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## ADDRESSING THE LINKS BETWEEN POVERTY, HOUSING, AND WATER ACCESS AND AFFORDABILITY IN DETROIT

By Sara Hughes, Kathryn Maloney, Anna Kaczmarek, Heather Newberry, and Elizabeth Wallace

### INTRODUCTION

Ensuring water access and affordability for Detroit residents is critical. The COVID-19 pandemic has underscored the importance of universal access to safe and affordable water for public health, as well as the barriers and challenges to this goal created by conditions of high poverty and aging infrastructure. Solving the water access and affordability challenge in Detroit requires engaging with the interactive consequences of an aging system, high levels of poverty, and persistent housing challenges.

Detroit's median household income (\$30,894) is just over half the statewide median (\$57,144), and more than one-third of the city's residents live below the poverty line.<sup>1</sup> At the same time, 41% of the city's residents face high housing costs, or housing costs that exceed 30% of household income.<sup>2</sup> This number is even higher for renters, with 53% facing high housing costs.<sup>3</sup> The majority of Detroit residents' homes were built prior to 1950. Coupling an aging and insufficient housing stock with low incomes means residential plumbing issues may often go unaddressed, leading to higher water use and water bills, and eventually preventing access to drinking water all together. In 2018, an estimated 11,000 Detroit residents lacked access to complete indoor plumbing systems—meaning they lacked either hot and cold running water, a bathtub or shower, or a sink with a faucet.<sup>4</sup> A recent study found water bills in Detroit are comparable to other large cities, but the burden is particularly high for Detroit residents due to low household incomes, with the city's poverty rate sitting more than 2.5 times higher than the national rate.<sup>5</sup> In 2016, 25% of residential water accounts were on a payment plan.<sup>6</sup> Understanding the intersections of poverty, housing quality, and water services in Detroit is a step toward innovative and creative solutions that

support public health and community resilience and promote efficiency in water use for the city's water system as a whole.

This brief evaluates the relationship between poverty, housing needs and burdens, and water access for Detroit residents, placing a particular focus on the need for and impact of plumbing repair efforts. We provide some background on water affordability in Detroit; analyze the impact low incomes, housing costs, and aging homes have on water access and affordability; and explore the potential of plumbing repairs as a cost-saving mechanism, including an analysis of the Water Residential Assistance Program (WRAP), the primary water assistance program serving Detroit residents. We find significant spatial variation in the location of households experiencing high housing costs and low incomes, which could inform future investment strategies for promoting water savings. Continued investment in residential plumbing repairs, and coordination across departments and between levels of government, will be critical for ensuring universal access to safe and affordable water in Detroit.

### KEY FINDINGS

- The intersection of poverty and housing quality presents a challenge for ensuring water access and affordability in Detroit.
- Existing plumbing repair supports in Detroit have benefits for residents' water bills and water use.
- Increased funding for plumbing repairs, improved tracking and monitoring of performance outcomes, and coordination between city departments can support efficient and affordable water services in Detroit.

## BACKGROUND

Throughout the U.S., water and wastewater charges have risen over the last 25 years at twice the rate of inflation, making water affordability a topic of national concern.<sup>7</sup> Detroit has faced its own affordability challenges driven by the rising cost of service delivery, a declining population, and rising poverty. The Detroit Water and Sewerage Department (DWSD) serves more than 230,000 households and nearly 700,000 residents. The water network itself consists of more than 2,700 miles of water mains.<sup>8</sup> As the system has aged, and the city’s population has declined, the costs of water service have increased. Today, “water consumption per capita in Detroit is much lower than the national average,” but residents have higher water cost burdens than average: nearly half of the city’s residents pay more than 3% of their income for water, a commonly used benchmark for water affordability.<sup>9</sup>

Unaffordable water bills can ultimately lead to people falling behind on payments and at risk of having their water shut off. A University of Michigan survey of Detroit residents found that people are willing and able to pay when their water bills are within their means.<sup>10</sup> Like water bills and plumbing repairs, water shut-offs are deeply intertwined with housing issues in Detroit. Thirteen percent of Detroiters who have moved in the last five years report experiencing a water shutoff; people who have experienced a water shutoff also report greater dissatisfaction with their neighborhood than those who have not experienced a shutoff (Detroit Metro Area Communities Study survey).

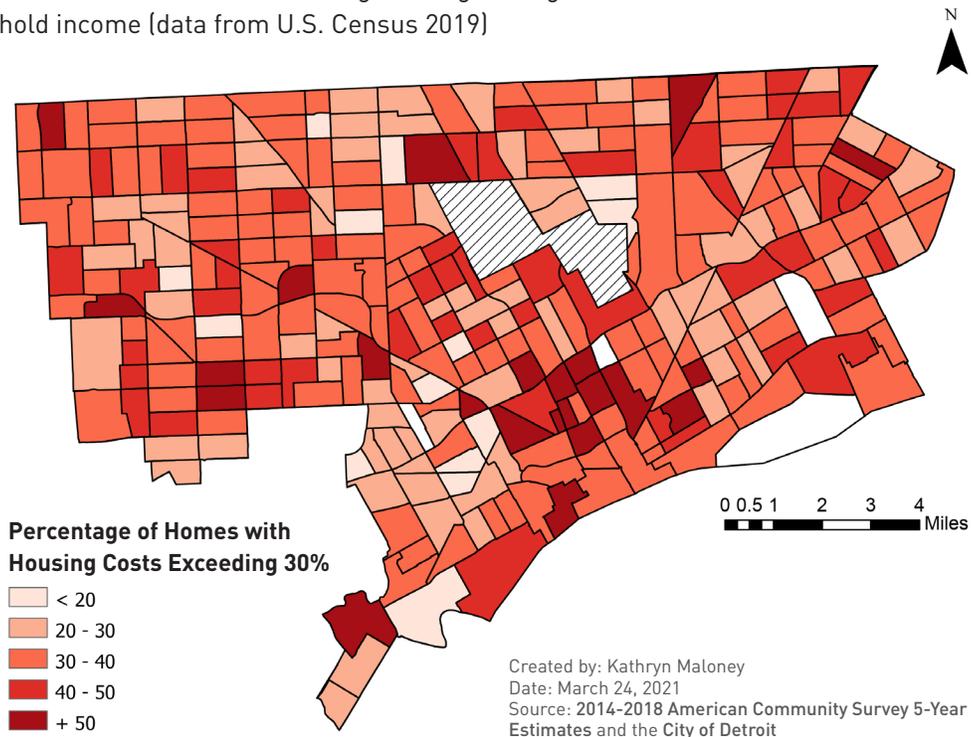
## MANY LOW-INCOME DETROITERS FACE HOUSING CHALLENGES

Quality, affordable housing is a persistent challenge in Detroit.<sup>11</sup> Many Detroiters have housing costs that exceed 30% of household income, a common benchmark for high housing burdens. These costs are distributed unevenly throughout the city, with some areas having more than two-thirds of residents facing high housing costs (Figure 1). When housing costs comprise a large portion of household income, it can be difficult for residents to keep up with repair costs and utility bills, including needed plumbing repairs. Tradeoffs in essential housing spending will be particularly pronounced for households with the lowest income levels.<sup>12</sup> We find that 30% of Detroit neighborhoods are particularly distressed, with rates of poverty and housing cost burden above the citywide average.<sup>13</sup> At the same time, Detroit’s housing stock is aging, with most of the city’s housing stock built prior to 1950 (Figure 2). In some areas of the city, low-income households are living in some of the city’s oldest homes, which have a greater likelihood of needing large and expensive repairs to maintain (Figure 3). This combination of low incomes, high housing cost burdens, and aging infrastructure means plumbing repairs are unlikely to be addressed by homeowners in particular without assistance.



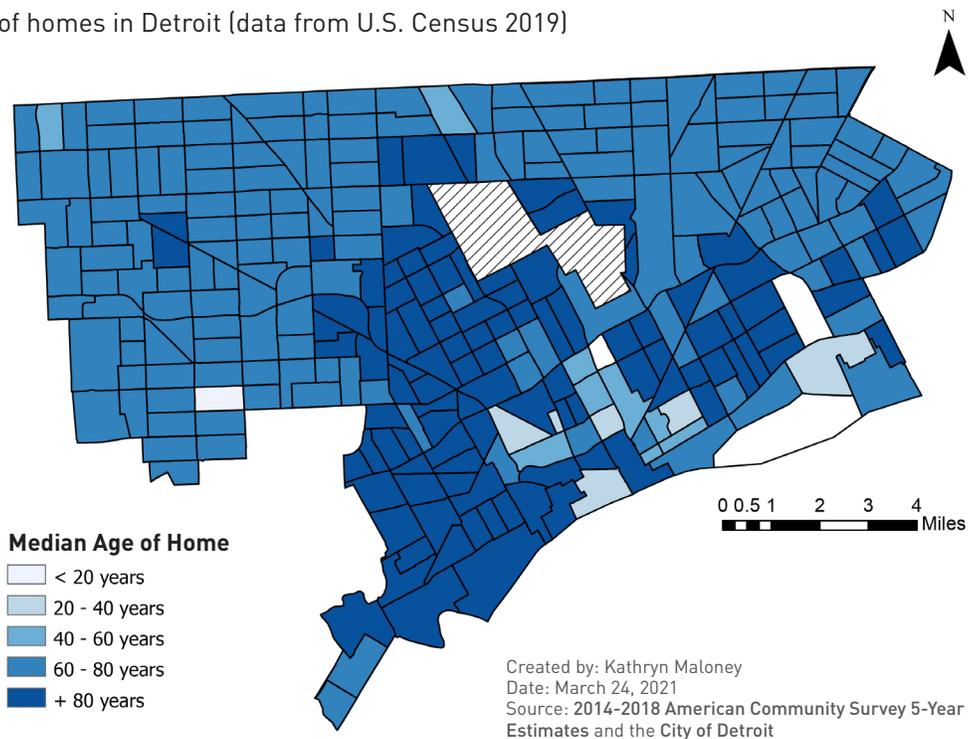
**FIGURE 1:**

Distribution of Detroit households facing housing costs greater than 30% of household income (data from U.S. Census 2019)

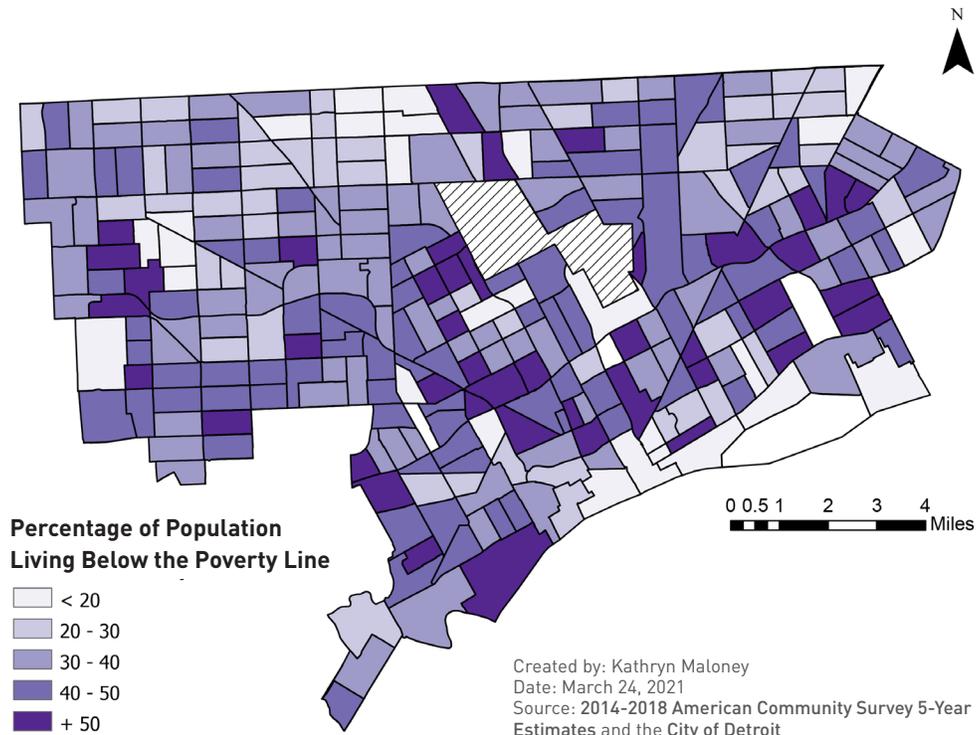


**FIGURE 2:**

The age of homes in Detroit (data from U.S. Census 2019)



**FIGURE 3:**  
Distribution of Detroit households experiencing poverty (data from U.S. Census 2019).



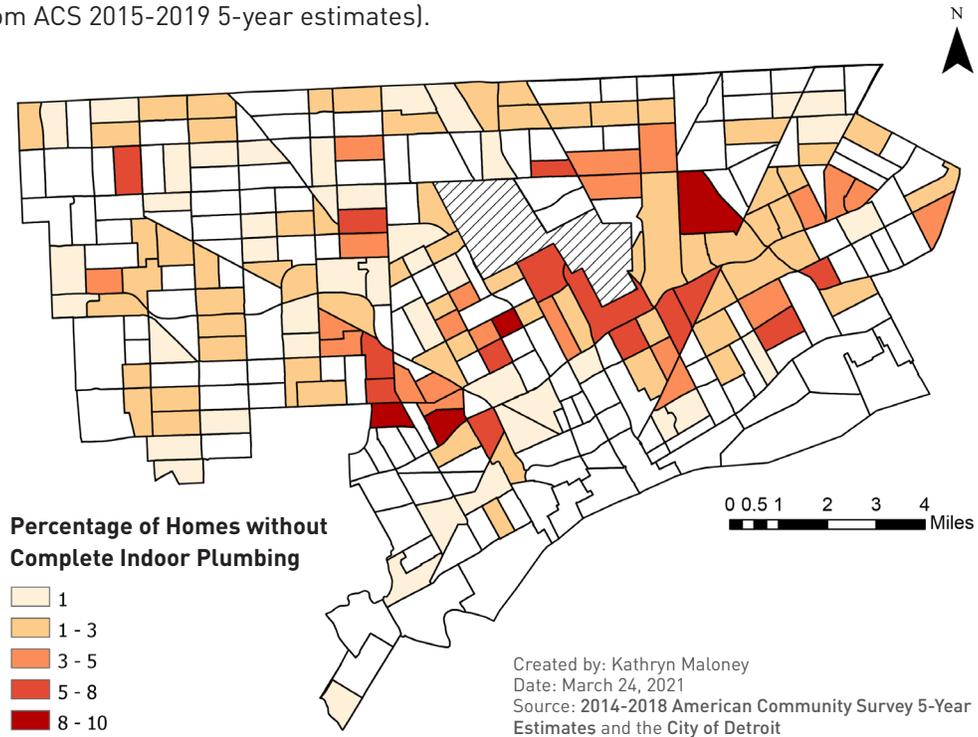
### ACCESS TO SAFE, AFFORDABLE WATER REQUIRES COMPLETE HOMES

Residential plumbing infrastructure plays a large role in the delivery of safe, affordable water. People need complete indoor plumbing systems — hot and cold running water, a bathtub or shower, and a sink with a faucet — for drinking, bathing, and cooking. In some Detroit neighborhoods, up to 10% of homes reported incomplete plumbing (Figure 4). Census tracts with higher shares of households without complete plumbing have lower average incomes and higher proportions of non-white residents when compared to census tracts with complete plumbing. Such plumbing deficiencies proved to be a significant challenge to

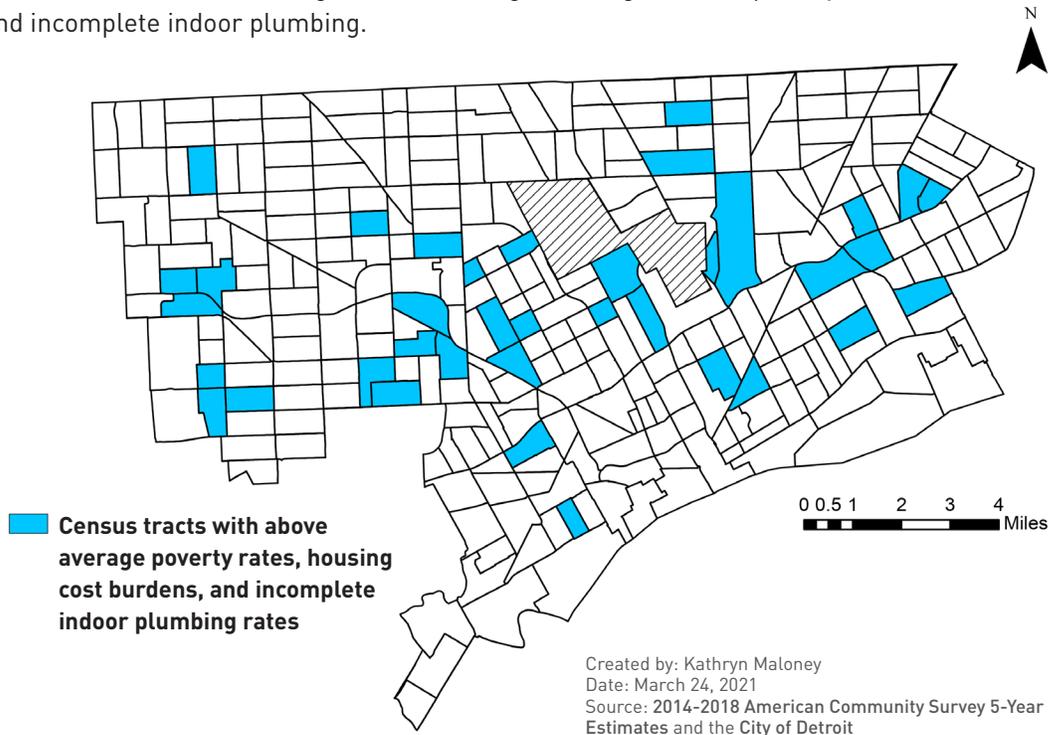
reconnecting homes during the COVID-19 pandemic under the emergency repair program initiated by Gov. Gretchen Whitmer’s executive order.<sup>14</sup>

We find that 17% of census tracts, representing 15% of the city’s population, face rates of both housing cost burden and incomplete plumbing that are above the citywide average. We also find that 20% of census tracts, representing 16% of the city’s population, have higher rates of both poverty and incomplete plumbing than the citywide average. Finally, 11% of census tracts face rates in all three categories that are above the citywide average (Figure 5). These “triple burdened” areas represent around 10% of Detroit’s population.

**FIGURE 4:**  
Distribution of Detroit households reporting incomplete indoor plumbing  
(data from ACS 2015-2019 5-year estimates).



**FIGURE 5:**  
Detroit Census tracts with higher-than-average housing burdens, poverty levels,  
and incomplete indoor plumbing.

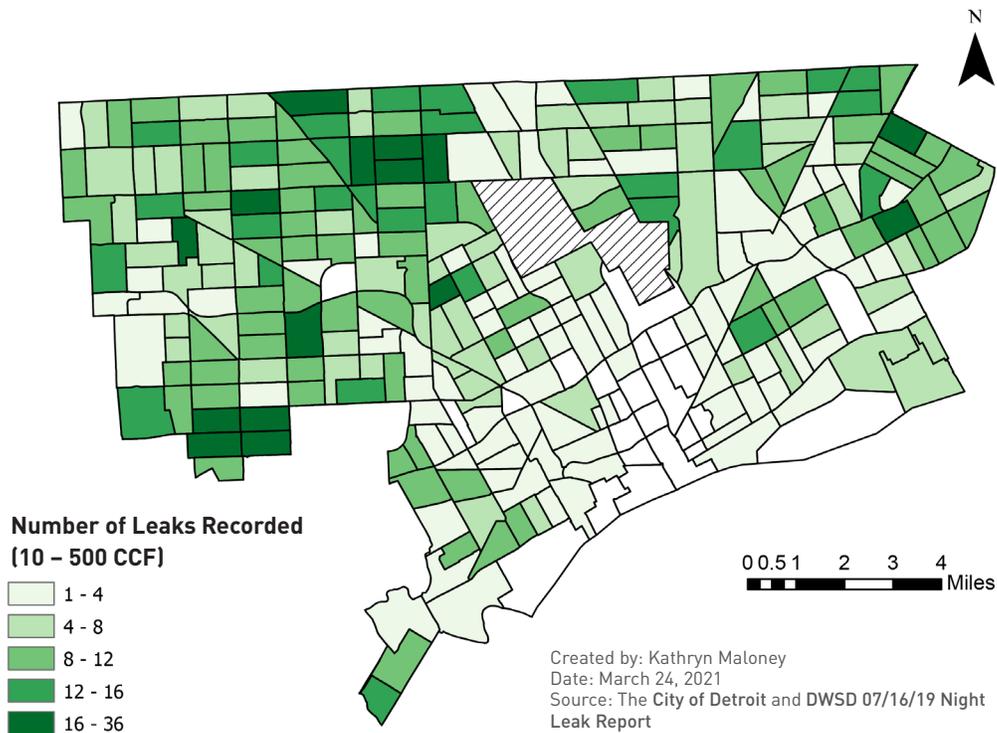


**LEAKS MAY HAVE A SIGNIFICANT IMPACT ON WATER BILLS**

In addition to ensuring basic water access, quality plumbing is also essential to water affordability. Poor housing quality and aging pipes can lead to large leaks and water loss, which increase water bills. One way of tracking large water leaks is to monitor for unexpectedly large overnight water use levels (between 10 and 500 centum cubic feet (CCF) of water between midnight and 4 a.m.). Figure 6 shows an example of how these leaks are distributed throughout the city using water billing data from July of 2019.

Addressing leaks is critical to affordability, as water lost through leaks—whether large or small—is reflected on monthly water bills. For example, a recent study estimated that Detroit residents could reduce water bills by 13.7% if inefficient or leaking toilets were replaced.<sup>15</sup> Reducing water bills through conservation can be a useful strategy for saving money and ensuring people pay their bills. Taking steps to conserve water and lower water bills is critical for water security, public health, and neighborhood stability and quality.

**FIGURE 6:**  
Distribution of large overnight water leaks in Detroit, July 2019.



## THE WATER RESIDENTIAL ASSISTANCE PROGRAM IN DETROIT

Water conservation and plumbing repairs for low-income households have the potential to improve water access and affordability in Detroit. Indoor plumbing repairs in Detroit are primarily being addressed through local conservation programs. While there are state and federal programs for energy bill assistance and efficiency retrofits, such as the Low Income Home Energy Assistance Program (LIHEAP), similar programs for water do not exist. In Michigan, state funding for water and sewer assistance are only available for emergencies and have not been used widely.<sup>16</sup> On average, six Michigan households receive emergency funding for home repairs each month, and 535 Michigan households receive emergency assistance with utility bills each month from the state.<sup>17</sup> Local governments and water utilities have been responsible for meeting this need.

During the COVID-19 pandemic, the critical need for indoor plumbing repairs to ensure water access and support public health became apparent to Michigan policymakers. The state issued a moratorium on water shutoffs, which the City of Detroit has extended through 2022, and provided \$2 million for plumbing repairs necessary to reconnect Michigan homes to water service.<sup>18</sup> The future of these state initiatives remains unclear.

For Detroit, the vast majority of funding for plumbing repairs and indoor plumbing retrofits is generated locally through the Great Lakes Water Authority's (GLWA) Water Residential Assistance Program (WRAP).<sup>19</sup> WRAP was established in 2016 to provide assistance to GLWA customers, including Detroiters, and is administered by the Wayne Metropolitan Community Action Agency. The goals of WRAP are to assist low-income households with their water bills, avoid service disconnection, and reduce water demand. WRAP offers water conservation audits to households that exceed 120% of average water consumption in the city. WRAP originally capped plumbing repairs for participating households at \$1,000, but has recently adjusted these parameters to be an average of \$1,500 per household. WRAP participants can have plumbing repaired and replaced, including outdoor spigots, indoor pipes, faucets, diverters, heaters and meters, laundry piping, tubs, toilets, and water-saving upgrades to

sink faucets and shower heads. Households that participate in the plan for 12 months and remain income-eligible can receive an additional 12 months of assistance for monthly water bills and arrears.

WRAP is funded at 0.5% of the GLWA budgeted revenue requirement, with a newly added 0.5% increase to help meet the needs in Detroit. Initial WRAP funding was \$4.5 million annually, and for 2021 was \$6.1 million for combined water and sewer supports.<sup>20</sup> An additional \$1.2 million was provided to the City of Detroit in 2018 to address growing plumbing repair needs.

In 2019, WRAP served 2,047 Detroit households. While this is a significant number of people and households, it represents just around half of the households estimated to lack complete plumbing in the region.<sup>21</sup> We evaluated the water and cost savings benefits of WRAP participation using WRAP data for the year 2019 collected and shared by the Wayne Metro Community Action Agency. These data included information gathered during the home water audit visit for the 2,047 participating Detroit households. These audits are designed to educate customers about their water use and savings potential, provide easy-to-install upgrades on faucets and showerheads, and identify additional plumbing repairs that would improve household water efficiency.

### ***Estimated Plumbing Repair Needs***

Nearly all (97%) of participating households needed additional plumbing repairs beyond those provided during the audit; around 25% of these households had plumbing repair needs that met or exceeded the maximum repair allowance, which was \$1,000 in 2019 (Table 1). The average household had two fixtures upgraded during the audit (with a range from zero to nine). Households that needed plumbing repairs were recommended for an average of \$562 of additional work.

### ***Estimated Water Savings from Audit Upgrades Only***

Complete data were only available for 389 participating households. Of these, 18% did not receive water saving upgrades during the audit visit. Of the households that did, we estimate the savings to be on average 609 gallons per month. Assuming a cost of \$11 per CCF (\$7.45 for water and \$3.38 for sewer as per 2019 water rates), the average savings would amount to around \$8.91 of savings on a monthly water

**TABLE 1:**  
Plumbing needs of participating households

	Number	Percentage
Households needing follow up plumbing repairs	1,225	97%
Households needing follow up repairs and expected to approach or exceed the \$1,000 cap	296	25%

bill and \$106.92 per year. This estimate includes just the water-saving upgrades made during the audit visit and not the recommended additional plumbing repairs. Across participating Detroit households that have complete data, the audits alone have saved the city and residents 187,853 gallons (251 CCF) and \$2,761 each month.

income, can help to ensure that people who need access to resources can apply without penalty and help to broaden the program’s impact.

- The City of Detroit could explore alternative revenue sources, such as social impact bonds that tie investor returns to desired outcomes.

## POLICY RECOMMENDATIONS

While plumbing repairs will not solve Detroit’s water affordability crisis, they are an essential part of the solution. Below are some recommendations for how we can more effectively and efficiently deploy repair resources to generate savings for Detroit residents.

### 1. Expand Funding for Residential Plumbing Repairs

Residential plumbing repairs are an effective way to improve water affordability, ensure water access, increase efficiency, and conserve a valuable resource. They can be out of reach for low-income homeowners, and additional funding is needed. Given the high level of need in Detroit, state and federal funding should help to fill the gap.

- As the federal government considers additional drinking water investments, resources should be available for conservation repairs as well as direct bill assistance.
- Michigan’s State Emergency Relief funding provides a one-time payment to households but is underutilized and insufficient. Increasing the resources available through SER, and revisiting how and when direct assistance is counted as

### 2. Target Investments to Reach Customers with the Greatest Need

It is important that any assistance program — including assistance for plumbing repairs — be available and accessible to the households that need it most. Plumbing repair funding should target customers with the greatest need and reduce barriers to access. The information provided in this report provides some insight into where these customers may be within the city and could be used to identify “hotspot” neighborhoods in need of investment in plumbing repairs. The goal should be to identify households with the greatest water losses and the least amount of resources available for repairs.

Much of this information can be available through household water billing and data. Finer-grained analyses, and a better understanding of the context of incomplete and leaky plumbing, can help to target resources. For example, some households will need more help with arrearages to address affordability while others will be better served by reducing monthly water bills going forward; others may have large, emergency plumbing repair needs. Designing flexible programs and funding streams can help optimize spending and ensure sustainable solutions.

More systematic tracking and monitoring of the impact of various types and scales of plumbing repair and upgrade strategies will help to identify investments that have greatest benefit to both customers and the water system. This includes identifying renters in the city who are in need of residential plumbing repairs and ensuring building codes and tenant protections are enforced.

### 3. Strengthen Coordination between City Departments

Incomplete plumbing and insufficient housing conditions are generating challenges for drinking water access and affordability but are the product of a suite of policy actions and programs. Greater coordination between DWSD, the Detroit Health Department, the Detroit Housing and Revitalization Department, and the Office of Sustainability could help to identify synergistic and innovative strategies for preventing plumbing disrepair and connecting people with the resources that can support safe, affordable, and accessible drinking water services. The Buildings, Safety Engineering and Environmental Department has a key role to play in residential building code enforcement. Partnering with local job training programs can help to generate skilled-trades jobs to implement the home audits and plumbing repairs. Collaborative efforts on these issues have emerged in the past through the city’s “efficient housing work group” and the water shutoff pilot interrupted by the COVID-19 pandemic. Revisiting and strengthening coordination efforts can help leverage the resources and expertise needed.

## CONCLUSION

Ensuring complete and efficient water services for Detroit residents is a critical component of the city’s goals for water access and affordability. High poverty rates and persistent housing quality challenges in the city mean public investments will be necessary. Water efficiency retrofits and plumbing repair programs hold significant progress and should be prioritized by policymakers.

## ABOUT THE AUTHORS

Sara Hughes is an assistant professor of environmental policy and planning at the University of Michigan’s School for Environment and Sustainability. She also leads the Water and Climate Policy Lab, whose work can be found at [waterclimatepolicylab.org](http://waterclimatepolicylab.org).

Kathryn Maloney, Anna Kaczmarek, Heather Newberry, and Elizabeth Wallace are graduate student research assistants with U-M’s School for Environment and Sustainability.

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## ENDNOTES

- <sup>1</sup> U.S. Census Bureau (2020). American Community Survey, 5-year estimates (2015-2019). [census.gov/quick-facts/fact/table/detroitcitymichigan,MI/PST045219](https://census.gov/quick-facts/fact/table/detroitcitymichigan,MI/PST045219)
- <sup>2</sup> U.S. Census Bureau (2019). American Community Survey, 5-year estimates (2014-2018). These estimates include 12-month average water and sewer costs.
- <sup>3</sup> *ibid.*
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- <sup>6</sup> City of Detroit (2016), "New Program to Assist Low-Income Water Customers," Press release. [detroit.cbslocal.com/2016/02/27/new-program-to-assist-low-income-water-customers-launches-in-march/](https://detroit.cbslocal.com/2016/02/27/new-program-to-assist-low-income-water-customers-launches-in-march/)
- <sup>7</sup> American Water Works Association (AWWA). "2019 Water and Wastewater Rate Survey," <https://www.awwa.org/Store/Product-Details/productId/75323192>
- <sup>8</sup> Detroit Water and Sewerage Department. <https://detroitmi.gov/departments/water-and-sewerage-department>
- <sup>9</sup> Detroit Sustainability Action Agenda. Two percent of median household income is a commonly used, though disputed, standard for water affordability.
- <sup>10</sup> Rockowitz, Dahlia, Chris Askew-Merwin, Malavika Sahai, Kely Markely, Cria Kay, and Tony Reames. 2018. "Household Water Security in Metropolitan Detroit: Measuring the affordability gap," Poverty Solutions, University of Michigan.
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- <sup>12</sup> Rockowitz, Dahlia, Chris Askew-Merwin, Malavika Sahai, Kely Markely, Cria Kay, and Tony Reames. 2018. "Household Water Security in Metropolitan Detroit: Measuring the affordability gap," Poverty Solutions, University of Michigan.
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- <sup>14</sup> Ellison, Garret (2020). "Damaged plumbing delays Detroit restarts during coronavirus outbreak, activists warn," <https://www.mlive.com/coronavirus/2020/03/damaged-plumbing-hampers-detroit-water-re-starts-during-coronavirus-pandemic-activists-warn.html>
- <sup>15</sup> Alliance for Water Efficiency (2020). "An Assessment of Water Affordability and Conservation Potential in Detroit, Michigan," <https://www.allianceforwaterefficiency.org/impact/our-work/assessment-water-affordability-and-conservation-potential-detroit-michigan>
- <sup>16</sup> Public Sector Consultants (2020). "Water Residential Assistance Program Evaluation: Program Successes and Opportunities for Improvement." Presented to Great Lakes Water Authority Audit Committee October 23, 2020.
- <sup>17</sup> Michigan Department of Health and Human Services. n.d. Annual Report of Key Program Statistics Fiscal Year 2019. "Table 39 State Emergency Relief (SER) Non-Energy: By Type Of Service Annual Information". [https://www.michigan.gov/documents/mdhhs/GA-039-Annual\\_SER\\_Non-Energy\\_Detail\\_513956\\_7.pdf](https://www.michigan.gov/documents/mdhhs/GA-039-Annual_SER_Non-Energy_Detail_513956_7.pdf)
- <sup>18</sup> Federal legislation has been introduced that would ban water shutoffs
- <sup>19</sup> While WRAP is the largest assistance program, there is also the DWSD 10/30/50 Payment Plan, the Wayne County Veterans Financial Hardship Services, WAVE Fund, MDHHS SER, and MDHHS additional emergency funds.
- <sup>20</sup> Public Sector Consultants (2020). "Water Residential Assistance Program Evaluation: Program Successes and Opportunities for Improvement." Presented to Great Lakes Water Authority Audit Committee October 23, 2020.
- <sup>21</sup> US Census Bureau (2019). American Community Survey, 5-year estimates (2014-2018). In this policy brief we are defining neighborhood as a Census tract.