<sup>5</sup> Households may oscillate in and out of positions of energy insecurity depending on different factors that affect home energy usage and affordability, including seasonal changes that create different energy needs; changes in the number of household members; evolving medical needs or a disease condition that requires additional energy services; and structural factors such as local energy rates, federal assistance guidelines, extreme weather events or the COVID-19 pandemic. Retired and elderly community members are also more likely to experience energy insecurity because of fixed incomes and a greater likelihood of energy intensive medical needs.

Medically vulnerable households tend to overlap with households experiencing energy insecurity, as the medically vulnerable depend on affordable energy access for home medical care and to prevent conditions that can create harm, such as temperatures that are too hot or cold, or poor indoor air quality. This means that medically vulnerable households may have greater energy needs, due to a dependence on electric-powered systems to maintain their health and treat disease conditions. This results in higher energy bills.

<sup>2</sup> American Council for an Energy Efficient Economy, “Energy Burdens in Philadelphia,” 2020

<sup>3</sup> US Census Bureau, American Community Survey, table CP04- Comparative Housing Characteristics

<sup>4</sup> “Philadelphia Energy Burden Report,” Greenlink Equity Map, February 2021, <https://www.equitymap.org/philadelphia-energy-burden-impacts>.

<sup>5</sup> Day, Rosie, and Gordon Walker. “Household vulnerability as ‘assemblage’.” *Energy Justice in a Changing Climate: Social Equity Implications of the Energy and Low-Carbon Relationship*, Zed Books, London/New York (2013): 14-29.

# BACKGROUND

In Philadelphia, neighborhoods that experience environmental injustices that led to disproportionate health inequities – such as more severe air pollution due to their proximity to highways and industrial sites leading to higher rates of respiratory disease<sup>6</sup> – also tend to be neighborhoods with poorer housing stock as a legacy of discriminatory housing policies.<sup>7</sup> This means that these homes tend to have much higher bills, due to a combination of medical needs within the home that require energy intensive care, and the building's inefficiency.

There are assistance programs in place for households that are energy burdened in Philadelphia, though many households-in-need are unable to access such programs due to rigid eligibility requirements. Grant programs like the federally-funded Low Income Household Assistance Program (LIHEAP) and Philadelphia's local program, the Utility Emergency Services Fund (UESF), provide households with funds to pay down utility bills, often when a household is already at the point of an energy crisis – which often stems from financial hardship. Utility companies also offer payment plan programs for qualifying customers.

In addition to financial assistance programs, Philadelphia's Basic Systems Repair Program and the federal Weatherization Assistance Program can help make homes more energy efficient through improvements to the building shell or by updating appliances. This makes thermal regulation easier while reducing utility costs for households with a high energy burden.

Medical certificates can be obtained by households with members who have medical conditions that require home energy access, which allows a medically vulnerable household to maintain utility service if they have a shut-off notice. However, medical certificates are only valid for a maximum of 30 days, and must be renewed by a medical professional at the end of a 30 day period to avoid service shut-off. Less direct programs also help Philadelphia households navigate energy insecurity. For example, in summer, the City opens public air conditioned spaces called cooling centers during heat health emergencies.<sup>8</sup>

<sup>6</sup> WHY?, "Why the air quality in Philly might be worse than we know", 2021

<sup>7</sup> WHY?, "If you don't trust the air you're breathing, keep reading", 2021

<sup>8</sup> The City of Philadelphia declares a Heat Health Emergency when the temperature gets high enough that vulnerable populations are at an increased risk of getting sick or dying from the heat. When a Heat Health Emergency is declared, several city services are activated, such as the opening of cooling centers, and a 'heatline' which residents can call to get health and safety tips and to talk to medical professionals to discuss conditions and illnesses made worse from the heat.

# BACKGROUND

Neither assistance programs nor city-sponsored cooling centers were adequately prepared for the pandemic, however, and were especially ill prepared for the pandemic's overlap with the growing impacts of climate change in Philadelphia. With many medically vulnerable households forced to isolate in their homes for months at a time, the home became the primary and often only safe location to care for medical needs, leading to higher energy bills for vulnerable populations and less vulnerable populations alike. Federal, state, and local actors attempted to modify energy assistance programs so that they were responsive to pandemic induced energy needs by extending deadlines to apply for assistance programs, mandating state-wide moratoriums on utility shut-offs,<sup>9</sup> creating new streams of financial assistance programs such as the Emergency Rental Assistance Program (ERAP), and training<sup>10</sup> staff at local community organizations to do remote intake for assistance programs. However, with the indefinite nature of the COVID-19 pandemic, more households have found themselves living with energy insecurity; accommodations made during the initial months of the COVID-19 pandemic were finite, although COVID-19 harms persist alongside increasingly detrimental impacts of climate change.



*"Respiratory monitor being used at Hiwane Health Center, Hintalo Wajirat woreda, Tigray Region." by UNICEF Ethiopia is licensed under CC BY-NC-ND 2.0.*

<sup>9</sup> PUC, "PUC Actions Related to COVID-19", <https://www.puc.pa.gov/about-the-puc/puc-actions-related-to-covid-19/>

<sup>10</sup> Pennsylvania Downtown Center, "PA Launches Emergency Rental Assistance Program". <https://padowntown.org/article/pa-launches-emergency-rental-assistance-program/>

# BACKGROUND

To understand how large-scale crises impact household energy insecurity, the Energy Rights Project investigated household energy insecurity in Philadelphia over an eighteen month period. Between March of 2020 and May 2021, we conducted 237 semi-structured interviews with individuals recruited from PGW and Grandom Oil energy conservation workshops, as well as a field school based out of Drexel University. During the summer of 2021, the Energy Rights Project, in partnership with the Energy Coordinating Agency, hosted 15 energy conservation workshops at community centers across Philadelphia; 103 individuals were recruited from these workshops for open-ended interviews.

Data collected from our survey and interview projects show that medically vulnerable households and energy insecurity in Philadelphia are inextricably linked. In our study, we identified two categories of households that could be identified as medically vulnerable. The first group includes households where someone lives with a medical condition that is affected by the temperature in the home; 36 out of 231 households (15.52%) fell into this group. The second group includes households where someone uses an electric-powered device to care for a medical condition; 54 out of 229 households (23.48%) fell into this group. For the rest of this paper these two groups will be referred to as households with temperature-related health conditions (TRC) and households with electric-powered medical devices (EMD), respectively. There is some overlap between these two groups; 18 out of 229 respondents (7.83%) have or live with someone that has a temperature-related health condition and also reported that someone in their household uses a medical device powered by electricity.

**"I've had two heart attacks and I've had a stroke. When I had a stroke, I was put on a blood thinner, and I get really really cold. But other than that, I'm fine. I live a normal life. I do have a monitor that my doctors can see. They check my heart while I'm sleeping at least two times a week. I fought it for a long time... I didn't want to have it, but after my stroke they wanted it. And I gave in. The device is powered exclusively by being plugged into an outlet."**



# BACKGROUND

To address these compounding vulnerabilities and the structural factors that contribute to them, we recommend a series of policy changes, tailored education and outreach, and pilot programs focused on alleviating and preventing future burdens that are experienced by vulnerable households. First, federal and utility-sponsored assistance program eligibility requirements should be expanded so that they reach a larger threshold of vulnerable households; these changes are long overdue and have been demanded by housing and energy rights advocates for more than a decade.<sup>11</sup> These programs must also be promoted through new avenues, as households that did not need assistance prior to the pandemic may now be eligible for these programs. Second, households should be made aware of ways that they can remain connected to utility service even if they are unable to pay their bills, such as by obtaining a medical certificate that will prevent utility shut-offs in their home. Households with members who are medically vulnerable have become more acutely burdened during the pandemic, for example, as they are staying in their home for longer periods of time, and using more energy, to prevent medical emergencies and reduce risk of COVID-19 contraction. Yet our study found that few households were aware of medical certificates. Third, education and affordable pathways to obtain solar energy for low-income households can help to lower energy bills and also help to ensure more reliable utility service. Finally, and in accordance with the City of Philadelphia's plan to decarbonize Philadelphia Gas Works, pilot programs for geothermal microgrids, which will update home heating and cooling infrastructures, create more reliable energy service, and reduce fossil fuel pollution, should be prioritized in neighborhoods with greater proportions of vulnerable households.



Image Citation: h080. "Solar nearly finished on the small roof". Flickr. June 6, 2011. Accessed August 29, 2022. <https://flic.kr/p/a1S32L>

<sup>11</sup> NEADA, "State LIHEAP Agency Responses to the COVID-19 Pandemic", 2020



# KEY FINDINGS

- 31% of structured interview respondents live in a medically vulnerable household (72 out of 231).
- Thirty-six respondents from the structured interviews (15%) have or live with someone who has a medical issue caused by or worsened by the temperature in the home.
- Fifty-four respondents (23.48%) from the structured interviews reported that someone in their household uses a medical device that is powered by electricity.
- Respondents with electric-powered medical devices in their home reported more electricity disruptions during the pandemic than those without such devices.
- In the structured interviews, respondents in households with temperature-related health issues were far more likely to have received a shutoff notice than respondents without temperature-related health issues.
- Respondents from the structured interviews with electric-powered medical devices in their home reported higher electricity bills.
- In the structured interviews, respondents from households with medical powered devices who saw their utility bills increase were more likely to make partial payments on their bills during the COVID-19 pandemic than those without such devices.
- In structured interviews, respondents in households with temperature-related medical issues and households with electric-powered medical devices were more likely to have signed up for an energy assistance program before the COVID-19 pandemic and to be aware of programs that could assist them during the pandemic.
- In structured interviews, respondents from households with temperature-related medical issues and households with electric-powered medical devices were more likely to have deferred maintenance on their home due to COVID-19.
- Forty out of 103 (38.83%) respondents from the open-ended interviews rely on electric-powered cooling devices, such as air conditioning units, to cope with extreme heat in Philadelphia.

# THE STRUCTURAL DYNAMICS OF ENERGY INSECURITY

Before discussing our study's findings regarding the relationship between medical vulnerabilities and energy insecurity, we detail some of the primary structural factors that exacerbate this relationship.

## Energy Burden

**"Energy Burden is defined as the percentage of gross household income spent on energy costs." (US Department of Energy)**

A household's energy burden is the percentage of income spent on home energy bills. According to the American Council for an Energy Efficient Economy (ACEE), certain households have disproportionately higher energy burdens, such as Black, Hispanic, Native American, older adults (65+), renters, and low-income multifamily building residents. In Philadelphia, a quarter of low-income households have an energy burden above 19%, which is almost 6 times higher than the median energy burden, and a higher energy burden is more common in Black, indigenous and Hispanic households. For example, 39% of Black households (211,731) and 45% of Hispanic households (69,345) in the Philadelphia metropolitan area experience a high energy burden (above 6%).<sup>12</sup> Factors leading to a high energy burden in Philadelphia's households are manifold, including city-wide aged housing stock, high poverty rates, and utility unaffordability. High energy burden does not exist in isolation, and typically exacerbates other issues of social equity, such as health disparities and environmental injustices.

**"If I lost power during a heatwave I'd suffocate and I would cry because I'm asthmatic and it would be hard for me to breathe."**

<sup>12</sup> American Council for an Energy Efficient Economy, "Energy Burdens in Philadelphia," 2020.

# THE STRUCTURAL DYNAMICS OF ENERGY INSECURITY

## Housing

**"HUD defines *cost-burdened families* as those 'who pay more than 30 percent of their income for housing' and 'may have difficulty affording necessities such as food, clothing, transportation, and medical care.'"  
(US Department of Housing and Urban Development)**

Unaffordable housing is a widespread problem in Philadelphia. According to a study conducted by Pew Charitable Trusts, 40% of Philadelphia households spent at least 30% of their income on housing costs in 2018, meaning they met the federal standard of being cost-burdened. The housing costs calculated by the US census do not include home maintenance and repair expenses, however, meaning the number of cost-burdened households is likely much higher due to Philadelphia's aged housing stock. Because the median age of a house in Philadelphia is 93 years old, many homes are energy inefficient and require significant maintenance projects in addition to routine upkeep. A poll conducted by Pew in 2019 found that 56% of Philadelphia homeowners had made significant improvements to their homes, such as roof or heating system upgrades or repairs, in the previous two years. This poll also found that lower income households, the households which are most likely to experience medical vulnerability and energy insecurity, indefinitely deferred repairs on their home due to financial constraints or had to make sacrifices in other areas of their life in order to afford such repairs.<sup>13</sup>

**"I'm asthmatic, chronic. My nebulizer plugs into an outlet. Keeps me from going to a hospital."**

<sup>13</sup> "The State of Housing Affordability in Philadelphia," The Pew Charitable Trusts, September 10, 2020, <https://www.pewtrusts.org/en/research-and-analysis/reports/2020/09/the-state-of-housing-affordability-in-philadelphia>.

# THE STRUCTURAL DYNAMICS OF ENERGY INSECURITY

## Climate Change

The main risks that climate change poses to Philadelphia are increased precipitation, flooding, and extreme heat events. These impacts will cause more severe harm to lower income communities and communities of color. Neighborhoods like Cobbs Creek, Point Breeze, Strawberry Mansion, and Hunting Park are among the hottest and most heat vulnerable neighborhoods in Philadelphia, largely due to lower tree canopy and fewer green spaces, more exposed asphalt and dark surfaces, and a history of red-lining and disinvestment that have contributed to aged housing stock in those neighborhoods.<sup>14</sup> During periods of extreme heat, households in these communities rely on electric powered cooling devices such as fans or air conditioning units to be comfortable in their homes, and in the case of households with TRC, these devices help to ensure that household members remain healthy. Households with EMD, who require consistent access to electricity to treat health conditions at home, are also impacted by extreme heat, particularly if intermittent power outages become more routine in the summer. As the effects of climate change become more severe and cause disproportionate impacts for households that are also at higher risk for energy and medical vulnerability, it's important to identify the unique harms that the compounded nature of these inequities create, and create safeguards that will protect communities at risk.

**"I get sick when I get really hot, but usually as long as the utilities are working, I don't get sick in the house but if I couldn't turn on the fan or AC I would get vertigo very badly."**

<sup>14</sup> Rep. "Beat the Heat Hunting Park." Philadelphia Office of Sustainability, 2019.

# The Intersections of Medical Vulnerability & Energy Insecurity

Our study found that medically vulnerable households were more likely to experience conditions that relate to energy insecurity. For example, medically vulnerable households were more likely to have experienced service disruptions both prior to and during the pandemic; they were also more likely to report pre-pandemic utility shut-offs than non-medically vulnerable households.

Medically vulnerable households were also more likely to report higher utility bills during the pandemic; stay-at-home orders followed by a shift to remote living and working led to more time spent in domestic environments, and thus, greater household energy usage. The amount of time spent at home may have been greater for people with existing medical conditions or risk factors that would have made COVID-19 more dangerous. Utility bills, of course, were not the only area where households saw increased expenses. Higher grocery bills and the need to purchase PPE, such as masks, cleaning products, and hand sanitizer, pushed monthly bills up as well.

While medically vulnerable households were more likely to be aware of federal and local assistance programs, many such programs are difficult to qualify for and not all medically vulnerable households will be eligible. Our study found that medically vulnerable households were more likely to make partial payments on utility bills, and thus are more likely to accumulate utility debt, which exacerbates existing financial and emotional burdens.



*"Silhouette of Asthma" by KristyFaith is licensed under CC BY-NC-ND 2.0.*

# The Intersections of Medical Vulnerability & Energy Insecurity

In addition to experiencing higher rates of energy service disruptions and financial burdens related to utility bills, medically vulnerable households also experience more burdens relating to their home's energy efficiency, which contribute directly to energy insecurity and thermal comfort. Although medically vulnerable households were more likely to be familiar with the federal Weatherization Assistance Program (WAP), which provides free energy efficiency improvements to low-income homes, only slightly more medically vulnerable households have gotten their home weatherized through WAP than non-medically vulnerable households. This again may point to the reality that many medically vulnerable households do not qualify for available assistance programs under current eligibility criteria. Medically vulnerable households were also more likely to defer maintenance projects on their home during the pandemic, which, depending on the severity and urgency of the maintenance being deferred, can increase household energy usage, create risky indoor conditions, and lead to more extensive damage to the building shell, for example. For those who spend more time at home – especially during the COVID-19 pandemic – because of disability, illness, or age, deteriorating or damaged home infrastructure compounds the risks that medically vulnerable households face.

The following sections provide more in-depth explanations for these findings, specifically, the greater likelihood of utility disruptions, higher bills and expenses; awareness and use of energy assistance programs as well as additional coping mechanisms; and the likelihood of weatherization, thermal comfort, and deferred maintenance.



(Kimberly Paynter/WHYY)

# Energy Disruptions & Medical Vulnerabilities

TRC households were more likely to have experienced heat loss both before and during the pandemic than other households. Similarly, EMD households were more likely to have experienced electricity disruptions both before and during the pandemic.

## HEAT LOSS

Heat loss can occur for a variety of reasons, including service outages, a heater breaking, or a utility shut-off. Heat loss is particularly dangerous for people who require thermal regulation for disease management, such as a specific and consistent home temperature in order to maintain their health or avoid symptoms.

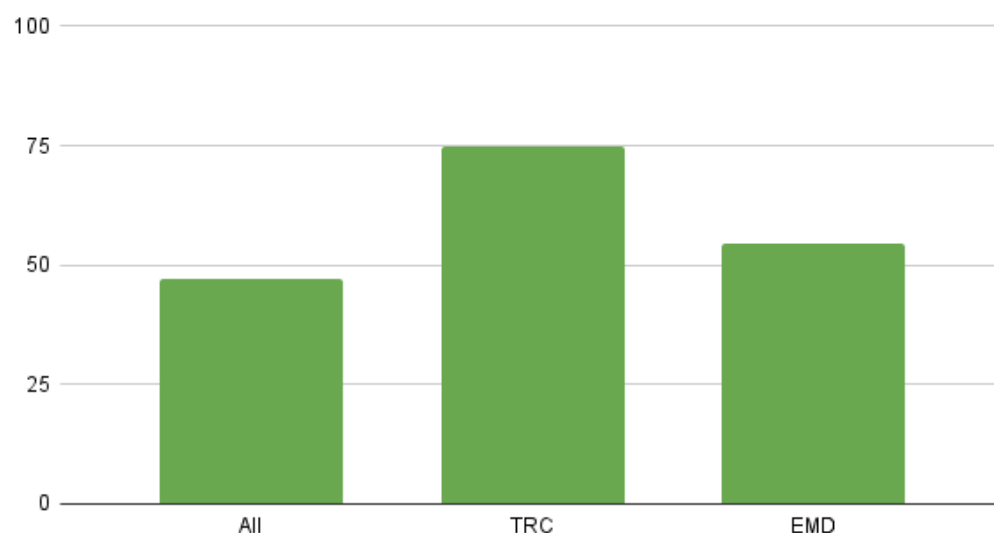
### Households who reported experiencing heat loss in their homes prior to the pandemic:

- 109 out of 231 (47.9%) households have lost heat in their homes.
- 27 out of 36 (75%) TRC households have lost heat in their homes before.
- 31 out of 54 (57.1%) EMD households have lost heat in their homes before.

For individuals that require a specific temperature in order to manage a medical condition, prolonged heat loss means that they have lost a necessary tool to manage their health. As shown above, both TRC and EMD households were much more likely to have reported an experience of heat loss at some point in time prior to the pandemic.

Of the 20 households who reported heat loss during the pandemic (out of 231 total households), 12 were medically vulnerable; six were TRC and seven were EMD households. In other words, medically vulnerable respondents were more likely than non-medically vulnerable households to have experienced heat loss during the first eighteen months of the pandemic.

Households reporting heat loss prior to the COVID-19 pandemic



*This graph shows the percentage of households that reported heat loss at some point prior to the pandemic.*



# Energy Disruptions & Medical Vulnerabilities

## POWER OUTAGES

Consistent access to electricity is something we often take for granted. For most households, the majority of power outages can be considered little more than a mild annoyance, but for households that make frequent use of electric-powered devices to manage health, a prolonged power outage could have dire consequences.

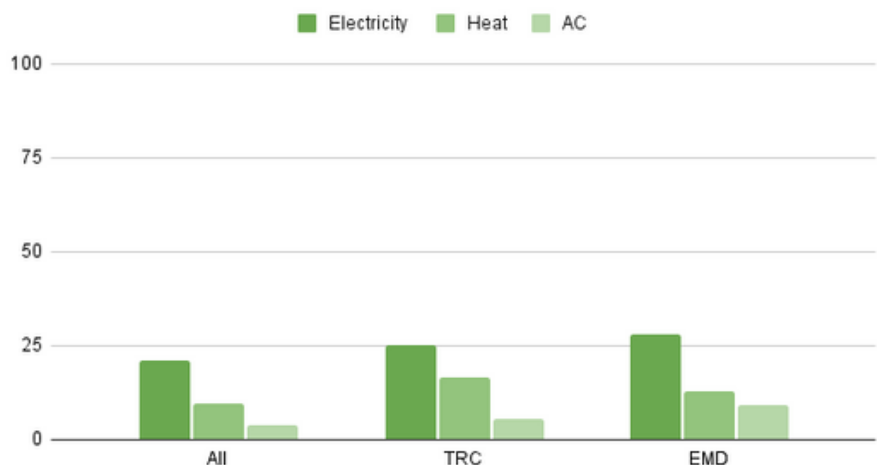
### Households that reported a power outage during the COVID-19 pandemic:

- 49 out of 231 households (21.21%) had experienced a power outage since the start of the pandemic.
- 9 out of the 36 TRC households (25%) had experienced a power outage since the start of the pandemic.
- 15 out of 54 EMD households (27.78%) had experienced a power outage since the start of the pandemic.

Even if these outages do not last very long, certain health conditions like COPD and asthma can flare up at any time. Other medical conditions require a consistent thermal temperature or good air quality to prevent symptoms, and thus rely on air conditioning, fans, humidifiers, space heaters, or dehumidifiers, for example. As shown in the chart below, both TRC and EMD households were more likely to report a heat loss and a disruption that impacted air conditioning than non-medically vulnerable households.

It is worth noting that 47 out of the 54 EMD households reported that the device being used to care for a medical condition is powered exclusively by an outlet. This means that 87% of EMD households would not be able to use their device during an electricity outage. It should also be noted that service outages also increase the risk of a power surge, which can render electric devices inoperable if not properly secured. While the outage itself does not cause a power surge, a sudden jump in current when power returns can damage any device not plugged into a surge protector.

Households reporting a power outages since March 2020



*This graph shows the percentage of households that reported a power outage since the beginning of the pandemic.*

# Energy Disruptions & Medical Vulnerabilities

## UTILITY SHUTOFFS

The threat of a utility shutoff is a key indicator of household energy insecurity, and medically vulnerable households were more likely to have received utility shut-off notices.

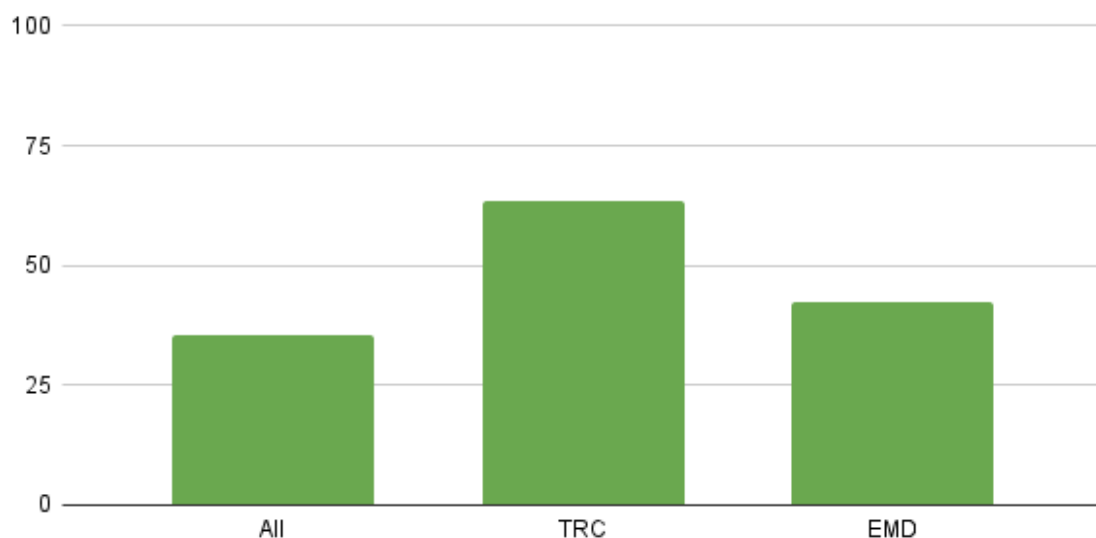
### Households that reported receiving a utility shutoff notice prior to the pandemic:

- 82 out of 232 households (35.35%) had received a utility shutoff before the pandemic.
- 23 out of 36 TRC households (63.39%) had received a utility shutoff notice before the pandemic.
- 23 out of 54 EMD households (42.31%) had received a utility shutoff notice before the pandemic.

TRC households were much more likely to have received a utility shutoff notice than non-medically vulnerable households and even EMD households.

It should come as no surprise that a utility shutoff notice increases stress and often forces households to sacrifice basic needs (such as groceries) or forces customers to forgo paying other bills in order to maintain access to energy services. When we asked people what they would do if their household received a utility shutoff notice and did not have the means to pay their bill, responses ranged from contacting and negotiating with the utility company, seeking government assistance, reaching out to an energy assistance organization, such as Philadelphia's Neighborhood Energy Centers, as well as more informal strategies such as borrowing money from friends and family, taking out a loan, or even letting the shutoff occur and paying the bill when possible.

Households that received a utility shutoff notice prior to the COVID-19 pandemic



*This graph shows the percentage of households that reported a utility shutoff notice prior to the pandemic.*

# Energy Disruptions & Medical Vulnerabilities

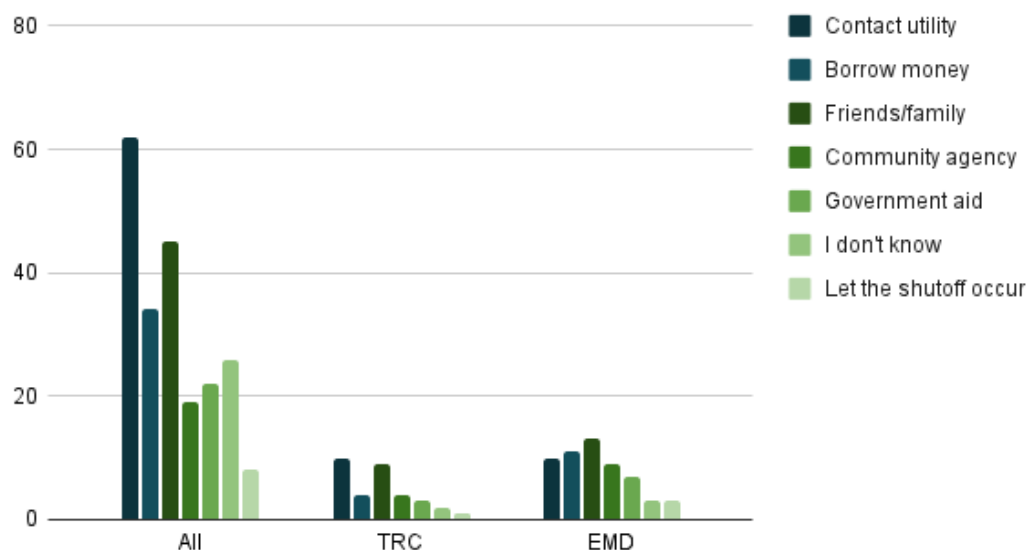
Among these exploratory responses, we observed that EMD households were more likely to borrow money or take out a loan than other households, perhaps because the loss of electricity would create a life-threatening situation. Conversely, EMD household were the least likely to contact the utility company for help, despite the fact that medical certificates are designed to prevent utility shutoffs in households that need consistent access to energy services to maintain the health of a household member.



(Kimberly Paynter/WHYY)

It's also worth noting, despite the small number of responses in each category, that medically vulnerable households were more likely to reach out to an energy assistance organization and ask family and friends for help, if faced with a utility shutoff notice without a means to pay the bill. This contrasted with non-medically vulnerable households, which were more likely to report that they did not know what they would do in such a situation.

## Strategies to address a utility shutoff notice



This graph shows the different strategies that households would use to address a utility shutoff if the household did not have the means to pay the bill. The graph represents the number of households rather than the percentage.

# Energy Affordability & Increasing Expenses During the Pandemic

Stay-at-home orders issued in the first few months of the pandemic led to higher utility bills for many households. This trend persisted even as stay-at-home orders were lifted because many people were forced to work and attend school remotely well into 2021. The conditions of the pandemic, in other words, resulted in greater energy burden for many households; our study found that medically vulnerable households were more likely than other households to see higher utility bills. This disparity relates back to the idea of compounded vulnerabilities. In this case, respondents who have existing disease conditions or disabilities are at higher risk for energy insecurity because they are more likely to stay at home, use more energy, and see an increase in utility bills.

## INCREASES TO UTILITY BILLS DURING THE COVID-19 PANDEMIC

Instead of leaving home for school or work, many people found themselves spending the majority of their time in domestic settings. This resulted in greater water, electric, and gas usage, and a need for more robust internet access, which in turn, produced higher utility bills.

### Reported increase in household utility bills:

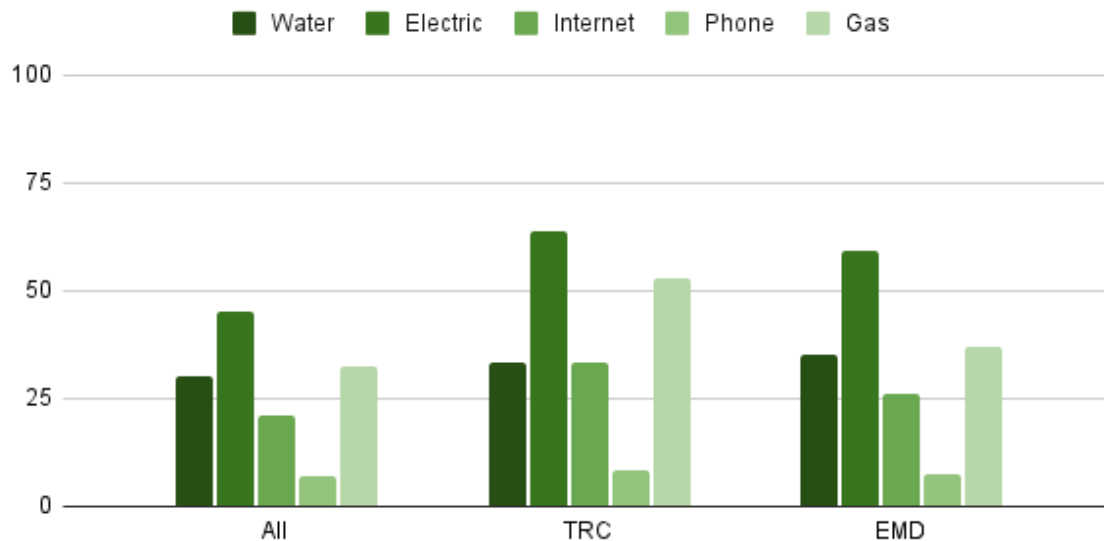
- Electric
  - All: 106 out of 234 households (45.3%)
  - TRC: 23 out of 36 households (63.89%)
  - EMD: 32 out of 54 households (59.26%)
- Phone
  - All: 16 out of 234 households (6.8%)
  - TRC: 3 out of 36 households (8.33%)
  - EMD: 4 out of 54 households (7.41%)
- Water
  - All: 71 out of 234 households (30.3%)
  - TRC: 12 out of 36 households (33.33%)
  - EMD: 19 out of 54 households (35.19%)
- Internet
  - All: 49 out of 234 households (20.9%)
  - TRC: 12 out of 36 households (33.33%)
  - EMD: 20 out of 54 households (25.93%)
- Gas
  - All: 76 out of 234 households (32.5%)
  - TRC: 19 out of 36 households (52.78%)
  - EMD: 20 out of 54 households (37.04%)

**“The pandemic made things more expensive because everyone's home, and I had two kids that were online for school, and then I was working online from home, and then you're not really, my son has medical problems, I'm not going to take him out. It was more energy use because they're on their laptops or chromes or tablets more.”**

Although internet bills are typically static and unchanging, some households had to purchase internet packages or upgrade existing services during the pandemic. Many respondents who did not have adequate internet access for remote education, for example, purchased more expensive plans to continue education online.

# Energy Affordability & Increasing Expenses During the Pandemic

Households reporting an increase in utility bills during the pandemic



*This graph shows the percentage of households that reported an increase in their utility bills since the pandemic began.*

## DIFFICULTIES PAYING BILLS DURING THE PANDEMIC

Over half of medically vulnerable households saw their utility bills increase during the pandemic. Our data shows that medically vulnerable households are struggling to pay these bills more often than non-medically vulnerable households, and are more likely to be making partial utility bill payments.

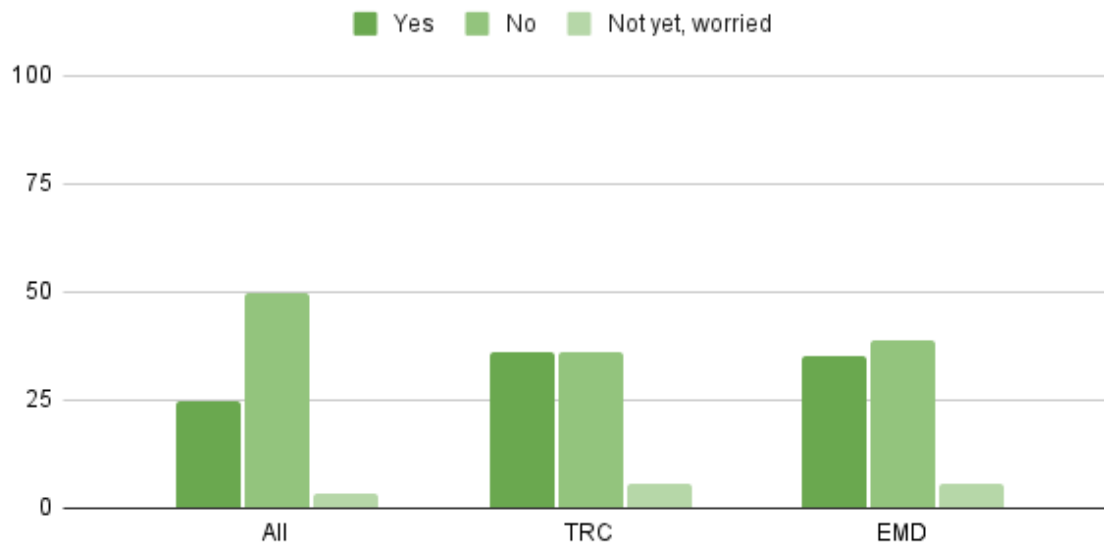
Reported difficulty paying utility bills during the COVID-19 pandemic:

- 57 out of 232 households (24.6%) of the total households reported difficulties paying their utility bills during the pandemic.
- 13 out of 46 TRC households (36.11%) reported difficulty paying their utility bills.
- 19 out of 54 EMD households (35%) reported difficulty paying their utility bills.

A concern here, which requires more research, is that medically vulnerable households may be using more energy, which increases utility bills, and these bills become less affordable, particularly for those on a fixed income or households with children, for example. Difficulties paying utility bills can also be attributed to economic conditions that the pandemic created which disproportionately impacted vulnerable households, such reduced or loss of household income and more money being spent on other household expenses.

# Energy Affordability & Increasing Expenses During the Pandemic

Households reporting difficulty paying utility bills during the COVID-19 pandemic



*This graph shows the percentage of households that are struggling to pay their utility bills since the pandemic began.*

## COPING MECHANISMS RELATED TO UTILITY BILL PAYMENTS

Living in a house where someone uses a medical device may reduce capacity to simply pay bills or allow a utility shutoff to occur. More thought and decision-making may be required to juggle financial constraints. The differences between the coping mechanisms in the 142 households who saw their utility bills increase, the 42 EMD households, and the 28 TRC households.

### Households paying their utility bills in full, even when the bills were higher:

- 44 out of 142 households (30.99%) were paying their bills fully.
- 6 out of 28 TRC households (21.43%) were paying their bills fully.
- 7 out of 42 EMD households (16.67%) were paying their bills fully.

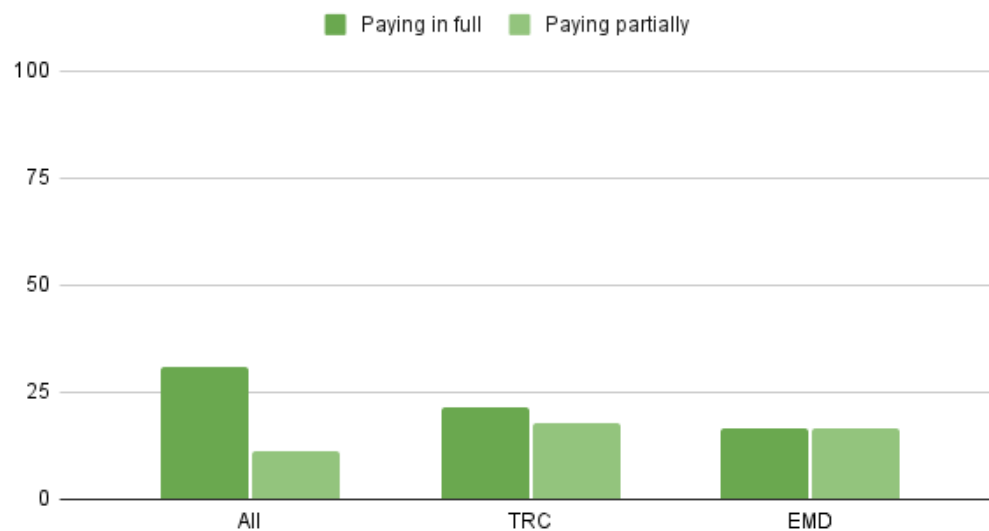
### Households making partial payments on their utility bills when the bills were higher:

- 16 out of 142 households (11.27%) were making partial payments.
- 5 out of 28 TRC households (17.86%) were making partial payments.
- 8 out of 42 EMD households (19.05%) were making partial payments.

# Energy Affordability & Increasing Expenses During the Pandemic

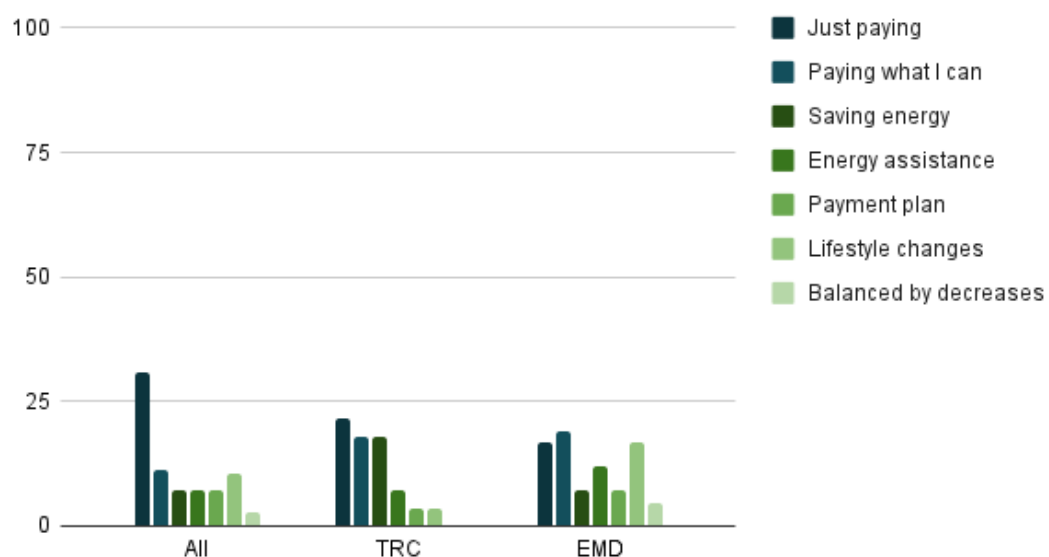
Medically vulnerable households are more likely to make partial payments on their utility bills when those bills increase. The figure above captures how some households are paying their bills – partially or in full – however not all respondents specified. Some households explained how they were trying to cut back on energy use, while others reported seeking energy assistance as a strategy. Some people we interviewed described making lifestyle changes such as cutting back on luxuries, selling personal belongings, and trying to get out of the house when possible.

Households' coping strategies for increased utility bills



*This graph shows the percentage of households that are making partial versus full payments on their utility bills when those bills are higher than pre-pandemic bills.*

Households' coping strategies for increased utility bills (detailed)



*This graph shows households reported strategies for coping with increased utility bills in percentage.*



# Energy Affordability & Increasing Expenses During the Pandemic

## NON-ENERGY RELATED EXPENSES

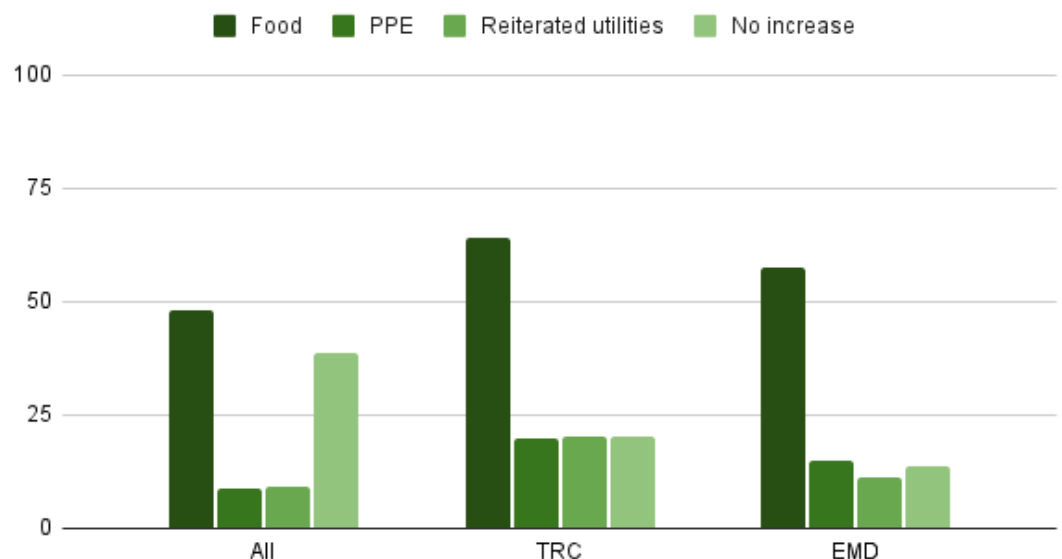
Medically vulnerable respondents reported increased spending on food and personal protective equipment (PPE). This could be significant because a greater proportion of their budget is being spent on PPE and groceries than pre-pandemic. Significantly more non-medically vulnerable households reported no increases at all.

### Other types of increased expenses reported by households during the pandemic:

- Food
  - All: 111 out of 230 households (48.26%)
  - TRC: 23 out of 36 households (63.89%)
  - EMD: 31 out of 54 (57.41%)
- PPE
  - All: 20 out of 230 households (8.7%)
  - TRC: 7 out of 36 households (20%)
  - EMD: 8 out of 54 households (14.81%)
- Reiterated utilities
  - All: 21 out of 230 households (9.1%)
  - TCR: 4 out of 36 households (11.11%)
  - EMD: 11 out of 54 households (20.37%)
- No increase:
  - All: 89 out of 230 households (38.7%)
  - TCR: 5 out of 36 households (13.89%)
  - EMD: 11 out of 54 households (20.37%)

### Household non-energy related increased expenses

*This graph shows the percentage of households that reported an increase in expenses not related to utility bills since the pandemic began.*



# Energy Assistance Networks

Medically vulnerable households were more aware of energy assistance programs that could aid with bill payment and were able to identify specific programs at much higher rates than non-medically vulnerable households. However, even with awareness of assistance programs, medically vulnerable households still struggled to afford utility bills, and only a fraction of people interviewed reported they would seek government assistance if presented with a utility shut off notice when they were unable to pay the bill. This suggests that medically vulnerable households experience barriers to accessing energy assistance, or have tried to obtain assistance in the past but have been unsuccessful.

## AWARENESS OF ENERGY ASSISTANCE

It should come as no surprise that medically vulnerable households, who may be more cost burdened, are more aware of energy assistance programs than other households. We did not ask respondents if they qualified for these programs or what they know about them, just if they were familiar.

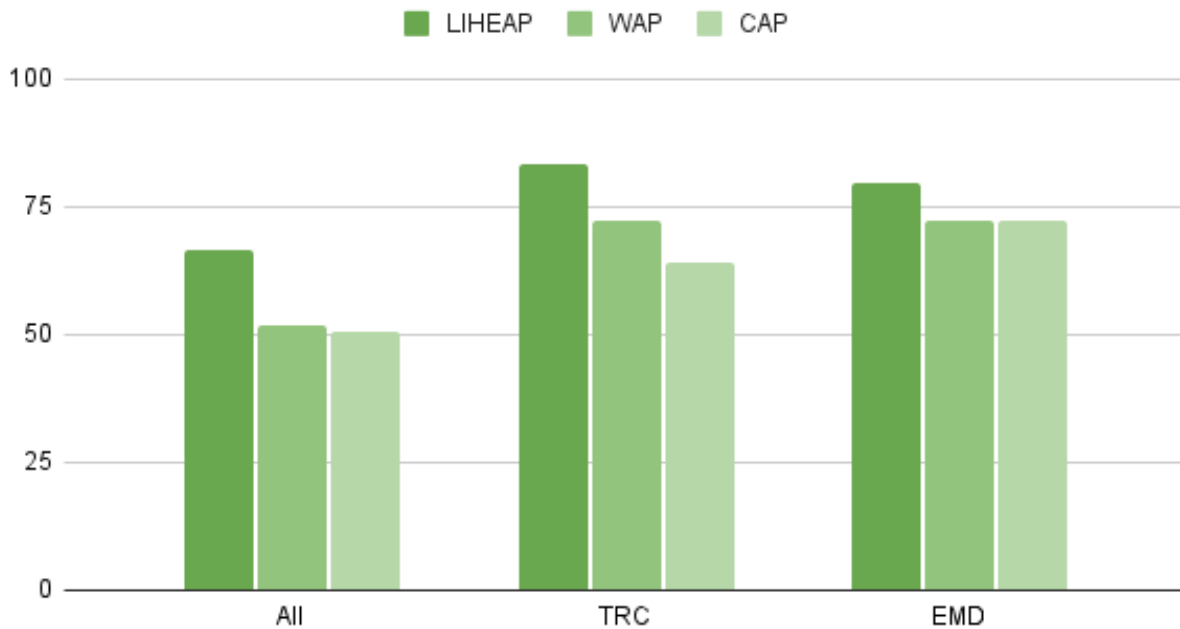
### Household awareness of energy assistance programs:

- LIHEAP
  - All: 152 out of 229 households (66.38%)
  - TRC: 30 out of 36 households (83.33%)
  - EMD: 43 out of 54 households (79.63%)
- WAP
  - All: 119 out of 229 households (51.97%)
  - TRC: 26 out of 36 households (72.22%)
  - EMD: 39 out of 54 households (72.22%)
- CAP
  - All: 116 out of 229 households (51.95%)
  - TRC 23 out of 36 households (63.89%)
  - EMD: 39 out of 54 households (72.22%)

**“All of us have a history of asthma. For my son, it's chronic. For the rest of us, it's acute. My son has an asthma breathing machine he has to use. When I had a shut-off notice, I called my son's doctor because of his health problems, they extended it. I was able to get UESF or LIHEAP, I don't remember. One of them helped me with the bill.”**

# Energy Assistance Networks

## Household familiarity with energy assistance programs



*This graph shows the percentage of households that were familiar with energy assistance programs.*

## ENERGY ASSISTANCE ENROLLMENT

Our study found that many of those interviewed have received some form of energy assistance, but medically vulnerable households were more likely than other households to have accessed assistance, both prior to and during the pandemic.

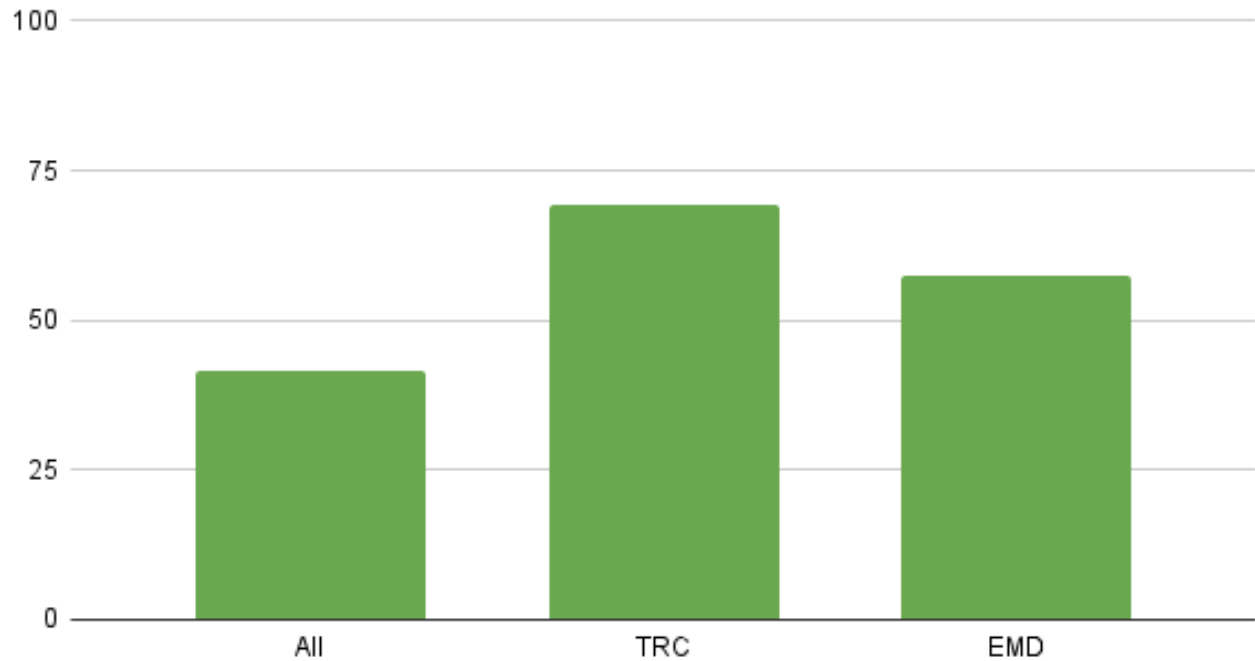
### Households that reported receiving energy assistance at any point in time:

- All: 96 out of 231 households (41.5%)
- TRC: 25 out of 36 households (69.45%)
- EMD: 44 out of 54 households (57.41%)

Fourteen of the 25 TRC households and 17 of the 44 EMD households that had used energy assistance prior to the pandemic were no longer enrolled. The reasons for this were not always clear. One possibility is that utility shutoff moratoriums allowed households that have experienced energy insecurity in the past to focus on other expenses; meaning, there was not an urgent need to seek assistance. Another possibility could be the timing of the interviews. Some energy assistance programs, like LIHEAP, are seasonal in Pennsylvania. Yet another possibility is that federal pandemic relief money made some households that are typically eligible for assistance, ineligible. More research is needed to understand the precise dynamics.

# Energy Assistance Networks

Household reported enrollment in energy assistance programs



*This graph shows the percentage of households that enrolled in an energy assistance program at any point in time.*



(Taeya Boi-Doku/The Energy Rights Project)

# Weatherization & Maintenance

Weatherization is a foundational tool used to increase home energy efficiency and reduce utility costs, and by extension, can make thermal comfort easier to obtain. Conversely, deferred maintenance – putting off basic system repairs, appliance upgrades or service, and even more minor “upkeep” on the building infrastructure – can lead to energy inefficiency, higher utility bills, and more significant costs down the road. Despite higher rates of awareness of the federal Weatherization Assistance Program (WAP) (as our above section indicated), only slightly more medically vulnerable households have had their home weatherized through WAP. Medically vulnerable households were also more likely to have put off maintenance due to COVID-19 than other households.

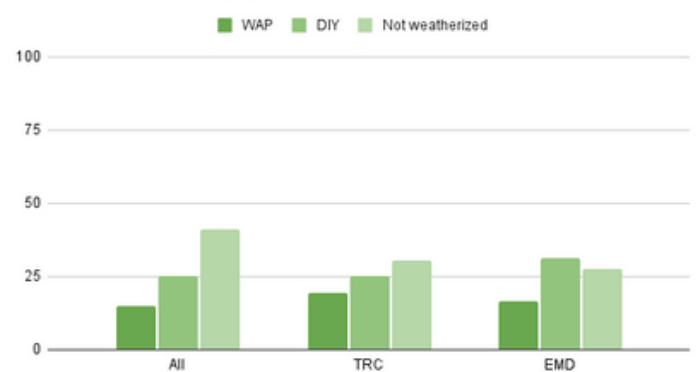
## WEATHERIZATION STATUS OF THE HOME

Weatherization increases the possibility of thermal comfort for medically vulnerable households by increasing energy efficiency. TRC households were slightly more likely than other household types to have their home weatherized through the state, while EMD households reported higher rates of DIY weatherization.

### Weatherization status of the home in percent:

- Weatherized through WAP
  - All: 34 out of 227 households (15%)
  - TRC: 7 out of 36 households (19.44%)
  - EMD: 9 out of 54 households (16.67%)
- DIY weatherization
  - All: 57 out of 227 households (25.1%)
  - TRC 9 out of 36 households (25%)
  - EMD: 17 out of 54 households (31.48%)
- Not weatherized
  - All: 93 out of 227 households(41%)
  - TRC: 11 out of 36 households(30.55%)
  - EMD: 15 out of 54 households (27.78%)

Household weatherization status



*This graph shows the percentage of households that have weatherized their home, either through WAP or DIY techniques learned in the PGW weatherization workshops, for example.*

Despite TRC households being more likely than all households to be familiar with WAP, the percentage of TRC homes weatherized through WAP is minimal; for EMD households, the likelihood is even less, despite greater familiarity with the program. This means that awareness of energy assistance programs is not the choke point; perhaps eligibility is the problem.

EMD households reported the highest rate of DIY weatherization, and the lowest amount of non-weatherization, although both medically vulnerable groups are less likely to not have any weatherization at all. TRC households report weatherization levels at the same rates as all households, despite an increased need for thermal comfort in their home.

# Weatherization & Maintenance

## DEFERRED MAINTENANCE DURING THE PANDEMIC

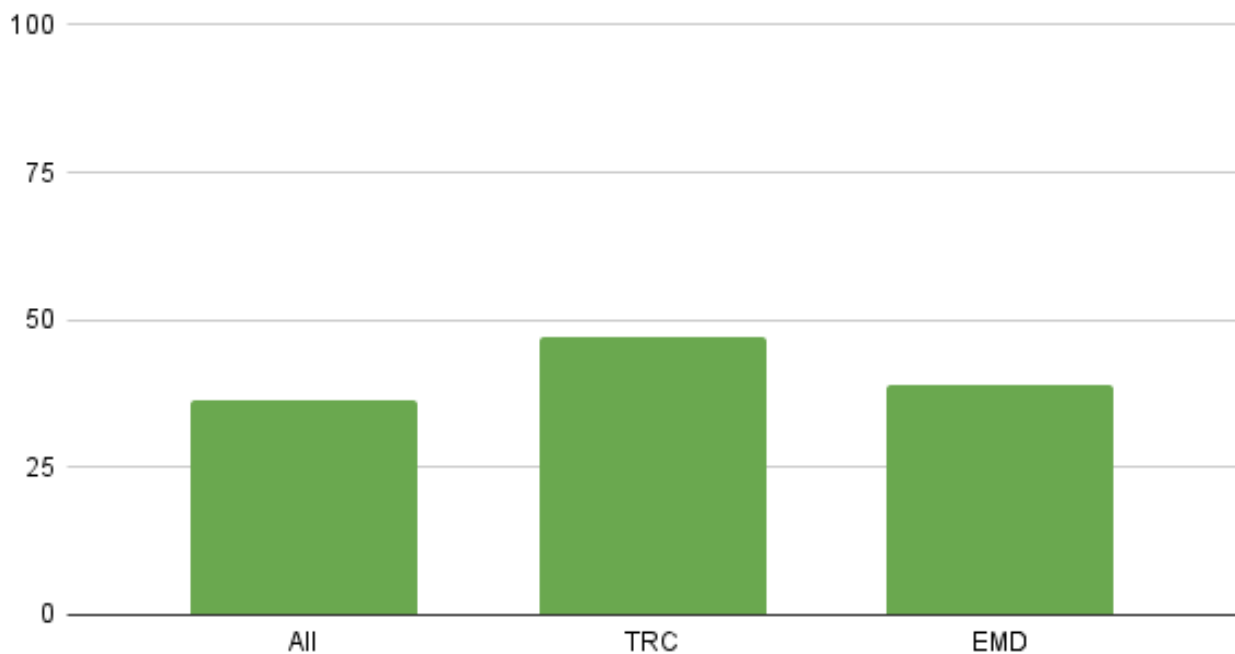
Maintenance projects of all kinds have been delayed during the pandemic. There are many reasons for this, including labor shortages and supply chain issues. For households, however, maintenance and repair projects were sometimes delayed due to a lack of funds or uncertainty about the future. Our findings show that TRC households have had to defer maintenance on their home at much larger rates than other respondents.

### Households that reported deferring maintenance during the pandemic:

- All: 84 out of 230 households (36.52%)
- TRC: 17 out of 36 households (47.22%)
- EMD: 21 out of 53 households (38.89%)

What this indicates is that both TRC and EMD households may exacerbate or compound energy insecurity by not being able to maintain their home during COVID-19. While we did not ask the exact nature of what was being deferred, anything in the house that is not functioning correctly could exacerbate a medical vulnerability.

### Households who deferred maintenance



*This graph shows the percentage of households that have deferred maintenance on their home during the COVID-19 pandemic.*

# CONCLUSION

The conversations that we had with 337 energy users in Philadelphia shed light on how the conditions that create medical vulnerability and energy insecurity are often one and the same. Across the board, EMD and TRC households displayed higher rates of energy insecurities in ways that would exacerbate their medical vulnerabilities. Below, we highlight once more the ways in which these overlapping vulnerabilities manifest, and provide recommendations that will help to ensure the health and safety of vulnerable households. These recommendations address the major findings from the data our team collected on energy and health:

- Households with electric powered medical devices were far more likely to have experienced power outages than non EMD households.
- Households with TRC – who require the ability to control and set the temperature in their home to remain comfortable and healthy – were more likely to have experienced heat loss in their home.
- Medically vulnerable households are more likely to receive shutoff notices, which can push households into health emergencies, especially during the pandemic when healthcare institutions were strained.

## **ADDRESSING ELECTRICITY DISRUPTIONS: GRID MAINTENANCE AND LOW INCOME SOLAR**

Households with electric powered medical devices were far more likely to have experienced power outages than non-EMD households, meaning that medically vulnerable households are more susceptible to unreliable electricity service. Because consistent, reliable electricity is critical for individuals with medical vulnerabilities to remain healthy, we propose that power grid servicing and maintenance become more routine and prioritized in neighborhoods with a higher proportion of medically vulnerable households.

In addition, when a household installs solar panels to power their home, they become their own energy provider, meaning that they would not be impacted by outages caused by service disruptions. More education and awareness of how to obtain and maintain solar panels, along with more affordable options for low-income households to receive solar panels, would grant energy and medically vulnerable households energy sovereignty from unreliable and expensive power grid networks.



# CONCLUSION

## **ADDRESSING HEAT LOSS: GEOTHERMAL MICRO DISTRICTS**

Households with TRC, who require the ability to control and set the temperature in their home to remain comfortable and healthy, were the group most likely to have experienced heat loss in their home. The causes of the heat loss varied from heaters breaking, service outages, to shut-off notices. In December of 2021, the City of Philadelphia published the PGW Diversification Study, which outlines various methods for the city's municipal natural gas utility to decarbonize and help the city meet its climate goals. Although the City stated that vulnerable customers would be prioritized in this transition, many elements of the plan contradicted this. For example, one proposed method for decarbonization consisted of adding renewable natural gas (RNG) into PGW's gas mix, however burning RNG would continue to pollute the air and aggravate respiratory health ailments, as RNG is still natural gas, and would raise the price of gas bills. The Energy Rights Project supports the proposed geothermal microgrid approach to PGW's decarbonization, as microgrids help to ensure heating reliability, and propose that pilot programs be implemented in neighborhoods with greater medical vulnerability and energy insecurity.

## **ADDRESSING SHUT-OFFS: EXPANDED ELIGIBILITY REQUIREMENTS FOR ASSISTANCE & MEDICAL CERTIFICATIONS**

Medically vulnerable households are more likely to receive shutoff notices, which can push households with these vulnerabilities into health emergencies, especially during the pandemic where healthcare institutions were strained. Medically vulnerable households were far more likely to be aware of energy assistance and were more likely to, at the very least, have heard of LIHEAP, WAP, and CAP. Despite this, only around 15% of medically vulnerable respondents indicated that they would seek out government assistance if faced with a shut-off notice. This discrepancy points to a burden that many vulnerable households face: ineligibility for federal assistance programs, such as LIHEAP, which would reduce the total amount of money paid on their bills. Income guidelines for programs like LIHEAP, WAP, and UESF should be expanded so that they are able to provide assistance to a wider range of vulnerable households, not only the most severely vulnerable. Additionally, only two households out of 337 energy users mentioned obtaining medical certifications, which allows a medically vulnerable household to maintain utility service if they have a shut-off notice. We propose that there be more robust outreach efforts conducted by both utility companies and community organizations in Philadelphia to spread awareness of this program.

# METHODS

The Energy Rights Project is designed in the tradition of experimental ethnography where methods of data collection and writing happen reflexively and in conversation with the people we are studying and working alongside. Ethnography is a qualitative research method that systematically observes and analyzes cultures and society using participant observation, interviews, surveys, and content analysis.<sup>15</sup> The Energy Rights Project sought to study household energy insecurity, which is defined as “a situation in which a person or household is unable to achieve sufficient access to affordable and reliable energy services, and as a consequence are in danger of harm to health and/or well-being.”<sup>16</sup> Initially, we began this inquiry through participant observation at Energy Service Organizations (ESOs) across Philadelphia, which are organizations that provide education and support to residents seeking utility assistance, weatherization services, and budget counseling. However, when the pandemic struck and stay-at-home orders were implemented, we shifted our work to focus on how the relationships between energy insecure households and their home energy systems shifted under the instability created by the pandemic. Unable to conduct in-person participant observation, we created a semi-structured interview instrument to conduct remote interviews with energy users to gauge how the pandemic impacted their home energy experiences.

The semi-structured interview instrument was designed during a field school focused on energy insecurity that ran at Drexel University between April-June 2020. The instrument was designed in collaboration with students at the field school, the Energy Rights Project team, and with feedback from other researchers studying the impacts of the pandemic. The first set of interviews were conducted between May and June 2020; a total of 86 interviews were completed with respondents recruited using the snowball method through the university-based field school. Interviews were conducted over the phone or Zoom and took an average of 45-minutes to complete. Six months later, the Energy Coordinating Agency began hosting weatherization workshops again, mostly over Zoom. Our team began conducting participant observation at the workshops and recruited participants for interviews, which were also conducted over the phone or Zoom. Between December 2020 and March of 2021, we interviewed 148 participants recruited from these weatherization workshops. During the summer of 2021, the Energy Rights Project, in coordination with the Energy Coordinating Agency, hosted 15 energy conservation workshops that focused on electricity and water conservation, and were open to anyone. From these workshops, we recruited 72 individuals to conduct open-ended interviews with. During the same summer, we conducted open-ended follow-up interviews with 30 individuals who were a part of our structured interview project.

<sup>15</sup> Allen, Mike The SAGE Encyclopedia of Communication Research Methods. 4 vols. Thousand Oaks, CA: SAGE Publications, Inc, 2017. doi: 10.4135/9781483381411.

<sup>16</sup> Day, Rosie, and Gordon Walker. "Household energy vulnerability as 'assemblage'." *Energy Justice in a Changing Climate: Social Equity Implications of the Energy and Low-Carbon Relationship*, Zed Books, London/New York (2013): 14-29.

# METHODS

Both semi-structured and open-ended interviews were conducted over the phone and included questions about the impacts of COVID-19 on the household (employment, the conditions of work and school, energy use, expenses, income, and conservation strategies) as well as emergency preparedness and energy service disruptions, both before and during the pandemic, knowledge of energy and energy systems, utility assistance, and weatherization. Two questions from the semi-structured interview asked about the relationship between health and energy; we focus on responses to those questions in this report, as well as unprompted discussion about the relationship between health, home, and energy in our open-ended interviews. In our open-ended interviews we also specifically asked how individuals were coping with extreme weather during the summer of 2021, which elicited responses that spoke to the relationship between home energy and health. Among those we conducted semi-structured interviews with (234), we spoke with more women than men (71.4% of respondents); nearly half self-reported their race as Black or African American (48.9%); and more than half made less than \$40,000 annually (54.2%). We did not collect demographic information for our open-ended interview project.

## Acknowledgements & Support

We would like to acknowledge and thank the Energy Coordinating Agency (ECA) and the Neighborhood Energy Centers (NECs) across Philadelphia for their support during this project. This project was funded by National Science Foundation grant number 1849592.

Cover Image: "PECO 7455" by MTSOfan is licensed under CC BY-NC-SA 2.0.

# ABOUT US

The Energy Rights Project is a social science study that investigates 1) how people understand energy systems, 2) how people access and use energy in their homes, 3) how organizations shape understanding of energy systems and everyday access to energy, and 4) how policy shapes relationships between energy users, energy providers, and energy assistance organizations.

The Energy Rights Project has three main objectives:

- To collect data and provide analysis that is useful for energy service organizations (ESOs) and policymakers.
- To provide an archive of material that can lend insight into household energy use, the struggle to secure affordable access, to energy and what can be done to address common problems related to energy affordability and security.
- To help educate people about energy - through our research activities and also by working with other organizations.

This project is funded by a National Science Foundation standard grant in the Division of Social and Economic Sciences Science and Technology Studies program.

**To learn more, please visit our website at [www.energyrights.info](http://www.energyrights.info), or email us at [ali.kenner@gmail.com](mailto:ali.kenner@gmail.com)**

