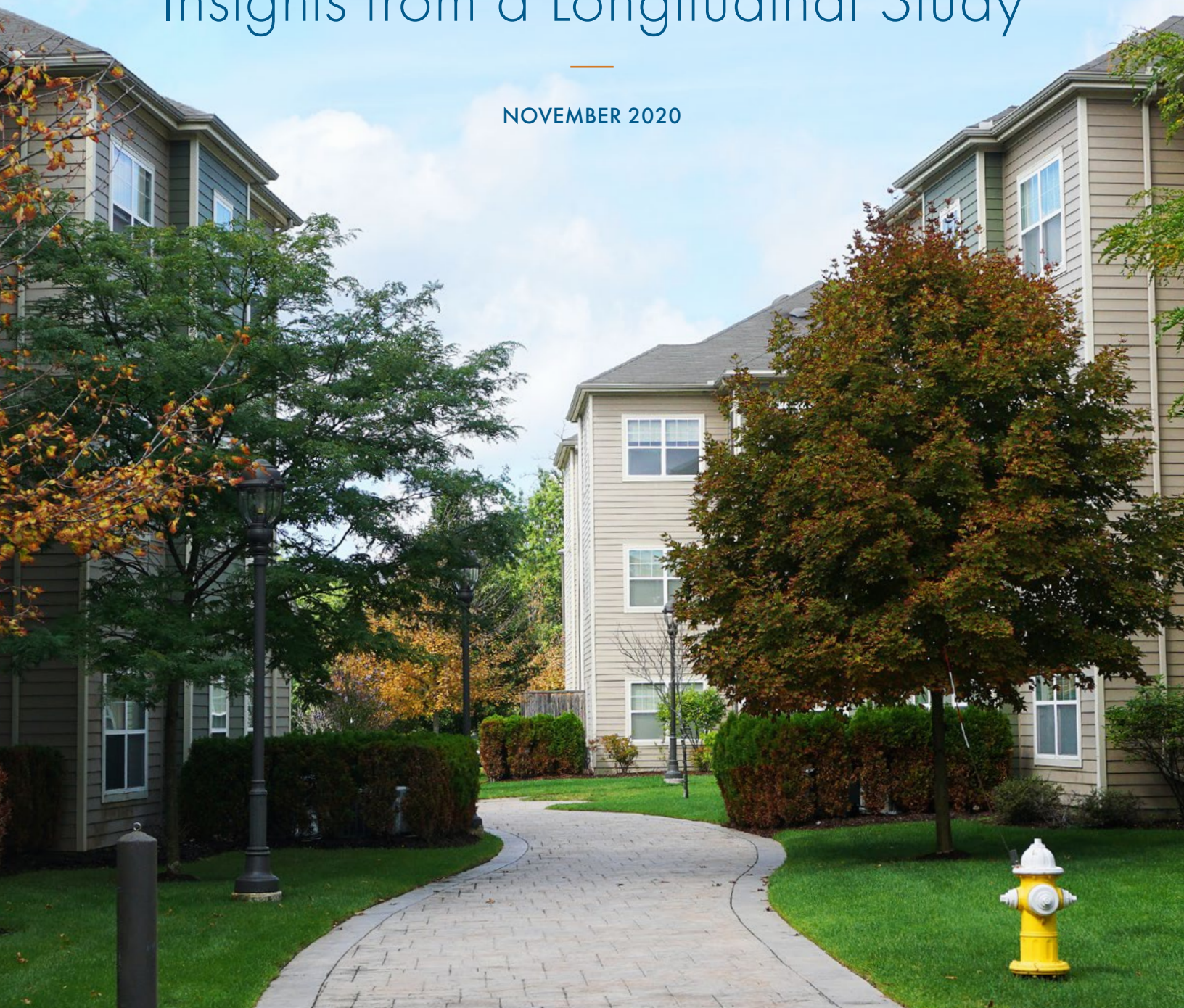


Overcoming Challenges in Housing-Based Research: Insights from a Longitudinal Study

NOVEMBER 2020





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Executive Summary

Affordable housing is a vital platform for promoting resident health and providing services to improve resident outcomes. As such, it offers the opportunity to partner with community organizations and people with low incomes to conduct research that explores their needs, evaluates the impact of policies and programs, and shapes funding, policy and programming decisions. Although housing-based research is valuable, it presents challenges and nuances that can be daunting. The complexities of daily life and community dynamics can influence residents' ability to participate in research. Similarly, the inherent uncertainties associated with developing and operating affordable housing can present difficulties in recruiting willing property owners. Despite these challenges, housing-based research remains an important tool for evaluating and highlighting proven solutions and for aligning funding and policy decisions with community needs.





In 2013, Enterprise Community Partners (Enterprise), The JPB Foundation (JPB), the National Center for Healthy Housing, and several university partners embarked on a multiyear, multisite study of green building practices. The *Healthy Home, Happy Kids* (HHHK) study* sought to measure the effect of these practices on the respiratory health of children living in affordable housing. The research team hypothesized that children living in affordable housing rehabilitated to “green” standards would have better respiratory health than those children who lived in “non-green” affordable housing.

Despite the expected positive health outcomes of green building practices, developers face many financial constraints in developing and rehabilitating affordable housing properties and often must make difficult trade-offs. Understanding how green building practices benefit resident health can help developers prioritize these practices. If the study’s hypothesis proved to be the correct, Enterprise would leverage the study’s findings to make the case that green building practices should be integrated into all affordable housing, with the ultimate goal of transforming the affordable housing financing system to relieve the financial trade-offs that developers face, ensuring that all residents of affordable housing benefit from the health-promoting features of green housing.

After nearly six years of field research, the HHHK project team soon will release a final report and related research briefs and articles. In addition to what we expected to learn about the benefits of green building practices, we also have learned some important lessons about conducting a large-scale research study involving residents of affordable housing. Trying to balance the need for scientific rigor with the realities of the affordable housing industry, residents’ lives and changing community conditions posed unique demands and tested the flexibility and creativity of the project staff and funder alike.

*The *Healthy Home, Happy Kids* study was renamed in 2018 during a substantial redesign of the study protocols to *Studying the Optimal Ventilation for Environmental Indoor Air Quality* (The STOVE IAQ Project). However, this report refers to both the original study and the redesigned study as the *Healthy Home, Happy Kids* (HHHK) study.

SUMMARY OF INSIGHTS AND RECOMMENDATIONS

This report explores the many challenges encountered during the HHHK study, as well as the strategies employed and insights gained throughout this process. Many of the insights and recommendations included in this report, and summarized below, confirm the challenges experienced by others. In the sections that follow, we highlight the solutions and workarounds employed by the HHHK research team.

■ **Insight #1: Identify key stakeholders and include them in the study design planning process.**

Recommendations

- Designate enough time and funding to allow a planning phase to be conducted prior to finalizing the study design, including the time and resources necessary for stakeholder engagement.
- Assemble and engage an advisory council that represents key stakeholder groups (including housing developers, property managers, residents, community stakeholders and scientific advisors) to provide an ongoing pathway for regular feedback and problem-solving.
- Engage representative stakeholders in the study design process if specific housing sites and communities have not yet been selected for a study.

■ **Insight #2: Create a strong team and the project infrastructure needed for a complex study.**

Recommendations

- Ensure that the project team includes staff who are experienced in community-based research and are familiar with the community or population of focus.
- Include members of the advisory council on the project team to ensure that implementation decisions are informed by science-, housing- and community-based perspectives.
- Incorporate resident participation in recruitment and data collection efforts into the study design, and ensure that residents receive the necessary training and support to participate as members of the project team.

■ **Insight #3: Pilot test the study design.**

Recommendations

- Designate enough time and funding to pilot test data collection methods and respond to challenges identified.
- Identify target properties as part of a pilot phase for housing-based research, testing the feasibility of a study's housing-related assumptions and criteria.
- Use pilot testing to confirm the skills and experience needed for research assistants and other staff to successfully implement the research protocol.

■ **Insight #4: Build strong relationships with developers, property managers and residents.**

Recommendations

- Anticipate the liability concerns of housing owners, and consult with advisors and legal experts to determine the best way to allay those concerns.
- Incorporate sufficient time to develop relationships with housing owners, property managers and resident leaders, ensuring that the study has a clearly articulated benefit for residents and the broader community.
- Create recruitment plans that reflect the unique context and needs of each housing development in partnership with housing stakeholders, community organizations and resident leaders.

■ **Insight #5: Pursue flexibility and creativity in adapting to implementation challenges with strong support from funders and advisors.**

Recommendations

- Create regular feedback loops with the project team, advisors and funders to identify and quickly respond to challenges that arise.
- Acknowledge both the need for flexibility within grant expectations and project planning and the unpredictability of many elements in housing-based research.
- Engage a diverse set of perspectives, including those of the study funders and project advisors, to identify creative solutions for obstacles that arise during study implementation.

Two key lessons emphasized throughout this report are the need to embed community-based participatory research (CBPR) principles in all aspects of the research process and the importance of recognizing housing owners and property managers as part of the “community” when conducting housing-based research. Although the HHHK research was not initially designed as a CBPR study, incorporating these methods along the way was crucial to addressing implementation challenges and moving the research forward.

This report offers insights derived from a single study and is not representative of all housing-based research. Nor does it provide an exhaustive list of recommendations for housing-based research. However, some of the challenges experienced by the HHHK research team were reported previously in the literature, and this report serves as additional confirmation. It also highlights additional challenges and offers potential solutions. We hope that other researchers, funders and housing stakeholders benefit from the collective experience reflected in this report and continue to pursue research that explores the value of affordable housing as a mechanism to improve individual outcomes and strengthen communities.



Introduction

Social science and public health research helps to illuminate the ongoing challenges facing underserved populations and to evaluate and advance effective solutions to address those challenges. In recent years, this research has focused on understanding the root causes of poverty and evaluating the effectiveness of specific interventions that address persistent disparities, particularly for communities of color. A unique research platform to support these efforts is affordable housing, which offers subsidized rents to households with low incomes. Typically owned and managed by public agencies, private developers or community organizations, subsidized affordable housing often serves as a platform for delivering services related to health, financial security, education and other social determinants. As a result, research based in affordable housing can be a valuable tool for testing the impact of solutions and shaping future funding, policy and programming decisions aimed at alleviating the challenges facing underserved populations.



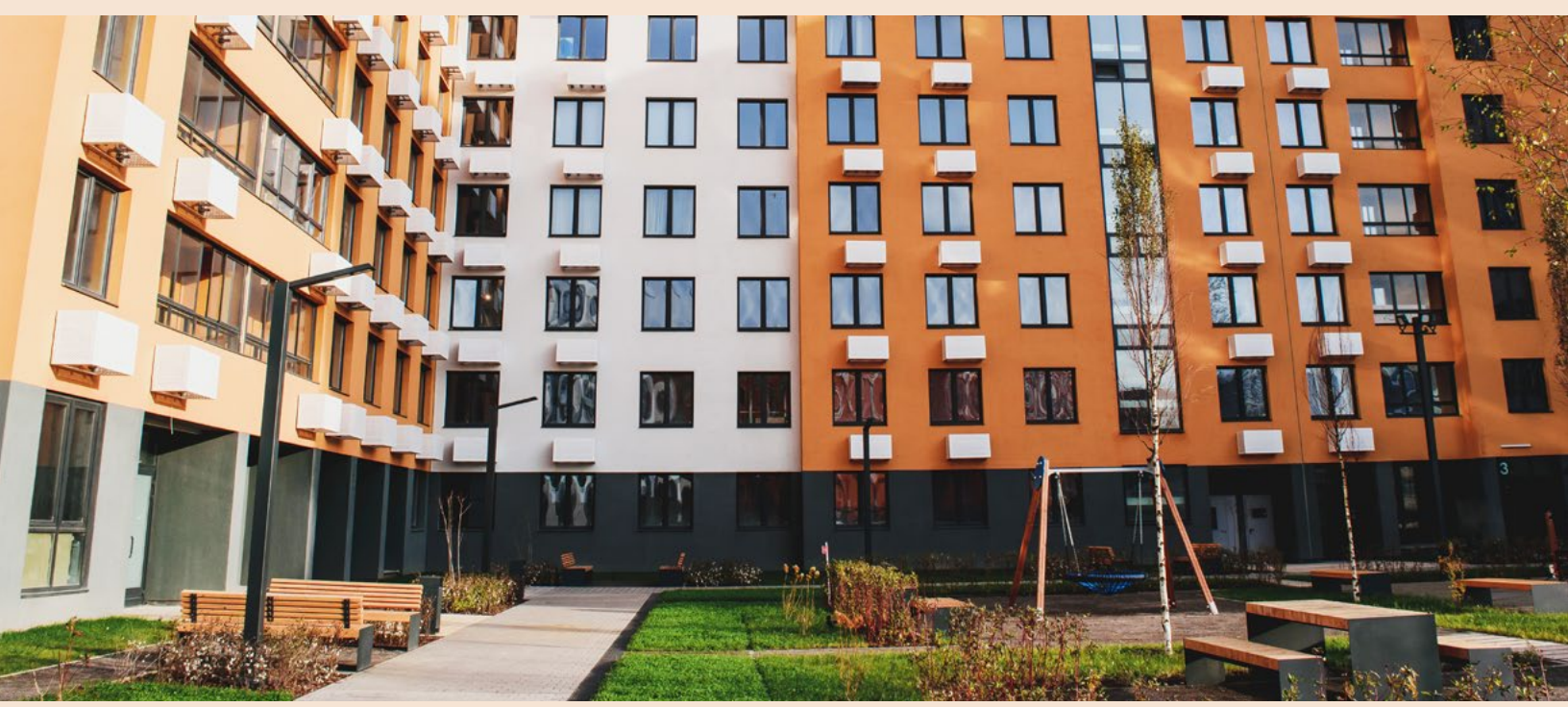
In 2013, Enterprise Community Partners (Enterprise) — in partnership with The JPB Foundation (JPB), the National Center for Healthy Housing (NCHH), and several university partners — undertook a multiyear, multisite study to determine the effect of the Enterprise Green Communities Criteria’s¹ (the Criteria) green building practices on the respiratory health of children living in affordable housing. The Criteria comprise the only national green building program designed exclusively for the affordable housing sector, reflecting Enterprise’s belief that the quality of affordable housing can have a strong impact on resident health. Enterprise recognizes the need for a robust evidence base that can promote effective solutions and fuel permanent change in industry practices. This need for a robust evidence base is particularly acute as developers continue to face financial constraints in the development and rehabilitation of affordable housing, creating difficult trade-offs when trying to incorporate green building practices. Early study proponents hypothesized that green building features improved the respiratory health of residents.

They envisioned transforming the affordable housing financing system to demand green building features in all new and rehabilitated affordable housing in the United States, should the study generate rigorous evidence showing the positive effects of green building features on health outcomes.

The *Healthy Home, Happy Kids* (HHHK) study faced challenges that tested the problem-solving capabilities of the entire research team. Housing-based research takes place in people’s homes and in their communities. The constraints and opportunities affecting a person’s daily life can influence their willingness to participate in a research study. Barriers in affordable housing finance, development and property management create unique challenges that can affect a study’s feasibility, while the local context and community relationships can further test researchers’ ability to achieve a study’s objectives. The HHHK study pursued a scientifically rigorous research design in this real-world context, leading to both expected and unexpected challenges throughout its implementation.



The **Enterprise Green Communities Criteria** (the Criteria) translate the collective expertise of leading housing and green building practitioners into a clear, cost-effective framework for implementing green building practices in affordable housing development and rehabilitation. Any housing development in the United States can pursue Enterprise Green Communities Certification, which includes both mandatory and optional criteria. The 2020 update to the Criteria focuses on integrative design, location and neighborhood fabric, operations and maintenance, resident engagement, building materials, and operating energy, among many other key topics for achieving green building practices. Compliance with ventilation standards to promote indoor air quality is an important component of the Criteria and a key focus of the *Healthy Home, Happy Kids* research study.



The success of the HHHK study depended on identifying a sufficient pipeline of eligible affordable housing developments in which to conduct the research, as well as a sufficient number of eligible participants who lived in these affordable housing developments. This involved regular interactions between the research team and affordable housing developers, property managers, tenant associations and residents. As the study got underway, issues with both securing the housing pipeline and enrolling households arose. In response, the research team, with the support of JPB and a senior research advisor, implemented several course corrections, including adopting some methods traditionally used in community-based participatory research (CBPR). CBPR actively involves community members and stakeholders in the research process. Although the study did benefit from these methods during its implementation phase, the challenges in securing sufficient pipeline to enroll the necessary households proved too difficult to overcome and the study was redesigned in 2018. Looking back, the study would likely have benefited more from adopting CBPR principles early in the planning and research design process.

Thus, one important learning from the HHHK study is the need to comprehensively embed CBPR principles in the design of a housing-based research study and employ CBPR methods and approaches throughout implementation, with the inclusion of CBPR practitioners on a research team. But this was not the only lesson learned by the research team.

This report reflects the experience of nearly six years of field research and captures the numerous insights gained in trying to balance the realities of the affordable housing ecosystem with the need for scientific rigor. Many of these insights will add to the existing body of literature around community-based research by highlighting the challenges unique to conducting such research in an affordable housing setting and confirming challenges experienced by others doing similar work. We share these lessons in the spirit of collaboration and transparency, hoping that others will benefit from our experience and continue to pursue research that tests solutions and explores affordable housing as a platform for improving individual outcomes and stronger communities.



SUMMARY OF THE FINAL HEALTHY HOME, HAPPY KIDS STUDY DESIGN

After a substantial redesign of the study to adapt to persistent research challenges, the primary research question focuses on the impact of ASHRAE 62.2-2010, "Ventilation and Acceptable Indoor Air Quality in Low-Rise Residential Buildings," on indoor air quality and resident health. The study compares indoor air quality and resident health in recently rehabilitated green affordable housing properties that meet the ASHRAE 62.2 standard with green properties that were recently rehabilitated but do not meet the standard.

Property Requirements: The affordable housing properties included in the study were required to have undergone green rehabilitation complying with the Enterprise Green Communities Criteria within the past five years. Properties in the study group were required to comply with the ASHRAE 62.2-2010 standard, while properties in the comparison group were required to not comply with the ASHRAE standard. All properties in the study were required to have gas stoves.

Participant Requirements: The study's participants were required to have lived in the property for at least four months prior to their enrollment in the study and to live in their home at least five nights per week.

Study Size: The study required enrollment of a total of 168 participants across multiple sites, and the retention of 104 participants at the conclusion of the study. The study goal was to enroll these 168 participants from a total of 840 eligible housing units.

Overview of the *Healthy Home, Happy Kids* Research Study

CHARTING THE COURSE

Where we live can have a profound impact on our health. Enterprise has long recognized the benefits of high-quality affordable housing and, through the Enterprise Green Communities Criteria, has continued to set the industry standard for what it means to build and maintain well-designed affordable homes that benefit resident health.





In 2013, JPB, Enterprise and NCHH embarked on a multisite research study to test the hypothesis that green building methods and materials have a positive impact on the health of residents living in affordable housing. Earlier research studies²⁻⁶ supported this hypothesis, but none were considered definitive. To fulfill the vision of the study's early proponents, the *Healthy Home, Happy Kids* study was designed to test this hypothesis with substantial rigor. Positive confirmation of the hypothesis, given the scale of the HHHK study, would provide the evidence necessary to demonstrate that the health-related components of the Enterprise Green Communities Criteria are essential to all housing design. Given the health benefits associated with green building practices, a definitive study could provide evidence that helps attract funding from sectors adjacent to the housing industry that would benefit from a healthier population, such as health care payers and providers. New funding sources could relieve housing developers of the full cost burden associated with green building practices and substantially expand their implementation. In addition, a definitive study could catalyze changes in housing policy that could further ensure that all residents of affordable housing have the benefit of green building practices.

The study originally was designed to measure the impact of rehabilitating older affordable housing properties consistent with key elements of the Enterprise Green Communities Criteria. This research focused specifically on the respiratory health and related health care utilization of children with not-well-controlled asthma. The study also would consider the overall health of these children, as well as the health and well-being of their caregivers.

As designed, the study would have measured the change in children's health and health care utilization from baseline (prior to housing rehabilitation) to one year post-rehabilitation. In addition, the health outcomes of children in the study group were to have been compared to those in the control group of children living in affordable housing that had not yet been rehabilitated.

With an ambitious vision for a potentially field-changing study, JPB, Enterprise, and NCHH formed a multidisciplinary research team with a set of expert advisors to undertake this work across three cities that were considered to have both a substantial pipeline of eligible housing developments and the necessary research partnerships and expertise. Enterprise served as the overall project manager for the study and identified the affordable housing developments that met the criteria for inclusion in the study (i.e., those developments that were scheduled for substantial rehabilitation consistent with the Green Communities Criteria within the study time frame). NCHH served as the coordinating research center, working closely with Enterprise to align and standardize the research approach in each of the study's locations: New York City, Chicago and San Francisco. In the early stages of study design, the research also received financial support from Wells Fargo and the Kresge Foundation.

PROJECT MANAGER PERSPECTIVE

Serving as overall project manager for the *Healthy Home, Happy Kids* research study was a new role for Enterprise. In putting Enterprise in this role, the study's architects sought to leverage Enterprise's knowledge of and experience with affordable housing developers across the country. As a national intermediary, Enterprise is actively involved in the development and financing of affordable housing, as well as in the creation and support of programmatic and policy solutions that benefit residents of affordable housing, people of color and low-income communities. Hence, Enterprise is uniquely positioned to translate research findings into policy, development and investment practice. Having a non-research institution serve as project manager can facilitate systems change based on research findings. However, this arrangement also can present challenges, as the Enterprise team discovered.

In its role as project manager, Enterprise was responsible for managing the relationships with the study's funders, advisors, developers and members of the research team. More specifically, Enterprise oversaw the budgets of the research team, prepared all recruitment materials, provided regular updates to the funders and project team, and coordinated with other Enterprise staff on the identification and outreach to potential affordable housing developments. Balancing the competing priorities, needs and perspectives of a diverse set of stakeholders and evaluating and resolving inevitable trade-offs required a substantial investment in staff time and a higher degree of coordination than initially anticipated.

Enterprise's engagement with affordable housing developers to identify the pipeline of eligible housing developments proved much more difficult than expected. Because Enterprise is actively engaged with affordable housing developers, the HHHK study represented one of several touchpoints with developers.

Underlying all of Enterprise's interactions with developers was the need to respect and preserve important long-term relationships, which necessitated a level of caution to avoid pushing too hard in recruiting a property for the study and thereby potentially alienating a key partner. Understanding such dynamics between developers and housing intermediaries provides important context when setting expectations for a housing-based study.

In retrospect, the HHHK study would have benefited from additional exploration of the available affordable housing pipeline, developers' potential reactions to the study and the challenges imposed by conducting research that depends on the timing of affordable housing renovation schedules. Enterprise learned a valuable lesson that is applicable to future housing-based studies: It is important to build in sufficient time during the design phase of a project to explore key aspects of implementation, such as those mentioned above. As part of this process, it also is vital to engage community members, resident and tenant groups, affordable housing developers, property managers, and other key stakeholders as partners in designing the goals and expectations for this type of study.

Although serving as project manager was challenging and charted new territory for Enterprise, it offered myriad advantages to the study. With an established platform to synthesize and disseminate research findings, coupled with the success of its Green Communities Criteria, Enterprise is positioned to catalyze change in the way affordable housing is built and financed in the United States. This benefit alone highlights the unique synergy intrinsic to researcher-practitioner collaborations, making the many challenges and lessons learned well worth the effort.

University-based research teams served as the local research partners and were responsible for recruiting eligible households from the identified housing developments and conducting data collection efforts. These university partners included the Icahn School of Medicine at Mount Sinai in New York City, the University of California, San Francisco, and the University of Illinois at Chicago. Formal and informal partnerships with local community organizations and individual community leaders were created to assist with recruitment efforts once developments that met the study's criteria were identified. The study's senior research advisor and National Advisory Council, along with JPB as the study's primary funder, provided ongoing support and guidance to the research team.

The multidisciplinary research team and National Advisory Council included experts in affordable housing and community development, asthma study design, environmental sampling and building performance testing, respiratory health assessments, health economics, statistical analysis, research on home-based hazards, and measurement of health outcomes. The National Advisory Council included members with extensive experience in research and practice and representatives from universities, federal agencies and private research institutions. As highlighted throughout this report, the expertise and collaboration of this team proved instrumental in designing and implementing the study, as well as in navigating the challenges faced throughout.

Healthy Home, Happy Kids Project Team





DEVELOPING A RIGOROUS STUDY DESIGN

The research team worked collaboratively with the study's funder and research advisors to develop a study design and research protocols that would test the hypothesis that green building practices improve the health outcomes of residents living in affordable housing. Previous research studies had been limited in their scale, both in terms of the number of participants and the geographical representation of the housing developments.^{7,8} The HHHK study benefited from the work of previous research, and two of the research advisors for the HHHK study already had undertaken a multisite green housing renovation study.⁹ These advisors provided valuable feedback and lessons learned from their previous work.

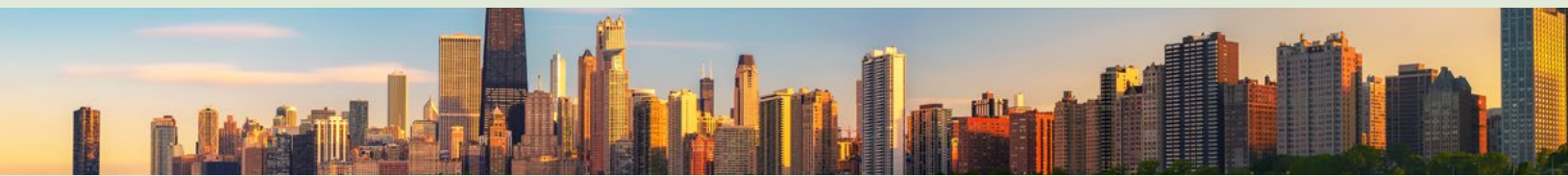
The HHHK study was intended to fill a significant gap in the literature by (1) including affordable housing developments in three different cities, (2) focusing on a specific health outcome (asthma), and (3) enrolling children with not-well-controlled asthma as a population most likely to show a positive change in that outcome. It is important to note that although the research design process included robust engagement of the study's research advisors, it did not include engagement with housing developers, property managers, community organizations or affordable housing residents. Throughout this report, we explore the implications of this approach and the need for future studies to adopt CBPR principles more comprehensively, from the earliest stages of research planning and design. We also explore the importance of considering housing developers and property managers as key stakeholders in housing-based research, in addition to the housing residents and community members who typically are included in CBPR studies.

Central to the original study design were two sets of criteria: one to determine the eligibility of an affordable housing development and one to determine the eligibility of a child living within the eligible development. The eligibility criteria for including housing in the study group required that a development would undergo substantial rehabilitation consistent with the Green Communities Criteria within the study time frame. A necessary key component of the planned rehabilitation was compliance with ASHRAE 62.2, a residential indoor ventilation standard that improves a home's air quality and, by extension, is expected to improve the respiratory health of occupants. The study design required compliance with the ASHRAE 62.2 standard because of its importance for health outcomes and relevance to the study's hypothesis. By comparison, the control group consisted of housing developments where no renovation/rehabilitation efforts were planned within the study time frame, but where such efforts eventually would be conducted. Enrollment in both the study and control groups depended on the willingness of the developer to have the property included in a research study.

The primary eligibility requirements for recruiting children as study participants required that a child be between the ages of 5 and 16, with diagnosed asthma that was not well controlled. Previous research suggested that this population would experience the most dramatic health improvements from the rehabilitation to green building standards.^{10,11} To ensure statistically significant results, the team set an ambitious goal of recruiting just over 1,200 children from across the three study cities. Based on research regarding the prevalence of children with not-well-controlled asthma in low-income communities and expected recruitment rates among eligible children, the study team estimated that these enrollment goals would require recruiting and enrolling study participants from more than 12,000 units of affordable housing.

Through outreach to developers, the Enterprise team identified housing developments that were planned for renovation and met the study's criteria. When the developer or property owner was within a few months of beginning construction on the property, the local research team would conduct recruitment efforts to identify and enroll residents as eligible study participants. Each housing development's unique recruitment plan was based on the local context, property layout, opportunities to connect with residents at planned events, property owner and property manager relationships with residents, available methods of communication with residents, existing community partnerships, and other site-specific challenges and opportunities. In some cases, property managers were able to contact residents directly to ask if they would be interested in speaking to a member of the research team about participating in the study. In other instances, research team members attended resident meetings or other community events to meet and recruit participants.

Once participants were enrolled, members of the local research team conducted in-home visits with the families participating in the study. During these visits, an adult was asked to complete a health interview, and objective health measurements were conducted to determine the children's lung function, test the severity of their asthma and identify biomarkers for sensitization to key allergens through blood samples. The study team also observed building features and conditions, tested in-home ventilation and conducted additional environmental testing in a randomized subset of homes. The local research teams conducted three rounds of data collection for each study participant: prior to the start of construction, immediately following construction, and again one year after construction was complete. Participating families received financial compensation at each visit, as well as a summary of their health and environmental testing data collected through the study.



FACING BARRIERS IN IMPLEMENTATION

The study faced numerous barriers as the research team worked to meet the ambitious enrollment goals. Difficulties were encountered in the recruitment of both eligible properties and eligible households. A primary barrier to the study was the challenge that affordable housing developers routinely face in obtaining financing from public or private funding sources, such as the Low-Income Housing Tax Credit¹² program. Delays in the allocation of these public or private funds, coupled with changes in construction timing, delayed the study's data collection efforts. Because only a limited number of affordable housing developments met the research criteria in the cities chosen for the study (New York City, Chicago and San Francisco), the research team had few options for fallback housing developments when an eligible property met financing or construction delays.

Progress also was affected by the difficulties in recruiting eligible participants. The study's design required that participants be recruited just prior to the beginning of on-site renovation/rehabilitation to provide a baseline for later data collection efforts. This time can be stressful for residents, because rehabilitation efforts may be coupled with a transition in property ownership or management. The anticipation of temporary disruption created by on-site construction, which can include short-term relocation, often made it challenging for research teams to connect with and build the trust among residents that is necessary to recruit study participants. Additionally, the study's focus on children with not-well-controlled asthma meant that the local research teams needed to identify a very specific subset of the resident population. Recruiting such a narrow segment of the resident population made it difficult to identify eligible study participants because fewer children were living in the properties than anticipated, and most of the residents approached about the study did not have a child who met the study's eligibility criteria.

ADAPTING THE STUDY DESIGN TO OVERCOME BARRIERS

After more than two years in the field working to identify eligible housing developments and enroll participants, the research team, advisors and funder came to a crossroads. Eligible housing developments continued to experience delays, and not enough developments in each study city had plans for substantial rehabilitation to fill the study’s needed housing pipeline. With recruitment efforts yielding fewer eligible study participants than anticipated in the properties that did progress to construction, the study’s success was in jeopardy.

The team wrestled with how to revise the study design to increase the chance for success — in terms of both completing the study and contributing to the evidence base originally envisioned by the study’s architects. For more than a year, the study team worked collaboratively with the National Advisory Council, funder, and developer partners to identify and assess the feasibility of options for adapting the study. The team first pursued minor modifications to the study design, including adopting a few CBPR tactics and allowing the enrollment of adults as well as children. When these minor modifications did not accelerate the study’s progress, the team undertook a substantial redesign of the study.

Key Project Milestones

2013

Study designed and National Advisory Council engaged

2014

Study team finalized and identification of housing pipeline begins

2016 – 2017

Field work begins and minor study modifications undertaken to overcome challenges

2018

Study redesigned to address persistent challenges

2019

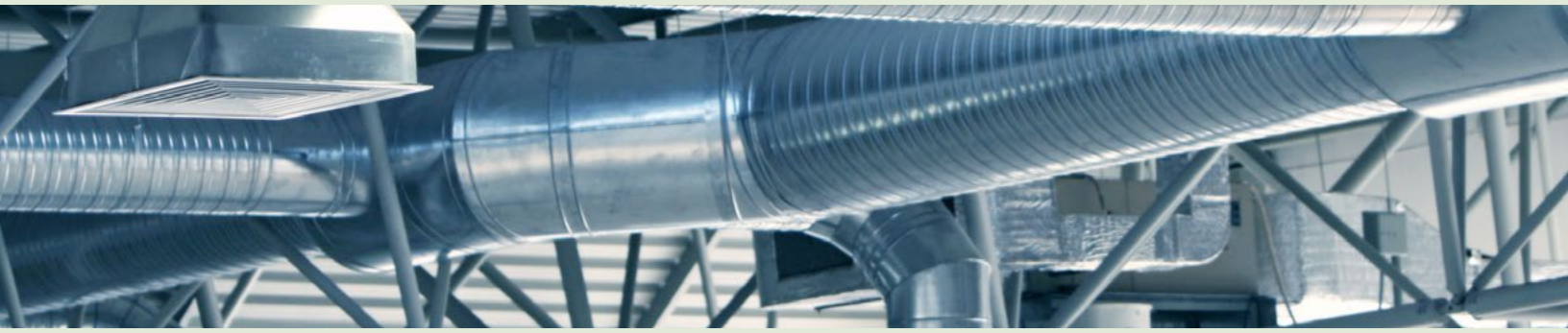
Redesigned study protocols implemented

2020

Protocols adapted for COVID-19 pandemic and data collection efforts completed

2021

Study findings to be published



The redesigned study narrowed the scope of the research from evaluating the impact of green housing rehabilitation on children with not-well-controlled asthma to focusing on one key aspect of green rehabilitation — the impact of mechanical ventilation on indoor air quality. The Enterprise Green Communities Criteria calls for implementation of the ASHRAE 62.2-2010 standard for indoor ventilation. Ventilation is thought to be one of the most important factors in improving respiratory health within building design by ensuring good indoor air quality. However, despite the importance of ventilation, the ASHRAE standard is not universally implemented in the rehabilitation of affordable housing developments, in part because of the financial constraints faced by developers and the perceived expense of meeting the standard. The research team and National Advisory Council believed that demonstrating the impact of mechanical ventilation on indoor air quality and resident health offered the opportunity to provide an evidence base for advancements in policy, financing and construction practices to promote resident health.

The study was redesigned to compare indoor air quality and resident health in recently rehabilitated buildings that meet the ASHRAE 62.2 standard with properties that recently underwent a green rehabilitation without meeting ASHRAE 62.2 criteria. This design allowed the team to focus exclusively on the impact of ventilation and streamlined data collection and analysis. The new focus also significantly widened the pipeline of eligible housing developments for the study, because properties no longer needed to be slated for an upcoming rehabilitation and could instead have been rehabilitated any time in the last several years.

The study redesign also shifted the focus from assessing the impact of housing rehabilitation on children with asthma to assessing the impact of ventilation on all residents. In particular, the redesigned study measured the impact of ventilation on indoor air quality, focusing on nitrogen dioxide as a proxy for respiratory health. In addition, clinical health measures would no longer be collected from participants, making the study less intrusive. These changes made it easier to identify and enroll eligible households from within the study properties. The study redesign also reduced the number of participants needed to ensure statistically significant findings, which consequently reduced the amount of housing needed for the study. Taken together, these changes dramatically accelerated the study's progress.

Although the design of the HHHK study has been adapted in response to difficulties in implementation, its value remains. Despite its revised aims, the study provides a unique contribution to the field due to the multisite implementation strategy and its focus on evaluating the positive indoor air quality and health effects of the ASHRAE 62.2 ventilation standard. Furthermore, the study highlights the value of a researcher-practitioner partnership when conducting housing-based research, which necessarily requires industry knowledge, relationships with developers and community partners, and experience translating research findings into policy actions.

Implementing CBPR Principles in a Housing-Based Study

The insights featured in this report explore the key challenges encountered, strategies employed, and lessons learned through conducting a scientifically rigorous research study in an affordable housing setting. One key lesson from our experience is the importance of implementing CBPR principles in all phases of the research process — from study design to the dissemination of findings.





As defined by Barbara Israel and colleagues in the *American Journal of Public Health*, CBPR is a “partnership approach to research that equitably involves community members, practitioners, and academic researchers in all aspects of the process, enabling all partners to contribute their expertise and share responsibility and ownership.”^{13,14}

In 1998, Barbara Israel, Amy Schulz, Edith Parker and Adam Becker provided eight key principles and characteristics of community-based research that continue to serve as a guidepost for community-centered research endeavors:¹⁵

1. Recognizes community as a unit of identity
2. Builds on strengths and resources within the community
3. Facilitates collaborative partnerships in all phases of the research
4. Integrates knowledge and action for mutual benefit of all partners
5. Promotes a co-learning and empowering process that attends to social inequalities
6. Involves a cyclical and iterative process
7. Addresses health from both positive and ecological perspectives
8. Disseminates findings and knowledge gained to all partners

These principles have been expanded and adapted by other researchers over time, including a focus on “cultural humility” as a critical component of community-based research that seeks to address inequities and disparities experienced by communities of color.^{16,17} The values of equity, social justice and distribution of power that contributed to the creation of CBPR are still prominent in communities today, giving CBPR ongoing relevance and priority in housing- and community-based studies.

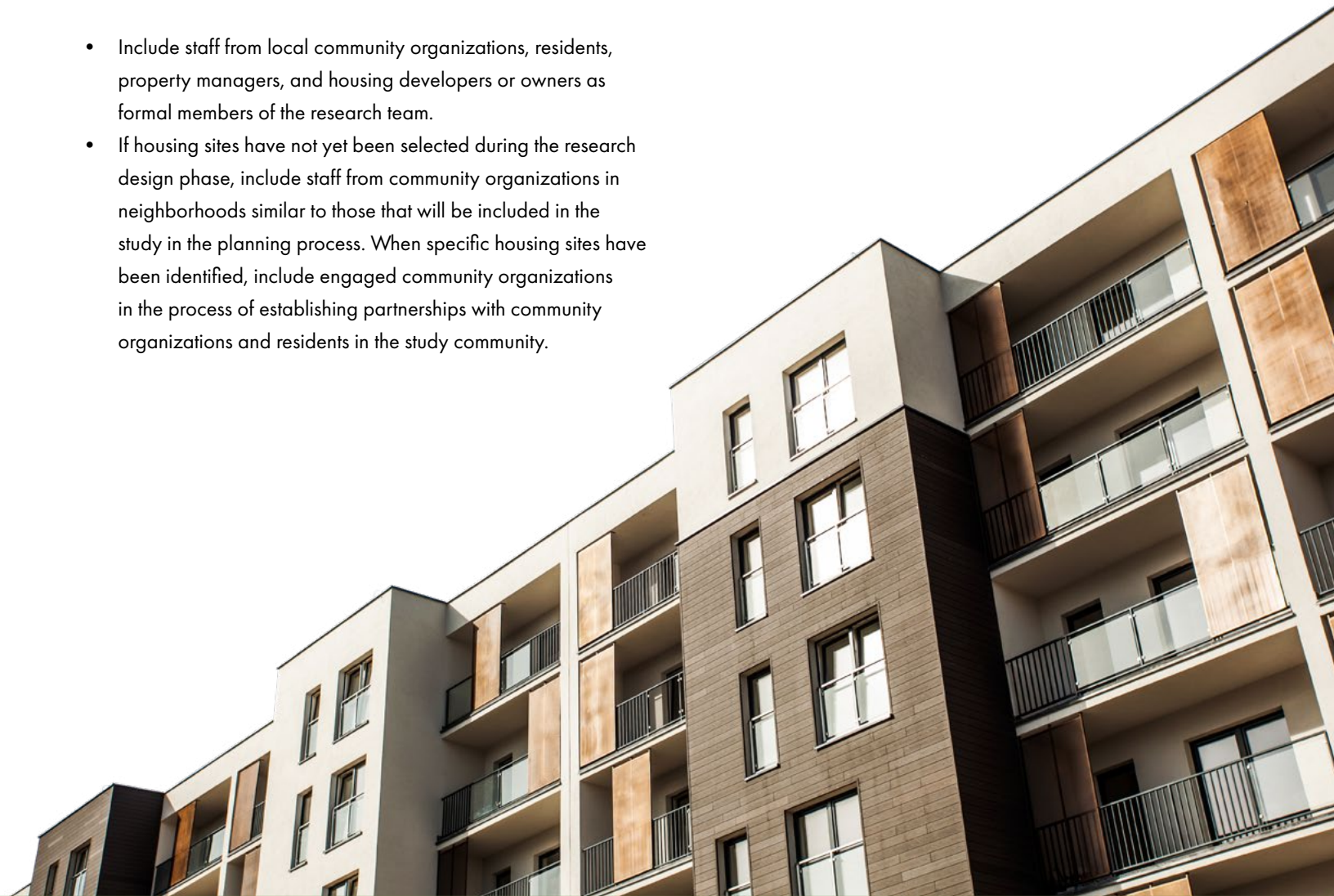
Although CBPR typically focuses on engaging individual residents and community representatives in the research process, the *Healthy Home, Happy Kids* study highlights the need to expand the definition of “community” to include housing developers and property managers. Property managers and housing developers offer a unique perspective that can help shape research, and their work is often directly affected by the process and outcomes of a housing-based research project. These housing stakeholders are also integral to a study’s success because they provide important opportunities to connect with residents. Understanding and addressing the concerns of property owners and managers early on can save enormous amounts of time once the research team moves into the field.

For decades, the literature and anecdotal examples of CBPR have highlighted both the value of this approach and its inherent complexities, particularly when bringing outside researchers and academic institutions into partnership with community members. In a research brief that summarizes the findings from a series of case studies conducted by the University of Pennsylvania, researchers concluded that CBPR “has the potential to make research more responsive to existing needs and to enhance a community’s ability to address important health issues. But CBPR is often unfamiliar territory to academic investigators and community organizations alike.”¹⁸ The University of Pennsylvania research brief identified barriers to CBPR implementation that are consistent with the experiences of the HHHK research team. In the case studies, academic investigators reported time constraints and the lack of infrastructure as primary barriers to engaging community members in CBPR, while community leaders identified a lack of trust as the greatest barrier.¹⁹

The 2014 publication^{20,21} of lessons learned through implementing CBPR principles in a similar housing-based study — one focused on the impact of green building components in affordable housing — highlights some of the challenges in implementing CBPR in a housing context. These challenges included housing owner concerns about the risk of liability if the research identified substandard living conditions, the role of property managers as gatekeepers in controlling access to residents, and the presence or anticipation of tension between residents and property management. The HHHK team experienced many of these challenges, and this report builds upon and reinforces many of the findings and lessons of this earlier study.

Translating CBPR principles into methods and approaches applicable to housing-based research can take many forms, a few of which are highlighted below:

- Include staff from local community organizations, residents, property managers, and housing developers or owners as formal members of the research team.
- If housing sites have not yet been selected during the research design phase, include staff from community organizations in neighborhoods similar to those that will be included in the study in the planning process. When specific housing sites have been identified, include engaged community organizations in the process of establishing partnerships with community organizations and residents in the study community.
- Include a diverse set of community stakeholders, including residents and property managers, in a study's advisory council, or establish a stakeholder advisory council as well as a research advisory council to incorporate the multiple perspectives needed for a successful study.
- Include dedicated time within a study timeline and a dedicated budget for engaging with residents and community stakeholders, through partnership with existing local leaders, to develop relationships and establish trust.
- Ensure sufficient compensation for community organizations and residents to participate on an advisory council.
- Share research findings with all who participated in the study, as well as others who may be interested, in a timely and accessible manner.



The following chart outlines the ways that CBPR principles were integrated into the HHHK study, as well as the aspects of these principles that were lacking from the initial study design and implementation.²²

CBPR PRINCIPLES	APPLYING CBPR PRINCIPLES TO THE <i>HEALTHY HOME, HAPPY KIDS</i> STUDY
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Recognizes community as a unit of identity

The perspectives and opinions of the study’s community stakeholders were not considered during the design of the HHHK study because the affordable housing developments had not yet been identified as part of the study design. However, engaging with representative developers and housing residents would have offered valuable perspectives and likely would have raised significant implementation concerns earlier in the process.

As enrollment in the study lagged, the team turned to CBPR methods to improve engagement with residents. One such method was the use of resident ambassadors to serve as liaisons between the residents and the research team, engaging residents to assist with recruitment efforts in a large property in New York City. These ambassadors provided an important perspective and, as representatives of their community, they helped build trust between the researchers and community members. The study’s engagement with local community organizations and resident leaders recognizes and values the autonomy of each community participating in the study while helping to legitimize the research project within the community.

As the study concludes, research findings will be shared with housing developers, property managers, and residents of those housing properties participating in the study. The research team envisions presenting the findings to these stakeholders in a forum where community members can offer their perspective on the findings, questions can be answered, and next steps can be discussed.

Builds on strengths and resources within the community

This principle was applied throughout implementation of the research study. A kick-off meeting was held with the developer and property manager for each property to determine opportunities for engaging residents and other community organizations that could be incorporated into the outreach efforts. The insights gained from this engagement led to the creation of custom recruitment plans for each property to effectively and respectfully engage residents as study participants and also helped to inform data collection methods.

Full implementation of this principle was limited because the creation of deep community partnerships was often not possible within the time frame available, particularly because the study was operating at many housing sites in many different communities. This is a unique challenge for a large, multisite housing study. However, providing additional time to allow these partnerships to form would likely lead to a study design and implementation process that more comprehensively builds on the strengths in a community.

CBPR PRINCIPLES

APPLYING CBPR PRINCIPLES TO THE *HEALTHY HOME, HAPPY KIDS STUDY*

Facilitates collaborative partnerships in all phases of the research

The development of the HHHK study was highly collaborative among the research team members, the funder and the study's National Advisory Council. However, the initial research design process did not include property owners and managers, community organizations or residents. Recognizing the importance of these groups, a broader set of collaborative partnerships — which did include property owners and managers, community organizations and residents — was pursued during study implementation. These partnerships took a variety of forms and often were established as custom engagement strategies were created for each property. Incorporating collaborative partnerships with these stakeholders in the research design process likely would have led to more feasible study goals that better reflected the lived experiences of those most affected by the research. This engagement also could have shaped data collection approaches and other aspects of study implementation.

As the study nears completion, the team will collaborate with key partners to determine how best to communicate the study's findings to various interested stakeholders, including policymakers, practitioners, property owners and managers, and residents. Sharing the study's findings prior to publication will allow these important stakeholder groups to provide their perspective on and interpretation of the results, as well as shape the resulting policy and practice recommendations.

Integrates knowledge and action for the mutual benefit of all partners

The HHHK study had strong alignment with this principle, and the very design and intent of the study was oriented around translating the research findings into action and informing change in industry practices. The study's ultimate goal is to promote healthier housing, better resident health outcomes and more efficient operations for property owners.

The CBPR methods employed during study implementation created additional benefits for community partners. In New York, the study team employed resident ambassadors to assist with recruitment efforts. Through their engagement with other residents, the ambassadors gained valuable information about resident and community needs. The community organization managing the resident ambassador program was then able to refer residents to needed services and modify its own program offerings to better meet those needs.

The project team will also engage key stakeholder groups, including residents and affordable housing professionals, to shape the interpretation of the study's findings and help inform future actions and industry recommendations.

CBPR PRINCIPLES

APPLYING CBPR PRINCIPLES TO THE *HEALTHY HOME, HAPPY KIDS* STUDY

Promotes a co-learning and empowering process that attends to social inequalities

This principle was incorporated into some aspects of the HHHK study, with a focus on engaging residents in the study's recruitment activities through both formal and informal outreach. Midway through the study, the study team turned to a resident ambassador program, which engaged interested residents in the study's recruitment process. Although these activities engaged residents and provided valuable insights into community needs, they were implemented in only one development included in the study.

Community input was not leveraged as part of the study's design, and it was a missed opportunity to gain the perspective of those most affected by the study. Had the team adopted this perspective early on, the study goals, assumptions and data collection approaches could have taken into account resident stress around construction, property management, changes in ownership, etc.

Overall, the study's engagement with residents could have promoted a stronger co-learning process by including resident representatives and housing owners as advisors or members of the research team. The team could have incorporated an intentional feedback loop to allow resident perspectives to inform study processes and design, data collection approaches and recruitment methods. The study team intends to incorporate resident feedback into the interpretation of study findings to integrate this principle into the final stages of the study.

Involves a cyclical and iterative process

This principle represents one of the strongest connections between CBPR and the HHHK study. With a strong project infrastructure that created feedback loops between all members, the study team was able to adapt to the feedback and challenges experienced and revisit the study design and processes to best fit the local context of each site.

Although communication channels were strong and well established among the research team members, no formal channels were established for property developers, owners or managers. However, through their connections with the research team, the feedback from these groups was often heard.

One element of this CBPR principle missing from the HHHK study implementation was an established means of soliciting resident feedback. As discussed above, this vital perspective would have helped the study team respond to implementation challenges proactively. An established feedback loop would have signaled to the team which elements of the study needed adjustment and would have created another means of building trust.

CBPR PRINCIPLES

APPLYING CBPR PRINCIPLES TO THE *HEALTHY HOME, HAPPY KIDS* STUDY**Addresses health from both positive and ecological perspectives**

The HHHK study is strongly aligned with this principle. The study was designed to assess the health-promoting aspects of housing investment, with the goal of demonstrating that healthy housing has an important positive influence on resident health. Specifically, the intent of the study is to determine the impact of mechanical ventilation compliant with the ASHRAE 62.2 criteria on indoor pollutant levels and, by extension, on resident health. Assuming the study's hypothesis is supported, the findings will be used to inform industry practices, expanding compliance with this important criterion and ultimately promoting a key aspect of housing quality as an important social and physical environmental determinant of resident health.

The study's data collection protocol acknowledges other public health concerns that may influence resident health, including the presence of toxic chemicals, outdoor pollutant levels, resident behaviors, and overall resident quality of life. The consideration of these factors through environmental testing, resident interviews, and observation of the home environment is an important part of the study's protocol and will influence the final analysis.

Disseminates findings and knowledge gained to all partners

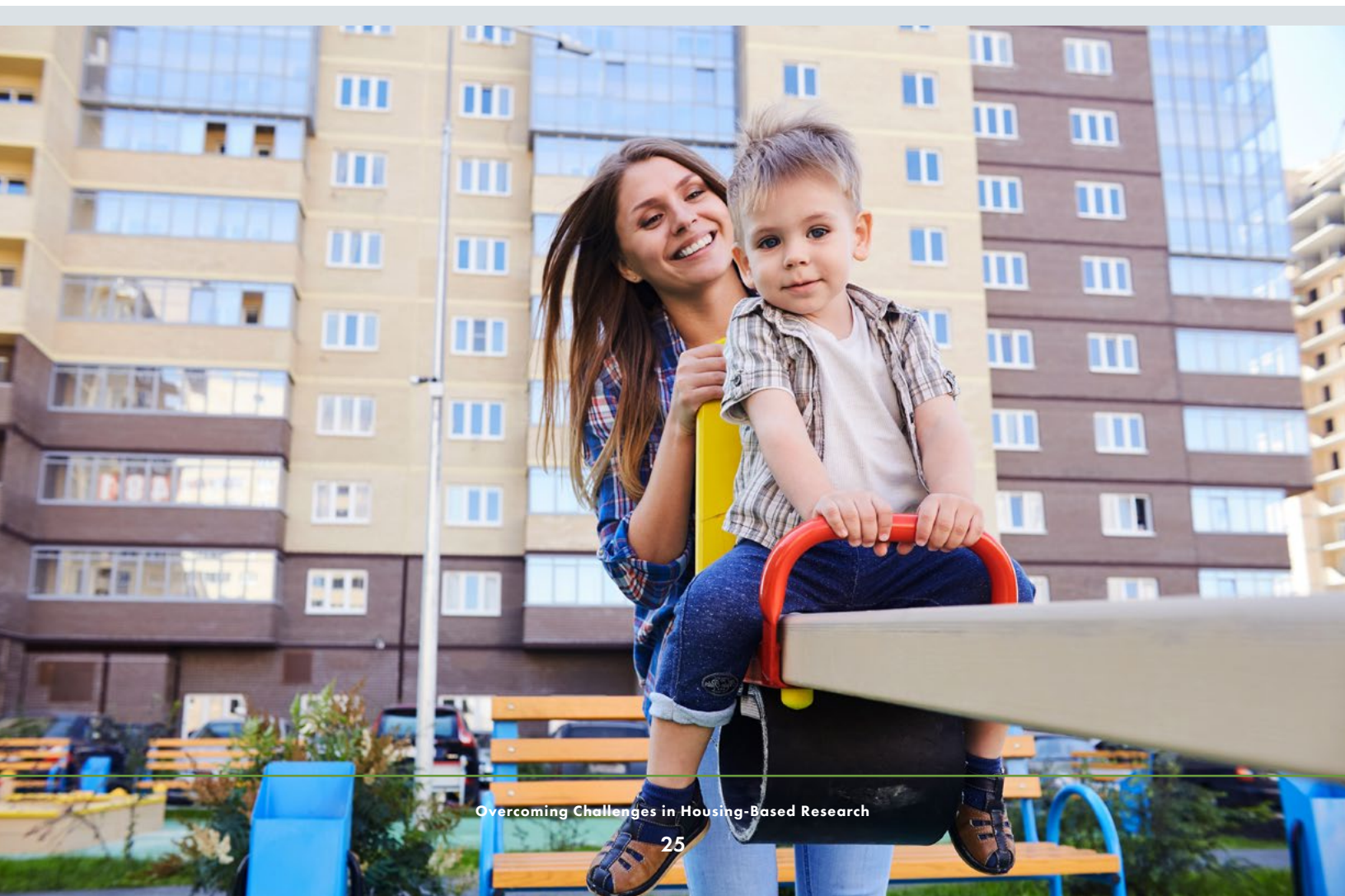
Dissemination of information is an important principle of the HHHK study design and goals. To leverage the knowledge gained through the study to inform changes in industry practices, effective communication of study findings is essential. When the report is available, the study team plans to share the research findings with all stakeholders, including developers, property managers and residents. In what is envisioned as an open forum, the team will actively engage with participants around the results, soliciting opinions on how best to share the information with a broader audience.



Introduction to Study Insights

The insights featured throughout this report are consistent with best practices for implementing community-based research and reflect many of the challenges experienced by similar studies. However, these insights also highlight the additional complexities associated with a multisite housing study in general and the *Healthy Home, Happy Kids* study in particular. Although they are not meant to be exhaustive and are based on the experiences of a single study, the following insights offer valuable considerations for researchers, funders and other stakeholders interested in advancing community-based research within an affordable housing setting:

- **Insight #1:** Identify key stakeholders and include them in the study design planning process.
- **Insight #2:** Create a strong team and the project infrastructure needed for a complex study.
- **Insight #3:** Pilot test the study design.
- **Insight #4:** Build strong relationships with developers, property managers and residents.
- **Insight #5:** Pursue flexibility and creativity in adapting to implementation challenges with strong support from funders and advisors.







INSIGHT 1

Identify key stakeholders and include them in the study design planning process.

RECOMMENDATIONS

- Designate enough time and funding to allow a planning phase to be conducted prior to finalizing the study design, including the time and resources necessary for stakeholder engagement.
- Assemble and engage an advisory council that represents key stakeholder groups (including housing developers, property managers, residents, community stakeholders and scientific advisors) to provide an ongoing pathway for regular feedback and problem-solving.
- Engage representative stakeholders in the study design process if specific housing sites and communities have not yet been selected for a study.

Housing-based research is essential to identifying effective solutions to deep-rooted social problems and provides a meaningful opportunity to engage affordable housing residents and the wider community in designing, implementing, understanding and sharing results of research studies. Yet by its very nature, housing-based research takes place outside of a controlled setting. Many researchers have experienced the difficulty, if not impossibility, of controlling for the conditions in a home or neighborhood and have seen how the daily challenges that these communities face can significantly affect the progress and results of a research study. Given this context, it is essential that the perspectives of those most affected by a research study be included in all phases of the study. Incorporating housing, community and resident stakeholders in an advisory council established in the earliest stages of research, ideally before funding commitments are made, can help ensure that their perspective is integrated in the study design and continues to inform a study throughout its implementation. This insight focuses on the planning phase, but the importance of gaining such perspectives in all phases of a research study is a recurring theme throughout the remainder of this report.

Providing the opportunity to solicit diverse stakeholder input during the planning phase ensures that the final study design will respect and value the knowledge, autonomy, and lived experiences of community partners and residents. Co-designing a study with key stakeholders, including residents, mitigates against unequal power dynamics of researchers and community members. This approach also helps the research team identify potential challenges and develop possible solutions. Although this insight is not new to many in the research community and is a fundamental part of established CBPR principles, it can be difficult to secure funding and the necessary time to support such an effort. It is crucial that research teams and funders collectively recognize the importance of equity in designing a research study and provide sufficient time and resources to conduct a thorough and inclusive planning phase.

Early and ongoing stakeholder engagement can be invaluable in helping to shape a study's key research questions, while also informing study design, study questions, enrollment criteria, data collection methods, communication strategies, and other study logistics. Through a planning phase, a research team can identify possible barriers that may arise and can stress test the research design to improve the overall study plans and implementation. This process can help inform expectations and assumptions for enrollment and retention rates, both of which are critical for studies that require recruitment of housing developments and/or residents that meet specific criteria.

As explored in the rest of this section, the *Healthy Home, Happy Kids* research study demonstrates both the value and complexity of conducting a planning phase in housing-based research. To properly support this important phase, funders of large-scale research studies must recognize that it can be time and labor intensive and must include adequate resources for implementation within the scope of their grants.

CONDUCTING A PLANNING PHASE BEFORE A COMMUNITY IS IDENTIFIED

Although early and ongoing stakeholder engagement is a cornerstone of CBPR, a multisite housing-based study may require a flexible approach. Specific housing developments and communities of focus may not yet be identified, and specific stakeholders may not be known. For many studies, like the HHHK study, the planning phase will define the inclusion criteria for housing developments, such as year built, development size/layout, construction and design features, or on-site services. These criteria will, in turn, influence the selection of specific housing sites. Regardless of the site, typical stakeholders for housing studies are likely to include residents, community-based organizations, housing developers, property owners and managers, architects and engineers, government agencies, and housing finance professionals. Including representatives of these groups in an advisory council that actively contributes to the design of a study is important during the planning phase. Even representatives who are not associated with a particular site that is later included in the study can provide invaluable input as the study design is developed and an implementation strategy is created.

Planning a study without a targeted geography or population selected is not typical for CBPR studies. Thus, it is important to include time and resources in this planning phase for researchers to conduct a second round of stakeholder engagement in the housing developments and communities ultimately selected. Local stakeholders can provide additional perspectives on the overall research design, research methods and study assumptions, while also highlighting key implementation issues unique to their communities. Researchers can use this time to build trust and co-create a feedback loop to ensure that local stakeholders continue to have a voice throughout the study's implementation. Local stakeholders may be added to an existing advisory group or a newly formed site-specific advisory group; however, researchers should plan to actively engage this group in key decisions, providing regular updates and soliciting feedback. When forming a stakeholder advisory council, it is critical to recognize possible power dynamics and ensure that all stakeholders represented have an equal voice in shaping the research.

ENSURING FEASIBILITY AT THE OUTSET THROUGH OUTREACH TO HOUSING DEVELOPERS AND PROPERTY MANAGERS

For housing-based research, the early engagement of a representative group of housing developers and property managers can identify potential implementation issues that may directly affect the successful execution of the research design. These stakeholders have a deep understanding of the barriers facing affordable housing development and rehabilitation and can provide valuable insights that help shape a study's focus and expected impact on the field. Additionally, engagement of housing stakeholders is essential for creating realistic criteria for research sites, identifying potential properties for recruitment, implementing recruitment strategies and providing researchers with needed access to properties.

This early engagement of housing developers and property managers in a planning process, through an advisory council or other methods of engagement, is especially important for housing-based studies that require identification of multiple housing properties. Soliciting the input of these stakeholders during the planning process will help researchers understand the feasibility and complexities of a proposed study and adequately anticipate the interest and ability of housing developers to include their properties in the research.

HEALTHY HOME, HAPPY KIDS EXAMPLE: **ENGAGING STAKEHOLDERS**

When redesigning the study in 2018, the *Healthy Home, Happy Kids* research team supplemented Enterprise's perspective on the affordable housing field by engaging in a planning process that included interviews with housing developers and other industry stakeholders to gain additional input that would help ensure that the redesigned study would yield actionable evidence. Learning from the challenges of the first study design, the team used this process to garner feedback that helped improve the feasibility of the redesigned study and minimize

potential roadblocks, while ensuring that the study would still provide a valuable contribution to the field. The planning phase for the study redesign also helped the team develop more attainable enrollment and retention targets and strategies. Having appropriate estimates for the pace of enrolling residents from the study properties and retaining residents over the course of the study was paramount for ensuring the overall viability of the redesigned study.



Although Enterprise is a nationally recognized intermediary with deep expertise in affordable housing development, finance and green building practices, we offered a single perspective. Researchers focused on housing-based studies may want to include the perspectives of other industry representatives, as well as advocates and policymakers, to support the planning process. These additional

stakeholders can include public housing finance representatives, or government agencies or institutions operating in adjacent sectors, like health, education, employment, or transportation. Incorporating these perspectives in a planning phase ensures the study's goals are clearly articulated and responsive to the evidence needed to bring about changes in the field.



ENGAGING RESIDENTS IN STUDY DESIGN HELPS SHAPE IMPLEMENTATION

Research that relies on the recruitment of study participants from a larger population of housing residents or community members will benefit greatly from engaging these stakeholders during the planning process. Engaging trusted resident leaders (including tenant associations) and community organizations can provide a feedback loop between the research team and the community, helping to inform data collection and recruitment approaches and ensuring that the community voice is fully integrated into the study's planning process and implementation efforts.

Through this engagement, researchers, residents and community leaders can explore together potential barriers and discuss solutions to those barriers. As mentioned above, however, this engagement is difficult to achieve in housing-based research when the specific research sites are not yet defined in the planning phase. As a result, housing-based researchers may need to embed additional community engagement in a pilot phase or at the start of research implementation once housing sites have been identified, understanding that the insights gained during this process may lead to additional modifications to study design.

Early resident and community engagement also can influence housing site selection, because the unique characteristics of each community can impact its feasibility as a study site. For example, the HHHK study was ill timed for a series of properties that were undergoing an ownership transition in addition to on-site construction. These transitions created a sense of uncertainty among residents and exacerbated existing community tensions, making recruitment more challenging. As a result, the rates of recruitment from these properties were well below the rates for other properties.

Researchers also should consider engaging with local service providers in the community during the planning phase, particularly if community relationships have already been established through past research or outreach efforts. Throughout the recruitment process, the HHHK research team gained assistance from local service partners working directly with residents. Bringing these partners into the study earlier in the process could have informed a "go/no-go" decision to choose whether to conduct recruitment at a particular property. Such early insights would have saved time and resources and helped to better focus our recruitment efforts. In addition, these partners often are knowledgeable and trusted members of the community; their perspectives could have helped to shape successful recruitment strategies, leading to better results and more effective recruitment efforts. It is important to note, however, that the limited pipeline of eligible housing for the HHHK study meant that few alternative housing options were available if early engagement of community stakeholders indicated that a property was not ideal for recruitment.



In hindsight, the HHHK research team would have benefited from early, direct engagement with a diverse set of housing and community stakeholders to inform study design. Many of the challenges experienced might have been identified had we taken this important step. The focus on developing a research design with the scientific rigor necessary to provide definitive evidence that can help shape housing industry practices led to several key implementation issues that were not considered in this early stage. For example, the eligibility requirements and ambitious recruitment goals for both housing properties and resident participants ultimately jeopardized the study's viability. Additionally, using the stakeholder engagement process to define the study criteria for housing sites might have resulted in a willing set of developers and a stronger housing pipeline, thereby avoiding some of the uncertainty of identifying housing within the study's time parameters. This process could have also included outreach to resident leaders who were previously involved in the Enterprise Green Communities Program's resident engagement efforts. Such engagement with a more diverse set of stakeholders in the study's planning process could have shed light on the feasibility of the study's housing enrollment goals by stress testing the team's assumptions.

These lessons highlight the fact that defining a specific planning process and ensuring robust stakeholder involvement are essential ingredients in designing a successful large-scale research project. Incorporating not only the expertise of the research team, but also the lived experience of those directly affected by the implementation of the study, can heighten its value and help to ensure meaningful results. Understanding the roles that housing providers and property managers play in identifying the pipeline and accessing properties for recruitment is key, as well as the pivotal role that resident leaders and on-site service providers can have in implementing a study. A planning phase will provide the time and resources necessary for active and meaningful engagement of representatives from all facets of the affordable housing ecosystem.





INSIGHT
2

Create a strong team and project infrastructure needed for a complex study.

RECOMMENDATIONS

- Ensure that the project team includes staff who are experienced in community-based research and are familiar with the community or population of focus.
- Include members of the advisory council on the project team to ensure that implementation decisions are informed by science-, housing- and community-based perspectives.
- Incorporate resident participation in recruitment and data collection efforts into the study design, and ensure that residents receive the necessary training and support to participate as members of the project team.

Conducting research in affordable housing involves a unique set of challenges, particularly in multiyear, multisite studies. For these complex projects, a strong project infrastructure of personnel, advisors, funders and processes serves as the connective tissue among the various components of a study and positions it for success. Conducting CBPR research across multiple sites requires an additional set of skills and experiences beyond those required by more traditional research projects. The research team should include researchers with substantial CBPR expertise and, if possible, direct experience with the study communities. The project team and study advisors should also include representation of community perspectives, establishing a formal feedback mechanism for the developers, property managers and residents involved in the study. Building this infrastructure intentionally and ensuring that it functions as envisioned will enable a complex project to deliver results even as it adapts and responds to real-world circumstances.



FILLING CRUCIAL ROLES ON THE STUDY TEAM

A strong project team with both content expertise and local knowledge and experience is paramount to the success of a housing-based study. For the *Healthy Home, Happy Kids* study, a collaborative, multidisciplinary project team was necessary for designing the study, implementing the research protocols in the field, responding to emerging challenges and adapting the study as needed. The various members of the study team brought a breadth of knowledge, expertise and research experience to the table.

Harnessing the power of this assembled group of experts required a clear understanding of the study's goals, the roles and responsibilities of each member of the project team, and workflow systems and processes. For example, NCHH took responsibility for developing research protocols and obtaining approvals from three separate institutional review boards (IRBs). Enterprise was responsible for identifying a viable affordable housing pipeline and providing overall project management. The various university partners were responsible for recruiting participants and collecting data. This division of responsibilities allowed each organization to leverage its strengths and provided varied perspectives that helped the project balance the ideal research setting with on-the-ground conditions of affordable housing properties.

As the project manager for the study, Enterprise needed to strike a delicate balance between achieving the study's goals and maintaining sufficient flexibility to respond to the challenges faced by the study team as they were implementing the research protocols in the field. Enterprise worked in close partnership with NCHH to navigate the study challenges and opportunities, often consulting daily. This partnership was successful, in part, because NCHH had expertise in supporting the use of rigorous research methods in community- and housing-based settings and had conducted a number of housing-based research projects in the past.

For multisite studies, the coordinating research center is particularly critical for developing protocols and aligning data collection procedures across the multiple sites and partner research organizations (and IRBs). An important part of NCHH's role in the HHHK study was to enable the various site-based teams to adapt specific methods and tactics as needed, while ensuring that any adaptations were within the parameters outlined in the research protocols and compliant with IRB approval. This included deciding which elements of the data collection and recruitment procedures the various site-based research teams could and could not adapt, depending on the need for standardization. The team regularly discussed the need for customization or adaptation of recruitment and data collection approaches that would accelerate the study's pace or create other benefits. As we discuss later in this section, a comprehensive process for regular communication and coordination of the study team facilitated the team's ability to make these decisions in a timely manner.

The experiences of the HHHK study revealed the value of having an engaged set of expert advisors to help adapt to unexpected challenges. The HHHK National Advisory Council was composed of experts in research design, building science, asthma and other related disciplines, and they provided guidance at key inflection points in the study's progress. However, the project team and advisory council lacked representation from residents, community organizations and housing developers. In hindsight, these perspectives would have offered a community-focused view, and their experience could have helped the research team better anticipate potential problem areas in identifying a housing pipeline or recruiting and enrolling participants. True to CBPR principles, a diverse set of advisors that includes residents, housing stakeholders (e.g., developers, owners, and property managers) and other community representatives is ideal for achieving a balance between scientific rigor, feasibility and community participation.

In many ways, the entire HHHK project infrastructure hinged on the coordination between the research team and senior research advisor. This collaboration allowed the team to identify challenges, share solutions and rely on tested expertise to guide the project forward. The senior research advisor's experience in similar studies helped shape the design and execution of the HHHK study. In addition to participating as an active contributor in team meetings, the senior research advisor also was willing to engage on an ad hoc basis as the study team worked through a number of technical and logistical problems. Having this resource available from the beginning was critical to the project's success.

The role of The JPB Foundation as the primary study funder and an active part of the project team must also be emphasized. JPB was instrumental in supporting the research team during study design, adapting to unexpected challenges, providing feedback on strategic direction, and connecting the team with advisors and other resources. Complementing the formal research team were other resources brought onto the team on a temporary basis as needed, including community-based housing experts, local service organizations, developers, property managers and the residents themselves. All members of the project team were united in their commitment to green building practices and improving resident health.

One lesson that emerged from our experience was the need for clear succession plans when conducting multiyear research. Initially designed as a three-site study, the unexpected retirement of primary staff members at one study site left significant gaps in the research team. At each site, the principal investigator, site coordinator and other key project staff were intentionally selected for their areas of expertise and could not easily be replaced. With tight deadlines for achieving key project milestones, the study team did not have the time or resources necessary to recruit a new site-based research team and ultimately decided to consolidate research activities in the remaining two cities. Although this change did not impact the overall progress of the study, it presented a significant hurdle and revealed the need for clear succession plans that account for both the contractual and IRB-related implications of appointing new key personnel or, at worst case, a new sponsoring research institution.





PRIORITIZING CULTURAL SENSITIVITY

CBPR principles and approaches highlight the importance of cultural sensitivity, sometimes called cultural humility, when designing, staffing and implementing research studies.²³ This principle is especially important in housing-based studies, because research will likely take place in participants' homes and require personal information to be shared. Without an understanding of and sensitivity to residents' cultures and experiences, research teams can struggle to build trust with study participants and may use recruitment or data collection methods that may be ineffective or have unintended negative consequences. For HHHK study sites where the local principal investigator had a primarily clinical background, we worked to ensure that the site coordinator or research staff had experience working in a community or housing setting as a complement to this clinical expertise.

Not surprisingly, the HHHK team often found that it was beneficial to have members of the research team who had direct experience in the participant communities, had a similar racial, ethnic, or cultural background or spoke the primary language of the participants. However, as a multisite study with a variable housing pipeline, the team could not anticipate the cultural needs of the residents. This made it difficult to predict what cultural groups and languages would be needed among research personnel, which ultimately presented challenges for recruitment efforts. When determining which housing developments to include in a study, identifying local community-based organizations, service providers, resident leaders and other community partners as stakeholders can help create early bridges across these cultural gaps.

HEALTHY HOME, HAPPY KIDS EXAMPLE: STRATEGIES FOR RESIDENT ENGAGEMENT

To engage community members directly in the research process, the *Healthy Home, Happy Kids* team pursued a model of Resident Ambassadors in a large housing development. Building on the success of working with residents to promote the Green Communities Criteria, the project team recognized the potential of having residents assist in enrolling their fellow community members. The team identified a local community development organization that worked extensively with residents in the community and was interested in supporting the research efforts. A formal contract was established for the community organization to recruit and oversee resident ambassadors who would conduct recruitment efforts to identify residents who might be interested in participating in the study. The community organization and the resident ambassadors received financial compensation for their time.

Although the Resident Ambassador program was helpful for engaging potential study participants, it added an additional layer to the study process. Because of IRB and privacy restrictions, the ambassadors could gather information only on whether residents were interested in the study and met the study criteria. The ambassadors would then pass that information along to the research team who would conduct a formal screening and enrollment process. This additional step in screening and enrolling study participants proved to be more time consuming than anticipated and did not substantially increase study enrollment.

An important lesson learned is the need to incorporate a Resident Ambassador program into the design of the study and ensure that ambassadors receive the training necessary to engage in the entire process of enrollment and data collection. Having the HHHK resident ambassadors fully integrated into the project team would have streamlined the study's processes and made their engagement more effective. The advantages to having residents participate in the enrollment process cannot be minimized, and we recommend that future studies consider similar strategies, provided the ambassadors can be integrated into the project team and offered the training necessary to allow them to fully enroll participants and conduct data collection.

As the HHHK study progressed, an informal approach to engaging residents in recruitment efforts also emerged. When conducting home visits for data collection, the team would ask participants if they knew of any other residents who might also be interested in participating. Some participants would reach out to neighbors while the study team was on site, providing an immediate connection with additional residents facilitated by a trusted friend or family member. Although this approach has limitations and is unpredictable, it does not require additional time or resources to implement.

ENSURING STRONG PROCESSES TO ALIGN EFFORTS

For projects with multiple sites or numerous stakeholders, a clear and comprehensive process for collaboration serves as the scaffolding necessary to align efforts that might otherwise be disparate and hard to coordinate. This alignment is particularly critical in multisite research where each site will experience unique challenges and opportunities that must be addressed while preserving enough consistency in implementation to ensure quality study findings.

As the HHHK team learned, intentionally building a support structure with frequent check-in points among the research team members and ensuring that it functions as envisioned provided a needed mechanism to discuss problems, debate solutions, and reach consensus that kept the study moving forward. Beyond a structure for project team check-ins, future researchers should include an intentional feedback loop for housing residents, property managers and developers to provide their perspective of the research experience. With such a mechanism, residents will be able to freely share their opinions and the research team will more directly communicate their respect for those opinions.

Although Enterprise and NCHH conferred frequently, regular coordination among the various team members was also essential to celebrating successes, identifying and resolving problems encountered in the field, and maintaining momentum through this multiyear study. Monthly calls were held among the research and project management teams and between the project management team and the funder. Regular updates were provided to the National Advisory Council, with group calls and in-person meetings held at key decision points in the study.





INSIGHT
3

Pilot test the study design.

RECOMMENDATIONS

- Designate enough time and funding to pilot test data collection methods and respond to challenges identified.
- Identify target properties as part of a pilot phase for housing-based research, testing the feasibility of a study's housing-related assumptions and criteria.
- Use pilot testing to confirm the skills and experience needed for research assistants and other staff to successfully implement the research protocol.

As experienced researchers are aware, a pilot test of the study methods and procedures is an important way to stress test both the decisions made during the planning phase and the project's infrastructure to identify any potential gaps in processes, resources, staffing or equipment. A pilot test provides important insights that can shape approaches to recruitment, participant outreach and communication methods. A pilot also can provide the opportunity for community members to offer feedback and suggestions on key elements of the study design.

PURSuing EARLY IDENTIFICATION OF PROBLEMS THAT CAN AFFECT THE BUDGET AND TIMELINE

A pilot allows a study team to test data collection methods and protocols and assess whether elements of the study design align or are at odds with the interests of residents, housing owners, property managers and other community members. Although a pilot test of data collection methods will not reveal all possible challenges, it will help the research team identify needed changes to study design and anticipate other problems that can arise. This can minimize delays and increase the chances that a study will stay on time and budget — a benefit that appeals to researchers and funders alike.

The results of a pilot test can inform the research project's final timeline, budget, enrollment expectations and assumptions. As an example, the *Healthy Home, Happy Kids* study team learned through pilot tests of data collection procedures that the in-home data collection visits would take longer than anticipated. This additional time would affect participant expectations, their willingness to engage in later phases of data collection and the research team's allocation of staff time. Along with updates to study planning and informed consent documents, the additional time required for data collection warranted an increase in financial compensation commensurate with the increase in participant time. With an engaged and supportive funder, the study team was able to address this need by redirecting study resources to increase participant compensation.

For a housing-based study that involves many properties, identifying a pilot site can also offer an opportunity to assess the probability of finding additional properties that will fit the study's criteria. This process can reveal unanticipated concerns that housing owners or property managers may have in volunteering to include their property in a study. These concerns may warrant changes to research design or modification of assumptions for housing recruitment. This process can be valuable in guiding future communications with housing stakeholders and setting expectations for housing partners that are participating in a research study. For a study that has specific targets for the number of housing units included and an aggressive pace for identifying these units, a pilot offers a realistic test of the study team's assumptions and expectations.





CONSIDERING CHALLENGES THAT ARE INHERENT TO IN-HOME INTERVIEWS AND DATA COLLECTION

Not surprisingly, conducting data collection within someone's home can bring unexpected complications. Piloting data collection approaches can help identify possible challenges and ensure effective procedures and checks for quality control. In the HHHK study, research assistants practiced doing in-home environmental monitoring correctly, conducting surveys with children and their parents in the home setting, and using an online instrument to enter data. A simple and highly constructive outcome of this pilot was learning which skillsets to prioritize in hiring future research assistants to meet the demands of the various elements of data collection.

The process of piloting data collection procedures can also reveal possible challenges in coordinating data collection across multiple sites. In some cases, limitations in internet access made accessing the project's online database problematic. In other instances, some participants needed to complete an interview verbally, while others needed to complete paper copies of a translated survey. Through pilot tests and ongoing communication among team members, the research team was able to create standard procedures for many of these situations and provide consistency in data collection procedures across sites.

These challenges are a reminder that funders and practitioners should be realistic about the time and resources required to effectively conduct and learn from planning and piloting data collection efforts, because the insights gained can lead to revisiting some elements of study design. This process can affect a study's timeline and budget but can minimize later delays that would otherwise jeopardize a study's completion.

HEALTHY HOME, HAPPY KIDS EXAMPLE: ADAPTING THE STUDY APPROACH TO ADDRESS IN-HOME HAZARDS

Early in the data collection process, members of the research team identified in-home hazards that warranted immediate attention. Through monthly all-team conference calls, the researchers were able to bring this issue to the full team for discussion to decide how the teams should respond to these identified hazards. The most urgent of the identified in-home hazards included the presence of mold and broken or missing carbon monoxide detectors and fire extinguishers. Alerting property management and property owners of these hazards would violate the study's confidentiality restrictions by identifying the specific households that were participating in the study. Confidentiality was required by IRB guidelines and was necessary to ensure residents that their participation in the study would have no effect on their housing status—a vital concern for residents of affordable housing.

Ultimately, the team prioritized the hazards that were most dangerous to resident health and safety and agreed to alert residents to the hazards and encourage them to contact property management. Additionally, the team determined that they would alert property management directly about any hazards identified in the property's common areas if property management was present with them on site; otherwise, Enterprise staff would relay the team's concerns to property management.

This situation required the team to balance the tension between prioritizing resident health by addressing pressing hazards and the need to protect participant confidentiality. Further complicating this situation was the potential for conflict between some residents, property managers, and property owners. Addressing identified hazards within this environment required the collaboration of Enterprise, NCHH, local research teams and the contractors who were conducting the in-home data collection activities. This is just one example of how the communication and collaboration among the full research team was instrumental in dealing quickly and effectively with the challenges of housing-based research. It also suggests the need for research teams to consider in advance how the team will respond within the privacy constraints of a study if in-home hazards are identified during data collection.



INSIGHT
4

Build strong relationships with developers, property managers and residents.

RECOMMENDATIONS

- Anticipate the liability concerns of housing owners, and consult with advisors and legal experts to determine the best way to allay those concerns.
- Incorporate sufficient time to develop relationships with housing owners, property managers and resident leaders, ensuring that the study has a clearly articulated benefit for residents and the broader community.
- Create recruitment plans that reflect the unique context and needs of each housing development in partnership with housing stakeholders, community organizations and resident leaders.

Examples of CBPR found in the literature emphasize the need to build trust and respect with residents and community members over time to facilitate meaningful community engagement in the research process and gain valuable feedback throughout the course of the study. In housing-based research, this trust-building extends to housing developers and property managers, whose engagement in the study is necessary for identifying and gaining access to properties.

BUILDING PARTNERSHIP WITH HOUSING OWNERS AND PROPERTY MANAGERS

Housing-based research relies on the engagement of property owners and managers in a variety of ways. The first and most critical way for a housing owner to engage in a study is to give their permission for researchers to conduct research at one of their properties. Obtaining buy-in and support can take time, which must be anticipated and planned for, especially when targeting properties owned by large real estate companies. Buy-in at such companies often needs to occur at many organizational levels and at each property. Building relationships with developers and property managers as early as possible is invaluable for laying the groundwork for buy-in and information sharing.

The *Healthy Home, Happy Kids* study consistently found that a housing owner's willingness to participate in the study often included consideration of their potential liability risk. On more than one occasion, owners opted out of the study for fear that they could be sued over negative health outcomes or hazardous conditions in the home. This consideration is particularly relevant for studies with data collection measures that include elements of the home environment, such as ventilation. To address this concern, the research team needed to consult with legal experts and discuss these risks with the housing owners. This process required additional effort and, in some cases, led to considerable time being spent with housing stakeholders that ultimately chose not to participate in the study. It is important for housing-based researchers to understand these risks up front and plan accordingly. Despite liability concerns, the HHHK team found many developers interested in improving the health of their residents and willing to support the research.



THE DEVELOPER PERSPECTIVE

The study team conducted multiple interviews with affordable housing developers as part of the process of redesigning the study and identifying key lessons learned. Through these interviews, developers reflected the importance of incorporating green elements in affordable housing construction and rehabilitation, as well as the difficulties that arise in implementation. For many nonprofit housing providers, their mission is to provide affordable housing to residents with low incomes with a goal of maximizing positive health outcomes. However, affordable housing developers face many financial constraints that could lead them to choose green building practices that are perceived to be less expensive than mechanical ventilation but offer fewer health benefits to residents. Enterprise explored such trade-offs in a series of reports released in 2009 and 2012 that analyzed the incremental cost of key health criteria in the Enterprise Green Communities Criteria, finding that mechanical ventilation can increase construction costs by around \$2 per square foot. As the *Healthy Home, Happy Kids* study found, this additional cost can represent a difficult trade-off for affordable housing developers managing tight budgets with other financial constraints.⁹

The developers who participated in the study saw it as an opportunity to contribute to the evidence base to make the case for green elements being a “need to have,” not a “nice to have,” in affordable housing construction practices. Developers shared that this research would help them with advocacy efforts and contribute to their long-term goals. Other housing developers are looking for a competitive advantage in their work, because most funding for affordable housing is awarded on a competitive basis and green construction is seen as an important part of retaining that competitive advantage.

Some developers expressed concerns about participating in a research study that includes data collection activities in residents’ homes, particularly environmental sampling of indoor air quality. Many housing developers feared that this data collection process could upset tenants and lead to lawsuits similar to those that arise because of the presence of lead or mold in a home. Even for developers working to include many green features in their properties, the prospect of a lawsuit, no matter the outcome, is enough to withdraw their involvement in the study. Each developer faces unique financing constraints and tenant relationships that influenced their ability and willingness to participate in the study, as well as the type of recruitment activities that were deemed optimal if they chose to participate.

⁹ Enterprise Community Partners. 2012. *Enterprise Green Communities Criteria: Incremental Costs, Measurable Savings—Update*. Available at <https://www.enterprisecommunity.org/download?fid=8107&nid=3596>.

After the vital first step of securing their permission to conduct research on a property, the role of housing stakeholders will vary based on the needs of each study and can include the following:

- Participating on a study's advisory committee
- Providing property access to the research team, particularly on properties that have restrictive security in place
- Providing information to the researchers about the property, housing unit details, resident demographics and resident contact information
- Inviting the research team to a resident meeting or creating opportunities for researchers to engage with and enroll residents
- Speaking to residents about the study in person or via email
- Passing out flyers about a study during a resident meeting or placing them on resident doors or in common areas

The HHHK study team found that each housing stakeholder had a different capacity and level of interest for assisting with recruitment of residents to participate in the study. The research teams provided options to the housing owner and worked with them to develop a feasible recruitment plan based on their desired level of involvement. This meant that the recruitment methods varied at each housing site, requiring both flexibility and creativity from the research teams. However, this sensitivity to each developer's needs was well worth the effort expended because it encouraged their participation and benefited recruitment efforts, resulting in resident enrollment.

Maintaining a strong relationship with housing owners also allowed the research teams to stay current on issues that could affect recruitment and other on-site study activities. This information is especially important for research studies that involve the development or renovation of affordable housing, because financing and construction delays are common and can impact a study's progress significantly.

Property managers also play a critical role in housing-based research. On-site property managers serve as gatekeepers, working to keep the building safe and secure, which often includes choosing how to engage with outside organizations and potentially limiting access to the property. It is important to remember that property managers are constantly busy — their tasks can cover human resources, finance and administration, mediation, community social coordination, and maintenance. Trust-building is especially important at the local level, particularly if property managers are not receiving additional compensation or other direct benefit from assisting the coordination of a research study. In this context, the HHHK study did not compensate property managers for their participation in the study. It is unclear whether such compensation would have led to greater engagement, but the possibility should be considered in future housing-based research studies, within the activities allowable by their respective IRBs.

The HHHK research team observed that additional time was needed to coordinate with property managers, and that frequent, proactive coordination in the property manager's preferred method of communication was most helpful for advancing these relationships. This engagement with property managers is essential, because they can provide an entrée to connect with potential study participants and can assist with recruitment activities. It is also important to note that, in some situations, a research team may need to gain approval and build relationships with people at different levels in a property management company, from the regional director to a site manager.

HEALTHY HOME, HAPPY KIDS EXAMPLE: COORDINATING WITH PROPERTY MANAGERS IMPACTS RECRUITMENT EFFORTS

Coordination with property managers was critical for recruiting residents at each housing site in the *Healthy Home, Happy Kids* study. In some cases, this coordination required on-site property managers to go beyond their regular duties to assist the research team with recruitment activities. Without a formal compensation structure for property managers at the study sites, the research team had to rely on their willingness to provide assistance as they were available. At several properties, the research team found that the best time to recruit residents was during the week in the early evenings, but this was after-hours for the property managers. This timing was problematic because the team could not leverage the existing relationships that property managers had with many residents unless they were available to accompany the team during recruitment. In some cases, the property managers were able to extend their hours to assist the research team during optimal recruitment times, but in other cases this was not possible and slowed recruitment efforts.

Having property managers included in the study's initial planning phase is a good way to surface potential challenges like these, identify a range of solutions, and create a foundation for their ongoing engagement in study implementation and communication of findings. Such solutions could include providing financial compensation or establishing formal partnerships with property managers to facilitate recruitment efforts. Recognizing the importance of property managers within housing-based research and devising a plan to engage them in the study early on would likely facilitate recruitment efforts and remove one obstacle experienced by the HHHK study teams.

DEVELOPING RELATIONSHIPS AND BUILDING TRUST

CBPR approaches emphasize the importance of building trust with housing and community residents as an integral part of the research process. Alongside many other benefits, building trust is fundamental for effective recruitment efforts in vulnerable communities, but it requires a significant investment of time to develop these relationships, particularly for a team of researchers who may be perceived as outsiders. This is especially true for studies where housing sites are not identified during the planning phase. Once a property is identified, researchers will need time to learn about the resident population, spend time on the site to understand residents' lived experience, and build familiarity among resident leaders.

A key element in effective recruitment is sensitivity to the interests and concerns of the community members who are recruited as participants. For example, reluctance to answer an unknown telephone number or open a door to a stranger may make recruitment more difficult, and building trust becomes increasingly important. For housing-based studies, both physical access to a property and culturally sensitive relational connections with residents are paramount for effective recruitment and ongoing retention of study participants. Throughout the research process, the HHK study team benefited from engaging resident leaders and other study participants in helping connect them with other residents for recruitment efforts. The research team also benefited from the connections provided by on-site property managers and service providers who had established relationships with residents.



COMMUNITY ORGANIZATION PERSPECTIVE

As a means of engaging community in the study implementation and boosting enrollment, the *Healthy Home, Happy Kids* study team tried a proven CBPR method: engaging resident ambassadors to promote the study to their neighbors. A neighborhood-based community development organization managed the program through a formal contract and was responsible for recruiting and overseeing the ambassadors. Both the organization and the resident ambassadors were compensated for their time. Engaging the community organization around the Resident Ambassador program highlighted the need to have included feedback from such organizations earlier in the process. In communication with the research team, the organization emphasized the importance of spending time in a community to bring to life a better understanding of residents and the challenges that they face. This necessary part of community-based research, they stressed, allows researchers to move beyond demographics to gain a deeper understanding of a community. Many residents in the community may fear outsiders, making the partnership with a well-known and trusted community organization and the involvement of local residents a valuable way to dispel fears and open residents up to conversations about participating in a research study.

In recruiting ambassadors, the community organization sought residents who were already deeply involved in the community with a network of established relationships. However, the organization noted that residents who are committed and willing to learn may perform just as well in the resident ambassador position regardless of whether they have existing relationships with other residents. Once committed to the study, the ambassadors received training on how to conduct door-to-door outreach and how to work with interested residents to complete a pre-screening form that would be used to determine their eligibility for the study.

In reflecting on the opportunity to serve as the liaison and coordinator for the Resident Ambassador program, the organization emphasized the unique opportunity it presented. When the ambassadors conducted door-to-door outreach, they also asked residents a few additional questions developed by the organization to better understand the needs of the community. These additional questions prompted broader conversations about resident needs, some of which were unknown to the organization. As a result, the organization was able to make programmatic changes to directly address resident needs, and the resident ambassadors were able to refer residents to existing programs offered by the organization. Staff stressed that as a small organization with limited capacity, they would not have been able to conduct door-to-door outreach without the support of the HHHK study and that this type of engagement would benefit other organizations that might serve in a similar role in other studies.

Although the HHHK research team was able to use the Resident Ambassador program in only one housing property, its value in embedding CBPR principles in a housing-based study was clear. In addition, several important lessons were learned that can guide future use of this important community engagement method. The resident ambassadors involved in the HHHK study would have benefited from additional training and insight into the overall study purpose and design. This training would have helped the resident ambassadors focus the pre-screening process on more households that were eligible for the study, thereby streamlining their efforts and potentially leading to better recruitment results.

The HHHK team conducted kick-off calls with developers and property managers for each housing development to better align recruitment strategies with the local context of each development and identify opportunities for recruitment. As part of this process, the team learned if the property managers and developers had existing connections with individual residents, resident leaders or local community organizations that could support recruitment efforts. Based on this information, tailored recruitment strategies were created for each housing development.

The efficacy of recruitment strategies varied greatly at each site, depending on both the local culture and resident population, as well as the physical characteristics of the housing development. In scattered-site housing developments, for example, residents typically had fewer relationships with one another and were not able to assist with recruitment in the same way that residents in a single multifamily building could.

As another example, the existence of a common space in a property also affected whether or not the research team had a place to set up a recruitment table and interact with residents as they entered and exited the building. Property managers sometimes facilitated recruitment efforts by conducting initial outreach to residents and providing a list of interested or potentially eligible residents to the research team.

The following page highlights some of the recruitment strategies undertaken as part of the HHHK study and the benefits and limitations of these various approaches to resident recruitment.



SHARING IDEAS ACROSS RESEARCH SITES

The HHHK monthly research team meetings helped the researchers share insights, challenges and ideas with one another on a regular basis. Many discussions included ways in which teams were working to establish relationships with key stakeholders, and methods that had worked at one site often were tried at others. From these discussions, it was clear that the research teams would have benefited from investing greater time upfront to learn about the community and develop community partnerships before formal recruitment campaigns began. This time was not built into the HHHK study and may have delayed other study activities. Future researchers can learn from this experience and plan accordingly.

EXAMPLE RECRUITMENT STRATEGIES EMPLOYED, WITH THEIR BENEFITS AND LIMITATIONS

Door-Knocking

This tactic allowed the research team to connect with residents who could not be reached by telephone. In buildings with secure entry and interior resident doors, this strategy requires property managers to provide building access. Property management schedules created some difficulty, because evening and weekends were found to be the best times for recruitment activities but were after business hours for property management staff. This required the property management staff to go above and beyond their normal duties. Financial compensation was not provided, but might help to overcome this challenge in future studies.

Resident Ambassadors (formal role)

This approach, discussed in depth throughout this report, provided the benefit of connecting the research team to more residents of a property. However, this tactic required the additional step of having the resident ambassadors pre-screen residents for eligibility, but the research team still had to conduct a full screening interview to confirm eligibility. Future studies using resident ambassadors should consider robust training to maximize the benefit of this form of community engagement.

Participant Introductions to Other Residents (informal role)

Some study participants provided introductions to relatives or friends living in the same property when the research team was in their home for data collection. These introductions were an easy and helpful way to connect with additional participants and engage residents in the recruitment process.

Mailing Study Materials to Residents

This approach included putting flyers in resident mailboxes or under their doors, as well as mailing postcards to residents with pre-paid postage on an interest card for them to mail back to the research team if interested in participating. Mailing postcards required little time from the research team but required funds for printing and postage and ultimately provided little benefit to the study's recruitment efforts.

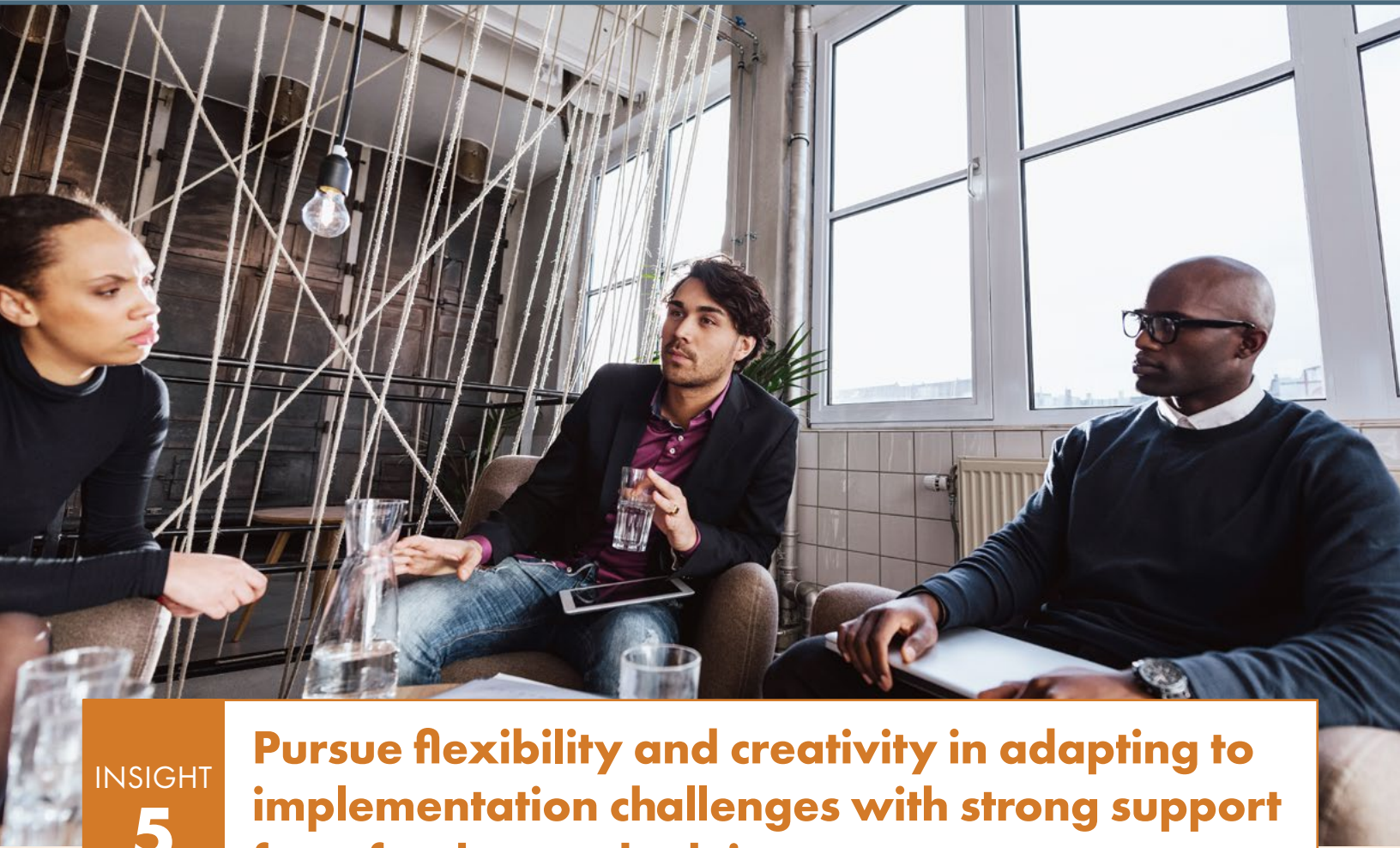
Attending Resident Meetings

The attendance at resident meetings had limited success in properties where there was a significant change planned for the property, such as a renovation or change in ownership, because the concerns and focus on these other pressing issues reduced the focus and attention on the study. At properties that were not undergoing significant change, resident meetings were not conducted as often, focusing recruitment efforts on other connection points with residents.

Attendance at Community Events

The research team was able to attend community events to connect with residents, including events hosted by social service providers. As one example, an on-site food bank operated at one study property for several hours each week. The research team was invited to come to the food bank during these regular hours and connect with residents while they collected their food. This provided a reliable location to connect with residents, but after a few weeks of attending the food bank, the research team had engaged with all residents using the service.





INSIGHT
5

Pursue flexibility and creativity in adapting to implementation challenges with strong support from funders and advisors.

RECOMMENDATIONS

- Create regular feedback loops with the project team, advisors and funders to identify and quickly respond to challenges that arise.
- Acknowledge both the need for flexibility within grant expectations and project planning and the unpredictability of many elements in housing-based research.
- Engage a diverse set of perspectives, including those of the study funders and project advisors, to identify creative solutions for obstacles that arise during study implementation.

Conducting research in an affordable housing setting requires pragmatism and a readiness to adapt to uncertainties and challenges that may arise. Most researchers have experienced unanticipated challenges in a study, particularly in complex studies that span multiple years. Strong collaboration among team members united in their commitment to the research purpose engenders the creativity and flexibility necessary to adapt to challenges and opportunities, giving even the most difficult studies a chance at success.

ESTABLISHING COLLABORATION AND TRANSPARENCY WITH PROJECT FUNDERS AND ADVISORS

Given the need for flexibility in the successful completion of a complex study, establishing honest and transparent relationships with funders and advisors is critical. Clear communication with strong feedback loops offers the opportunity for research teams, community members, advisors and funders to identify problems and engage in problem solving together. As evidenced from the experiences of the *Healthy Home, Happy Kids* study, advisors and funders can be valuable allies to help a research team navigate challenging circumstances, refocus objectives and adapt to changing conditions in the field. An important part of this process is collectively re-evaluating the scope of a study at key decision points, particularly when unexpected challenges arise. Engaging in this reflection and re-scoping process with the study's funder and advisors as active participants was a crucial inflection point for the HHHK study.

The parameters of grant agreements and research contracts should acknowledge the need for flexibility and provide sufficient latitude for researchers to address problems as they arise. Grant agreements and research contracts that separate a planning process from research implementation are ideal, because they provide the opportunity to identify and plan for potential obstacles, building adequate budget, staff time, and milestones into the final research design. For the HHHK study, the project team was able to revisit portions of the project budget as the study progressed, a flexibility that may not always be allowed under grant agreements. As a supportive and engaged funder, JPB offered the research team the time and flexibility they needed to work through issues and chart a path forward. As one example, pilot tests of the data collection procedures indicated that the study's home interviews would take longer than initially anticipated, warranting more financial compensation for study participants. Because of the flexibility afforded by JPB, the research team was able to repurpose a portion of the study budget to meet this need.

KNOWING WHEN AND HOW TO PIVOT A STUDY DESIGN

The HHHK study also benefited greatly from the funder's willingness to undertake a process to redesign the study. This significant effort was not entered into lightly. The research team engaged the National Advisory Council, senior research advisor and funder in a series of conversations over the course of a full year to identify minor modifications that could enhance the study's successful completion without substantial changes to the study's protocol or intended scientific rigor.

While these minor modifications were being implemented, the group continued to consider alternative recruitment methods and more significant changes to the type of housing included in the study. Collectively, the group weighed each option against its expected effects on the study's progress, the implications for the study budget and timeline, and — most important — the impact on the study's findings. When the minor modifications did not yield a substantial change in study progress, the group began to pursue more comprehensive changes to the study design. Various options were considered based on their ability to leverage the study's existing assets, including personnel and data collection procedures developed, while maximizing the expected contribution of the study's findings to the field.

The research team interviewed several developers to inform this process and engage a stakeholder group that had been missing from the original study design. The feedback gained from developers was helpful in shaping the study's redesign and testing assumptions of feasibility.

Throughout the ongoing engagement with the study advisors and funder, one promising option emerged, and a new planning process was undertaken over the course of several months that resulted in a major overhaul of the study's original design. This process required collaborative scoping of a new research design, protocols, and IRB review and approval; stakeholder engagement; updated research contracts; and a new budget and revised timeline. The project team was able to modify budgets and contractual obligations to ensure that a committed and highly skilled project team remained in place with funding for the duration of the research. The opportunity to step back, consider the goals of both the funder and the research team, and design a new study in real time was both unusual and necessary for the original intent of the HHHK study to be realized. Without the support and flexibility of JPB, the research team would not have been able to undertake this process successfully.

FUNDER PERSPECTIVE

A safe and healthy home affordable to everyone is essential to enabling resilient communities, which is the goal of JPB's Environment Program. We know that most Americans spend 90 percent of our time indoors. But for many of us, our home can be an unsafe environment. In the United States, 4.8 million people live in homes with poor indoor air quality, leading to at least 2 million emergency room visits from asthma related to triggers in the home.

Our homes are essential contributors to planetary and human health. JPB supports healthy and energy-efficient housing as a strategy for addressing health disparities and the outcomes of systemic racism and oppression. One way we do this is by focusing on preventing pollutants and exposure to toxic classes of chemicals in the homes and communities of people of color or those who have low incomes. We invested in the *Healthy Home, Happy Kids* study to provide evidence for methods that will improve health and increase the affordability of housing by preventing exposure to poor indoor air quality.

JPB's commitment to the HHHK study over the past seven years was driven by a desire to better understand the impact of green housing on health. We wanted to help provide evidence for how to meet one of the more difficult aspects of installing green improvements in existing housing, which is the provision of proper ventilation. During the project period, the HHHK study experienced every possible challenge, including staff changes, low study enrollment, a pandemic, shifting the research scope to better achieve success and eliminating a study site. As a funder, we had multiple opportunities to exit but we believe in partnering with our grantees through good times and difficult ones. Recognizing the difficulty of bringing a complex project to fruition, we knew there was a need to be as flexible as possible even though it wasn't comfortable.

We have learned much about our own capacities and what it takes to support research through this partnership, including that —

- We lack the capacity to manage longitudinal multisite research projects and need expert consulting staff with practical experience to help guide our role in such projects.
- We must provide planning resources upfront to allow all partners time to set up a collaborative process, including principles of engagement that will support a multiyear study with staff who may come and go.
- Advisory committees are not just lists of experts with outstanding credentials — they must be engaged throughout to actively advise, not just to rubber stamp decisions.
- Transparent and frequent communication is essential for any partnership.

Philanthropy is a tremendous resource for research projects that otherwise would not receive the type of funding needed through academic or public sources. But we recognize it is very different from providing general operating support or conventional project support. Research has more unknowns and sometimes, no matter how hard everyone works, we may not arrive at the outcome we want. Community-based participatory research is necessary, but — as we learned — it must be entered into with great care, much planning, and partnership agreements that recognize even though the road ahead may be long and bumpy, shared learning will result and it will inform the field. It is one of the few ways we can design solutions that will improve the health and well-being of the people we are serving.



Conclusion

Conducting research in affordable housing developments will continue to be an important means of evaluating programs and policies designed to improve resident outcomes. As detailed in this report, the nuances and intricacies of conducting such research can be daunting. CBPR methods and techniques offer valuable guideposts for housing-based research, particularly given the need to develop relationships at key inflection points along the research path. But as the researchers in the *Healthy Home, Happy Kids* study found, one size does not fit all, and CBPR principles must be incorporated from the earliest stages of a study to fully embrace the goals and benefits of this approach.



If those of us involved in the HHHK study were to use one word to describe its course, that word would have to be “bumpy.” In retrospect, this is not surprising, given its longitudinal nature, its multisite design and its target communities. Affordable housing is a complex ecosystem in which to work, and we did not fully account for the changing circumstances experienced by both housing developers and property managers, as well as the residents themselves. Even this group of experienced researchers and a national housing intermediary found more to learn and consider than initially expected when embarking on this ambitious study. Approaching this work with humility and openness to seek guidance from diverse stakeholder groups, community representatives and the residents themselves is foundational to the success of housing-based research. Each of the insights listed below, and described in the previous pages, is the result of the research team’s willingness to share openly and honestly in an effort to guide future research studies and highlight the importance of stakeholder feedback early and often throughout the process.

Despite the study’s challenges, the tenacity and creativity of the study’s research teams, expert advisors and funder allowed the study to confront and adapt to one challenge after another. Although none of these challenges is new to researchers, their combined effects jeopardized the future of the HHHK study on more than one occasion. The insights provided in this report stress the importance of advance planning for a study of this magnitude, highlight the need to identify key stakeholders and to build trusting relationships as early as possible, and acknowledge the value of an interactive and engaged funder.

Although the HHHK study was not originally designed as community-based participatory research, applying those principles as the study progressed enabled the research team to navigate numerous obstacles and challenges. Given the unique characteristics of each study property — its owner, its management and its residents — the team applied various techniques and learned, through trial and error, what worked and what did not. A more intentional effort to bring CBPR methods into the planning and design phase of future housing-based research studies can avoid some of the pitfalls experienced by the HHHK study team. More important, such methods recognize and respect community members, enhancing the probability for success and findings that will lead to needed social change.

- **Insight #1:** Identify key stakeholders and include them in the study design planning process.
- **Insight #2:** Create a strong team and the project infrastructure needed for a complex study.
- **Insight #3:** Pilot test the study design.
- **Insight #4:** Build strong relationships with developers, property managers and residents.
- **Insight #5:** Pursue flexibility and creativity in adapting to implementation challenges with strong support from funders and advisors.

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