Title TBD

Abstract TBD

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# Introduction

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# Citizen Science and Volunteered Geographic Information

Aided by the development of interactive web platforms and applications for mobile data collection, citizen science has become a common method for field research (Curtis, 2018). Defined as “projects that engage both professional scientists and non-specialists in the process of gathering, evaluating or computing scientific data,” Curtis (2018, p. 1) describes two main strands of this research. The first is participatory action research, where community members themselves drive research into collectively identified problems (see also Kindon, Pain, & Kesby, 2007). The second is scientist driven research, where non-experts are enlisted in the process of data collection for already existing research projects. One of the most widely cited examples of this approach is the online project eBird, which collects data from bird watchers to create maps of species’ geographic distribution (Sullivan et al., 2014; The Cornell Lab of Ornithology, 2019).

A related term, volunteered geographic information (VGI), has been used to describe explicitly spatial data produced by ordinary citizens (Goodchild, 2007; Haklay, 2013). These data can be collected through both active or passive participation. The former includes research projects like eBird or online review platforms such as TripAdvisor. The latter includes services that collect data as background information, such as location services on cell phone applications, posts on social media that include geographic location, or surveillance footage (Haklay, 2013).

VGI is not synonymous with citizen science: VGI sometimes lacks the component of active engagement common to most citizen science projects, and not all citizen science includes explicitly spatial data. One of the most prominent examples of VGI is the web service OpenStreetMap, which provides user contributed global data on roads, buildings, and natural features (Bittner, 2016). While this dataset has been used within research projects or for social initiatives such as crisis mapping, it is not itself created to answer specific research questions (Haworth, 2017; Quinn & Yapa, 2015). Yet VGI and citizen science do overlap. For example, a website created to study the spread of disease between oak trees provided tools for concerned citizens to add nearly 2,000 observations to a research dataset (Connors, Lei, & Kelly, 2012). Another study used a participatory design to include both university faculty and community residents to collect, analyze, and report data on local watershed problems (Taki, Jelks, Hawthorne, Dai, & Stauber, 2018).

As crowdsourced tools for scientific inquiry, both VGI and citizen science have been credited with easing the process of data collection and increasing trust between scientists and the general public, though concerns about data quality and geographic sampling remain. A recent meta-analysis by Brown (2017) showed that data accuracy and participation rates have varied considerably in studies making use of a participatory citizen science model. To achieve better consistency, Brown argues for the use of techniques from survey design that are aimed at increasing motivations for participation as well as explicit attention to and systematization of the geographic distribution of community volunteers. These concerns are echoed by Brovelli, et al. (2015), who found that the effectiveness of mobile data collection projects was closely linked to intentional volunteer recruitment and clear project goals. Together, these studies show that while new technologies may help facilitate citizen science research, they do not replace the logistical and relational labor of recruiting researchers or developing and communicating clear project goals.

VGI and citizen science have played a prominent role in many smart city projects, which have incorporated data in bike sharing (Attard, Haklay, & Capineri, 2016), real time traffic data such as that provided by Google (Johnson & Sieber, 2013), or even emotional states (De Oliveira & Painho, 2015) into governance tools and decision making. Cardullo and Kitchin (2019) use Arnstein’s (1969) ladder of citizen participation as a way to classify the kinds of “digital citizenship” created though these projects. At one end of this spectrum, residents are merely passive providers of data or consumers for whom crowdsourced data supports more informed decisions. Traffic maps or energy use dashboards are two examples of this approach. At the other end of this spectrum, residents are empowered to rework existing policies and institutions through forums like hackathons or other meetups where new solutions to urban problems are identified and developed. In practice, Cardullo and Kitchin write, examples of these are rare, as communities tend “to organize their activities and activism around addressing social and environmental issues through political and policy solutions rather than technological ones” (p. 9-10). Still, they argue, the potential remains for something more than neoliberal, consumer focused models of smart citizenship.

Pragmatist models of inquiry provide a useful structure for active forms of citizen engagement. Based in the work of early 20th century thinkers such as John Dewey and William James, pragmatism is a non-foundationalist philosophy that emphasize the social situatedness of knowledge (Dewey, 1997; James & McDermott, 1967). As Barnes (2008) puts it, pragmatism views ideas and knowledge “like knives and forks, implements to accomplish particular tasks, and not transcendent truths” (p. 1544). Those “tasks” are the ongoing routines that constitute social practice, or alternatively, processes of inquiry meant to identify social problems and develop new, more equitable practices. Through a process of inquiry, a diverse set of stakeholders develop a shared understanding of social problems, one that draws upon their respective experiences and perspectives. This knowledge is constructed *through* the process of inquiry and is thus specific to that time and place—it does not predate it, like an artifact waiting to be unearthed. In this sense, pragmatism’s influence is evident in later work such as Kuhn’s (1962) discussion of paradigm shifts, work in science and technology studies (Latour, 1993), or feminist critiques of positivism (Haraway, 1988) all of which emphasize the socially situated nature of knowledge production.

The models of civic engagement provided by citizen science and VGI share this emphasis on inquiry as a social process, one in which various publics can play an active role. Yet, as Harney et al. write, describing their model of process pragmatism, rather than working with

pre-existing publics that are already assembled around the pre-existing agendas that the academic is able and willing to endorse, process pragmatism seeks to use the process of research and knowledge production to construct new publics, new understandings, and new capacity to act. Working in the spirit of pragmatism involves bringing together diverse groups of people with differing worldviews, to find common ground and to create new publics united around issues of common concern. (Harney, McCurry, Scott, & Wills, 2016, p. 9)

In the context of citizen science, this approach emphasizes how the research process can generate new connections between diverse stakeholders. Through an inductive, collaborative process, research teams can construct new understandings of their local neighborhoods and the issues that face them. In this sense, the use of VGI moves beyond a framing of “citizens as sensors” (Goodchild, 2007), as community members play an active role in identifying problems and interpreting the data they collect.

At the same time, the task of building this shared understanding requires time and logistical coordination, as well as the ability to nurture social connections between members of a research team. Our research examines this process through analysis of a community housing assessment program in x cities across rural Georgia. Specifically, we give attention to the ways that a community based process of VGI data collection provided new insights into housing conditions within these communities, as well as ways that communities sometimes struggled to coordinate this process. In doing so, we contribute to the growing literature on how the use of VGI for citizen science can effectively facilitate community engaged research.

# Setting and Methods

The communities we partnered with for this research were part of the Georgia Initiative for Community Housing (GICH), a program designed to facilitate community planning for affordable housing (University of Georgia, 2019). Each year, five communities enter this program, and these are most often small municipalities from rural parts of the state. As part of their application, communities assemble a housing team that includes a range of key stakeholders, including elected officials, members of community organizations, and housing professionals such as real estate agents or mortgage lenders. Over the course of GICH’s three year program, planning teams attend bi-annual retreats where they attend sessions on issues including techniques for managing heir properties, tools for identifying and reducing blight, and information for working with state housing authorities and their funding programs. Each community also is assigned a facilitator who helps them identify and plan for goals, which often included targeted redevelopment of a set of properties along with a successful application for state or federal funding. Over it’s 12 year history, GICH has enrolled 76 communities throughout the state.

In recent years, many GICH communities have included community housing assessments to provide data for redevelopment plans and funding applications. Community housing assessments, also called windshield surveys, provide a systematic approach to understanding exterior conditions of the local housing stock and other neighborhood issues. Housing assessments help communities focus their efforts on the most critical issues for their housing stock (White, Jensen, & Cook, 1992). These assessments use a windshield survey of properties in a targeted study area, going house by house to identify problems with the housing structure or lot conditions. In most cases, planning teams have opted to conduct this assessment themselves rather than hire an outside agency. Working with the city of Pembroke, one of the first communities in the GICH program to use this method, as well as an existing tool developed by Jeffrey Crump at the Unviersity of Minnesota, faculty at the University of Georgia (UGA), including one author of this paper (Skobba), developed a standardized data collection form for this process in 2013. It allowed survey teams to rate structural issues as either minor or major problems and created a three tier system of classification based on these classifications. Communities were given broad flexibility with this survey and often developed customized questions.

The authors developed second version of this survey in 2017 based on a review of similar survey forms used in municipalities across the country as well as appraisal forms used for Fannie Mae and HUD FHA loans. The revised (?) survey was then reviewed by housing professionals with housing assessment or appraisal experience. It includes a foundation to roof assessment of built structures as well as questions on the condition of the lot (e.g., overgrown grass, trash/tires) (appendix A). Each issue listed on the survey has a point value, and the sum of these points is used to create a general classification from a list of six categories. Table 1 also provides a summary of categories included on each of these two surveys, though for version 1, not every community included each category. Table 2 summarizes the classification system of each survey.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | ***Version 1*** | ***Version 2*** |  |  | ***Version 1*** | ***Version 2*** |
| **Property status** |  |  |  | **Roofing** |  |  |
| Occupancy | x | x |  | Swaying roof | x |  |
| **Property characteristics** |  |  |  | Gutter/fascia repair |  | x |
| Single family/ multifamily | x | x |  | Missing shingles | x | x |
| Height/stories | x | x |  | Partial re-roofing | x | x |
| **Foundation** |  |  |  | Complete re-roofing | x | x |
| Cracked | x | x |  | Replace roof structure | x | x |
| Partial replacement |  | x |  | **Lot assessment** |  |  |
| Complete replacement | x | x |  | Overgrown/weeds | x | x |
| **Exterior** |  |  |  | Missing ground cover | x | x |
| Exposed insulation | x |  |  | Dead/hazardous trees |  | x |
| Gutter repair | x | x |  | Inoperable vehicle | x | x |
| Repainting | x | x |  | Junk in yard/porch | x | x |
| Minor dry rot | x | x |  | Porch used as storage | x | x |
| Needs replacement |  | x |  | Graffiti |  | x |
| Chimney repair | x | x |  | **Tax records** |  |  |
| Missing siding | x | x |  | Homestead status | x | x |
| **Windows/doors** |  |  |  | Owner name | x | x |
| Uneven windows/doors | x |  |  | Owner address | x | x |
| Repainting |  | x |  | Parcel location | x | x |
| Dry rot | x | x |  |  |  |  |
| Cracked glass | x | x |  |  |  |  |
| Window replacement | x | x |  |  |  |  |
| **Stairs/rails/porch** |  |  |  |  |  |  |
| Repainting |  | x |  |  |  |  |
| Dry rot/missing railing | x | x |  |  |  |  |
| Repair needed | x | x |  |  |  |  |

**Table 1: Topics included on housing assessment surveys**

|  |  |
| --- | --- |
| **Survey 1 classification** |  |
| *Standard* | No more than one minor issue |
| *Substandard* | More than one minor issue and at least one major issue |
| *Dilapidated* | More than three minor issues and more than 2 major issues |
|  |  |
| **Survey 2 classification** |  |
| *Well maintained* | (Less than 3 points): New or in good condition. Does not need any repairs. |
| *Sound* | (3-9 points): In good condition but is in need of some maintenance work, such as repainting or minor repairs. |
| *Minor repairs needed* | (10-14 points): Housing unit has several deferred maintenance issues or one moderate repair project (i.e. replacement of several windows) |
| *Moderate rehabilitation needed* | (15-39 points): Requires multiple repairs, including the repair/replacement of one major component. |
| *Substantial rehabilitation needed* | (40-55 points): Requires the repair and replacement of most or all exterior components. |
| *Dilapidated* | (More than 55 points): Housing unit suffers from excessive neglect, appears structurally unsound and not safe for human habitation, and may not be feasible to rehabilitate. |

**Table 2: Structure classification system**

With support of a USDA funded grant, the UGA research team created a set of digitized data collection tools to support these GICH communities. This two part suite of tools includes online forms for VGI data collection and a web application to map and analyze survey results. Data collection is accomplished through one of two platforms: OpenDataKit (ODK), an open source software that is most functional on Android devices, or Fulcrum, a proprietary multiplatform data collection tool that requires a paid subscription. Both tools allow users to input data via smartphones or tablets, greatly reducing the need for volunteers to do manual data entry. Both also allow for data to be linked to existing parcel records based on address or parcel number, which reduces the risk of error and allows for the import of data on parcel ownership and tenure status for analysis. Lastly, these platforms include the ability to link photos of the properties to the survey records.

Once collected, these data are visualized through an online web application. Few of the GICH planning teams include members with expertise in Geographic Information Systems (GIS) software for mapping and analysis, and learning how to operate desktop or online software can be overly time intensive. To ease this process, one UGA faculty (Shannon) and research assistants developed an online web application using the open source Shiny platform, created by the company RStudio for the R programming language (RStudio, 2016). R include support for mapping and analysis of spatial data, and through this online platform, planning team members can view properties by their overall rating and by specific property issues. They can also download records of selected properties and identify the most common problems listed in the survey data (Figure 1).

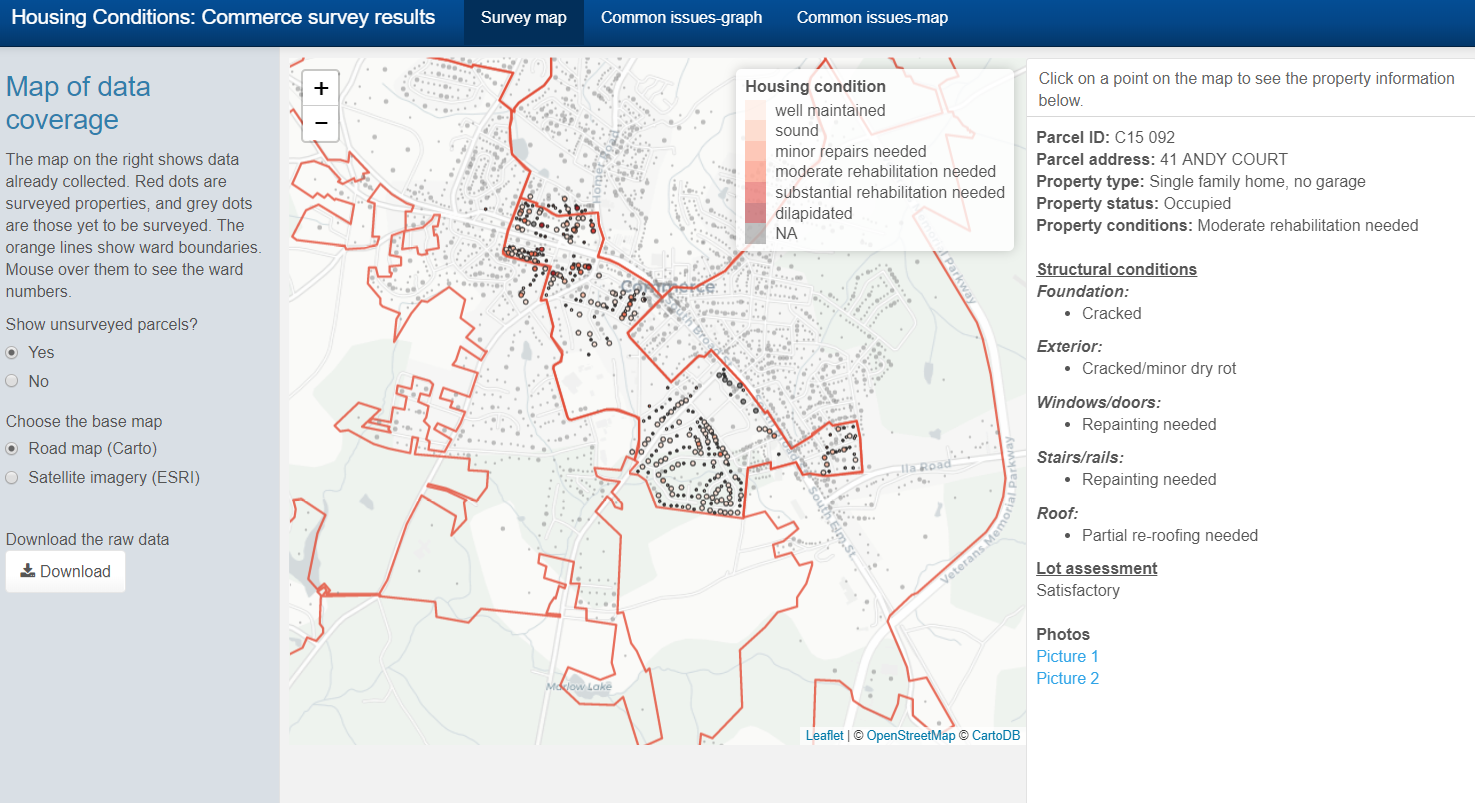


Figure 1: Screenshot from the online web application.

Since the creation of the housing assessment survey, ten Georgia communities have moved through this housing assessment process. We focus on seven communities that generated the most responses on this paper: Arlington, Marshalltown, Hancock, Benson, Stewart, Tyler, and Lewisville[[1]](#footnote-1). All but one of these communities—Lewisville (~25,000 residents)—have populations less than 15,000, and four have 5,000 or less. They are located throughout Georgia: Marshalltown and Arlington in the east near the South Carolina border, Hancock, Stewart, and Lewisville just outside the Atlanta suburbs, and Benson and Tyler in the central region of the state. Tyler is also home to a regional college.

Table 3 provides a demographic summary of these communities from the 2013-17 American Community Survey (United States Census Bureau, 2019), with values rounded to mask their identity. None of these communities have a median income more than 50% than Georgia’s ($52,977). The rate of renter-occupied housing ranges from 40%-65%, which is at or above Georgia’s statewide rate of 40.3%. The racial composition of these communities varies widely. Arlington is 80% African-American, while the rate Lewisville is only 15%. Similarly, 70% of the population in Hancock is classified as White, in contrast to only 30% of the population in Tyler. Housing structures are somewhat older than the statewide average, with a median construction dates ranging from 1965 to 1985.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Population | Median age | Median income | % rental households | % Hispanic | % African-American | % White | Median year for structures |
| Benson | 5,000 | 30 | $ 20,000 | 40% | 5% | 50% | 50% | 1975 |
| Hancock | 7,500 | 35 | $ 25,000 | 35% | 10% | 20% | 70% | 1980 |
| Lewisville | 25,000 | 30 | $ 25,000 | 65% | 25% | 15% | 40% | 1985 |
| Marshalltown | 5,000 | 40 | $ 15,000 | 45% | 10% | 35% | 50% | 1970 |
| Tyler | 3,000 | 40 | $ 18,000 | 40% | 5% | 60% | 30% | 1965 |
| Stewart | 15,000 | 35 | $ 20,000 | 65% | 5% | 40% | 50% | 1985 |
| Arlington | 2,000 | 40 | $ 15,000 | 55% | 0% | 80% | 20% | 1975 |
| |  | | --- | | **All of Georgia** | | 10,201,635 | 36.4 | $ 52,977 | 40.3% | 9% | 31% | 54% | 1988 |

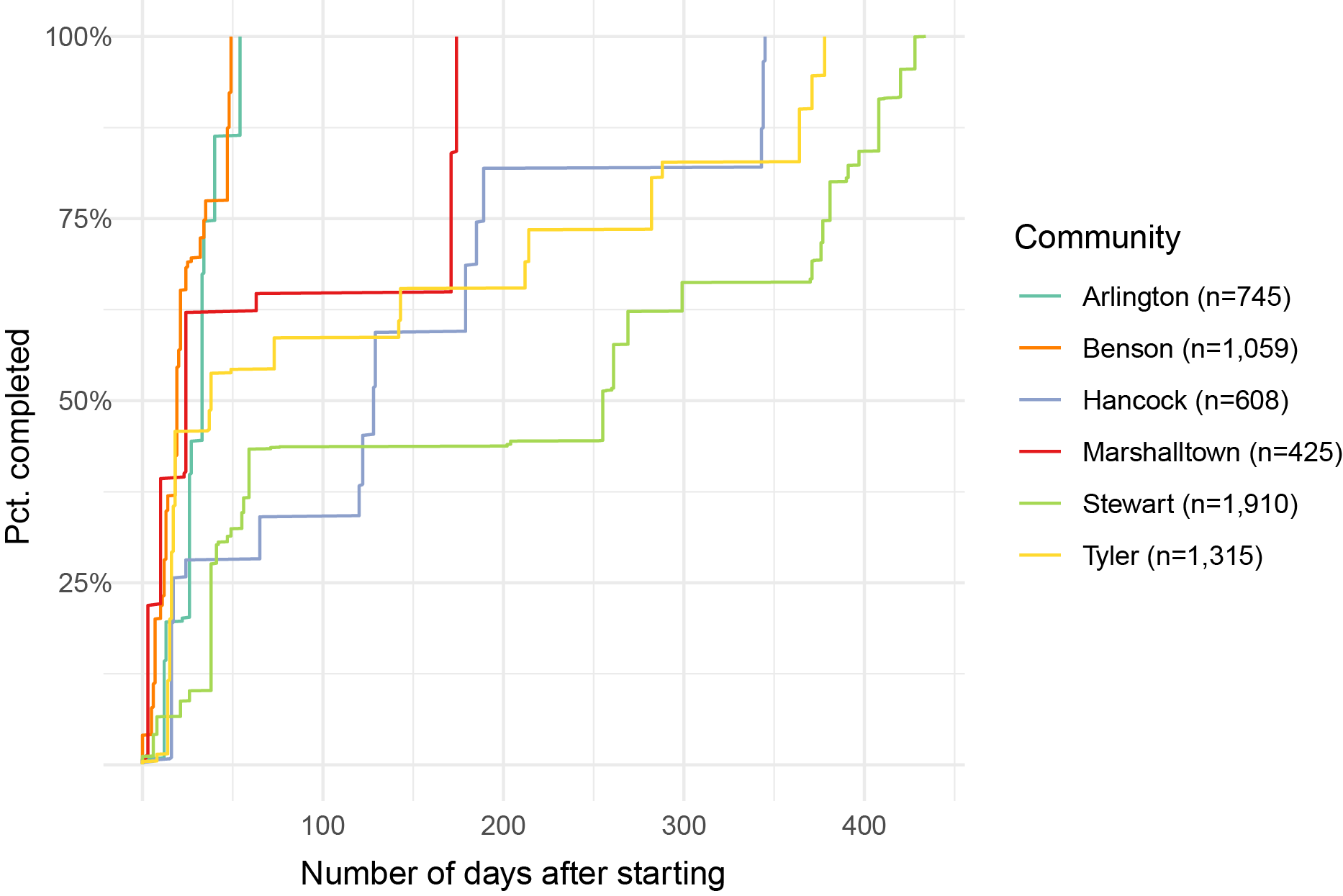
**Table 1:** Demographic summary of study communities. Actual values are rounded to mask identity.

# Findings

## Technology and process

The digital tools created for this project greatly improved each community’s capacity to collect and analyze housing data. The housing team leader in Stewart, for example, said that without the digital tools, “we wouldn't have been able to accomplish things. We wouldn't be able to the housing assessment. We wouldn't have had the data or the understanding of the data to be able to have these important conversations at the local level.” Similarly, the team leader in Tyler said, “I like the fact that now I can go out and do [the survey] on my own, because it's an app that you can just put on one of these devices and head out and have it done. It was just so much easier. And then to come back and download it was certainly easy, too.” A few aspects of this process were still sometimes troublesome, such as identifying a property number or even an address for poorly marked properties and vacant lots. In a few cases, survey team members were more comfortable using paper forms than tablets. As noted above, maintaining consistency across team members and communities was also often a challenge. These were all relatively minor issues, however, and the ease of data collection provided by digital tools was often cited as a key advantage of this process.

Outside of data collection itself, however, many housing teams struggled with survey planning, training, and community outreach. Once these teams had decided to start a housing assessment, they often wanted to begin data collection as quickly as possible, usually within a few weeks. It was often difficult for housing teams to develop a clear study area and a sustainable plan for data collection. As a result, after an initial burst of activity, many communities stalled out as volunteers moved on to other tasks and plans for where to go next were unclear.



**Figure 2: Rate of survey completion among communities**

Figure 2 visualizes this process. In this graph, the x-axis shows the number of days after the first property was surveyed, and the y-axis shows the rate of completion based on the final count of survey records. Lewisville is not included on this graph, as they were one of the first to use this process and did not include dates for individual records. In all communities, the first 25% of records were collected in the first fifty days, and in four communities, more than half of all records were collected during this time period. Yet for most communities, there is a clear lull in data collection after this point, extending between 100 to 200 days, followed by shorter bursts of activity up until the completion of data collection.

The two exceptions to this trend were Benson and Arlington. In Arlington, data collection was done by a paid staff with previous experience in housing assessment. As noted earlier, local university students were responsible for data collection in Benson, and the short time frame for data collection in this case reflects the structured nature of their work, which was completed for course credit. It is worth noting that the leadership of the housing team in Benson hoped to collect additional data, but they were unable to facilitate further survey work.

Hancock and Marshalltown used students from [institution redacted] for data collection, and in both cases, faculty and a small number of other students returned periodically after initial data collection to complete the survey. Stewart and Tyler both relied on community volunteers and city staff for data collection. In both cases, data collection took a year or more, but for Stewart this also resulted in the largest sample of any community (1,910 records). Tyler was the second largest (1,315 records), and their timeline shows a steady pace for data collection, with multiple breaks of approximately 50 days between bursts of activity.

The intermittent pattern of data collection is also evident in the following passage, from an interview with the housing team leader (TL) in Stewart, talking about the process of data collection in that community.

TL: Yeah. It's been mostly college kids, and then staff. I've done a lot of it. Then we had some just community volunteers. Those have been individual people who are interested in helping, and I'll give them a stack of maps and a Kindle, and just say, "All right, at your own timing, get as many of these as you can and bring them back to me."

I: Right. Have you felt like it's been helpful to do things like have a little wave of involvement like, "Hey, January is going to be, we're going to get a bunch more data month," and then you let it settle for a while? Or has it just been a rolling, ongoing project?

TL: It was important for us to have the goal to reach 1,000 by the end of the year, because then we had to meet it. It made us do volunteer days with the high school students and get partnered with a school club that came out and did it. That happened because we're like, "We're at 800. We need 200 more to get to the thousand mark." Then that group was like, "We'll do it. We'll make it our community service month." There's been little bursts of energy with it. Yeah, and that's consistently, we'll get, I don't know, a handful of houses every two weeks or so. I mainly am going and trying to get the gaps or the little holes where we got everything around these five houses, and then I'll go try to get those five, because it wouldn't be as straightforward for volunteers that's doing it for the first time.

Many communities made use of both staff and college students in similar ways, working in short bursts to cover a broad area and then returning to fill in gaps as needed. Yet this is also a difficult process that requires collaboration with multiple local organizations, as well as the ability to develop a systematic process of data collection across neighborhoods. While all seven communities described in this paper completed this process, they often found it more difficult than expected and sometimes fell short of their overall goal.

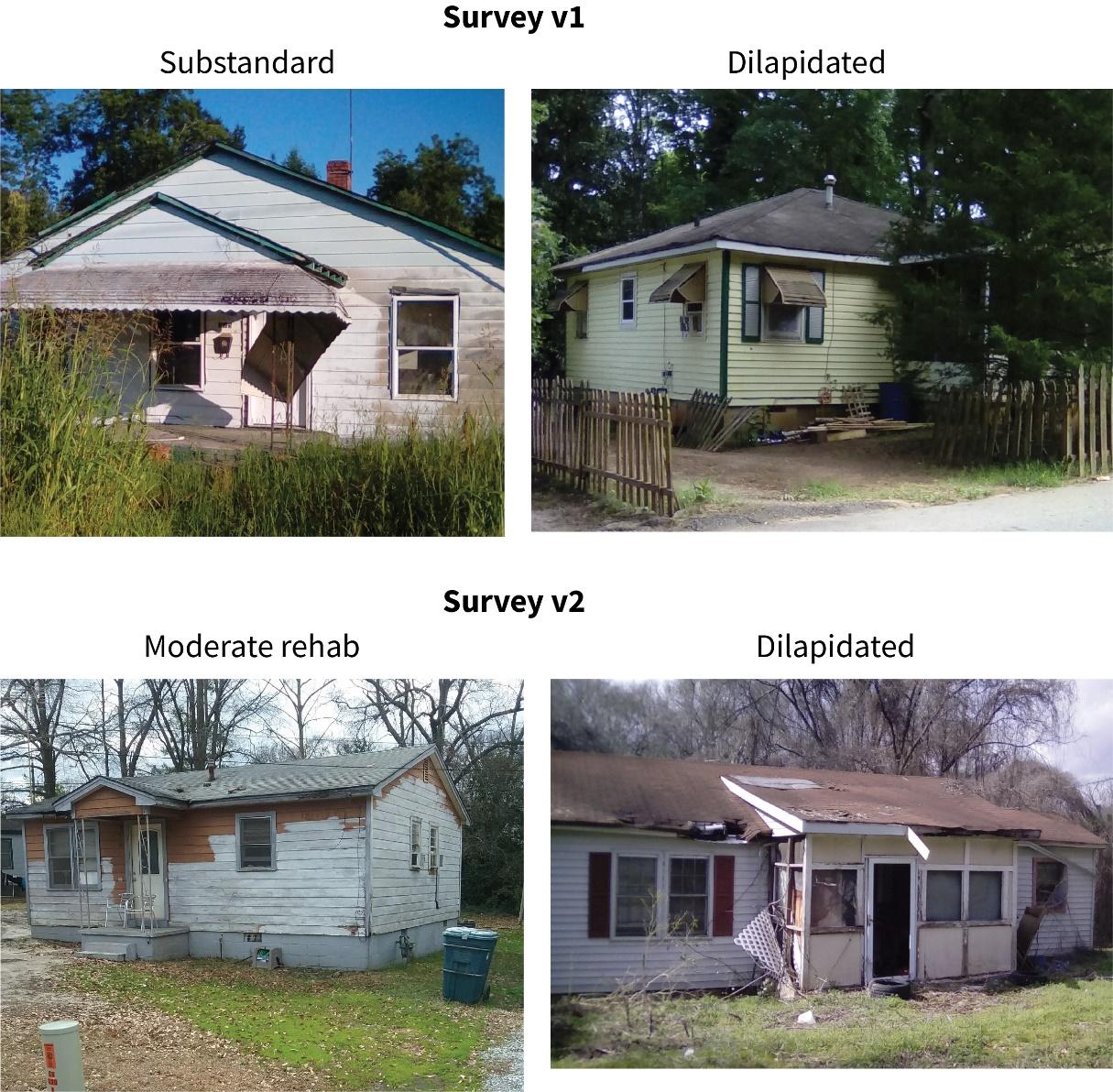
## Community housing data

Drawing from work in all seven communities, our data contains ratings for 6,841 structures. Table 1 shows the overall classification of structural conditions based on collected responses. In all communities, a plurality of structures were classified as standard (v1) or well maintained (v2), and in five of the seven, a majority of structures received this classification. The notable exception to this trend is Marshalltown, where only 28% of properties were rated well maintained. This community had the one of the oldest median structure ages of all communities and also one of the lowest median incomes. Along with Lewisville, it was one of the two communities that was predominantly surveyed by students at [institution redacted for review], though structures in Lewisville were rated much better overall. On the high end, 27% of structures in Tyler were rated as dilapidated, and Stewart, Benson, Arlington and Marshalltown all had approximately 10% of structures rated as needing serious repair.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Survey version 1** |  |  |  |  |
| **City** | **Lewisville** | **Stewart** | **Tyler** |  |
| **# of records** | 468 | 2,208 | 1,315 |  |
| **Standard** | 65.4% | 75.1% | 56.3% |  |
| **Substandard** | 26.9% | 15.2% | 16.5% |  |
| **Dilapidated** | 7.7% | 9.7% | 27.1% |  |
|  |  |  |  |  |
| **Survey version 2** |  |  |  |  |
| **City** | **Arlington** | **Benson** | **Hancock** | **Marshalltown** |
| **# of records** | 745 | 1,059 | 621 | 425 |
| **Well maintained** | 69.5% | 49.7% | 61.7% | 28% |
| **Sound** | 8.5% | 14.7% | 13.2% | 21.4% |
| **Minor repairs** | 3.9% | 7.9% | 6.3% | 10.4% |
| **Moderate rehab** | 8.7% | 16.9% | 11.3% | 22.4% |
| **Substantial rehab** | 2.8% | 4.2% | 1.3% | 5.6% |
| **Dilapidated** | 6.6% | 6.5% | 2.9% | 4.9% |
| **Not classified (e.g., vacant lot)** | 0% | 0% | 3.4% | 7.3% |

**Table 4: Housing classifications by city**

Submitted photos provided additional detail on property conditions in these communities. Figure 1 provides representative images from both survey versions of structures that were rated in the middle and bottom end of our classifications. The houses shown in the substandard and moderate rehabilitation images had significant damage to the exterior, though they both appeared structurally sound. The two buildings rated dilapidated had significant roof damage and in the case of the bottom image, the image also shows significant damage to the exterior and windows. For community teams, the ability to collect and browse through these images provides a holistic image of how multiple structural issues can contribute to unsafe housing environments and provide evidence to outside funders of the need for grant funding for housing rehabilitation or replacement.



**Figure 1: Representative photos of structures rated as substandard or dilapidated**

While the two versions of our housing survey differ in question formatting and issues focused on, there are also a few areas of overlap. The communities using the first version of the survey often customized their questions, which did limit comparability. Using the crosswalk shown in Table 1, we matched many responses to survey 1 to similar areas in survey 2. We then analyzed the prevalence of these issues across communities, leaving off Lewisville because. Table 5 shows these rates for all issues present in at least 2% of survey responses.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **City** | **Tyler** | **Stewart** | **Benson** | **Hancock** | **Marshalltown** | **Arlington** | **All** |
| **Survey version** | **v1** | **v1** | **v2** | **v2** | **v2** | **v2** |  |
| **Exterior** | Cracked/minor dry rot | 29.6% | 16.6% | 12.9% | 7.6% | 25.2% | 7% | 16.1% |
| Repainting needed |  | 23.4% | 20.6% | 13% | 27.8% | 12.8% | 15% |
| Replace siding/exterior | 17.1% | 2.2% | 7.1% | 4.2% | 15.8% | 4.4% | 6.9% |
| **Foundation** | Cracked foundation | 10.7% | 1.3% | 13.1% | 7.1% | 22.8% | 9.4% | 7.6% |
| Partial replacement needed |  |  | 8% | 3.5% | 13.6% | 2.6% | 2.7% |
| **Roof** | Gutter repair |  | 5.1% | 5.2% | 6.6% | 26.8% | 1.1% | 3.2% |
| New roof structure | 12.7% | 3.4% | 5.9% | 2.6% | 13.4% | 4.4% | 6% |
| Partial re-roofing |  |  | 7.6% | 3.4% | 12.5% | 2.8% | 2.6% |
| Total re-roofing |  |  | 5.4% | 3.5% | 13.2% | 2.6% | 2.3% |
| Missing shingles | 29.3% | 11.7% | 5.8% | 6.8% | 20.2% | 8.7% | 13.1% |
| **Stairs/ porch** | Cracked/minor dry rot |  |  | 13.5% | 11% | 26.6% | 8.9% | 5.7% |
| Major repair/replacement | 17.2% | 2.8% | 7.4% | 3.4% | 13.6% | 9.8% | 7.6% |
| Repainting needed |  |  | 18.3% | 10.1% | 24.9% | 6.8% | 6.1% |
| **Windows/ doors** | Cracked panes | 10.5% | 6.6% | 12.7% | 8.1% | 18.6% | 6% | 8.6% |
| >3 windows replacement | 12.3% | 3.8% | 4.4% | 1.4% | 9.9% | 5% | 5.6% |
| <= 3 windows replacement | 12.3% | 4.8% | 5.7% | 2.3% | 13.2% | 2.3% | 6.1% |
| Repainting needed |  |  | 19.2% | 10.5% | 29.2% | 8.5% | 6.7% |
| **Yard** | Junk in yard |  | 8.4% | 0% | 2.1% | 9.4% | 0% | 3.5% |
| Missing ground cover |  | 16% | 0% | 6.8% | 12% | 0% | 6.5% |
| Porch used as storage |  | 8.1% | 0% | 4.3% | 6.1% | 0% | 3.4% |
| Overgrown/weeds |  | 16.8% | 0% | 8.4% | 12.7% | 0% | 7% |

**Table 5: Prevalence of top issues across communities**

Across all communities, the three most common issues reported were dry rot (16.1%), repainting on the exterior (15%), and missing shingles (13.1%). Most issues were present in less than 10% of surveyed properties, and the need for many major repairs such as re-roofing or foundation replacement was present in less than 3% of all properties. The specificity of these responses, combined with the geographic data shown in Figure 1, can help communities target requests for assistance and plans for housing renovation. The housing team leader in Tyler commented on the value of this detailed data, saying that “there were people that started with us, a three year period, that has had still not done the housing assessment. And I thought, how do you know? How you really know what you're working? If we haven't accumulated the data to know which way to go. And so that was, I don't think you can do anything without that.”

These rates varied widely between communities. Marshalltown specifically averaged 10.7% higher than the overall rates, and Tyler was 8.3% higher than the overall rates for the issues shown in Table 5. This was also apparent when examining specific issues. For example, looking at rates of minor dry rot present on stairs or porches, Marshalltown’s rate of 26.6% was more than 15% higher than Hancock (11%). Benson’s rate of 13.1% of properties with a cracked foundation was nearly twice as much as Hancock (7.1%), but less than half of Marshalltown (22.8%).

The variability in these rates across communities may indicate real differences in housing quality, or it may reflect differences in sampling within those communities. However, it may also indicate a lack of consistency among reviewers. For example, Marshalltown’s survey was largely done by students in a service-learning class at our institution, and our supervision may have influenced the higher rates in that community. Hancock was surveyed by a mix of our student and local officials, but in a different semester and over a smaller area. Benson was largely surveyed by students as well, as it is home to a regional university. Yet those students may not have received the same training at those at [institution redacted]. In Arlington, surveying was done largely by a single individual with past experience in housing evaluation, and this person did not collect data on yard conditions for any properties, resulting in a 0% rate for all categories. Addressing potential discrepancies across communities remains a work in progress and is one drawback of a community driven process.

## Connections to residents and neighborhoods

In addition to the data on specific housing conditions, feedback from housing team members and our own experience showed how the process of data collection created opportunities for new insights into neighborhood conditions and chances to interact with residents. A housing assessment does not collect any private data. Survey teams stand on a street or sidewalk and only record and photograph parts of the structure visible from that public location. Yet many residents are understandably curious about why their homes are being surveyed in this way and ask teams about the purpose of their work. Communities have pursued systematic ways of answering these concerns. Many post notices on social media or in local newspapers prior to the event or announce it at community gatherings. Some communities print postcards with information about the assessment and contact information for housing team leaders.

In many cases, though, these one-on-one interactions provide a chance to not only clarify the goals of the housing assessment but also to talk with residents about needs in specific neighborhoods. Once residents understand that the goal of the assessment is to secure resources for neighborhood improvements, they often speak about specific concerns: properties in need of repair or chronic problems across multiple properties. A housing team leader in Hancock describe it this way:

Doing the walk through, some of the people would come out on their porches or out in their yard and actually were thrilled that we were doing the assessment and glad to hear that we care. And that was probably the biggest surprise, because I think we're not always aware of the situation. We look at the cover and not inside.

While collecting data in Marshalltown, a resident spoke with one of the authors (Jerry) about an adjacent property that was clearly need in repair. “Make sure you get that one,” she said, noting that it had been in poor shape for years and expressing frustration that the city had done little to address it. When city staff are the ones doing the survey, as was the case in multiple communities, the survey process becomes opportunities for informal outreach and, potentially, trust building with neighborhood residents.

Value of the community assessment at finding unexpected outcomes:, Millen tire cleanup, impact on students from quotes; Contrast between communities that did data collection vs those who outsourced it

## Putting the data to work

Kim’s interviews--how do stakeholders talk about the outcomes of this process (or do they?). How is it being used by communities? Importance of leadership. Use of the data to prioritize interventions and make progress.

# Conclusions

Restate potential value of this approach and best practices we’ve identified for making it work. Effective at helping identify issues even if it heads in unexpected directions.

What does it mean to *know* the community, both the data itself but also first hand knowledge from data collection.

Importance of knowing what you’re looking for--why important to do the assessment.

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1. All city names are pseudonyms [↑](#footnote-ref-1)