

# **Examining the Effects of the Rental Assistance Demonstration on Children Living in Public Housing in Fresno, California**



**PD&R**



# Examining the Effects of the Rental Assistance Demonstration on Children Living in Public Housing in Fresno, California

Prepared for  
The U.S. Department of Housing and Urban Development  
Office of Policy Development and Research

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November 2019

## Foreword

The Rental Assistance Demonstration (RAD) was authorized by Congress in 2012 to help address the backlog of capital needs in public housing. The recently published report, *Final Report: HUD's Evaluation of the Rental Assistance Demonstration (RAD)*, details the findings of a congressionally mandated evaluation aimed at understanding RAD's impact on:

- The preservation and improvement of public housing units
- The leveraging of private sector resources
- The effect of RAD conversion on residents.

To supplement this evaluation—and provide a deep dive into understanding the effects of RAD on children and families—The Department of Housing and Urban Development's (HUD's) Office of Policy Development and Research funded this study, which examines the effects of RAD on children living in public housing in Fresno, California.

Two major takeaways regarding resident experiences and children's outcomes are worth highlighting. First, despite a short-term disruption to their daily lives, residents were satisfied with the quality of services they received during temporary relocation and with the renovated units to which they returned. Second, a greater proportion of children who experienced a RAD conversion attended school regularly and had higher grade point averages than children living in public housing or using vouchers in the same school district. Furthermore, children who experienced a RAD conversion were no more likely to visit the emergency room than other children living in public housing. These findings strengthen the evidence that RAD conversion—and the temporary relocation and disruption families undergo during renovation—is not presenting negative effects on children. The report also emphasizes the importance of strong, clear communication during the conversion process and offers insights for strengthening the roll-out of the program moving forward.

For HUD, the compelling findings from this study underscore the value of funding critical research that complements congressionally mandated evaluations. These types of studies provide valuable context that bring depth and nuance to a larger body of research by allowing for deeper insight into specific topics of interest and by opening new lines of inquiry that inform policy and strengthen HUD's programs.

Seth D. Appleton

A handwritten signature in black ink, appearing to read 'S. Appleton', with a long, sweeping horizontal stroke extending to the right.

Assistant Secretary for Policy Development and Research  
U.S. Department of Housing and Urban Development

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## Acknowledgments

This project is funded by the U.S. Department of Housing and Urban Development (HUD) under fiscal year (FY) 2013 Rental Assistance Demonstration Grant Program (H-21666CA). Any opinions, findings, conclusions, or recommendations expressed in this publication are those of the authors and do not necessarily reflect the views of HUD or the government. The authors are thankful for the Fresno Housing Authority staff and residents who participated in our interviews and allowed us access to valuable information. We are also thankful for research assistance provided by Mercedes Ekono and Andrea Rodriguez Lebron. The data linkages between Fresno Housing Authority and the California Office of Statewide Health Planning and Development and the Fresno Unified School District were made possible with support and technical assistance from those organizations—in particular, Cassie Morgan, Bobbie Culter, Jorge Valdez, Juanita Banuelos, Angie Nguyen, Karen Henderson, David Jansen—and we are extremely grateful for their assistance.

## **DISCLAIMER**

**The contents of this report are the views of the contractor and do not necessarily reflect the views or policies of the U.S. Department of Housing and Urban Development or the U.S. Government.**

## Executive Summary

The Rental Assistance Demonstration (RAD) is a recently launched federal housing program of the U.S. Department of Housing and Urban Development (HUD) that converts public housing to Section 8 rental assistance contracts to finance critical maintenance and repairs. Although the program is heralded as a critical tool to improving the public housing stock, RAD is still in its earliest stages, and there is much to be learned about how it affects residents living in public housing. The overall goal of this study is to explore the mechanisms by which RAD may influence the well-being of low-income children in public housing and, more broadly, how HUD's rental assistance programs can be strengthened. With Fresno Housing Authority (FH), one of the first sites to implement RAD (hereafter referred to as FH-RAD), we had the unique opportunity to interview its residents and examine the health and education outcomes of children living in its RAD properties by using unique administrative data.

As the program figures to become HUD's major housing preservation strategy, monitoring how RAD affects the quality of life and health of children is a key area of future research. Investigating the effect of FH-RAD on the well-being of children living in public housing will contribute to a better understanding of how HUD's rental assistance programs can be strengthened. Understanding the role of RAD in child development is critical in light of the shortage of affordable housing and the growing number of families struggling to pay rent. A little more than one-half of renter-occupied households with children in the United States experience an excessive rent burden, meaning that they spend more than one-third of family income on rent (Aratani et al., 2011). The federally administered public housing program provides low-income households with rents they can afford, thereby serving as an important income supplement and source of stability for families (Aratani et al., 2018). The quality of public housing varies widely; however, many buildings are in dire need of rehabilitation owing to years of underfunding (GAO, 2018). In November 2011, the RAD program was established under the Consolidated and Further Continuing Appropriations Act of 2012 in response to the capital needs of America's public housing units. RAD "provides the opportunity to test the conversion of public housing and other HUD-assisted properties to long-term, project-based Section 8 rental assistance to achieve certain goals, including the preservation and improvement of these properties through enabling access by PHAs and owners to private debt and equity to address immediate and long-term capital needs" (HUD, 2017a: 4). Through RAD, PHAs can voluntarily apply for conversion to project-based Section 8 contracts to improve the financial or physical condition of public housing.

In an effort that started in July 2012, FH-RAD used Low-Income Housing Tax Credits (LIHTCs) to convert public housing units into Section 8 Project-Based Rental Assistance (PBRA) units. Conversion was completed in the fall of 2015, including the major rehabilitation of 447 units and the construction of new community centers, featuring an administrative office, a computer room, and a community room used for various resident programs and services.

We focus on key dimensions of housing subsidies that are associated with healthy child development: physical environment, residential stability, access to amenities and services, perceived safety, and income supplement (Aratani et al., 2018). The mechanisms through which RAD affects the well-being of children are complex and likely to act in different directions.

Because one of FH-RAD's objectives is to improve and upgrade public housing, FH-RAD is anticipated to have a positive effect on child well-being through improved housing quality and increased pride among residents. On the other hand, temporary relocation as a result of RAD may have detrimental effects on children, considering the research on residential instability (Aaronson, 2000; Aratani et al., 2018). We hypothesize, however, that the adverse effects may be offset by intentional resident engagement that incorporates residents' input and addresses their needs. FH-RAD was particularly suited as a case study to address the role of resident engagement because FH formulated a philosophy behind resident engagement that informed the structure and nature of their resident involvement plans. FH's philosophy emphasized the importance of including residents in decisionmaking processes, not only to better fit renovation plans to resident needs but also to foster ownership and a sense of pride among residents.

With a case study of FH-RAD, we ask the following questions:

- What are the overall changes as a result of FH-RAD in key housing dimensions that promote the well-being of children?
- What is the short-term effect of RAD implementation on the health outcomes of children?
- What were the key aspects of resident engagement and strategies that FH employed that potentially reduced the adverse effect of RAD?
- What are the educational outcomes of children living at post-RAD properties compared with those in other subsidized housing programs?

Employing a mixed-methods design, we collected and analyzed the following data:

#### **Qualitative data**

- FH-RAD planning and implementation documents
- Individual interviews with 23 FH staff who were involved in FH-RAD implementation or who worked at FH-RAD sites
- Individual interviews with 30 parents in their newly renovated units after the FH-RAD conversion
- Field notes and visual images of FH-RAD and public housing sites

#### **Quantitative data**

- FH resident records of 2,851 children from 1,180 households enrolled in FH's public housing program in 2012 (including 10 housing properties that went through the FH-RAD conversion)
- State health records that contain emergency department (ED) visits including hospitalization in 2012 and 2016 from the California Office of Statewide Health Planning and Development (OSHPD) that were linked to FH resident records
- School records from Fresno Unified School District that were also linked to FH resident records among children living in the properties in the city of Fresno

## Key Findings

- 1. As a result of FH-RAD, there were significant improvements in the physical environment in the following four areas: (1) thermal comfort; (2) mold removal; (3) aesthetics and building design; and (4) appliances and layout.** The overwhelming majority of residents were pleased with their renovated units—in particular, increased thermal comfort by the replacement of swamp coolers with wall-mounted heating and cooling systems. One resident noted, “Everything is perfect because now the rooms, everyone sets the temperature they want, it’s not too hot, it’s perfect now...more comfortable.” Residents also commented on receiving compliments from their families and friends, which suggests that they felt increased pride towards their renovated homes.
- 2. Another area of improvement seen in FH-RAD was access to new amenities and services, including the construction of community centers and onsite property managers.** Some residents who met with the onsite manager described him or her as “attentive” and “very nice” and reported improved communication with FH staff by having the manager on site. At the time of our interview with residents, community centers were not yet open; however, residents talked about the positive effect of having facilities such as a Boys & Girls Club housed at one of the community centers. A resident reported, “The gain in the long run, like the Boys & Girls Club to help keep kids positive, not negative. So I’m glad that they put it here.” Further research is needed to understand how RAD can be used to improve residents’ access to amenities and services and, in turn, promote the well-being of children living in HUD-assisted housing. In addition, on the basis of the post FH-RAD data, we found that a higher proportion of children living in Fresno post-RAD properties attended school regularly and had a higher grade point average (GPA) than children living in public housing (PH) or private housing with Section 8 vouchers in the same school district.
- 3. Because FH-RAD required temporary relocation of residents during the major rehabilitation, residents experienced some amount of instability and disruption in their daily activities; however, most residents were satisfied with the quality of services they received during temporary relocation.** Further, quantitative data analysis using a quasi-experimental design showed that there was no difference in the likelihood of having one or more ED visits between children who experienced a RAD implementation and moved back to the rehabilitated units within 1 year and comparable children in public housing, despite temporary relocation and the less favorable neighborhood characteristics of FH-RAD sites. During interviews, parents of asthmatic children also described noticing an immediate improvement in their children’s health upon returning to the renovated unit.
- 4. FH’s effective resident engagement seemed to successfully mitigate the potentially adverse effect of RAD, such as from temporary relocation.** Its key strategies included the following:
  - Providing childcare and other incentives to increase meeting attendance
  - Implementing multifaceted efforts to convey RAD information effectively, which can help residents navigate program changes and temporary relocation
  - Providing opportunities for residents to give their input, which helps PHAs understand residents’ needs during temporary relocation and in the long term

- Integrating resident input into the implementation plan to maximize the potential benefit and reduce the adverse effect of RAD

## Conclusions

FH-RAD helped improve two housing dimensions that promote the well-being of children in the short and long term: the physical environment and access to amenities and services. Residents reported major improvements in four areas: (1) thermal comfort; (2) mold, which may immediately improve the health outcome of children; (3) aesthetics and contemporary building design; and (4) appliances and layout, which were associated with increased pride in their residence. Further, the new construction of community centers expanded FH's capacity to serve residents through an onsite property manager and new services and programs, such as parenting classes. More research should be conducted to better understand how enhanced resident services can contribute to the healthy development of children.

In the short term, residential instability was one of the main adverse effects of RAD. Two major sources of residential instability for residents were identified, including potential changes to income eligibility and temporary relocation. HUD requires that public housing residents maintain a right to return to the property following the conversion under RAD. To effectuate this, HUD prohibits families from being re-screened when admitted into the Section 8 program. When LIHTC is used to help finance repairs, however, the LIHTC program imposes additional income eligibility criteria.<sup>1</sup> FH managed differences between the income eligibility requirements by offering families alternative housing options that they voluntarily accepted. The 2017 tax bill includes a provision that may help reduce scenarios where there are conflicting income eligibility requirements by allowing for income averaging and occupancy by families earning 60 to 80 percent of area median income (AMI). Nevertheless, even with this provision, not all residents can return to their unit if their income is higher. Coordination with the Internal Revenue Service (IRS) and HUD to grandfather in residents, regardless of their income level, could help avoid additional paperwork and any loss in eligibility. Informing residents of their rights and complying with RAD-mandated protections is an important task for PHAs to minimize resident-confusion and ease anxiety related to RAD conversion. Temporary relocation during rehabilitation of units was another cause of instability, and individuals with special needs—such as pregnant mothers and parents with young children or children with chronic health problems—reported challenges. In the case of FH-RAD, effective resident engagement and an improved physical environment potentially helped safeguard families from some of RAD's negative effects. Based on the analysis of state health records 1 year after FH-RAD completion, there was no difference in the likelihood of having one or more ED visits between children who experienced a RAD implementation and moved back to the rehabilitated units within 1 year and comparable children in public housing. Most residents we interviewed were also satisfied with

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<sup>1</sup> To qualify for the credit (4 or 9 percent), a project must meet the requirements of a qualified low-income project. Project sponsors and developers (project sponsors) are required to set aside at least 40 percent of the units for renters earning no more than 60 percent of the area median income (the 40/60 test) *or* 20 percent of the units for renters earning 50 percent or less of the area median income (the 20/50 test). Those units are subject to rent restrictions such that the maximum permissible gross rent, including an allowance for utilities, must be less than 30 percent of imputed income based on an area's median income.

the services they received during the temporary relocation, and FH's deliberate effort to engage residents in its RAD planning process seemed to have led to those achievements.

Moreover, children living in post FH-RAD properties are overall more likely to regularly attend school and to have a higher GPA, compared with children in public housing or choice voucher programs. Because RAD properties are not randomly selected, however, further analysis is needed to isolate the effect of RAD from building and neighborhood characteristics and to better understand the factors associated with improved outcomes. The findings suggest that effective resident engagement may play a role in mitigating the adverse effects of FH-RAD associated with instability. With that said, we also identified challenges with resident engagement and pointed out areas for improvement, including incorporating resident input into its RAD planning and aligning RAD with broader resident safety and community development goals.

Housing authorities display tremendous flexibility in how they engage residents throughout RAD implementation, as HUD currently requires only resident notification of RAD. Future research would benefit from examining the experience of residents across sites and documenting best practices that maximize the benefits of RAD for children living in public housing. Because RAD is still in its earliest stages, much is yet to be learned about its effect in the long term.

#### **Key strategies that PHAs could consider in implementing RAD:**

- **Creating different venues for residents to communicate with PHA staff so that residents can provide their input and have their needs addressed during the conversion.** Having a minimum of three meetings with residents during RAD planning is insufficient to fully engage them. Low-income families often cannot attend resident meetings because of competing family and work responsibilities, limited resources, and irregular work hours. In particular, families with very young children or children with chronic health conditions and disabilities are less likely to attend the meeting; special arrangements may be required for this hard-to-reach group during temporary relocation. PHAs may be able to increase meeting attendance by informing residents in advance of the availability of childcare during meetings. Providing other venues for information sharing, such as one-on-one interviews, surveys, or an open-door policy, can help further increase the engagement. Those outreach activities are particularly critical in understanding residents' current needs so that they can be incorporated in the RAD capital improvement plan and during temporary relocation. We also found that frontline staff had greater understanding of residents' needs because they interacted with the residents more frequently than did management teams. Maintenance staff, especially, were more aware of the condition of the properties. Moving forward, PHAs should consider including maintenance staff in the RAD implementation team and the resident engagement plan. Reflecting the diverse needs of residents will also contribute to the greater success of RAD implementation.
- **Providing residents with monthly updates on the construction or renovation and continuing to engage residents after RAD completion.** During the RAD conversion, PHAs should continue to communicate with residents about any updates through their website and by email or any other method of communication preferred by residents. Such communication can help minimize anxiety and confusion among residents and will keep them updated on

how their input was integrated into the renovation plan. Further, after the completion of RAD, PHAs should consider providing guidance to residents on how to use new appliances efficiently because some residents noticed increases in their utility bills after RAD conversion. Educating residents about how to take care of the new appliances and units is also critical to maintain the renovated units in the long run.

- **Gathering information around perceived safety among residents.** PHAs should consider conducting a survey of residents about their perceived safety, as part of their RAD needs assessment, and a post-RAD resident survey to monitor the changes over time. By virtue of its design, RAD does not address neighborhood quality, and monitoring and ensuring safety is essential in the post-RAD properties that involved major rehabilitation or new construction in high-crime neighborhoods. Further, because public housing residents often have a lower level of perceived safety, changes in their physical environment may lead to anxiety despite well-intended PHAs' efforts to increase safety (for example, by removing gates). Such information can help PHAs address perceived safety issues among residents.

## Chapter 1. Background

### What is the Rental Assistance Demonstration?

The Rental Assistance Demonstration (RAD) program, introduced in 2011 by Congress, allows for the voluntary conversion of public housing and other properties assisted by the U.S. Department of Housing and Urban Development (HUD) to long-term, project-based Section 8 contracts. Through the conversion, RAD enables public housing agencies (PHAs) to access private debt and equity to address immediate and long-term capital needs (HUD, 2017a). According to an independent assessment carried out, as of 2010, America’s public housing units required more than \$25 billion (or \$23,593 per unit) in maintenance and repairs (Abt Associates, 2010). PHAs have traditionally relied on public housing funding—through an Operating Fund and Capital Fund—to address those capital needs and improve the quality of life for residents, but those funds have not kept up with the pace of deterioration of public housing (Econometrica, 2016). RAD provides PHAs the flexibility to secure more stable financing to preserve public housing and address capital needs (Hanlon, 2017; Schwartz, 2017).<sup>2</sup> The properties may be owned or controlled by public, nonprofit (Econometrica, 2016), or private-for-profit entities with a special-purpose entity subject that is formed to access Low-Income Housing Tax Credits (LIHTCs) (GAO, 2018). The hope is that this increased financing flexibility, with a long-term Section 8 contract, will help sustain affordability (GAO, 2018).

RAD initiatives have been expanding rapidly across the United States. During the first stage of RAD, the program was capped at 60,000 public housing units, but the cap was increased to 185,000 units in fiscal year (FY) 2015, 225,000 units in FY 2017, and 455,000 units in FY 2018 (HUD, 2017b). As of September 2018, RAD has leveraged \$5.75 billion in new funding (both private and public) to complete the conversion of 100,000 units, averaging about \$57,000 in improvements per unit (GAO, 2018). Ultimately, HUD expects 30 percent of the nation’s public housing portfolio to be preserved or redeveloped through RAD and converted to Section 8 contracts (HUD, 2018).

According to the 2010 needs assessment conducted by Abt Associates (2010), the most common needs in public housing properties were systems within dwelling units, such as kitchens and bathrooms (accounting for 39 percent of all capital needs); building architecture, including doors, exterior walls, and interior walls (34 percent of all capital needs); site systems, including sidewalks, landscaping, and water and gas lines (19 percent of all capital needs); building mechanical and electrical systems (6 percent of all capital needs); and mechanical room systems (2 percent of all capital needs). Important, the same assessment noted that the highest cost drivers were windows, kitchens, and bathrooms; however, only 37 percent of properties needed window repairs or replacements, 81.1 percent of properties needed improvements to bathrooms and 79.9 percent needed improvements to kitchens (Abt Associates, 2010). Abt Associates (2010) also estimated that, within 20 years, all kitchens and bathrooms will need some repairs or improvements, and that 96 percent of all roofs will need to be repaired or entirely replaced. The

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<sup>2</sup> In converting to Section 8, PHAs can leverage public and private debt and equity (Hanlon, 2017); and the Declaration of Trust doesn’t permit the PHA property to serve as a security for debt, while under RAD, the Declaration of Trust is removed with a Use Agreement.

physical condition of public housing units is only expected to worsen, highlighting the need for increased investment in public housing.

RAD includes a significant set of resident protections, including (1) at a minimum, three meetings with residents to inform them of the RAD process and their procedural rights and to elicit feedback; (2) guaranteed right of return in case of relocation, without risk of being rescreened for eligibility at their current residence; (3) phased-in rent increases over 3 to 5 years; (4) continued recognition of and funding for resident organizations (a carryover from public housing); (5) formal eviction and grievance procedures; and (6) the provision of “choice-mobility” for residents, which allows them to receive a voucher or other tenant-based rental assistance after 1 to 2 years of residing in the converted property (GAO, 2018).

### **Fresno Housing Authority and Rental Assistance Demonstration (FH-RAD)**

This is a case study of the first round of RAD, implemented by the Fresno Housing Authority (hereafter referred to as FH, and the properties undergoing RAD conversion are referred to as FH-RAD) between 2013 and 2015. FH consists of a city-level public housing authority, established in 1940, and county-level authority, established in 1945. Since 2012, FH has operated under a single executive director (Fresno Housing Authority, 2017). FH oversees 70 housing developments in 16 cities and towns within Fresno County, and its property holdings are worth an estimated \$250 million (Fresno Housing Authority, 2014). FH overall serves 4,000 people living in public housing units owned and operated by FH (Fresno Housing Authority, 2014). One-half of FH public housing residents are extremely low income, 97 percent are people of color, and 73 percent are families with children (Fresno Housing Authority, 2017). To serve this diverse population, FH conducts resident services in English, Spanish, and Hmong.

FH used LIHTC to implement RAD. LIHTC is one of the most widely used funding sources for RAD conversions. According to the RAD interim report (Econometrica, 2016), of the \$2.5 billion that was secured for RAD projects between 2012 and October 2015, close to 40 percent came from private investors in LIHTC equity (39.4 percent), followed by soft money sources (27.6 percent), lenders (22.7 percent), and the PHA’s own resources (10.1 percent). LIHTC equity also accounts for a large share of affordable housing investments in non-RAD housing, including Section 8 housing (Gramlich, 2016; Hanlon, 2017). RAD properties that convert using LIHTC equity must be owned by a separate entity, but the PHA must preserve its interest in the property—for example, through a ground lease or consent rights—highlighting RAD’s encouragement of public–private partnerships yet ensuring no loss to affordable housing (Turner Center for Housing Innovation, 2017). For conversion to Section 8, two types of programs are available to PHAs: project-based rental assistance (PBRA) and project-based vouchers (PBV). Several subtle differences exist between them. PBRA is subject to a Housing Assistance Payment contract that ties subsidies to a unit, whereas with PBVs, the contract is between the PHA and the owner. These contracts are subject to mandatory renewals every 15 to 20 years (GAO, 2018). The main difference between the two is the office within HUD that administers the program. The PBV program is part of the larger Housing Choice Voucher (HCV) program, which provides tenants with vouchers they can use to live in private properties (Gramlich, 2016; HUD, 2013, 2017b). PHAs can attach some of their vouchers to specific units or buildings, thereby making them project based as opposed to tenant based (HUD, 2015). With PBVs, Housing Assistance Plan (HAP) contracts are administered by PHAs directly, which allows

PHAs to stay more involved in the administration of properties (Turner Center for Housing Innovation, 2017). The RAD program provides tenants with a choice mobility option to get a tenant-based HCV after RAD conversion. Tenants in a RAD PBV property may apply for an HCV after 1 year in the RAD property, whereas tenants in PBRA programs must wait 2 years to apply for an HCV (Gramlich, 2016; HUD, 2017b). Thus, tenants may seek outside housing that is more affordable or better suits their needs in terms of transportation, job opportunities, and schools (HUD, 2017c).

The RAD conversion by FH, covered in this study, relies on the PBRA program, in which owners enter into contracts with HUD to provide and manage affordable housing units (Gramlich, 2016). FH-RAD sites are currently co-owned by FH and a for-profit entity and managed by FH. Thus, the FH-RAD conversions examined for this report do not include any PBV properties. The planning for FH-RAD started in July 2012. It was approved in three cities—Fresno, a largely urban area, and Mendota and Orange Cove, rural and agricultural areas of the county. FH-RAD included the major rehabilitation of 10 properties (447 public housing units) and the new construction of community centers in the properties providing resident services and programs. Figure 1 shows the planning and implementation phases for FH-RAD.

**Figure 1. FH-RAD Planning and Implementation Phases**



FH-RAD temporary relocation was implemented in phases, along with the new construction of community centers, from December 2013 to August 2015, as shown in Table 1.

**Table 1. FH-RAD Temporary Relocation and Move-Back Date**

	Fresno	Orange Cove	Mendota
Earliest Move-Out Date	December 2, 2013	December 2, 2013	December 13, 2013
Move-Back Date	August 1, 2014– April 21, 2015	July 14, 2014– August 24, 2015	February 28, 2014– July 13, 2015
Official End Date of RAD Implementation	April 21, 2015 (2 sites) July 14, 2015 (1 site)	October 21, 2015	July 13, 2015

### Demographic Characteristics of Fresno County, California

Fresno County is in California’s Central Valley and has a population of more than 960,000 (U.S. Census Bureau, 2016). The largest city in the county is the city of Fresno, with an approximate population of 513,000 in 2016, and 28.9 percent of them are children younger than 18 years old (U.S. Census Bureau, 2016). The average household size is 3.16, and the average family size is 3.63 (U.S. Census Bureau, 2016). As of the 2010 Census, the county contained 315,531 housing units, 91.7 percent of which were occupied, and of those units, about 45 percent were renter occupied (U.S. Census Bureau, 2011). According to 2010 U.S. Census data for Fresno County, 74.1 percent of all households are family households, made up of 49.9 percent husband-wife families, 7.3 percent male householders with no spouse present, and 16.9 percent female householders with no spouse present. The rest of the households in Fresno County are nonfamily households, with most of those householders living alone (U.S. Census Bureau, 2011).

Compared with the rest of California, Fresno County has a higher proportion of Hispanic/Latino residents (52 percent), a smaller proportion of non-Hispanic White residents (30.8 percent), Asian and Pacific Islanders (9.8 percent) and African-American residents (4.7 percent), two or more races (2 percent), and 0.7 percent of American Indian/Alaska Natives and other unspecified race (U.S. Census Bureau, 2016).

In Fresno County, more than one-third of children (38.7 percent) live below the poverty line, as do 22.2 percent of all families in Fresno County (U.S. Census Bureau, 2016). Young children in Fresno also are more likely to live in poverty than are older children: 44.1 percent of children ages 4 or younger and 36.5 percent of children between the ages of 5 and 17 live below the poverty line. Further, families with non-White householders have higher poverty rates than do families with White householders: 37.4 percent for families with African-American householders, 31.2 percent for families with Hispanic/Latino householders, 22.1 percent for families with Asian householders, 21.5 percent for families with American Indian/Alaska Native householders, and 18.1 percent for families with White householders (U.S. Census Bureau, 2016).

## The Goal of This Study

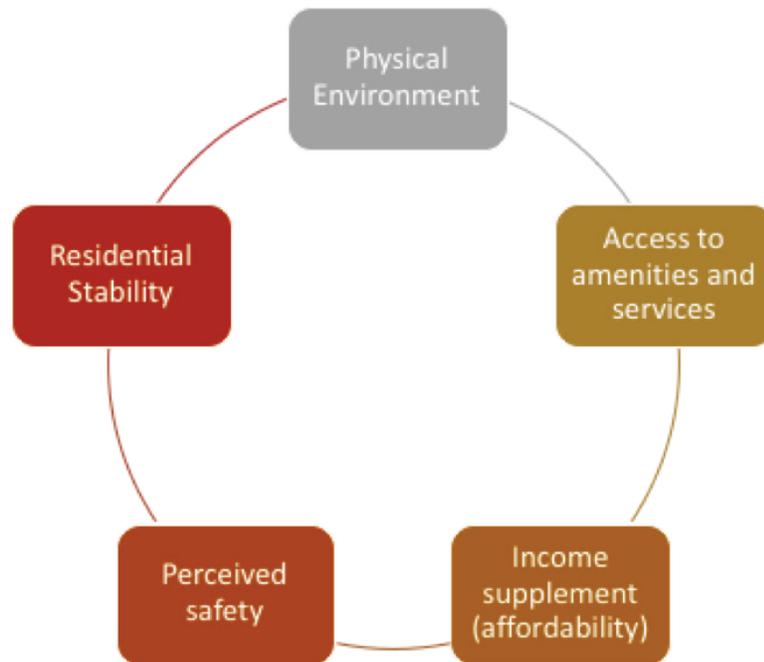
The overall goal of this study is to explore the mechanisms by which RAD may influence the well-being of low-income children in public housing and, more broadly, how HUD's rental assistance programs can be strengthened through RAD. Understanding the role of rental assistance in child well-being is important because current estimates suggest that 52 percent of renter families with children in the United States experience an excessive rent burden—they spend more than one-third of family income on rent, and that percentage has been increasing in recent years (Aratani et al., 2011). Further, housing is one of the most important socioeconomic determinants of child development (Evans, Saltzman, and Cooperman, 2001), and rental assistance programs are one of the critical social safety nets that can potentially promote healthy development and school success among children at high risk for poor outcomes (Aratani et al., 2018).

A wealth of research has documented how neighborhoods may matter for the well-being of children and families who receive rental assistance (Leventhal and Brooks-Gunn, 2003, 2004; Sanbonmatsu et al., 2006). Research on the effects of traditional public housing on low-income children, however, has been inconclusive in finding a positive or no effect (Aratani, 2010; Currie and Yelowitz, 2000; Newman and Harkness, 2000). This is in part due to the many years of underfunding and a backlog of capital improvements in older, aging public buildings, which has led to a wide variation in the quality of public housing programs and how they are administered by local PHAs. More recent studies suggest that rental assistance generates positive health effects for adults (Fenelon et al., 2017) and positive mental health effects for children (Fenelon et al., 2018). As RAD aims to address the capital needs of public housing units, investigating how RAD affects the well-being of children living in public housing will contribute to a better understanding of how current rental assistance programs can be strengthened through RAD.

## Conceptual Framework

In this section, we discuss the theoretical framework that our study anchors. To understand how RAD conversion may affect the well-being of children, we built our study on the conceptual framework that identified key dimensions of rental assistance that are associated with healthy child development (Aratani et al., 2018). In particular, we focus on five housing dimensions in understanding the effect of RAD on child well-being: physical environment, residential stability, perceived safety, income supplement, and access to amenities and services (shown in Figure 2, adapted from Aratani et al., 2018).

**Figure 2. Housing Dimensions of Public Housing that Affects a Child’s Well-Being**



Using this conceptual framework, this evaluation study has four specific aims:

1. To document FH-RAD implementation and changes in key housing dimensions that are associated with the well-being of children
2. To examine the short-term effect of RAD implementation on the health outcomes of children
3. To document key elements of resident engagement and strategies that can potentially reduce the adverse effects and increase positive effects of RAD implementation
4. To compare the educational outcomes of children living in post-RAD properties with children in public housing and Section 8 voucher programs

In the following section, we will discuss in detail the conceptual framework. We will explain each housing dimension of traditional public housing programs that is associated with child well-being on the basis of previous research and how FH-RAD can potentially affect each dimension.

**Physical Environment:** Although the physical quality of public housing displays wide variation, evidence reveals that residents of some public housing have high exposure to indoor environmental risks, including inadequate ventilation, second-hand smoke, mold, and pests (Adamkiewicz et al., 2013; Colton et al., 2015). Asthmatics are more likely than nonasthmatics to be residing in public housing, which likely indicates poor management and upkeep of public housing (Rauh, Landrigan, and Claudio, 2008). Although extant work suggests that substandard housing may negatively influence children’s academic achievement and social-emotional health through overcrowding and the ensuing family stress, this body of research is more limited (Leventhal and Newman, 2010). Further, the physical deterioration of public housing may

reinforce negative stereotypes and stigma associated with the “projects” as chronically affected by social dislocation and dereliction (Blokland, 2008; Wacquant, 2007). The poor conditions of public housing often are blamed on the behavior and characteristics of tenants, without reference to the years of underfunding and spatial disadvantage (Blokland, 2008; Wacquant, 2007). The stigma can have detrimental effects on residents, evoking a sense of failure and shame (Blokland, 2008; Keene and Padilla, 2010), negatively affecting their self-esteem and psychosocial stress (Blokland, 2008; Keene and Padilla, 2010; Link and Phelan, 2006) and lowering children’s educational aspiration and expectation (MacLeod, 2008). Research based on the interviews with parents living in public housing also showed that parents felt marginalized by living in public housing, and they could not get actively involved in children’s schooling (Yoder and Lopez, 2013). **Because FH-RAD includes the major rehabilitation of public housing units, we expect improvements to the physical environment and, in turn, enhanced pride in residence and the increased well-being of children.**

**Residential Stability:** Research shows that housing instability is associated with multiple negative child outcomes (Aaronson, 2000; Aratani and Cooper, 2015; Cutts et al., 2011; Desmond and Kimbro, 2015; Newman and Holupka, 2014a). The potential short-term negative impact of relocation also is documented in Moving to Opportunity (MTO) studies. After evaluating the short-term effect of moving from public housing into lower-poverty neighborhoods, these studies found no effect on children’s school outcomes and physical health and mixed results by gender on social-emotional outcomes, with boys faring worse (Leventhal, Fauth, and Brooks-Gunn, 2005; Sanbonmatsu et al., 2006). This research indicates that RAD may potentially have a negative impact for children in the short term due to instability associated with temporary relocation. In particular, temporary relocation puts children in public housing at risk of disruptions in important social networks that provide critical sources of support and resources to families (Aratani et al., 2018). Further, families who moved from public housing to Section 8 programs during HUD’s previous public housing preservation program, HOPE VI, expressed concerns about potential rent increases and their ability to pay utilities (Clampet-Lundquist, 2004). To minimize adverse effects or resident concerns related to RAD conversion, HUD seeks to notify residents during the RAD planning stage through required resident meetings and has issued thorough guidance related to relocation rights and processes and residents’ right of return (Housing/PIH Notice 2016-17). **Thus, RAD may negatively affect child well-being as a result of temporary relocation and an increased sense of uncertainty experienced from the changes in subsidies; however, resident notification and effective engagement in RAD planning and implementation may help reduce such negative effects.**

**Access to Amenities and Services:** Access to community resources and services often is determined by the neighborhoods where public housing is located (Aratani et al., 2018). Community resources—such as parks, libraries, and high-quality afterschool programs—and access to high-quality health clinics and grocery stores that sell healthy fresh vegetables and fruits are critical for the well-being of children and their parents (Jencks and Mayer, 1990; Kerber et al., 2007; Leventhal and Brooks-Gunn, 2000; Sallis and Glanz, 2006). Access to such community resources and services varies considerably across public housing properties in the United States (Distelberg and Taylor, 2015; Regan et al., 2006; Scammell et al., 2015; Talen and Koschinsky, 2014). Public housing complexes often have onsite playgrounds, offering better access to community activities and encouraging outdoor activities for children (Kimbro, Brooks-

Gunn, and McLanahan, 2011; Regan et al., 2006), and some PHAs also have childcare facilities on the premises (Robins, 1988). Due to fiscal constraints, however, public housing agencies face challenges in implementing such onsite programs (Gillespie and Popkin, 2015). Public housing tends to be near lower performing schools (Horn, Ellen, and Schwartz, 2014), although research is limited regarding the quality of preschools and kindergartens near public housing. The FH-RAD plan included upgrading or adding amenities, including the construction of a new community center to house afterschool programs, such as Boys & Girls Clubs. FH plans also sought to realign existing resident services with a health and education focus at the community centers. **FH-RAD may contribute to better health and educational outcomes of children by improving access to amenities and services; however, those gains may materialize only in the long term.**

**Perceived Safety:** Disadvantaged neighborhoods characterized by high rates of poverty and joblessness experience higher levels of crime (Wilson, 2012). Several studies of public housing residents have documented concerns for residential safety, such as the fear of and exposure to crime (Katz, Kling, and Liebman, 2001; Newman and Schnare, 1993) and the presence of gangs in public housing buildings (Forrest-Bank et al., 2015). To cope with a low level of safety, families may limit their outside interactions, restrict activities to inside their home, or selectively socialize with neighbors (Hernández, 2016). Limiting family life to the home environment has been shown to heighten stress and depression among parents and negatively affect child development (Hernández, 2016). A poor physical environment of public housing may also contribute to the reproduction of poverty by influencing patterns of neighborhood investment and disinvestment, as well as crime, which can shape opportunities and the safety of residents (Keene and Padilla, 2010). **Because RAD's design does not address neighborhood conditions, perceived safety among residents may not change immediately.**

**Income Supplement (Affordability):** Through housing subsidies, parents have lower housing costs, which allows them to redirect resources toward health-promoting and educational investments, such as nutrition, physical activity, health care, and educational materials such as books, which may lead to more responsive parenting (Newman and Holupka, 2014b; Slopen et al., 2018). At the same time, through RAD, some residents may experience higher rent. Unlike public housing, Section 8 housing does not allow for flat rents but instead requires tenants to pay income-based rents that are capped at 30 percent of their income (Econometrica, 2016). **Residents that move from flat-rent public housing to income-based RAD may therefore see a rent increase (GAO, 2018) and experience financial strain, with potential negative effects for child well-being over time.**

In the next chapter, we will discuss data sources and methodology that correspond to each specific aim of this study.

## Chapter 2. Data and Methodology

### Overview of Approach: Mixed-Methods

We employed a mixed-methods design, combining both quantitative and qualitative research. Mixed-methods approaches are particularly well suited to advance our understanding of how to effectively disseminate and implement evidence-based interventions (NIH, 2012). A challenge associated with evaluating an intervention like RAD is that often neither a quantitative approach nor a qualitative approach alone is adequate to achieve a comprehensive understanding of the process of the intervention and the outcomes resulting from that intervention. Mixed-methods research allowed us to capitalize on the strengths of both qualitative and quantitative data and to reach an indepth understanding of problems. Thus, this study involved the analysis of administrative data, field observations, and indepth interviews with key stakeholders. As summarized in Table 2, our data included the FH-RAD implementation plan; individual interviews with 23 FH staff and 30 residents; FH resident records that include 2,851 children from 1,180 households enrolled in FH’s public housing program in 2012 (including 849 children who experienced RAD and 2,002 children who lived in non-RAD public housing properties) that are linked to state health records and school district data; and the purpose of using each type of data. Qualitative data were mainly used for our first specific aim, which is to document FH-RAD implementation. It also helped generate research hypotheses to test the short-term effect of RAD, which is our second specific aim. Based on examination of the effect, again using qualitative data, we identified key elements of resident engagement and strategies. Finally, using the post-RAD quantitative data, we compared the educational outcomes of children in post-FH RAD properties and other housing programs. In the next section, the details of each data source and analytic strategy are discussed.

**Table 2. Summary of Qualitative and Quantitative Data, Its Function, and Specific Aims**

<i>Type</i>	<i>Data Sources</i>	<i>Function</i>	<i>Specific Aims of This Study</i>
<b>Qualitative</b>	FH-RAD Implementation Plan	a. To document FH RAD implementation, including resident engagement	(1) To document FH-RAD implementation and changes in key housing dimensions
	Interviews with FH staff and residents	b. To generate hypotheses on the effect of RAD	(2) To examine the short-term effect of RAD implementation on the health outcomes of children
		c. To interpret the quantitative data results	(3) To document key elements of resident engagement and strategies that FH employed
<b>Quantitative</b>	FH resident records	d. To test the hypotheses on the health effect of RAD	(4) To compare the educational outcomes of children living in post-RAD properties with children in public housing and Section 8 voucher programs
	State health records School records	e. To describe the educational outcomes of children living in post-RAD properties	

## Qualitative Methods

**Data Sources:** Data were pooled from official documents related to RAD's implementation, telephone interviews with FH staff and residents who experienced RAD implementation, and onsite observations.

**Qualitative Data Collection:** In fall 2013, we began telephone interviews with FH staff in which the staff were invited to discuss retrospectively the planning process and the ongoing RAD implementation at the time of the interview. The first site visits were in spring 2015, and the last site visits and qualitative interviews with residents were completed in early December 2015. Based on the FH timeline of RAD implementation, we conducted three site visits. During each site visit, we conducted indepth interviews with FH management and frontline staff, including administrative and maintenance staff, and tenant families at the RAD units that had been converted. We also toured the premises with FH staff to document RAD implementation with photographs. The interviews and observations were used to generate thematic domains regarding the experiences of stakeholders (for example, resident's involvement in RAD implementation; relocation due to the RAD conversion; expectations, anxiety, or stress related to the implementation; and perspectives on the effect of RAD on children).

- **RAD Planning and Implementation Documents:** We reviewed documents related to the RAD planning and implementation prepared by FH and capital needs assessment reports prepared by a contractor for FH.
- **Interviews with FH Staff:** We recruited FH officials with the assistance of the site's RAD manager, who was asked to generate a list of key FH personnel involved in the RAD process with their job titles and contact information. Beyond generating the list, the RAD manager or other supervisors were not involved in the recruitment process. Once the list was generated, the research team directly contacted each person by phone or email to inform them about the study and to invite their participation. Telephone interviews lasted 30 to 40 minutes and were conducted one-on-one. Participants' participation was completely voluntary. As a result, we interviewed 16 management staff, whose roles ranged from project managers to the leadership teams of FH. Of the 16 respondents, 4 had prior experience working in public housing or as a property manager. We also interviewed in person seven staff who interface more directly with residents. Those frontline staff members had roles ranging from office assistants to maintenance workers. All frontline staff had at least 2 years of experience working with FH.
- **Interview with FH residents.** Across three RAD implementation sites, we conducted qualitative interviews with 30 heads-of-household (that is, primary caretakers who had children younger than age 10) who had experienced the full RAD conversion process. All interviewees were female, ranging in age from 25 to 55 years old. Respondents were primarily Hispanic (94 percent) and were either native English speakers (50 percent) or native Spanish speakers (50 percent). Most respondents indicated that their highest level of education was high school (70 percent), and most respondents (90 percent) reported a yearly household income of \$20,000 or lower. Resident interviews were conducted inside the respondent's renovated apartment unit. Staff interviews took place in person or via phone if an in-person interview was not possible. The interviews spanned a wide range of topics related to the RAD process, including questions about resident participation in the

RAD implementation process. Each interview lasted approximately 30 to 45 minutes. Given the linguistic diversity of the residents, resident interviews were conducted by skilled interviewers in the language preferred by the respondent (either Spanish or English).

**Qualitative Data Analysis:** The qualitative aspect of this study was based on a phenomenological approach, which describes the meaning and experience of a concept or phenomenon among a group of individuals with mutually shared lived experiences (Creswell, 1998). It seeks to grasp the very nature of the phenomenon and provide a description of the universal essence of what people experience and how they experience it (Creswell, 1998). For this study, we sought to capture and interpret commonalities in the RAD experience from the perspective of different stakeholders—including public housing residents, building maintenance staff, and management staff—at a housing authority to describe the core elements of stakeholders’ experience and understand the “what” and “how” components of the RAD implementation process. Interview transcripts were systematically coded for emergent themes, using a thematic analytical approach to understand the nature of resident engagement across RAD conversion sites. For the purposes of this analysis, we aimed to glean information regarding resident participation from the perspectives of residents, frontline staff, and upper management. The interview transcripts were coded and analyzed by three members of the research team. The team used MAXQDA (Versions 11 and 12), a qualitative software program, to assist in the analysis process to manage general coding, code categorization, and theme development of the interview-based data. To validate the results, three coders verified that the application of the codes was consistent across transcripts, and any discrepancies in coding were discussed and modified as needed. Additional visits of post-RAD sites were also conducted in 2016 through 2018, and the research team shared preliminary findings with FH staff to further validate the results.

## Quantitative Methods

**Data Sources:** To measure the health and school performance of children living in FH-RAD properties and compare with those in traditional public housing, administrative records from FH were merged with school district and state health data. Following is a brief description of each of these data sources.

- **FH resident records** covered the periods prior to RAD implementation (January 1, 2012–December 31, 2012) and afterwards (January 1, 2015–December 31, 2015). The data contained information on residents in Fresno County public housing and voucher programs, including program participation, dates of enrollment, basic demographic characteristics, and detailed income information. Resident data were collected by FH annually or upon any change to household program eligibility, in compliance with federal requirements.
- **State health records** were sourced from California Emergency Department Data in 2016. The California Office of Statewide Health Planning and Development (OSHPD) is responsible for collecting data on every emergency department (ED) visit from general acute care hospitals, emergency departments, and ambulatory surgery centers. The emergency discharge data captures all outpatient discharges, and the patient discharge

data captures all patients seen in the ED and then admitted as an inpatient. Together they constitute a comprehensive record of ED visits in California. Each patient record also contains information on patient demographics, primary and secondary discharge diagnosis, and payment source (for example, insurance).

- **School district data** were obtained for the 2016–2017 school year from Fresno Unified School District, the largest of four school districts where children in FH public housing attend school. The student records range from preschool to high school and contain information on student demographics, state standardized test scores (Smarter Balanced Assessment Consortium, or SBAC), grade point average, and number of absences.

**Data Linkage Methods:** For the analysis of health outcomes, children in FH-RAD and public housing (PH) were linked to ED and patient discharge data received from OSHPD. The linkage was conducted by an experienced OSHPD staff and Dr. Yumiko Aratani, the first author of this report, using birthdate, gender, and the last four digits of social security numbers (SSNs). For the analysis of educational outcomes at post-RAD sites, children in Fresno sites were also linked to Fresno Unified School District (FUSD) data by FUSD information technology (IT) department staff on the basis of a preestablished memorandum of understanding (MOU), using birthdate, gender, names, and residential addresses because FUSD does not collect students' SSNs. We obtained approvals from Columbia University Medical Center's Institutional Review Board (IRB) and California State Committee for Human Subjects to conduct this data linkage because it involved the use of the sensitive data.

## Quantitative Data Analysis

**Analytic Strategy:** Because RAD sites are selected are based on their building and neighborhood characteristics (Econometrica, 2016), and households' decisions to remain or leave their residence during public housing redevelopment are not random, potential selection biases posed a problem in investigating the effect of RAD on health outcome, which is measured by ED use. RAD housing projects have been shown to be observationally different from traditional public housing in their demographic and neighborhood characteristics. An interim report found RAD to have tenants with lower median incomes and surrounded by neighborhoods with more overcrowding, greater rent burden, and lower vacancy (HUD, 2016). Demand for affordable housing was identified as a factor in selecting sites for conversion. Another factor was neighborhood stability because RAD projects tended to be in neighborhoods with lower poverty rates (Econometrica, 2016). Given differences in the distribution and characteristics of public housing and RAD, unobserved characteristics may have led to differential selection for each housing program and to the household's decisions to stay in the same residence. Selection biases related to those neighborhood and building characteristics will be discussed further in Chapter 6.

To minimize potential selection bias, two different methods were used: (1) propensity score matching (PSM) and (2) inverse probability of treatment weighting (IPTW). The goal of each of these techniques is "to replicate a randomized experiment, at least with respect to the measured confounders, by making the treatment and comparison groups look as if they could have been randomly assigned to the groups, in the sense of having similar distributions of the confounders" (Stuart et al., 2009: 720). Thus, propensity score methods help to ensure that children in RAD are compared with similar children in non-RAD housing across observed covariates. Matching can

result in loss of sample size, an IPTW was conducted to retain the full sample and further evaluate the robustness of our findings from propensity score matching. All children in the sample obtained a propensity score—the predicted probability of being in FH-RAD—based on the demographic and household characteristics. The details of the analytic methodology will be discussed further in Chapter 6, along with the results.

## Chapter 3. FH-RAD Implementation

In this chapter, we will discuss FH-RAD implementation and changes in five housing dimensions before and after RAD implementation on the basis of FH-RAD implementation documents, resident records, and qualitative interviews with residents and FH staff. As mentioned earlier, we focus on five housing dimensions of public housing programs that are known to be key determinants of child well-being: (1) physical environment, (2) residential stability, (3) access to amenities and services, (4) perceived safety, and (5) income supplement (housing affordability) (Aratani et al., 2018). The qualitative analysis also helped generate research hypotheses that are used to test the health effects of FH-RAD, which are examined in Chapter 4. In that chapter, we asked, “What are the overall changes as a result of FH-RAD in key housing dimensions that promote the well-being of children?”

### Physical Environment

As part of the RAD planning process, a consulting firm, EMG, conducted a capital needs assessment to document the conditions of pre-RAD units and buildings and to inform future rehabilitation needs. The assessment included items related to the built environment; overall code compliance and accessibility (for example, indoor air quality and mold); integrity of the building’s physical and mechanical systems (for example, roofing, heating, and ventilation); and dwelling quality and amenities (for example, appliances, plumbing, and pest infestation). For each item, the condition was coded as follows in Table 3:

**Table 3: Capital Assessment Category, Description and Scoring**

Assessment Category and Description	Score
<b>Good:</b> satisfactory as-is; requires only routine maintenance during the reserve term, or repair or replacement may be required due to a system’s estimated useful life	4
<b>Adequate:</b> satisfactory	3
<b>Fair:</b> satisfactory as-is; repair or replacement is required due to current physical condition and/or estimated remaining useful life	2
<b>Poor:</b> immediate repair, replacement, or significant maintenance is recommended	1

Methods used for the assessments were based on site observations, research, judgment, and referencing of Expected Useful Life (EUL) tables from various industry sources, and EMG determined when a system or component would most likely require replacement. Appendix A includes the results summary of EMG’s environmental assessment. Some of the key health-related items that EMG rated as poor and requiring immediate action were indoor air quality, mold, and building ventilation in Mendota and Orange Cove and pest control in Fresno. Other items that EMG rated as poor across most or all properties included accessibility code compliance (for example, ramps and parking); fire protection and security; site irrigation systems; building heating, ventilation, and air-conditioning (HVAC) systems; dwelling appliances; and a number of maintenance deficiencies (for example, interior finishing, exterior and interior stairs).

**Figure 3. FH-RAD Sites During Construction**



Although FH-RAD units were not demolished, they went through major rehabilitation, including interior and exterior changes.

The FH-RAD plan was developed on the basis of the capital needs assessment results. As part of the FH-RAD major rehabilitation (Figure 3), improvements were made to building and unit quality to bring them up to market standards. Properties underwent upgrades to amenities, appliances, and interior finishes, including the installation of new unit dishwashers, building washer and dryers, lighting, and recycling stations. Floors were replaced, and dark kitchen cabinets were also replaced or repainted. Three- and four-bedroom units were provided an additional washroom. Structural upgrades were made to the roof and building envelope; landscaping was done (for example, installation of a new irrigation system and trees); and existing mechanical, electrical, and plumbing systems were replaced, including upgrades to the HVAC systems. Residents noted major improvements in four areas: (1) thermal comfort and (2) mold, both of which could immediately affect the health outcome of children; (3) aesthetics and contemporary building designs and (4) appliances and layout, which potentially increase resident satisfaction and pride.

**(1) Thermal comfort**

Residents particularly talked about the problems associated with swamp coolers, shown in the following pictures (Figure 4) during the pre-RAD period. More than one-half of residents complained that swamp coolers were not effective in cooling their entire apartment. Swamp coolers consist of water supply valve, float, pump, evaporative pads, blower, and blower monitor. When swamp coolers turn on, the water supply valve brings water through the bottom of the swamp cooler to reach a certain level. Once there is enough water, the pump brings water to the evaporative cooler pads, and the blower starts pulling warm air through the pads to be cooled off. Finally, the blower sends the cool air back into the house. They tend to function best in a dry, hot climate such as in Fresno. The age of the coolers and their location in the corridor of most units, however, made effective cooling of residents' homes difficult, especially on hot summer days, when the temperature commonly reaches more than 100 degrees Fahrenheit in Fresno. Most residents (57 percent; 17 residents) that we interviewed complained about the coolers not effectively cooling the room. After moving into their renovated apartments upon RAD

completion, however, the majority (70 percent; 21 residents) reported their satisfaction with the air-conditioning and heating systems. The installation of wall-mounted heating and cooling (mini-split) units in each room significantly improved their thermal comfort. Participants were also pleased about having each household member able to control his or her room's temperature, and air circulation in the apartment improved. Residents noted the following:

*Resident: Everything is perfect because now the rooms, everyone sets the temperature they want, it's not too hot, it's perfect now...more comfortable.*

*Resident: It's also comfortable, practical, because if I'm here in the living room, I turn it on. If I'm in my room, I turn it on. Every area has its air unit.*

**Figure 4. Swamp Coolers Pre-FH-RAD and Heating and Cooling Units Post-FH-RAD**



Swamp coolers (on the left, provided by FH) were replaced with the wall-mounted heating and cooling (mini-split) units, which were installed in each room.

## (2) **Mold**

The capital needs assessment identified mold problems as one of the critical items to be addressed. Twenty-three percent of parents (seven parents) worried about mold in their pre-RAD unit. Residents believed that mold was present due to the lack of fans in bathrooms. One resident shared her concern about her pre-RAD unit:

*“I was kind of worried about the mold. . . . Yeah, because our son started getting like a little bit of asthma, and the mold is not good for that, not good for me too.”*

RAD upgrades addressed this issue with the installation of fans and a complete upgrade of the bathroom, as shown in Figure 5. Residents expressed satisfaction with their newly installed bathroom, along with other updates to the ventilation system. Residents also noted that the unit is larger than before.

*Resident: “Well, the way they fixed it, everything turned out well. The bathrooms, the kitchen. . . .”*

**Figure 5. A Renovated Bathroom in a Post-RAD Unit**



FH-RAD renovated bathrooms in each unit.

**(3) Aesthetics and contemporary building designs**

Nearly two-thirds of residents (63 percent; 19 residents) were satisfied with the new wood flooring that replaced the linoleum flooring, which residents often described as “worn out, old, and discolored” and “hard to clean.” Residents were pleased by how easy the new flooring was to clean (shown in Figure 6).

*Resident: “Right now it’s more easy to clean and you sweep, it looks clean.”*

FH-RAD also updated the physical appearance of the properties with a modern look. Residents talked about how they were getting compliments from their friends and families (Figure 7).

*Resident: “When you talk about like living in government housing, they think, well, oh, man, I don’t want to live over there, you know. But then when you show them how they look, they look better than the apartments [in their neighborhood], you know?”*

*Resident: “We get a lot of compliments about how the housing looks, they look better than what they did.”*

**Figure 6. Pre- and Post-FH-RAD Implementation (Flooring)**



Some pre-RAD units had linoleum flooring (above, left); some had carpeting (not shown). The updated flooring in post-RAD units is hardwood (above, right).

**Figure 7. Pre- and Post-FH-RAD Implementation (Property Entrance Area)**



The photos above show the entrance to one of the FH-RAD sites, Cedar Courts, pre-RAD (above, left, provided by FH) and post-RAD (above, right). The post-RAD property has a contemporary look, with a colorful entrance sign that is more inviting than the pre-RAD entrance area.

#### (4) Layouts and appliances

Three-quarters (77 percent; 23 residents) of interviewees reported an improvement in the space/layout of the renovated apartment. Respondents were pleased with the increased space in the kitchen, living room, and bathroom and with larger closets and more cabinets:

*Resident: “Like I said, it’s—I think it’s good, I mean, I have a good apartment, it’s—everything is convenient, inside, fresh, everything. I like it, and it’s—I think it’s much bigger, the living room. Like my parents that have come to see it, they’re like oh, the living room’s a little bit bigger, the kitchen is bigger. . . . And I think it’s better. I like it.”*

*Resident: “The bathrooms are bigger, roomy.”*

The paint color in pre-RAD kitchens made the space appear dark. All the kitchen cabinets in the post-RAD units had been repainted in a light color that made the area much brighter (shown in Figure 8).

Residents also talked about the installation of dishwashers and the relocation of washers and dryers to a more convenient area inside the unit (Figure 9):

*Resident: “They installed a dishwasher. Before it was here, the washer and dryer were in the kitchen. Now they put it in the hallway . . . It’s better because, yes, it’s not here in the kitchen.”*

*Resident: “I like the fact that there’s the washer and dryers inside. Because before they were outside, so I had to go out the door, outside at night and wash and dry and go outside and wash and dry. You weren’t really like comfortable with knowing if your washer and dryer was going to be there in the morning.”*

**Figure 8. Pre- and Post-FH-RAD Implementation (Kitchen Area)**



The kitchens in pre-RAD units (above, left provided by FH) were painted a dark color, which was updated with light-color paint. Also, a dishwasher and granite countertops were installed.

**Figure 9. Appliances in Pre- and Post-RAD Units**



New washers and dryers were installed in post-RAD units. In pre-RAD units (left), washers and dryers were sometimes placed outside.

## Residential Stability

Residential stability is one of the key dimensions of public housing that can positively affect the well-being of children. RAD can potentially result in short-term instability due to two factors: (1) program changes and (2) temporary relocation, as the result of the RAD conversion. In the following, we evaluate each factor that may have led to short-term instability during FH-RAD implementation.

### (1) RAD conversion through LIHTC

HUD prohibits residents from being rescreened for income eligibility under Section 8 rules. Because FH was using LIHTC to finance repairs, however, FH still needed to recertify residents under the requirements of LIHTC, which is administered by the Internal Revenue Service (IRS). One FH staff noted,

*“[LIHTC] has different qualifications than public housing. So then we had to do a lot of paperwork. That has had an impact on our residents. We’ve had some residents who have come in four or five times to redo paperwork.”*

Further, some residents exceeding the maximum income level under LIHTC rules may not have been allowed to move into a LIHTC unit. In such cases, FH could have either removed the unit from the LIHTC “basis” (thus reducing the development investment available to the property) or secured consents from the residents, waiving their right to return. In the case of FH, a few residents did not meet the LIHTC income level and were offered monetary incentives to voluntarily leave the property.<sup>3</sup> Had the residents not accepted the incentives,

<sup>3</sup> To be eligible for HUD assistance, a household must have income below 80 percent of area median income (AMI). LIHTC eligibility is generally below 60 percent AMI; however, average incomes across a property can be used to meet the eligibility criteria as a result of an amendment in 2017. If a property has 20 units, and 10 households have

FH would have been required to remove the units from LIHTC basis. In this case, the residents did accept the offer and were provided housing counseling to support their relocation. One FH staff member commented,

*“For the six people who didn’t qualify because their income was too high, we had some moving consultants meet with them, talk to them about the program, tell them that because their income was a little higher, they don’t qualify. We found a bunch of areas—well we found a bunch of housing in all different areas of town that are comparable to theirs and we offered them the payout to take those areas.”*

Parents interviewed in this study described diligently complying with the certification process, which involved submitting “lots of paperwork” to the housing authority to verify income and other eligibility criteria. Forty-three percent of residents (13 residents) described paperwork as difficult to complete.

More than one-half of the residents who reported having to complete “more paperwork” were in Orange Cove, where the first phase of RAD conversion took place. On the other hand, more than one-third (37 percent; 11 residents), mostly from Fresno and Mendota, described the requirement as “easy” to comply with, and they had to complete “the same paperwork” as before. Only one resident in Orange Cove reported it being easy. During the first round of the conversion, FH was still figuring out how to navigate through the RAD process, which might have explained the extra paperwork for those residents. This seemed to be less of an issue in the later phases of FH-RAD.

Slightly less than one-third of residents (nine residents) talked about confusion or concerns for the future and whether they could continue to stay in their housing unit long term due to changes from public housing to Section 8. One resident was not sure whether she would continue to be eligible for her housing subsidy if her income goes up:

*“If you max it out, then I guess that’s when you know, I’m not going to be able to qualify for it, and I mean, so . . . I want to work, but at the same time, I feel like if I work and our income will go up, everything will—goes up, maybe we won’t even qualify to live here. But besides that, I feel like it’s okay, too.”*

The confusion also came from the fact that some residents saw their neighbors moving out of their units as a result of their higher income.

*Resident: “I don’t feel secure because sometimes I hear and they say that, ‘Well that family didn’t qualify; well that family couldn’t be here anymore, they left, they’re*

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income at 40-percent AMI, the other 10 could have income at 80-percent AMI. Because the FH-RAD discussed in this study took place before the 2017 amendment, the 80-percent AMI households had to leave assistance or move to a different property. Based on the follow-up interview, however, in the case of FH-RAD, the averaging would not have significantly reduced the number of households who did not qualify for an LIHTC unit. Further, FH staff also stated that the paperwork associated with LIHTC is usually twice as much as that of paperwork for a public housing program.

*leaving. ' And that's why I don't feel secure, right? I don't feel secure that . . . I have many years living here with them, but well, I'm not secure of always being here. "*

Since the time of the FH-RAD implementation, HUD has developed materials to help residents better understand their rights under RAD. These materials include RAD Resident Fact Sheets, and published guidance for PHAs, with significant detail around compliance with the requirement for resident-right-of-return (Housing/PIH Notice 2016-17) that better addresses confusion about how to manage LIHTC eligibility criteria. As evidenced by the preceding accounts, helping residents better understand RAD remains critical.

## **(2) Temporary relocation**

Residents were given a choice of whether they wanted to use moving services or move themselves to a temporary relocation site. FH worked with a residential service company that coordinated the temporary moves. For Fresno and Orange Cove RAD, nearby relocation sites were identified for temporary relocation (mean distance between RAD sites and temporary relocation sites were 2.1 miles for Fresno sites and 3.2 miles for Orange Cove sites, as shown in Table 3). On the other hand, Mendota RAD had a limited housing stock, and residents were assigned units at FH's migrant housing sites in a nearby town, Firebaugh, which is about nine miles from Mendota (see Figure 11). FH worked with Mendota's school district to arrange for a school bus so that children could remain in the same school district during the temporary relocation. This presented some challenges for some parents.

Six parents (20 percent) described how it led to some disruption in children's routines. One parent in Mendota RAD told us,

*"Well, for my kids, they didn't like it a lot, because they had to wait here at the school like two hours, so they could take them to Firebaugh. And then they have to get up early, like around 6:00, because the bus would come like early."*

Nearly two-thirds of residents (18 residents), however, were satisfied with the moving arrangements and with having the option to choose between having movers and getting paid to move themselves. The resident who decided to have movers noted,

*"They moved me in, they placed my furniture. I mean really? I mean and all I had to do was wait."*

In Orange Cove and Mendota, one-tenth of households did not move to a temporary relocation site but could move to a newly renovated unit because of changes in family size (or other administrative reasons). As shown in Figure 11, overall, Orange Cove RAD residents stayed at temporary relocation sites longer: about one-half of them stayed for 6 months or more, whereas about one-half of Mendota and Fresno RAD residents stayed for less than 6 months.

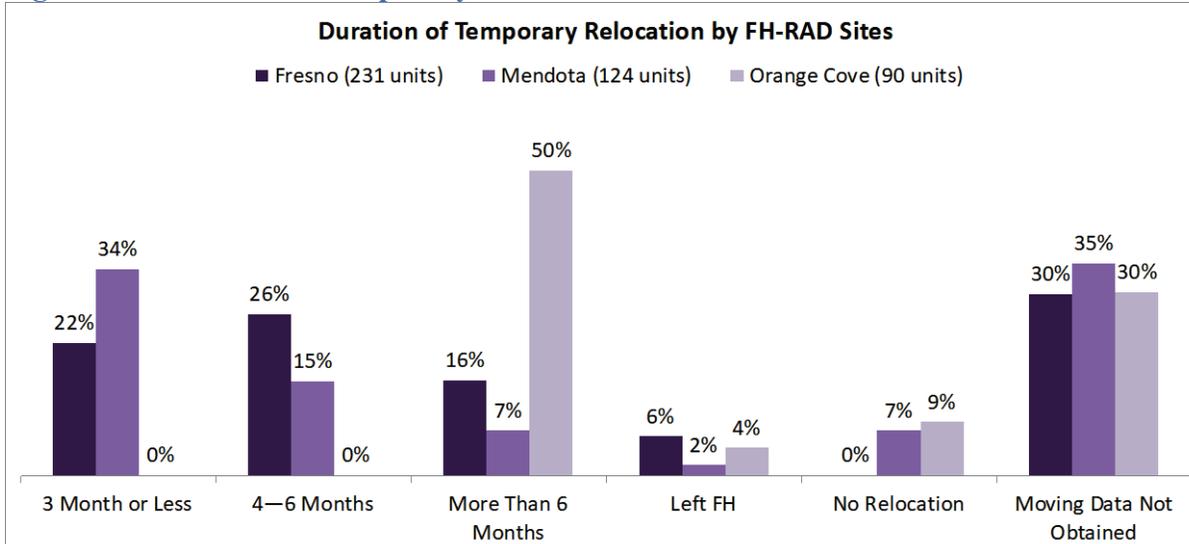
**Table 4. Distance Between Temporary Relocation Sites and RAD sites**

	Mean Distance (Miles)	Median (Miles)
<b>Fresno</b>	2.1	1.1
<b>Orange Cove</b>	3.2	0.8
<b>Mendota</b>	6.9	9.4

**Figure 10. Temporary Relocation Site (Firebaugh) for Mendota RAD Residents**



**Figure 11. Duration of Temporary Relocation**



Based on FH resident records, of the 849 children living in sites selected for RAD between January and December 2012, 475 children younger than age 18 (born after 1994 and before 2013) were found to be still living at RAD properties in 2015 (when RAD was completed). That is 56 percent of children who had a resident certification date in 2012 with a RAD property address. Table 5 shows the percentage of RAD children identified as living at one of the three RAD sites in 2012 and 2015. We found that a higher proportion of children had stayed at Orange Cove RAD sites as of 2015 (63 percent), followed by children at Mendota RAD (59 percent) and Fresno RAD (50 percent) (Table 6). Because FH-RAD implementation was done in phases between 2012 and 2013 and timelines varied by sites and buildings, we do not have information on how many of those 849 children were living at the RAD properties at the time of FH-RAD

implementation, and due to limitations of the data, we could not examine where the rest of the residents moved.

We also identified 1,209 children who continued to live in public housing units in 2015, which is 60 percent of the 2,002 children who had a certification date with a public housing (PH) property address in 2012. About 5 percent (82) of those 1,209 children moved to another property within an FH-PH program from 2012 to 2015, so overall, about 55 percent of PH children remained at the same property between 2012 and 2015. Thus, based on the descriptive data, the residential stability of residents after RAD implementation seems to be similar to that of residents in traditional public housing programs.

**Table 5. Number of Households and Children, by RAD Status, in 2012 and 2015**

	RAD		PH	
	Households	Children	Households	Children
<b>2012</b>	339	849	841	2,002
<b>2015 (% of 2012)</b>	204 (61%)	475 (56%)	535 (63%)	1,209 (60%) 1,127 (55%) who stayed in the same building

**Table 6. Number of Children Who Stayed in the Same Program Until 2015**

	Fresno RAD		Mendota RAD		Orange Cove RAD	
<b>2012</b>	373		272		205	
<b>2015 (% of 2012)</b>	188	(50%)	158	(59%)	130	(63%)

### Access to Amenities and Services

FH-RAD included upgrades to recreational and common areas to accommodate more services, community organizations and gatherings, and other property management functions. Examples include the expansion of a community building at Cedar Courts, construction of a new community center at Rios Terrace, new community buildings at each Orange Cove site, and new outdoor play areas (shown in Figures 12 and 13) and community gardens. Further, nearly every post-RAD property has onsite management staff, and residents reported a more streamlined management experience. One resident felt that with the onsite manager, their concerns would be better taken care of:

*“[W]e feel that they take care of us, as people of low income, adequately. I feel that it’s a positive thing for us.”*

Residents shared their excitement about the newly built community centers and services, although the services were not yet started at the time of our interview with residents. A resident talked about her plan to take her son to the community center:

*“I think they offer computer classes or something, like, Boys & Girls Club. And they offer for the kids to go play over there and learn something. . . . I love to take my son.”*

**Figure 12. Onsite Community Centers at RAD Sites (Post-RAD Only)**



This newly built community center was designed by an architect who was selected by FH residents.

**Figure 13. Computer Room at the Community Center and Waiting Area in Front of Administrative Office (Post-RAD Only)**



Each community center at post-RAD properties houses an administrative office, waiting area, community center, children’s library, and computer room that are accessible to residents.

## Perceived Safety

We asked staff and residents about overall safety around their property. Because not all of the parents talked about safety before RAD implementation, we were not able to observe overall changes in resident safety before and after RAD. Three FH staff members expressed concerns about resident safety. One staff member particularly noted that Orange Cove has a high crime rate, which was concerning because RAD’s upgrading units in a poor neighborhood may invite break-ins in the newly renovated areas. In addition, residents shared that lighting was a key challenge to security at all sites, and those concerns were addressed in the final design. FH staff clearly had conflicting views regarding how to ensure neighborhood safety after RAD

conversion. At least four FH staff members agreed with residents that fences and surveillance are needed, whereas others, particularly the FH leadership team, felt that opening up the property was critical to fostering a sense of community in the area. FH also made efforts to connect residents to neighborhood resources, such as City Neighborhood Councils, to foster a greater sense of community. The following quote by an FH staff member highlights the importance of acknowledging and addressing perceived safety among residents:

*“These people (residents) live here, they know the area, they’re here at night, they’re here afterhours. They know what they need for their safety.”*

Other parents (seven parents; 23 percent) talked about safety problems, such as thefts they experienced during the pre-RAD period. At the time of our interview, shortly after returning to renovated units, seven residents (23 percent) expressed feeling generally safe. Three residents particularly noted that the new motion sensor security lighting installed at their property makes them feel safer at night, and one resident liked having the outside light:

*“Yeah, it is better, the outside light, I don’t have to really turn it on and off, it goes automatically on, it turns off. They have sensor lights, that’s good.”*

Residents’ concerns regarding safety centered around the openness of the housing complex, which was a significant change for residents who used to live in areas that had fences around their units, as shown in Figure 14 (left side). Residents had requested safety features, such as fences; despite being discussed in the planning phase, that feature was not included in the final design. Instead, FH removed most of the fences that used to surround public housing properties, in an attempt to integrate the properties into the surrounding communities, also shown in Figure 14 (right side). The areas that parents expressed most concerns about were the safety of their children playing outside, close to speeding cars, and having outsiders coming through the properties. Some residents talked about their concerns for having their children playing outside because post-RAD properties did not have closed spaces near their unit anymore:

*“[M]e and other people that lived in the back, we have complaints about they don’t have fence like for the kids. I think the whole complex should have at least a fence or something. Here I can’t let my kids or my son go out there because he’s going to run into the street.”*

Another concern shared by residents was limited privacy:

*“I’ve been here living for more than three years. And right now it’s open and they come, the kids come, and get the stuff and take it over there. Because there’s so many kids around here.... Because we’ve been having a lot of problems because of the kids come [from outside] and they come and go through here. And we don’t have no privacy anymore.”*

That concern can be partially addressed by encouraging residents to go to the newly built playground (Figure 15) and the community center, which hosts different afterschool programs.

Other residents demonstrated understanding of why no standard fence was installed:

*“The fact that they [FH] are giving us better living. They are—actually they said, “Well no fences because that’s going to decrease the security.” So what they did, which I thought was a really good idea, is they put flowers all right here so that people won’t come walking through our area. Right now you can’t tell because it’s growing. But as they’re growing they’re going to turn into these bushes, that is going to keep people—basically security that is fashionable [Laughter] for lack of better words.”*

**Figure 14. Security Fences in Pre-RAD and Post-RAD Properties**



Pre-RAD properties were surrounded by fences (above, left, provided by FH), but post-RAD properties have no fences (above, right).

**Figure 15. Playgrounds Areas Public Housing and RAD Properties**



The playground areas in public housing sites are often fenced (left), whereas in the new playground at post-RAD sites, there are no fences, and children and families can more easily access this amenity (right).

## Income Supplement/Housing Affordability

As discussed earlier, rental assistance plays an important role in supplementing income by covering a portion of rent, thereby reducing the rental burden for low-income families. Such supplemental income can help families invest in other resources that can benefit their children (Newman and Harkness, 2000). The U.S. Government Accountability Office (GAO) reports that residents that move from flat-rent public housing to income-based RAD may therefore see a rent increase (GAO, 2018). During the interviews with residents, only one resident mentioned a rent increase; another one mentioned the possibility of increased rent. Three people talked about how the upcoming changes in their rent are unclear to them. In addition, one-third (11 residents) talked about increased utility bills, probably due to the newly installed air-conditioner and other appliances in their unit. That issue may be addressed by better educating residents about how to save on energy bills. In FH-RAD, fewer than 10 households in the converted units had a flat rent; therefore, changes in income supplement/affordability seems minimal, although some residents were unsure about the future increase, which is also related to their income change, not necessarily due to RAD per se.

### Chapter Summary

Thus, based on our analysis of data compiled from FH-RAD implementation, qualitative interviews with FH staff and residents, and the resident records, Table 7 summarizes the changes in terms of each housing dimension after FH-RAD implementation. Overall, we found improvement in two housing dimensions: Physical environment and access to amenities and services. Because FH-RAD involved major rehabilitation, temporary relocation resulted in some disruption in daily activities. Using LIHTC for conversion affected a small proportion of residents with higher incomes, who ended up voluntarily leaving the program, and also created anxiety among residents with regard to their eligibility in the future. Further, those who chose to stay experienced some level of instability due to changes in their routine activities, such as schooling, that resulted from the temporary relocation. Further studies are needed to examine how FH-RAD is affecting perceived safety and income supplement/affordability. On the basis of those findings, in the next chapter, we will first develop research hypotheses on the health effects of RAD and conduct statistical analysis by using a quasi-experimental design.

**Table 7. Changes in Housing Dimensions as a Result of FH-RAD Implementation**

Housing Dimensions	Overall Changes as a Result of FH-RAD
<b>Physical Environment</b>	<ul style="list-style-type: none"> <li>Improved housing quality, including thermal comfort, elimination of mold, and updated appliances and layout</li> <li>Increased pride in their residence as a result of aesthetics and contemporary building designs</li> </ul>
<b>Access to Amenities and Services</b>	<ul style="list-style-type: none"> <li>Access to new community center, which includes a computer room and other amenities</li> <li>Enhanced resident services</li> </ul>
<b>Residential Stability</b>	<ul style="list-style-type: none"> <li>Instability related to temporary relocation and changes in income eligibility</li> </ul>
<b>Perceived Safety</b>	<ul style="list-style-type: none"> <li>Increased concerns about child safety and theft as a result of open spaces</li> </ul>
<b>Income Supplement/Housing Affordability</b>	<ul style="list-style-type: none"> <li>Potential increased utility bills</li> <li>No more flat rent rate</li> </ul>

## Chapter 4. The Effect of FH-RAD on the Health Outcomes of Children

The second aim of this study was to examine the short-term health effects of FH-RAD. In this section, we focus on the health outcomes of 475 children who experienced FH-RAD from the time of planning and implementation between 2012 and 2015 and comparable children in public housing who did not experience FH-RAD during the same time period. Propensity score matching techniques were used to identify comparable children in the treatment (RAD) and control groups (public housing). In this chapter, we ask, “What is the short-term effect of RAD implementation on the health outcome of children?” Based on the examination of FH-RAD implementation and changes observed by residents and staff as a result of FH-RAD, we developed the following hypotheses:

- (1) FH-RAD has a positive effect on children’s health due to the improvement in physical environment, such as increased thermal comfort and the removal of mold.
- (2) FH-RAD has a negative effect on children’s health due to instability associated with program changes and temporary relocation.

We describe in detail in Appendix D the procedure of propensity score matching. As discussed earlier, RAD selection is not random; therefore, we conducted propensity score matching to identify comparable children who lived in public housing sites that did not experience FH-RAD implementation. The following variables (refer to Table 8) were included to create a comparable sample based on what was known to influence assignment to specific properties and factors associated with returning to the post-RAD residence (FH-RAD children) or remaining in the same residence (children in non-RAD public housing properties, hereafter referred to as FH-PH children): age, gender, race and ethnicity, family income, parental marital status, receipt of other public assistance (such as Temporary Assistance for Needy Families [TANF]), and household size (Newman and Schnare, 1993). The health status of household members was one of the major factors that public housing residents considered in deciding their relocation sites during Hope VI (Joseph and Chaskin, 2012), and we also included two measures of household health status: (1) the total number of household emergency department (ED) visits and hospitalization in 2012 and (2) whether a child had an ED visit in 2012.

**Table 8. Summary of Variables Used to Identify a Comparable Sample of Public Housing Residents Through Propensity Score Matching**

Variables	Measures
<b>Individual Characteristics</b>	
Age	Continuous variable, calculated from the date of birth.
Female	Dummy variables: female coded as 1, male as 0.
Race/Ethnicity Black Non-Hispanic or Latino Hispanic or Latino Other Non-Hispanic	Race was included as a set of dummy variables for Hispanic, Black non-Hispanic, and Other Non-Hispanic (for example, White, Asian, and Native American). Because too few non-Hispanic Whites, Asians, and Native Americans were found in the sample, they were collapsed into one category as Other Non-Hispanics.
<b>Household Characteristics</b>	
Household Size: Mean (SD)	Continuous variable that includes the number of household members.
Having 5+ Household Members	Dummy variable: five or more household members coded as 1; otherwise, 0.
Head's Age: Mean (SD)	Head of household age was calculated from the date of birth.
Single Female Household	Dummy variable: if head of household is female and no spouse or co-head is present in the household, coded as 1.
Family Gross Income Mean (SD)	Household income was measured continuously and drawn from FH reporting on gross income after exclusion, <sup>4</sup> based on the earliest annual certification date in 2012 or 2013, receipt of Supplemental Security Income, and receipt of Social Security.
Family Gross Income Median (IQR)	
1+ Household Member Employed	If the household had income from employment reported, coded as 1; otherwise, 0.
Child Support	If the household had income from child support reported, coded as 1; otherwise, 0.
TANF and General Assistance	If household had income from cash assistance (such as Temporary Assistance for Needy Families [TANF]) and general assistance, coded as 1; otherwise, 0.
Disability Benefits (Supplemental Security Income [SSI])	If household had income from SSI reported, coded as 1; otherwise, 0.
Social Security	If household had income from Social Security reported, coded as 1; otherwise, 0.
<b>Health Status in 2012</b>	
Number of ED Visits or Hospitalizations by Household Members	The number of ED visits and hospitalizations by household members was calculated from the 2012 health record data linked to FH resident records.
Child had One or More ED Visit	If children had one or more ED visits, coded as 1; otherwise, 0.

<sup>4</sup> Because family gross income after exclusion appeared most reliable based on the income data provided by FH, those income data were used; however, family gross income before exclusion may better capture available financial resources.

**Effectiveness of matching procedures.** Table 9 presents baseline individual and household characteristics of children in FH-RAD and non-RAD public housing after matching. For propensity score matching (PSM), children were matched using many-to-one nearest neighbor matching with replacement. To obtain strong matches, we restricted the scope to the area of common support and used a caliper so that FH-PH children fell within a specified range of the FH-RAD children's propensity score (0.25 times the standard deviation of the propensity score is often recommended) (Austin, 2011; Stuart, 2010). Balance of the propensity score was assessed visually, based on the distribution of propensity scores for treatment groups and assessment of the standardized mean differences for all covariates (Austin, 2011; Stuart, 2010). A standard difference of more than 0.1 was used to indicate important imbalance between treatment groups (Austin, 2011; Stuart, 2010). Before matching, we found that FH-RAD and FH-PH groups were significantly different across 3 of the 12 variables included in the propensity score matching and weighting. Balance between FH-RAD and FH-PH groups was achieved after matching and weighting across the 12 covariates. None were found to have a standardized mean difference (SMD) greater than 0.1, which often is used to indicate important imbalance (Austin, 2011).

As shown in Table 9, a good balance between FH-RAD and FH-PH groups was achieved as a result of matching, and all the standardized differences (Cohen's D) were smaller than 0.1 in terms of individual and household characteristics, including the health of household members and children (measured by the number of ED visits and hospitalizations and whether a child had an ED visit in 2012). Because FH-RAD site selection was based on building-level and neighborhood characteristics, we also compared those characteristics from the 2012 American Community Survey 5-year estimates, including rental burden, crowding, vacancy, renter occupation, and poverty rate. Appendix Figures D1–D3 show selected household, building, and neighborhood characteristics that highlight differences between FH-RAD and FH-PH children at the time of RAD planning in 2012 before matching. The building-level characteristics included were number of units, percentage of households employed, and median household income. For neighborhood characteristics, we used urbanization (urban vs. rural), with urban defined as residence in the city of Fresno. Other neighborhood characteristics were drawn from the 2012 American Community Survey 5-year estimates at the ZIP Code level, including population size, median household income, poverty rate (percentage of households living below the poverty level), vacancy rate (percentage of vacant homes), rental rate (percentage of the neighborhood housing stock occupied by renters), rental burden (percentage of households devoting more than 35 percent of their income to housing and utility expenses), overcrowding (percentage of households living in housing with more than one person per room), and unemployment rate (details of the findings on building and neighborhood characteristics before matching are included in Appendix D). Those variables were not included in the final propensity score model because we were not able to achieve sufficient overlap in the propensity scores for FH-RAD and FH-PH groups and potential matches; we proceeded with balancing on individual demographic and household-level covariates. Despite the building and neighborhood characteristics, the matched sample of FH-RAD and FH-PH children had the same rate of ED visits (14 percent) before FH-RAD implementation, which is another indicator of good balance across two groups.

**Table 9. Characteristics of Children in RAD and PH Properties Among Matched Sample, Based on Propensity Score Matching (Characteristics Shown are from 2012)**

	FH-RAD (n = 450)	FH-PH (n = 746)	SMD (Cohen's D)	Used in PSM/IPW
<b>Individual Characteristics</b>				
Child's Age	9.09	8.97	- 0.024	Yes
Female	0.48	0.48	0.012	Yes
Race/Ethnicity				
Black Non-Hispanic or Latino	0.88	0.89	0.023	Yes
Hispanic or Latino	0.03	0.02	- 0.055	Yes
Other Non-Hispanic	0.09	0.09	0.006	Yes
<b>Household Characteristics</b>				
Household Size: Mean				
Having 5+ Household Members	0.54	0.53	- 0.011	Yes
Head's Age: Mean	37.47	37.32	- 0.016	Yes
Single Female Household	0.49	0.49	- 0.005	Yes
Family Gross Income (Mean)	7423.40	7916.00	- 0.092	Yes as a log form
1+ Household Member Employed	0.62	0.59	- 0.058	Yes
Child Support	0.41	0.41	- 0.030	Yes
TANF & General Assistance	0.26	0.23	0.091	Yes
Disability Benefits (SSI)	0.12	0.09	- 0.078	Yes
Social Security	0.05	0.05	0.009	Yes
<b>Neighborhood Characteristics</b>				
Live in Fresno	0.40	0.40	0.005	Yes
<b>Health Care Use in 2012</b>				
Number of ED Visits or Hospitalization in the Households	1.34	1.22	- 0.055	Yes
ED Visit by Child in 2012	0.14	0.14	- 0.022	Yes

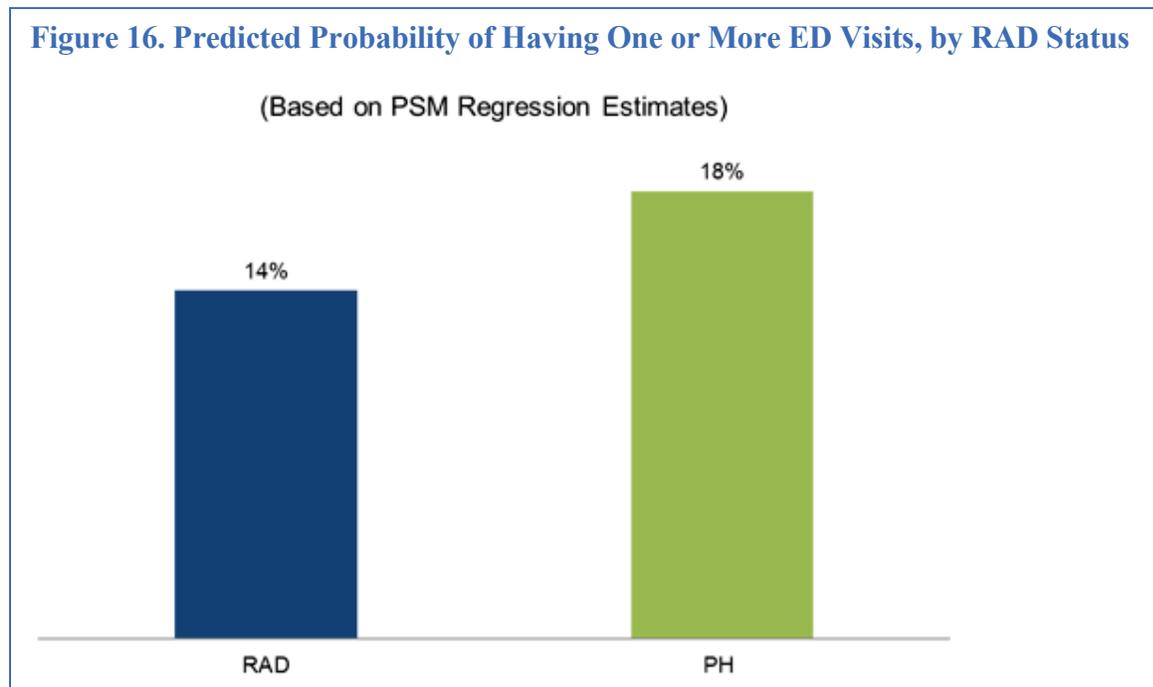
Next, we estimated the average treatment effect on the treated groups using logistic regression, further adjusting for any residual covariate imbalance post matching. The analysis was also replicated using inverse probability weighting (IPW) to address the sample size loss from matching. A weight was calculated for each child by assigning RAD cases a value of 1 and weighting all FH-PH cases by the inverse probability of being in RAD (Austin, 2011). Thus, FH-PH children were weighted more heavily if their characteristic were more similar to FH-RAD children. Post-weighting balance was assessed through examining the standardized mean differences for each variable between FH-RAD and FH-PH groups using the cutoff value of 0.1 (Austin, 2011). The effect of FH-RAD on having any ER visit was then estimated using logistic regression, treating the propensity score weights as sampling weights. To achieve doubly robust analysis, we also adjusted for the covariates included in the PSM model. Robust standard errors were also used to account for the lack of independence in our sample that may include multiple children from each household when more than one child is present.

Table 10 presents the treatment effect after PSM and inverse probability weighting. To more directly compare the results with each method used, we calculated predicted probabilities and assessed the difference for FH-RAD and FH-PH children. Regardless of the estimation technique, FH-RAD children had a lower probability of having ER visits in 2016 than did FH-PH children by 4 percentage points. Based on PSM and IPW results, the difference was not statistically significant. Figure 16 shows that, overall, the estimated probability among FH-RAD children is lower than the national average for ER visits within the past 12 months among children younger than 18 (14 percent) based on PSM results, whereas the estimated probability among children in public housing properties was closer (18 percent) to the national estimates for a low-income demographic on Medicaid (22.8 percent) (National Center for Health Statistics, 2017); however, our lower estimates are due to the fact that we are controlling for other socioeconomic characteristics and for previous ED visits. If FH-RAD children had not experienced the FH-RAD implementation, their likelihood of having ER visits would have been no different. Our overall findings suggest that FH-RAD implementation did not negatively affect the health outcomes of children and that FH-RAD children are less likely to use ED services than are comparable children living in public housing.

**Table 10. Effect of RAD Implementation on the Health Outcome of Children (Emergency Department Use)**

Outcome	Matched with Replacement (n = 1,196)		Inverse Probability Weighting (n = 1,683)	
	t.e.	t-statistics	t.e.	t-statistics
Having One or More ED Visits	-0.04	-1.61	-0.03	-1.55

t. e. = the difference in predicted probabilities for RAD and non-RAD children estimated from logistic regression.  
 Note: Both models include the covariates outlined in Table 8.



## Parent Perspectives on How RAD May Have Affected Their Health

As noted in Chapter 3, the immediate benefits of RAD may be attributed to increased thermal comfort as a result of AC installation and removing mold from the units and buildings. Swamp coolers had been one of the major resident complaints in the pre-RAD period, and improvements on the cooling system may have brought benefits that contributed to the improved health outcomes of children. In particular, parents with asthmatic children particularly noticed the immediate improvements in their children's health after moving back to the renovated units. During our interviews with 30 parents, we asked them whether RAD implementation affected the health of their children. Four parents described the direct health benefits of RAD:

*"I took him to every time to his doctor, because...he couldn't breathe really well. He needed his asthma machine for that. . . . He moved back [to the renovated RAD unit], haven't got sick or nothing. And that's good."*

*"But besides that, it's like I feel like it's much cleaner [after moving back to the renovated unit], it's like because from before when we have housing, the houses that we lived in, it had a lot of mold, and that's—I noticed my kid, they got sick a lot, but living here [the renovated unit], they don't get sick no more."*

At same time, the majority of residents had children without any significant health problems; therefore, they reported no major health changes after moving back to their renovated units. Residents did talk about the increased level of comfort at their units, which children enjoyed:

*"Well, . . . [being] comfortable in my unit. Yeah. And for my kids, especially for my kids. Yeah. So they feel comfortable where they're living."*

## Chapter Summary

Using a quasi-experimental design and linked administrative data, we found that despite some disruptions due to temporary relocation reported by some residents, there was no difference in the likelihood of ED visits between children who experienced a RAD implementation and moved back to the rehabilitated units within 1 year and comparable children in public housing RAD participants were not selected randomly; however, so further research is needed to isolate the effect of RAD from neighborhood and building characteristics. Parents of children with asthma discussed immediate changes in their children's health after returning to the renovated units. In the next chapter, we will discuss resident engagement during the FH-RAD planning and implementation process and identify key resident engagement strategies that may have helped minimize the adverse effects of FH-RAD.

## **Chapter 5. Key Types of Resident Engagement and Strategies for RAD Implementation**

This chapter outlines HUD’s requirements for resident notification, describes how FH went beyond those requirements, and highlights the key types of resident engagement FH employed in reducing the potentially negative impact of RAD implementation, such as residential instability. As in the previous chapter, we found no negative health effects of RAD on children despite the potential negative effect of residential instability due to temporary relocation and anxiety around changes in the program. In this chapter, we ask, “What were the key types of resident engagement and strategies in FH-RAD that potentially reduced the adverse effects of RAD?” Through interviews with residents (n = 30), front-line staff (n = 7), and management-level employees (n = 17), we sought to identify key strategies to engage residents that may have helped reduce potential negative effects of RAD and increase the potential benefits of RAD. With this question in mind, we also clarify the important distinction between resident notification and resident engagement, the latter indicating that FH has residents participate in more meaningful ways in the planning and implementation process. Interviews examined resident engagement in the RAD planning phases and implementation process as perceived by residents, front-line staff, and upper management of the housing authority.

### **HUD’s Resident Notification Requirements During the Planning Phase**

To apply for RAD, HUD requires public housing agencies (PHAs) to notify residents and resident organizations about RAD and then hold at least two resident meetings before submitting an application; that constitutes the planning phase. Meetings must be held at the site that PHAs are seeking to convert. The RAD Notice (2017a, page 82) specifies that the discussion must include a description of the PHA’s preliminary intentions with respect to “(a) whether the conversion will include a transfer of assistance, (b) plans to partner with an entity other than an affiliate or instrumentality of the PHA if such partner will have a general partner or managing member ownership interest in the proposed Project Owner, (c) change in the number or configuration of assisted units or any other change that may impact a household’s ability to re-occupy the property following repairs or construction, (d) de minimis reduction of units which had been vacant for more than 24 months at the time of RAD Application, and (e) the scope of work.

Thereafter, additional meetings with residents are required to discuss any material change in the calculation of their utility allowances and any substantial change to the conversion plans relative to what was presented in the RAD Application or the previous resident meeting. A substantial change to the conversion plans includes, but is not limited to:

- Introduction or abandonment of a transfer of assistance or a material change in the projected location to which the assistance would be transferred;
- Plans to partner with an entity other than an affiliate or instrumentality of the PHA if such partner will have a general partner or managing member ownership interest in the proposed Project Owner;
- Change in the number or configuration of assisted units or any other change that may impact a household’s ability to re-occupy the property following repairs or construction;

- De minimis reduction of units which had been vacant for more than 24 months at the time of RAD Application; or
- A substantial change in the scope of work.”

HUD requires that PHAs provide written responses to resident comments and questions that come out of the meetings before the application can receive initial approval. After initial approval of an application, PHAs must hold at least one more resident meeting (more, if plans change) and get any additional feedback before submitting the financing plan and receiving final approval. Once an application receives final approval, the PHA is responsible for notifying residents and informing them of the planned changes. PHAs are responsible for holding a minimum of three resident meetings throughout the RAD process.

### **FH’s Philosophy and Strategies of Resident Engagement**

FH went beyond HUD’s requirements throughout the entire RAD implementation process and developed a philosophy in line with fostering meaningful resident engagement. FH held multiple resident meetings before, during, and after the renovations. They held three meetings in 2012 before submitting their application to provide residents with information and discuss conceptual designs related to the renovations. HUD required meetings only during the application phase, but FH also held meetings at each site after renovations were completed to get resident feedback post-renovation. HUD’s requirements around resident notification address the quantity of resident participation more than the content of that participation. FH’s philosophy emphasized the importance of including residents in decisionmaking processes, not only to better fit renovation plans with resident needs but also to foster ownership and pride of place among residents (Fresno Housing Authority, 2013).

Through interviews with residents and FH staff, we identified five types of resident engagement strategies that may have minimized the potential negative impact of RAD: (1) ensuring a high level of resident attendance at RAD planning meetings; (2) helping residents better understand RAD; (3) providing multifaceted opportunities for residents to give their input; (4) integrating resident input into the implementation plan, especially regarding spatial design; and (5) providing employment opportunities for residents through the Section 3 program during implementation. In this section, we discuss the challenges FH faced in each type of resident engagement and the strategies they used to address those challenges. On the basis of interviews with residents, we also discussed how each strategy may have better supported residents to reduce the potential negative impact of FH-RAD implementation.

#### **(1) Ensuring a High Level of Resident Attendance at RAD Planning Meetings**

Although the HUD requirement does not specify the level of meeting attendance among residents, FH held at least five or six meetings at each FH-RAD location to provide opportunities for all residents to attend.

#### ***Key Strategy: Providing Childcare and Other Incentives to Increase Attendance***

Frontline and upper-management staff understood some barriers to the meeting attendance and

accommodated families in nontraditional ways to encourage participation. Both staff levels discussed providing childcare to families as one incentive to promote resident engagement. Although this incentive was not directly mentioned in resident interviews, without access to childcare, many parents might not have been able to attend planning meetings. Other incentives included refreshments, raffles, and even discussing employment opportunities through RAD, which is discussed further:

*FH staff: “I would go to the tenant meetings; I was mainly with the kids. . . . I would babysit the children, just games and coloring and stuff like that, activities during the meetings, that way the parents were able to pay closer attention to what had to be said or the information that was given I think to them.”*

*FH staff: “[Creating job opportunities for some of the families] has also been something that would attract them to some of the meetings. We actually had a meeting geared toward working with the contractors and what were the skill sets there and if anyone could be matched up or paired, we had a team with our resident services whose focused solely on helping the residents to participate on however they could with the job opportunities.”*

Reports of resident involvement, as measured by meeting attendance, were relatively high. Of the respondents interviewed, 21 residents (70 percent) indicated that they attended at least one resident planning meeting. Still, for some residents, attending meetings was difficult. Although staff endeavored to make meetings accessible, five residents (17 percent) noted that they were unable to attend planning meetings because of other commitments, including work and finding childcare:

*Resident: “Because I had really young kids and it would be inconvenient and sometimes the meetings were in the afternoon, kind of late and I didn’t have anyone to watch them.”*

*Resident: “I never had time to go. . . . I had a six and a five and then I was pregnant. I was not gonna sit there for two hours in a building listening. So they just mainly gave me letters and stuff.”*

Although childcare was available, the first resident’s response indicates that she was not aware of the service. Better informing residents about the availability of childcare and other incentives before the meetings may also help increase meeting attendance.

## **(2) Helping Residents Better Understand RAD**

FH used resident meetings to provide information to residents on topics including future housing application procedures and pending resident relocations. Residents largely found the meetings to be helpful insofar as the plan for renovations was clearly outlined by staff. The majority of residents interviewed (24 residents; 80 percent) expressed at least a general understanding of what the RAD process entailed, characterized by knowledge of the basic processes associated with a RAD conversion (that is, residents understood that apartment unit renovation and temporary relocation were scheduled to occur). One challenge noted by FH staff was oversaturation of information, in that the meetings possibly provided residents with *too* much

information, constituting a barrier to resident engagement.

*FH staff: “[F]or the most part, I think we had too many meetings per site prior to . . . I think they kind of got discouraged and the attendance started decreasing after that.”*

***Key Strategy: Providing Multifaceted Efforts on the Part of the Staff to Convey the RAD Information Effectively***

Staff shared information with residents both verbally and visually, using pictures of expected renovations and boards that displayed renovation plans. Sixty percent of residents (18 residents) found the information conveyed by FH to be effective.

*Resident: “[W]e felt good, good, very comfortable with everything because each, each step that we were going to take was explained by the [housing authority].”*

*Resident: “The meetings were pretty good. All the information was there. The boards that they made, like all the pictures, the setting of how it was going to be, and the time.”*

*Resident: “[T]he majority of what we were explained was that they were going to fix, make everything look very pretty, they even told us they were going to give us a porch in the back . . . a little house. A lot of the things they told us there. They showed us the pictures.”*

*Resident: “I heard about it when they were going to start the process through the housing at the apartments that I live in. They sent out letters and notices. And they had where you can go to group meetings to find out more information, as well as when you would get letters on your door that you could call the housing manager and ask any questions.”*

**(3) Providing Multifaceted Opportunities for Residents to Give Their Input**

FH used resident meetings as an opportunity for residents to provide input and feedback on designs and renovation plans. Meetings took place in various formats, including (1) 30-minute open houses, in which residents could speak with relocation staff and (2) 60-minute small-group conversations that provided a venue for dialogue over matters such as the use of public space. Varied meeting lengths provided opportunities for residents to attend based on their availability while permitting more in-depth discussions with FH staff. During the planning phase, staff asked residents what they wanted and informed residents of the plan that was going to be submitted to HUD. Residents expressed general excitement over the broad details of the plan, particularly around the larger kitchen and bathroom sizes proposed.

***Key Strategy: Creating Different Venues for Residents’ Input, Such as Focus Groups and an Open-Door Policy***

Four staff members interviewed mentioned having an open-door policy for residents to solicit recommendations during the planning phase. In addition, strategies such as implementing focus groups and an open-door policy provided opportunities for residents to interact with FH staff

more deeply than by simply receiving information at meetings. The open-door policy allowed residents with scheduling conflicts to engage in the RAD process outside scheduled meetings, illustrating FH's commitment to providing residents with pertinent information. Fifty percent of residents (15 residents) thought that they were given opportunities to share their ideas. One resident talked about her unique opportunity to represent FH residents.

*Resident: "I sat in a panel with a mayor and all the developers with the Housing Authority and also... the housing authorities and the city, the builders, the constructionists. I got to meet firsthand who they were, what their ideas were. I got to play a voice for the housing people around here that didn't really want to speak, but they needed security and other things besides the material things. Like we need other aspects for our children to get involved with and educational programs and things like that for our kids to stay active with."*

*FH staff: "We did try to hear various perspectives from the folks we were going to serve, we got feedback on you know we're going to have laptops or computers—would you prefer laptops?—we let them provide some feedback on the furnishings or the different things we were trying to do. So I think we went above that."*

#### **(4) Integrating Resident Input into the Implementation Plan, Especially Regarding Spatial Design**

At meetings during the planning phase, residents were able to articulate their key priorities for during the renovation, including transportation for children's schooling, safety measures, and aesthetic changes of both in-unit (for example, patios, updated heating and cooling systems) and complex-wide features (such as play areas, fitness rooms, barbecue areas). Notably, in addition to staff-led efforts to educate residents about the conversion plan, several staff talked about including residents in the planning stage.

More than three-quarters of residents talked about how their needs were reflected in the RAD plan (77 percent; 23 residents). Residents also reported that FH staff listened to them and that the majority of their wishes were included.

*Interviewer: "And do you think they incorporated your wishes and your neighbors'?"*  
*Resident: "Yes, I think that the majority because everyone was asking for the AC and they put that in. Same with the lights and what they're going to make here, libraries and all that. I think that yes, at least for me, yes."*

One of the unintended consequences of encouraging resident input was planning disillusionment. Asking residents for open-ended feedback before drafting the plan to submit to HUD, while not clearly explaining funding limitations or the final plans, generated high expectations among residents. Forty-three percent (13 residents) felt that their input was not included. Evidently, FH-RAD plans could not include every resident suggestion, and not clearly communicating which suggestions were included in the final plan became a source of frustration and sometimes anger among residents. Aside from planning disillusionment, another challenge was differing perceptions on resident safety among FH staff and residents. Safety was the number one item

among three key items that residents identified as important in the resident survey that FH conducted for the RAD implementation. FH staff noted that this response was universal across Fresno County, but implementation did not include follow-through on addressing safety concerns.

*FH staff: “[E]veryone in the city and in the county areas all had a write-in, and the write-ins were the same across the board: ...we want to feel safe.”*

*Resident: “Yes, it is a bit safe, but it should—they set up a gate or something. [Other apartments nearby] have their gate, and their—their code.”*

*Resident: “I heard they were going to make—me and other people that lived in the back, we have complaints about they don’t have fence like for the kids. I think the whole complex should have at least a fence or something. Here I can’t let my kids or my son go out there because he’s going to run into the street. That was one of the things that they did ask us from the housing authority, and we told them what we thought, and we heard they were going to do it, but they didn’t.”*

### ***Key Strategy 1: Having Residents Involved in the Decisionmaking Process***

FH invited residents to help select architects and relocation specialists—one of the ways to incorporate resident input into the planning. Moreover, inviting the project’s architect to some meetings to highlight the planning updates and respond directly to resident questions and concerns also helped improve resident understanding of the renovations. Four residents talked about their experience at the meetings with architects.

*FH staff: “We sought input on the design, we actually engaged some of the residents to help us to select the architect and the relocation professional consultant who was working with us.”*

*Resident: “They explained everything very well because even the architects who were going to do the job—there was a meeting where they came to explain everything step by step. There were various meetings where they explained step by step what they were going to do.”*

### ***Key Strategy 2: Addressing Long-Term Resident Complaints***

In Fresno, during the summer months, temperatures can reach over 100 degrees Fahrenheit. Existing cooling systems have been the source of residents’ complaints, and at least four FH staff mentioned the swamp coolers as a major problem for residents. RAD provided an opportunity to address this significant complaint among residents. Air-conditioners were installed in each room, and the majority of residents cited AC as a major improvement in the post-RAD unit:

*FH staff: “[N]umber one thing, the air-conditioners; that is a major thing, something we pushed for years to put ACs. It was never feasible, they [upper management] would say. But that alone is going to be a big difference. . . . It gets warm out here. I worked out*

*there on top of these roofs at 115 degrees one time, and you're just short of getting a heat stroke."*

*Resident: "The swamp cooler on, the little fan, and their room was like boiling hot, because it was only in the hallway. So in the hallway, it wouldn't get to them, and then right now, here, everybody has their own air-conditioner, so I mean, they could control it."*

*Interviewer: "What do you like the most about this new apartment?"*

*Resident: "What I like the most about this apartment is the air-conditioner."*

*Interviewer: "OK. Do you feel more comfortable?"*

*Resident: "I feel more comfortable."*

### ***Key Strategy 3: Providing Transportation for Schooling During Temporary Relocation Based on Individual Family Needs.***

During temporary relocation, some children end up living far from their school, and having a transportation service was a critical strategy to minimize the disruption in residents' daily activities. The majority of parents of school-age children were overall pleased because FH made transportation arrangements (such as providing buses or financial compensation for self-transportation) so that children were able to remain in the same school during the temporary relocation. Eight parents particularly reported that their children's schooling was not affected by temporary relocation because of the transportation arrangements. One mother explained:

*"No, it didn't affect them because there was transportation, only the time, they had to wake up a little earlier, but that's it. There was transportation, it would come for them, even when there were summer classes which my daughter had to attend a few days there was also transportation. Everything was fine. It didn't affect them at all."*

FH also arranged for some residents without a vehicle to stay within walking distance to their children's school. One parent expressed appreciation for the special arrangement that was made for her children so that their schooling was not affected by the temporary relocation:

*"They moved me to another apartment because of my son's school, which is across the street, which they accommodated. They asked several questions to see how they could accommodate. Other people were moved in other areas. And I appreciated that, because I didn't have a vehicle that worked at that time; my car was giving me problems."*

Some parents had to make adjustments in the beginning, but the situation turned out to be manageable:

*"[O]nly thing that was uncomfortable was that we had to take the kids to school or pick them up after, but—it was fine with me because they gave us transportation and everything. They helped us with the move and everything. It was—well, for me it was very good."*

FH also conducted one-on-one interviews with residents to identify their special needs for their children's schooling and made arrangements accordingly. The thoughtful residential services paid off because the majority of residents were satisfied with services they received during temporary relocation.

### **(5) Providing Employment Opportunities for Residents Through RAD Implementation**

One way that FH staff members tried to engage residents during the implementation of RAD was to provide them with job opportunities. FH staff members were aware of some of the hardships associated with relocation and attempted to use RAD to help residents by providing opportunities for employment and to build skills and experiences that can lead to long-term employment even after the RAD completion.

#### ***Key Strategy: Using Section 3 Mechanism***

Three FH staff members talked about using the Section 3 mechanism during RAD construction, which requires RAD contractors to offer employment opportunities for residents:

*“[W]e were really trying to figure out if we could achieve more in Section 3 and so we worked a bit on more clear guidelines for our general contractors on what we wanted them to do on Section 3.”*

Overall, only three FH-RAD parents talked about Section 3 programs and more outreach can be done in the future. While visiting one of the RAD construction sites, we interviewed one of the residents that were assisting with cleaning the area during demolition under Section 3 program. The resident noted being more aware of what work was being done since she was working with the construction crew:

*Construction staff resident: “I’m a single mom with five kids, and I came and, well, I applied, and it’s a good-paying job for this area.”*

*Construction staff resident: “I got four daughters. And we got hired by—well, we just went to apply and we got hired the same day. You know, we didn’t have no interview or nothing. They hired us. And I do like working for the company.”*

According to 2014 HUD report, FH hired 52 residents as part of the Section 3 program, and many more received training and attended workshops as part of RAD conversion. Residents were hired to complete tasks such as installing solar panels at a RAD site.<sup>5</sup> Although we do not have the data on how many residents from RAD sites were hired, tracking such information would help better understand the effect of RAD in creating economic opportunity.

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<sup>5</sup> Section 3 Summary Report. Economic Opportunities for Low- and Very Low-Income Persons U.S. Department of Housing and Urban Development Office of Fair Housing and Equal Opportunity. Summary Report Submitted by Fresno Housing Authority.

## Chapter Summary

FH went beyond HUD's requirement for resident notification and engaged its residents in meaningful ways during its RAD planning and implementation, which seems to have reduced the disruption associated with RAD conversion, such as temporary relocation. Table 11 summarizes the five strategies discussed and outlines how each type of engagement could support residents during RAD conversion. In particular, the first two key aspects of resident engagement—ensuring a high level of meeting attendance among residents and helping residents better understand FH-RAD—seemed to help reduce anxiety associated with changes in their rental assistance and temporary relocations among residents. Providing opportunities for residents to give their input was also critical for FH to understand the specific needs of residents. Moreover, integrating residents into the planning also helped address long-term complaints and the diverse needs of residents during temporary relocation and, as a result, increased satisfaction with services during the temporary relocation and with the renovated units. Finally, providing Section 3 is a unique way to provide residents with employment opportunities during RAD implementation, which may help offset rent or utility expenses as a result of the conversion; further research is needed to understand the role of Section 3. In the next section, we examine the educational outcomes of children living in post-RAD properties in the year after RAD implementation was completed.

**Table 11. Summary of Key Aspects of Resident Engagement and Key Strategies**

Five Key Aspects of Resident Engagement	Key Strategies (Number of Residents Discussed During Interviews)	Challenges (Reported by Staff and/or Residents)	How This Type of Engagement Could Support Residents
<b>Ensuring a High Level of Resident Attendance at RAD Planning Meetings</b>	<ul style="list-style-type: none"> <li>• Providing childcare and other incentives to increase attendance (0 residents; FH staff only)</li> </ul>	<ul style="list-style-type: none"> <li>• Not all residents were informed about the availability of childcare (5 residents; 17%)</li> </ul>	<ul style="list-style-type: none"> <li>• Helps reduce anxiety associated with changes in their rental assistance and temporary relocation</li> </ul>
<b>Helping Residents Better Understand FH-RAD</b>	<ul style="list-style-type: none"> <li>• Providing multifaceted efforts on part of the staff to convey the RAD information effectively (18 residents; 60%)</li> </ul>	<ul style="list-style-type: none"> <li>• Oversaturation of information (FH staff)</li> </ul>	
<b>Providing Multifaceted Opportunities for Residents to Give Their Input</b>	<ul style="list-style-type: none"> <li>• Creating different venues for residents' input, such as focus groups and an open-door policy (18 residents; 60%)</li> </ul>	<ul style="list-style-type: none"> <li>• Planning disillusionment (13 residents; 43%)</li> <li>• Lack of consensus on resident engagement (FH staff)</li> </ul>	<ul style="list-style-type: none"> <li>• Helps PHAs better understand specific needs of residents during temporary relocation and post-RAD</li> </ul>
<b>Integrating Resident Input into the Implementation Plan, Especially Regarding Spatial Design</b>	<ul style="list-style-type: none"> <li>• Having residents involved in the decisionmaking process such as selecting the architect and relocation specialists (4 residents; 13%)</li> <li>• Addressing long-term resident complaints such as swamp coolers (23 residents; 77%)</li> <li>• Providing transportation for schooling during temporary relocation based on individual family needs (8 residents; 27%)</li> </ul>	<ul style="list-style-type: none"> <li>• Varied views of perceived safety (20 residents; 67%; and FH staff)</li> </ul>	<ul style="list-style-type: none"> <li>• Addresses residents' needs during temporary relocation</li> <li>• Results in higher resident satisfaction with renovated units by addressing key resident issues</li> </ul>
<b>Providing Employment Opportunities for Residents</b>	<ul style="list-style-type: none"> <li>• Using Section 3 mechanism (3 residents; 10%)</li> </ul>	<ul style="list-style-type: none"> <li>• None reported</li> </ul>	<ul style="list-style-type: none"> <li>• Increasing earning to offset a potential rent increase</li> </ul>

## Chapter 6. Educational Outcomes of Children in Post-RAD Properties

In this section, we will examine the educational outcomes of children living in post-FH-RAD properties in Fresno. Due to the limitations of the data, we were not able to fully identify children who experienced RAD implementation from Fresno Unified School District (FUSD) data; therefore, we were not able to examine the causal effect of RAD on the educational outcomes of children.<sup>6</sup> On the basis of the positive changes observed by residents, however, such as increased comfort in their residence and increased access to amenities and services, we asked, “How do the educational outcomes of children living in FH-RAD differ from those living in other subsidized housing programs?” As measurements of educational outcomes, we will look at chronic absenteeism and grade point averages (GPAs). Chronic absenteeism is also an important indicator of child health and mental health (Ingul et al., 2012; Meng, Babey, and Wolstein, 2012).

We compared school attendance and school performance of children living in FH-RAD properties as of 2016 (including 61 original FH-RAD children) with those living in traditional public housing and private housing as part of the Housing Choice Voucher program (Table 12). In 2016, most FH children in FUSD were enrolled in the Section 8 vouchers program. Due to changes in FH’s data system during RAD implementation, demographic variables available in FUSD school records among FH residents were child age and gender. The average age of children in FH-RAD was slightly older (6.2 years) than those in FH-PH (5.9 years) and in FH’s Section 8 voucher program (6.0 years). Children in FH-PH programs had a higher proportion of girls (53 percent) than among children in FH-RAD (49 percent) and the Section 8 vouchers program (50 percent).

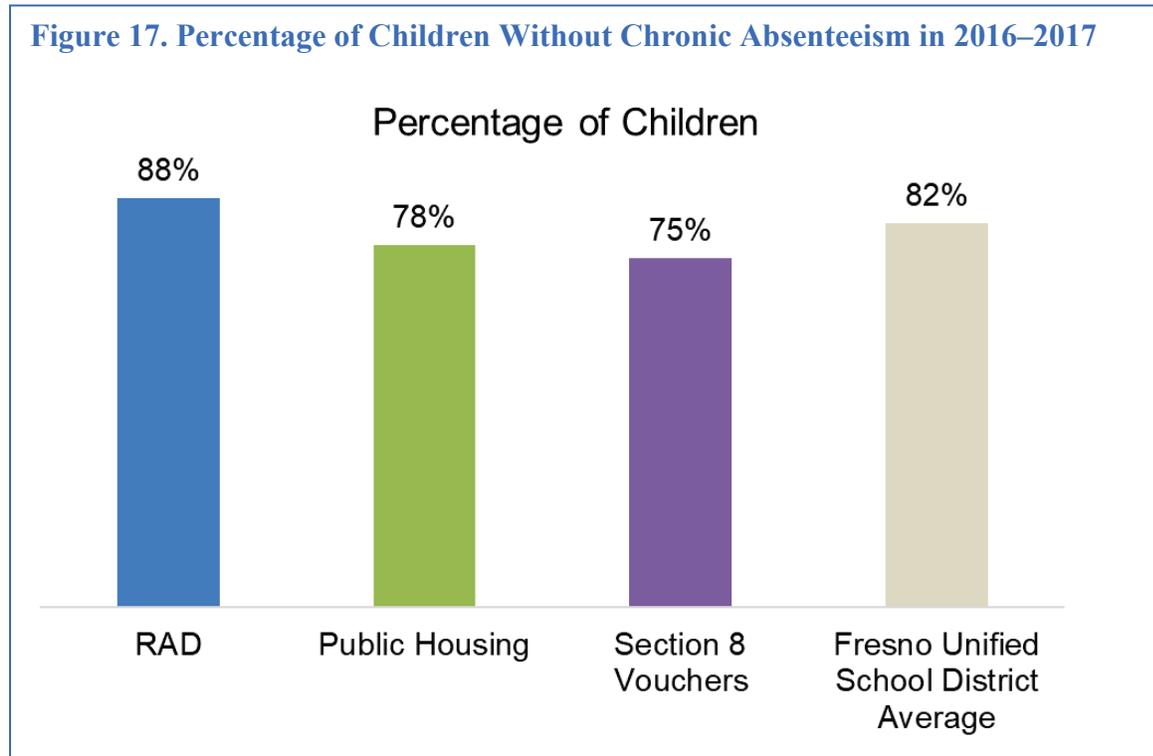
**Table 12. Comparison of FUSD-FH Children, by Program Type (2016)**

	RAD (n = 176)	PH (n = 412)	Housing Choice Vouchers (n = 8,301)
Percent Female	49%	53%	50%
Average Child Age	6.2 years	5.9 years	6.0 years
Percent Preschool (Pre-K) and Kindergarten	10%	15%	13%
Percent Elementary School	58%	52%	51%
Percent Middle School	13%	12%	15%
Percent High School	18%	20%	20%
Percent Missing Grade Information	<1%	1%	1%

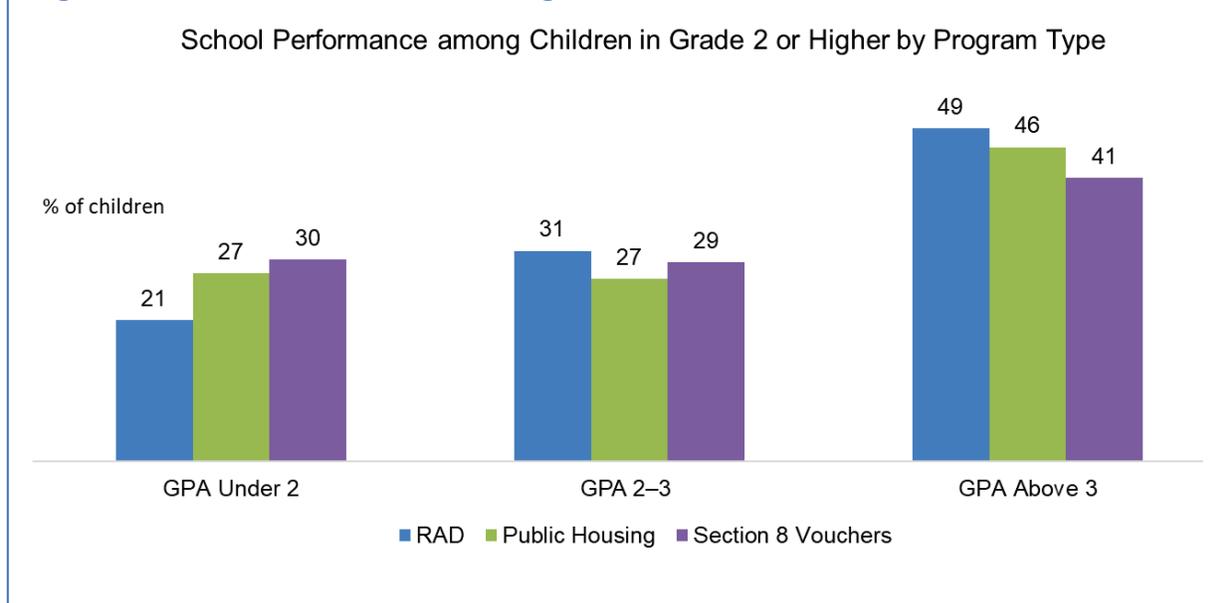
<sup>6</sup> We were able to obtain data only from FUSD. Although it is one of the largest school districts in Fresno County, we were able to identify the 2016–2017 educational records of only 61 children living in pre- and post-RAD sites and 115 children who moved into RAD properties after 2012. There were three reasons why only a small number of original RAD children were found. First, of the 188 children who had been living in the area of the city of Fresno served by FUSD, 31 children (16 percent) were no longer enrolled in the FH program. Second, of the 157 children still enrolled in FH and living at a Fresno RAD site, 3 children were missing household IDs that were used for linking RAD and FUSD data. Third, of the remaining 154 children, 83 still living in RAD properties with valid household IDs were not enrolled in FUSD and are likely attending a school in one of the other eight school districts in Fresno County.

We also examined two educational outcomes: (1) *not* having chronic absenteeism, which is defined as not missing 18 days of school in a year (Bauer, Liu, Schanzenbach, and Shambaugh, 2018) (Figure 17); and (2) maintaining a GPA of 2 or higher for children who are enrolled in Grade 2 and above (Figure 18). Overall, RAD children regularly attended school (88 percent); only 12 percent had chronic absenteeism, which is lower than the school district average (17.9 percent) for the same academic year. A larger proportion of children with chronic absenteeism was found among those living in public housing (22 percent) and Section 8 voucher programs (25 percent). Further, a higher proportion of RAD children enrolled in Grade 2 and above had a GPA of 3.0 or higher (49 percent) than those enrolled in public housing (46 percent) and the Section 8 voucher program (41 percent). On the other hand, about 20 percent of RAD children had a GPA lower than 2, whereas the proportion was 27 percent among children in public housing and 30 percent among children in the Section 8 voucher program. Thus, overall, RAD children had better school attendance and higher GPAs than those in public housing and the Section 8 voucher program. The differences in educational outcomes across programs were statistically significant.

**Figure 17. Percentage of Children Without Chronic Absenteeism in 2016–2017**



**Figure 18. School Performance Among FH Children**



### Parents' Perspectives on How RAD Might Have Affected the Educational Outcomes of Their Children

In addition to direct health benefits as a result of improvement in the physical environment, such as thermal comfort, the 30 parents we interviewed cited the additional benefits of RAD that might have contributed to the educational outcomes of their children: (1) increased pride and reduced stigma of living in public housing (10 parents) and (2) improved amenities, such as having community centers (9 parents).

*Resident: “[B]efore, even my daughter would say, ‘I don’t want to live here.’ I would say, ‘Why not?’ She would say, ‘Because these houses are very ugly.’ And now that we’ve come back, that they’re pretty, I tell her, ‘And now what do you say?’ She says, ‘Well now I don’t say anything—I like it.’ That’s why I say, perhaps proudly, well, yes, yes. [I am proud of living here]. That’s why I’m also pleased, because my kids say, ‘It’s pretty. . . . I’m happy.’”*

*Resident: “In the sense that well, we are more comfortable, and my kids, well, they’re happier in the big house—they’re really willing to live there now. I have lived here for some time. Even though it is not our house, we feel as if it were our house.”*

*Interviewer: “What was their reaction like when they first came in?”*

*Resident: “My youngest one was like wow, look at the floors, the kitchen, she liked it. The oldest one was kind of like doubtful.”*

*Interviewer: “But how is she now?”*

*Resident: “She likes it. She made new friends.”*

Parents also reported feeling less stigmatized about living in the “projects.”

*Resident: “They’ve really, really improved and upgraded, as far as the outside and inside. So now when I tell people, ‘Oh, I live in the projects,’ they’re like, ‘Oh, those are nice’ I’m like, ‘Yeah, you guys should go apply.’ So I have a couple of friends that have applied and stuff, because they came to—‘Can I see what they look like?’ I’m like, ‘Yeah, look it. They make this bigger.’ Like I’m all happy about that little area right there. ‘Cause we didn’t have that before.”*

Related to the second point, parents were excited about a future community center, even though it was not completely built at the time of our interview. They emphasized the importance of having a Boys & Girls Club and a computer room for their children at the community center.

*Resident: “The gain in the long run, like the Boys & Girls Club to help keep kids positive, not negative. So I’m glad that they put it here.”*

*Resident: “I’m glad that they have [the community center] now, ‘cause that kind of keeps kids off the streets. Kind of keeps them in a positive way. I wish they would have had something like that, because maybe I would have grew up a little bit better. I wouldn’t have been out there acting like a little wannabe gang member or something.”*

One parent talked about improvement in their children’s grades.

*Resident: “I see my kids’ grades going good. Instead of going down, they go up.”*

## **Chapter Summary**

The descriptive results indicate that overall, children living in post-FH-RAD properties are performing better in school and attending school more regularly, compared with children living in public housing properties or with Section 8 vouchers. This outcome may be due to the better quality of the physical environment and access to resources that promote child well-being (for example, a community center, computer room, children’s library) and the increased pride and happiness that parents talked about. Future research is needed to further examine the effect of temporary relocation on school attendance and the long-term effect of RAD on the educational outcomes of children. In the next chapter, we will discuss key findings and recommendations for policy and future studies.

## Chapter 7. Conclusions

### Key Findings

In this section, we summarize key findings and recommendations for the current RAD policy and future research.

1. **The physical environment was the most significant achievement of FH-RAD. The physical environment of housing units was substantially improved in the following four areas: (1) thermal comfort; (2) mold removal; (3) aesthetics and contemporary building design; and (4) appliances and layout.** The overwhelming majority of residents were pleased with their renovated units—in particular, increased thermal comfort from replacing swamp coolers with wall-mounted heating and cooling systems. One resident noted, “Everything is perfect because now the rooms, everyone sets the temperature they want, it’s not too hot, it’s perfect now . . . more comfortable.” In addition, residents expressed greater pride as a result of the new upgrades and aesthetics, and some commented about receiving compliments from family and friends.
2. **Another area of improvement through FH-RAD was access to amenities and services, with the construction of the new community center and the onsite property managers.** Residents who met with the onsite manager described the staff to be “attentive” and “very nice” and felt their communication with FH staff improved after FH-RAD. Although at the time of our interviews with residents, the community centers were not yet open, residents anticipated that the community center programs, such as a Boys & Girls Club, would have a positive effect on their children. A resident reported, “The gain in the long run, like the Boys & Girls Club to help keep kids positive, not negative. So I’m glad that they put it here.” Further research is needed to understand how RAD can be used to improve residents’ access to amenities and services and, in turn, promote the well-being of children living in HUD-assisted housing.

**Because FH-RAD required temporary relocation of residents during the major rehabilitation, residents experienced some level of instability (moving out from the old unit, moving into a temporary relocation site, and moving back to the newly renovated unit). The daily activities of families were disrupted,** particularly those with special needs, such as families with young children or asthmatic children. Most residents, however, were satisfied with the support provided. **Quantitative data analysis using a quasi-experimental design showed that there was no difference in the likelihood of having ED visits between children who experienced a RAD implementation and moved back to the rehabilitated units within 1 year and comparable children in public housing, despite temporary relocation and less favorable neighborhood characteristics.** During interviews, parents of asthmatic children also described noticing an immediate improvement in their children’s health upon returning to the renovated unit. In addition, a higher proportion of children living in Fresno RAD properties attended school regularly and had a higher GPA than did children living in PH or private housing with Section 8 vouchers in the same school district. This positive outcome may be attributed to an improved physical environment, greater access to amenities and services, and increased pride. Further research to examine the effect of RAD is needed to understand how increased residential satisfaction and pride can enhance educational outcomes of children.

3. **FH's effective resident engagement seemed to successfully reduce the potentially adverse effect of RAD, such as from temporary relocation.** Key strategies included the following:
- Providing childcare and other incentives to increase meeting attendance
  - Implementing multifaceted efforts to convey the RAD information effectively, which can help residents navigate program changes and temporary relocation
  - Providing opportunities for residents to give their input, which helps PHAs understand residents' needs during temporary relocation and long term
  - Integrating resident input into the implementation plan to maximize the potential benefit and reduce the adverse effect of RAD

### Study Limitations

This study has a number of limitations. First, the results based on interviews with residents may not be generalizable to other areas. The majority of RAD projects are taking place in large metropolitan areas, whereas most FH-RAD residents interviewed were from smaller rural areas. About 20 percent of our interviewees did not have to temporarily relocate but moved directly into a new unit from their old one, although 90 percent of all FH-RAD residents experienced temporary relocation (Figure 12). That arrangement may have affected overall perspectives and experiences reported by our interviewees.

Second, RAD status was not randomly assigned. Unobserved factors associated with RAD selection and tenant composition and also associated with ED visits may be sources of bias. For example, emergency department encounters could be affected by neighborhood characteristics of RAD properties as compared with public housing comparison sites. If that were the case, however, we would expect ER visits to be worse given RAD sites had higher poverty and housing needs compared with the public housing comparison group. Further analysis is needed to better isolate the effects of RAD from building and neighborhood characteristics. Finally, our models do not include insurance status, although it has been shown to be highly indicative of health service use (National Center for Health Statistics, 2017). Nevertheless, considering that both groups had mostly similar demographic characteristics and the same rate of ED visits before FH-RAD implementation, there is no reason to believe insurance status of RAD tenants would be any different than that of tenants in public housing.

Third, the findings on the ED visits may be generalizable only to Fresno County and residents who stayed in RAD for the entirety of the conversion process. Children from families who opt out of the RAD conversion or those who moved out of RAD properties may have decidedly different health outcomes. They could potentially fare worse given that their daily lives would be subject to more change and disruption. The effect of RAD on health is also likely to vary across cities, considering reports of inconsistencies in tenant education, engagement, and protections in the conversion process (Turner Center for Housing Innovation, 2017; GAO, 2018).

Finally, children who identified as RAD and non-RAD are based on their certification dates during the FH-RAD planning and implementation period, and we were not able to cross-check with FH-RAD moving data that were collected separately from the resident records. Identifying households living in RAD properties and tracking them through the process is generally difficult.

In 2016, HUD started requiring property owners to maintain local resident logs throughout the relocation and post-conversion process. Resident logs may not contain information on households converted before that date; however, and reviews will be conducted only when there is suspected risk of noncompliance. Without a comprehensive database for tracking and compliance procedures, difficulties in assessing the effects of ongoing and completed RAD conversions will likely remain.

## Conclusions and Policy Recommendations

FH-RAD helped improve two housing dimensions: physical environment and access to amenities and services that can promote the well-being of children in the short and long term. In particular, residents noted major improvements in four areas: (1) thermal comfort; (2) mold, which could potentially immediately affect the health outcomes of children; (3) aesthetics and contemporary look; and (4) appliances and layout that were associated with residents' increased pride in their home. Moreover, the new construction of community centers expanded FH's capacity to better serve residents through onsite property managers and to provide new resident services and programs, such as parenting classes (for example, Abriendo Puertas). To observe no negative effect thus far despite the challenges associated with relocation is promising and warrants further investigation. More research should be conducted to understand how enhanced resident services can contribute to the healthy development of children and how the effects vary across RAD sites.

In the short term, residential instability was one of the main adverse effects of RAD. Two major sources of residential instability for residents were identified, including potential changes to income eligibility and temporary relocation. Although HUD requires that public housing residents maintain a right to return to the property following the conversion under RAD and prohibits families from being re-screened when admitted into the Section 8 program, when LIHTC is used to help finance repairs, the LIHTC program imposes additional income eligibility criteria. FH managed differences between the income eligibility requirements by offering families alternative housing options. To qualify for the credit (4 percent or 9 percent), a project must meet the requirements of a qualified low-income project. Project sponsors and developers (project sponsors) are required to set aside at least 40 percent of the units for renters earning no more than 60 percent of the area's median income (the 40/60 test) or 20 percent of the units for renters earning 50 percent or less of the area's median income (the 20/50 test). Those units are subject to rent restrictions such that the maximum permissible gross rent, including an allowance for utilities, must be less than 30 percent of imputed income based on an area's median income. The 2017 tax bill includes a provision that helps this issue by allowing for income averaging and occupancy by families earning 60 to 80 percent of AMI, which may reduce the number of residents who may otherwise lose eligibility. Nevertheless, even with that provision, not all residents can return to their own unit. Coordination with the IRS and HUD to grandfather in residents, regardless of their income level, could help avoid additional paperwork and any loss in eligibility. Meanwhile, informing residents about their rights is an important task for PHAs to avoid resident-confusion and reduce anxiety related to the conversion.

Second, temporary relocation during rehabilitation of units can also cause instability, and residents with special needs—such as pregnant mothers, parents with young children, and parents of children with chronic health problems—reported challenges. In the case of FH, however, effective resident engagement and an improved physical environment have helped

offset the potentially negative effect of RAD implementation on children. According to an analysis of state health records of children who lived in FH's public housing before and after RAD implementation, there was no difference in the likelihood of having one or more ED visits between children who experienced a RAD implementation and moved back to the rehabilitated units within 1 year and comparable children in public housing. . Further, most of the residents interviewed were satisfied with the services they received during the temporary relocation, and FH's deliberate effort to engage residents in the RAD planning process seemed to have led to these achievements. Third, we found that children living in post-RAD properties were overall more likely to regularly attend school and to have a higher GPA compared with children in public housing or housing choice voucher programs. Because RAD properties were not randomly selected, however, further analysis is needed to isolate the effects of RAD from building and neighborhood characteristics to better understand factors associated with improved outcomes. Further examination is also needed to understand the long-term effect of RAD implementation on residents, given that RAD is in its earliest years of implementation.

As seen from this case study of RAD implementation by Fresno Housing Authority, effective resident engagement can play a role in reducing adverse effects associated with temporary relocation. This study identified challenges with resident engagement and pointed out areas for future improvement, especially regarding managing resident expectations, incorporating residents' input in RAD planning, and in addressing perceived safety concerns. HUD currently only requires resident "notification"; future studies should investigate the role of resident engagement in reducing the potential adverse effects of RAD, such as residential instability, and continue to document best practices to engage residents. More insight is needed on residents' perspectives and experiences to maximize the benefit of RAD in improving the lives of children living in public housing communities.

### **Key Strategies That PHAs Could Consider in Implementing RAD**

- **Creating different venues for residents to communicate with PHA staff so that residents can provide their input and address their needs during the conversion.** Having a minimum of three meetings with residents during RAD planning is insufficient to fully engage them. Low-income families often cannot attend resident meetings because of competing family and work responsibilities, limited resources, and irregular work hours. In particular, families with very young children or children with chronic health conditions and disabilities are less likely to attend the meetings. Special arrangements may be required for this hard-to-reach group during temporary relocation. PHAs may be able to increase meeting attendance by informing residents in advance of the availability of childcare during meetings. For those who are not able to attend meetings, providing other venues for information sharing—such as one-on-one interviews, surveys, or an open-door policy—can help increase the engagement of hard-to-reach residents. These outreach activities are particularly critical in understanding residents' current needs so that they can be reflected in the planning stage. We also found that frontline staff had greater understanding of residents because they interacted with residents more frequently than did management teams. Maintenance staff in particular were more aware of the condition of the properties. Moving forward, PHAs should consider including maintenance staff in the RAD implementation team and resident engagement plan.

- **Providing residents with monthly updates on the construction and renovation and continue to engage residents after RAD completion.** During the RAD conversion, PHAs should continue to communicate with residents about any updates through their website and email or any other method of communication preferred by residents. When providing orientation on new appliances, PHAs could also provide advice on how to save on utility bills, as some residents noticed an increase in their utility bills. Educating residents on how to use the appliances efficiently and take care of the units also is critical to preserve the renovated units in the long run.
- **Gathering information about perceived safety among residents.** As part of their RAD needs assessment, PHAs should consider conducting a survey on residents' perceived safety and conduct a post-RAD resident survey to monitor the changes over time. By design, RAD does not address neighborhood quality; monitoring and ensuring safety is essential in the post-RAD properties that involved major rehabilitation or new construction in high-crime neighborhoods. Further, because public housing residents often have a lower level of perceived safety, changes in their physical environment may lead to anxiety, despite a well-intended PHA's effort to increase safety (for example, by removing fences). Engaging residents in property and neighborhood plans would also benefit PHAs in the maintenance of their renovated properties down the line.

The RAD program has the potential to transform the lives of public housing residents by creating residential space where low-income families feel deserved, proud, and empowered. The RAD conversion, especially through the improvement in physical environment, is changing the face of American public housing. One resident expressed her determination to be successful and thereby demonstrate her appreciation that FH made her feel deserved:

*“Housing Authority’s RAD . . . they did all this and basically saying that, ‘You deserve this,’ ‘cause there’s no way that somebody would put somebody in an apartment so beautiful for you just to fail. I was so—like I was so not complete if I failed. I almost felt almost obligated now to show them more.”*

HUD, PHAs, and researchers must continue working together to further understand the role of RAD in strengthening rental assistance so that low-income children living in public housing can live in a healthy environment to reach their fullest potential.

## Appendix A. Fresno Housing Authority RAD Implementation

**Table A1. Items Inspected and Assessed During Property Assessments and Overall Scores**

	Fresno	Orange Cove	Mendota
<b>Property-Level Average Score</b>	2.43	2.64	3.21
· Code Compliance and Accessibility	1.50	1.30	3.20
· Built Environment	3.40	2.80	3.70
· General Site Improvements	2.70	3.00	3.00
· Architectural and Structural Systems	4.00	4.00	4.00
· Operating Systems	1.70	2.30	2.90
· Exterior and Interior Stairs	2.80	NA <sup>7</sup>	4.00
· Exterior Walls	2.30	2.80	2.50
· Pest Infestation	1.00	2.30	2.40
<b>Building-Level Average Score</b>	3.26	3.13	3.42
· Code Compliance and Accessibility	3.00	2.80	2.30
· Superstructure and Floors	3.50	3.50	3.50
· Roofing	2.90	3.10	3.50
· Common Areas, Entrances, and Corridors	3.20	4.00	4.00
· Heating, Ventilating, and Air-Conditions	2.80	2.60	3.30
· Plumbing and Domestic Hot Water	2.90	3.40	4.00
· Electrical	4.00	2.90	4.00
· Gas Distribution	4.00	3.10	2.70
· Fire Protection and Security Systems	3.00	2.80	3.50
<b>Dwelling Level Average Score</b>	2.72	2.52	2.92
· Code Compliance and Accessibility	2.80	1.30	1.00
· Electrical	2.70	2.70	3.60
· Plumbing	2.90	3.00	3.30
· Interior Finishes	2.40	3.10	4.00
· Appliances	3.20	2.80	3.40
· Pest Infestation	2.30	2.20	2.20

**Table A2. Critical Repair Items Discussed Across Properties**

Critical Repair Items	Locations
Accessible Parking	Fresno
Smoke Detectors at Dwelling Units	Fresno; Orange Cove; Mendota
Excessive Moisture	Orange Cove; Mendota
Ground Fault Circuit Protection (GFCI) Receptacles	Fresno, Mendota
Exterior Stairs	Fresno
Real Estate Assessment Center (REAC) Score	Mendota

<sup>7</sup> Not applicable as there were no exterior and interior stairs at the prosperities in Mendota.

**Table A3. Summaries of Code Compliance and Accessibility Identified as Needing Immediate Improvements**

Items	Locations	Level (for example, Dwelling)
Indoor Air Quality and Mold	Orange Cove; Mendota	Dwelling/Apartment Unit; Building
Accessibility	Mendota; Fresno	Property

**Table A4. Other Items Identified as Needing Immediate Improvements**

Level	Items	Fresno	Mendota	Orange Cove
<b>Property</b>	Access Control	X		
	Drainage Systems and Control		X	
	Dumpsters		X	
	Excess Noise		X	
	Exterior Doors		X	
	Exterior Water Heater Doors	X		
	Landscaping	X	X	
	Other Equipment and Devices	X	X	
	Other Finishes (Exterior Walls)		X	
	Parking and Paving		X	
	Patios		X	
	Pest Control Policy	X	X	X
	Pest Infestation for General Property	X		X
	Pest Infestation for Trees on General Property	X		
	Signage		X	
	Site Lighting	X		
	Trash Disposal Areas	X		X
	Underground Irrigation System	X	X	X
	Utilities (Sanitary Sewer, Storm Sewer, Domestic Water, Electric, Natural Gas, Telephone, Cable Television Services)	X		
Ventilation: Bathroom Exhaust Fans Vented to Exterior	X	X	X	
Windows	X			
<b>Building</b>	Attics		X	
	Distribution Ductwork	X		
	Domestic Water Supply	X		
	Electric Meters and Equipment		X	
	Plumbing Systems	X		
	Soffits, Eaves, and Fasciae		X	
	Unit Heating and Air-Conditioning	X	X	
	Ventilation		X	X
<b>Apartment</b>	Bathrooms	X	X	

Level	Items	Fresno	Mendota	Orange Cove
<b>Unit</b>	Dwelling Appliances: Range Hoods		X	X
	Floor Coverings in Kitchens/Bathrooms	X	X	
	Floor Coverings in Living Rooms/Bedrooms	X		
	Ground Fault Circuit Protection	X	X	X
	Interior Light Fixtures	X	X	
	Kitchen Cabinets	X	X	
	Pest Infestation in Units	X	X	X
	Plumbing in Apartment Bathrooms		X	X
	Resident Education on Pest Infestation		X	X
	Ventilation: Range Hoods Vented to Exterior		X	
	Water Pressure and Quantity of Hot and Cold Water	X		

## Appendix B. Interview Questions

### *Public Housing Authority (PHA) Staff:*

1. Why did you apply for RAD? What does this opportunity represent to you?
2. Please describe the RAD sites that are currently undergoing renovations? How and why were those sites chosen? (e.g., characteristic of tenants, how many units? What type of families?)
3. Please walk us through the RAD implementation process?  
Probe: What has your experience been implementing RAD program?  
Probe: What are the most positive aspects of the RAD implementation? From the housing authority perspective? From the tenant perspective?  
Probe: What are the major difficulties in implementing the RAD program? From the housing authority perspective? From the tenant perspective?  
Probe: Please describe the administrative aspects of the RAD process including the financing process?  
Probe: How were the contractors, architects, etc., selected for this project? What has been your experience working with them?  
Probe: What would you change about the process to improve it?
4. Please describe tenant involvement in the RAD implementation process.  
Probe: What kind of strategies did you use to increase tenant participation in the RAD process?
5. Please describe the tenant relocation process. What are the logistical issues involved in relocating residents? Please describe any challenges experienced in executing the relocation (such as length of time away from unit, attrition or permanent move, tenant resistance). What strategies are most/least effective in the relocation process?
6. What, if any, additional services have been provided in this process, for example, supportive services? How are the uptake of additional services tracked?
7. What do you expect to gain when the RAD process is completed? From the housing authority perspective? From the tenant perspective?

### *Residents:*

1. Please tell us your experience with the RAD planning and implementation.  
Probes: How did you first hear about RAD? Did you attend any meetings or information sessions? How many did you attend? What was your experience in those meetings (were they helpful, interesting, informative)? Are there any other activities that you involved as the part of RAD

planning and implementation? How did you feel about what the HA was proposing? What were the most important elements of the changes for you? Other residents? How well do you feel they incorporated tenant feedback in the RAD planning and design stages?

2. What do you understand the RAD process to be? How informed do you feel about it?
3. Please tell us what it was like to live here before RAD.
4. Please tell us about the temporary relocation during the RAD implementation. How was your experience in the temporary relocation site? What was the most positive? What was the most difficult?
5. Please tell us about your new residence. How do you feel about your new unit? How about the building as a whole? Other amenities?
6. How is this RAD change affecting your children and family? What have they said about it so far? What did you notice any changes in children compared to before the RAD implementation? How about changes in your community as a whole?
7. What is the most positive part of RAD for you as a tenant?
8. What is the most difficult part of RAD for you as a tenant?
9. What are you looking forward to most in this process? What are your major concerns?
10. Do you have any others concerns related to RAD that you have not mentioned?
11. What do you hope to gain for you and your family from the RAD process in the long run?
12. Finally, could you tell us a little bit about yourself? How long have you lived in this public housing complex? Could you tell me about your household members? How many people are living in your household? How many children do you have? How old are your children? Which school do your children attend?

## Appendix C. Analysis of Qualitative Data

Interviews were digitally recorded, transcribed, and checked against the recording for fidelity in transcription. Transcripts, post-interview and post-focus group write-ups, field notes, observations, and images will all be uploaded to a data management and analysis software program widely used in qualitative research, MAXqda, in preparation for data analysis.

All data were reviewed initially in their entirety and in an open-ended fashion to get a sense of the nature of the data and to verify that the information was clear and complete. An initial coding scheme based on common themes was developed to guide the coding process. Using MAXqda, we created categorizing and coding, developing themes, and organizing data segments to facilitate the identification of emergent themes. Across each domain of qualitative data, relevant patterns of individual, administrative, process, and contextual factors were identified so as to inform special issues and concerns in the RAD implementation process. The primary analytic approach to the qualitative data included an adaptation of grounded theory. In grounded theory approaches, data collection and analysis occur simultaneously, which allows for a flexible response to new information and the development of conceptual models to understand the changes that occurred over time and across domains. We coded each transcript, field note, interview write-up, and visual data for content and themes to identify emergent patterns. As the domains became well defined, coding began with the construction of a preliminary codebook and coding scheme. Transcripts were uploaded into MAXqda, first coded with open codes to identify broad themes or patterns, followed by axial codes, or more interpretive codes that will be used to identify core concepts. With coherent axial coding, it was possible to construct the participants' understanding of RAD implementation. Quotes from interview transcripts, captions from field notes, and images of RAD sites were used to inform the themes that best illustrate the experience of RAD among residents, housing officials, and others involved in this process. The results were to validate and complement the quantitative components of the study.

### *Validity and Reliability of Qualitative Research*

Validation procedures and the reliability of results were conducted in three ways. First, inter-rater reliability testing was performed throughout the coding process such that multiple coders conducting thematic coding aimed to reach a minimum of 80-percent agreement in codes assigned to transcripts, field notes, and images. Discrepancies in coding were discussed and reconciled by a team made up of a principal investigator, a coinvestigator, and three research assistants/associates. Second, results were also verified and contextualized by drawing on the multiple sources of data for triangulation purposes—that is, quantitative results, referring to the broader context in the transcripts, field notes, and images. Third, preliminary and final study results were reviewed with selected key study participants (for example, PHA staff and residents who agreed to be contacted for followup by phone) to ensure that the experience of RAD was accurately and adequately described.

## Appendix D. Quantitative Data Analysis

**Propensity score matching (PSM):** An unbiased estimate of the average effect of treatment in the population is the difference between the average responses in treatment and control groups, which Rosenbaum (1984) expresses as  $E(r_1 - r_0)$ , where  $E(\bullet)$  denotes expectations in the population. Although a random assignment of the treatment is the gold standard for making any causal inference, conducting randomized experimental studies are often expensive and time consuming, and it is difficult to generalize the findings. A more commonly used alternative approach—observational studies—do not enable causal inferences to be made because dependent variables (or outcomes) generally are affected by many variables other than those under investigation, and researchers have little control to create an environment where the effects of the most disturbing variables are absent (Rosenbaum, 1984). The PSM method is based on what Rosenbaum and Rubin (1983: 43) call a “strongly ignorable treatment assignment assumption.” This is an assumption in which treatment assignment is “strongly ignorable given the observed covariates  $\mathbf{x}$  if (a) the responses ( $r_0, r_1, \dots, r_t$ ) are conditionally independent of the treatment assignment  $z$ , given the observed covariates  $\mathbf{x}$ , and (b) at each value of  $\mathbf{x}$ , there is a positive probability of receiving each treatment” (Rosenbaum, 1984: 42–43), which is described as

Equation (1a)  $(r_0, r_1, \dots, r_t) \perp\!\!\!\perp z \mid \mathbf{x}$   
and

Equation (1b)  $0 < \Pr(z=t \mid \mathbf{x}) < 1$  for  $t=0, \dots, T$  and for all  $\mathbf{x}$ .

This means that under Equation (1b), treatment assignment is strongly ignorable, given all the covariates ( $\mathbf{x}$ ), and even if the assignment is a deterministic function of  $\mathbf{x}$  and other possibly unobserved covariates ( $\mathbf{u}$ ), these unobserved covariates  $\mathbf{u}$  are unrelated to the responses ( $r_0, r_1, \dots, r_t$ ) at each value of  $\mathbf{x}$ , which is described as

Equation (2)  $(r_0, r_1, \dots, r_t) \perp\!\!\!\perp \mathbf{u} \mid \mathbf{x}$ .

Under this assumption, we can obtain unbiased estimates of the average treatment effect (for details, see Rosenbaum, 1984). In PSM, first we estimate the propensity score, which is the propensity toward exposure to a treatment, given the observed covariates  $\mathbf{x}$ . The propensity score we estimated in this study is the probability of living in RAD projects, and it can be estimated by logit regression. Once the propensity score was estimated, the treatment group was matched with the control group, based on the propensity score. We used matching methods, including nearest neighbor matching, with replacement and inverse probability of treatment weighting to test how sensitive the findings were due to the matching methods. After matching was conducted, we estimated the treatment effect of living in RAD projects. To show the differences in child outcomes between treatment and control groups, we employed multivariate regression by controlling for pretreated covariates. That was done to achieve more precision in the results to adjust for differences between the treatment and control groups that the matching may not have perfectly caught (Hill, Waldfogel, and Brooks-Gunn, 2002).

As shown in Table D1, in general, children living at RAD sites had slightly better socioeconomic household characteristics—higher family income (median: \$12,908), having a household member employed (62 percent), less reliance on cash assistance (89 percent)—than their counterparts living in public housing sites that were not selected for RAD (59 percent and 93

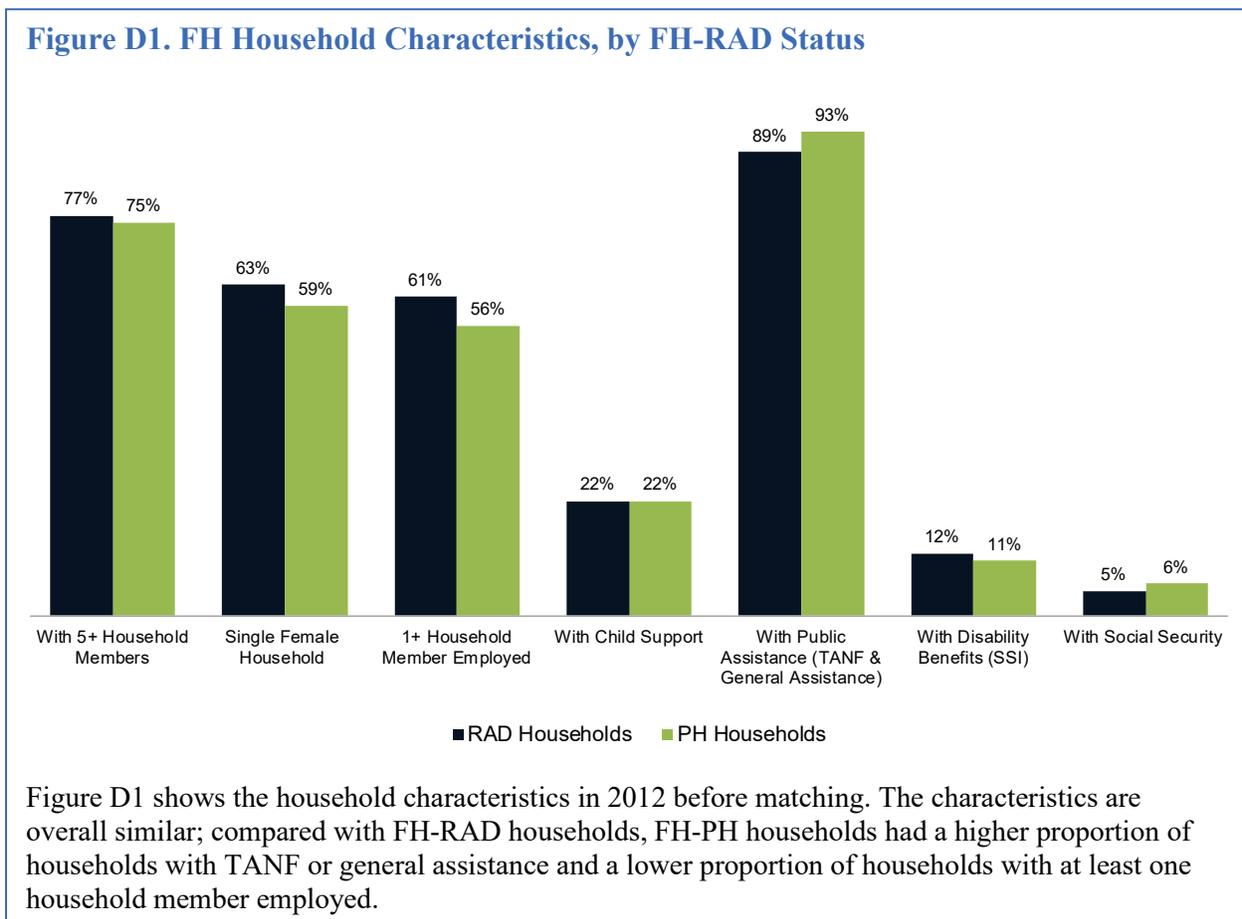
percent, respectively), which is also shown in Figure D1. The majority of RAD children lived in mid-size properties (25 to 50 units); about 25 percent lived in large-size properties (75 units or more). About 45 percent of PH children lived in mid-size properties, another 27 percent lived in properties with 50 to 74 units, and close to 25 percent lived in small-size properties (fewer than 25 units), as shown in Figure D2. RAD children were also more likely to live in buildings with neighbors who were employed (59 percent) and had higher median income (\$12,760) than were non-RAD, PH children (52 percent and \$10,722, respectively). On the other hand, FH-RAD children were more likely to live in a surrounding neighborhood with higher rates of poverty (percentage of households living below the poverty threshold), higher rates of overcrowding, higher rates of housing cost burden (percentage of income devoted to housing and utility expenses), and higher rates of renting, compared with their non-RAD, public housing counterparts (shown in Figure D1). Although those findings seem contradictory, they may reflect that many of FH household members in rural RAD properties are seasonal farm workers, and we coded those with any earning income in their certification year as being employed. Unlike other RAD sites in the country, however, those in Fresno have tenants with higher median household incomes compared with those in traditional public housing. As noted in RAD's interim evaluation, this is likely an indication of local variations in the way housing authorities select projects for RAD.

**Table D1. Characteristics of Children in RAD and PH Properties in 2012 (pre-RAD Implementation) Before Propensity Score Matching**

	<b>RAD (n = 475)</b>	<b>PH (n = 1209)</b>	<b>p</b>
<b>Individual Characteristics</b>			
Child Age: Mean (SD)	9.3 (5.0)	9.0 (5.0)	0.3513
Female	48%	49%	0.9127
Race/Ethnicity			
Black Non-Hispanic or Latino	4%	5%	0.1089
Hispanic or Latino	88%	85%	0.1252
Other Non-Hispanic	8%	9%	0.5186
<b>Household Characteristics</b>			
Having 5 or More People in the Household	54%	52%	0.3992
Head's Age: Mean (SD)	37.7 (8.8)	37.8 (9.8)	0.7257
Single Female Household	63%	59%	0.1328
Family Gross Income: Mean (SD)	13984 (7658.0)	13110.5 (8094.5)	0.0432
Family Gross Income: Median (IQR)	12908.0 (10281.2)	10761.3 (10405.9)	—
One or More Household Member Employed	62%	59%	0.131
Child Support	22%	22%	0.829
Public Assistance (TANF & General Assistance)	89%	93%	<0.001
Disability Benefits (SSI)	12%	11%	0.3763
Social Security	5%	6%	0.2358
<b>Neighborhood Characteristics</b>			
In the City of Fresno (%)	40%	42%	0.3447
<b>Property Characteristics</b>			
# of Units	58.7 (2.6)	41.6 (.53)	<0.001
% Employed	59%	52%	<0.001
Average Family Income	12760.17 (136.0)	10722.3 (68.5)	<0.001
<b>Zip-Code Level Demographic Characteristics (Based on American Community Survey)</b>			
Population Size (SD)	26256.5 (18985.9)	21008.2 (17219.5)	<0.001
Median Household Income	27913.0 (729)	32584.8 (8476)	
Below Poverty %	44%	36%	<0.001
Vacancy	5%	5%	0.0047
Rental Occupied	59%	55%	<0.001
High Rent Burden	51%	46%	<0.001

	RAD (n = 475)	PH (n = 1209)	p
Over Crowding	21%	15%	<0.001
Unemployment Rate	22%	15%	<0.001
<b>Health Status of Household Members in 2012</b>			
Number of ED Visits or Hospitalization in the Households	1.29	1.44	0.3322
ED Visit by Child in 2012	14%	16%	0.3493

ED = emergency department; IQR = interquartile range; PH = public housing; RAD = Rental Assistance Demonstration; SD = standard deviation; SSI = Supplemental Security Income; TANF = Temporary Assistance for Needy Families



**Figure D2. Building Size, by FH-RAD Status**

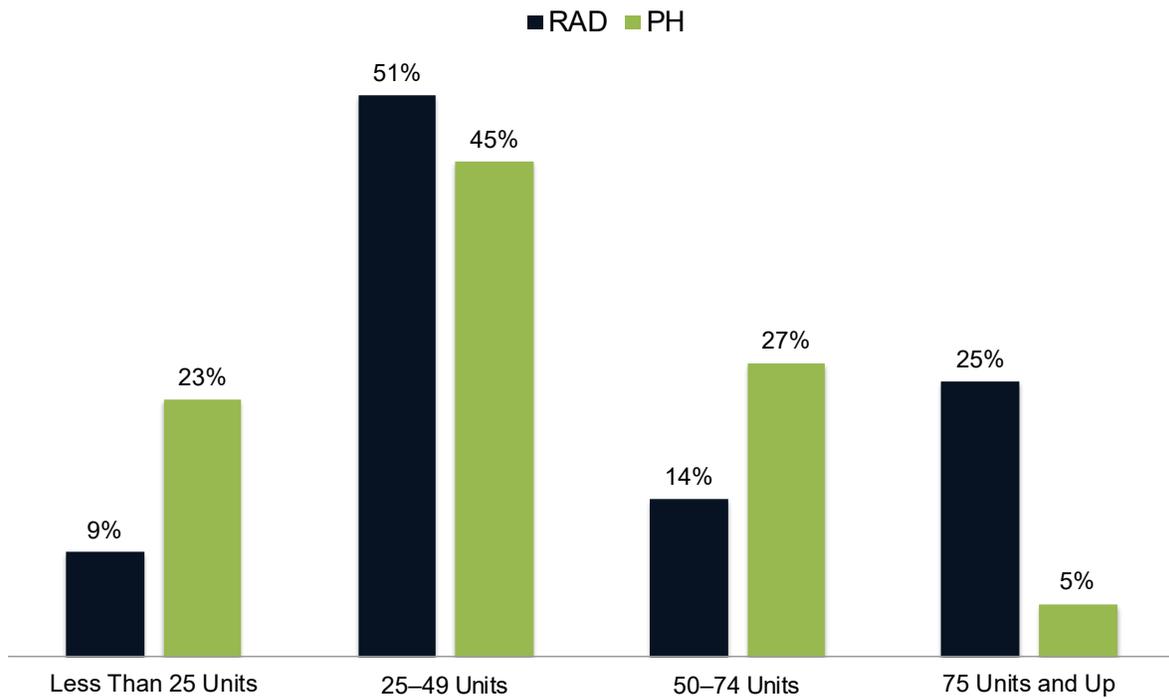


Figure D2 compares the size of RAD and non-RAD public housing (PH) properties. Overall, FH-RAD sites had higher proportions of properties with 75 or more units (25 percent) and higher proportions of the smallest units (9 percent) than FH-PH properties (5 percent and 23 percent, respectively).

**Figure D3. Neighborhood Characteristics, by FH-RAD Status**

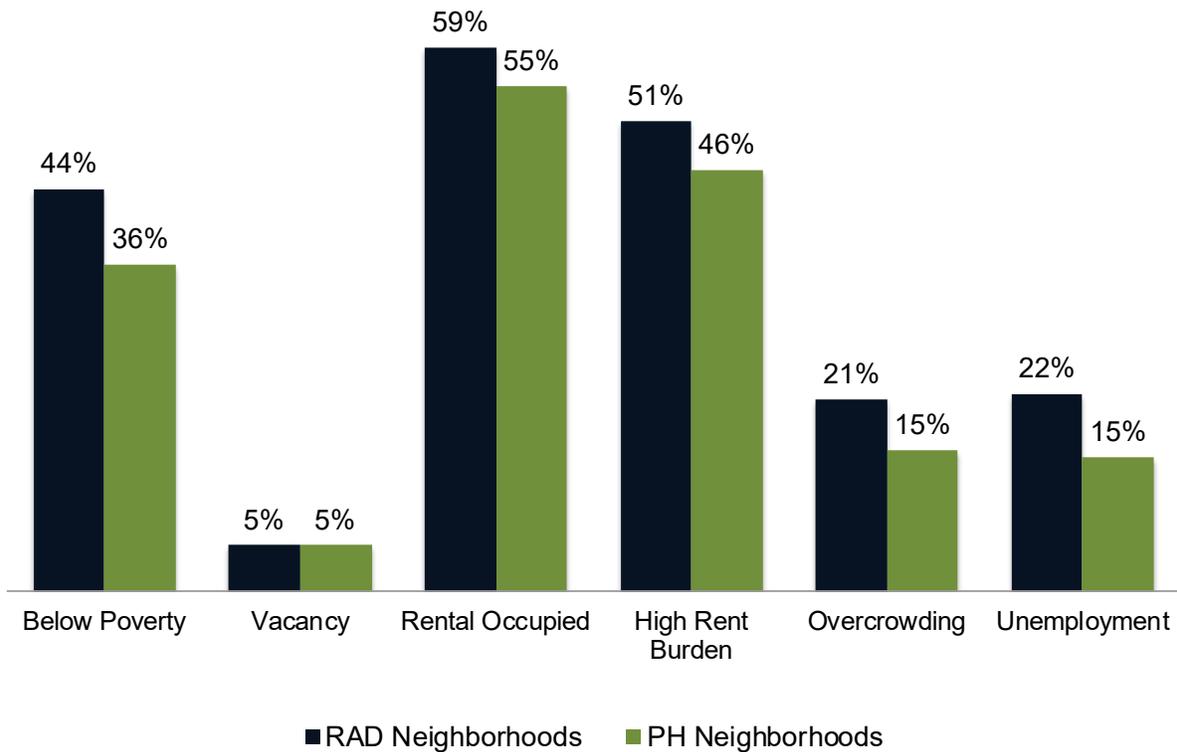


Figure D3 shows the neighborhood characteristics of FH-RAD and non-RAD public housing (PH) properties. The neighborhood characteristics were taken from 2010 Census data. FH-RAD properties are more likely to be located in disadvantaged neighborhoods, with a higher rate of poverty, rent burden, overcrowding, and unemployment.

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U.S. Department of Housing and Urban Development  
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Washington, DC 20410-6000



March 2020