An Evaluation of the Family Self-Sufficiency Program in Pittsburgh Using Event History Analysis

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The Housing Authority of the City of Pittsburgh's (HACP) Family Self-Sufficiency (FSS) program was designed to enable public housing and housing choice voucher households (HCV) to increase their household's incomes and savings and to move toward self-sufficiency. Despite program graduates having higher incomes and escrow savings than non-graduates, HACP reported low-enrollment and high attrition rates from its FSS program. In response, HACP developed an increased minimum rent policy which raises the minimum rent for public housing households from $25 to $150 and for HCV households from $50 to $150, for work-able households, unless the household enrolls in the FSS program.

This study addresses the following research questions 1.) What are the outcomes of FSS participation? 2.) When are FSS participants most likely to leave the FSS program? 3.) What explains exit from the FSS program? This study uses administrative data from 2010 to 2017 and an event history framework to determine whether or when FSS participants leave the program and uses logistic regression to explore factors that may explain an FSS participant's likelihood of leaving the program prior to completion.

This study found that there are significant differences in FSS program enrollment and attrition between the public housing and the HCV households. HCV households were far less likely to enroll than public housing households and once enrolled, they were far less likely to remain in the program than public housing households. This study also finds that the increased

minimum rent policy was not a strong incentive for residents to enroll or remain in the FSS program. This study also did not find any seasonal effects or point in the program when participants were more likely to leave the FSS program.

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Preface

I am very grateful for the support of my family, friends, and professors during the doctoral program. I would first like to thank my advisor, Sabina E. Deitrick, for being the best advisor imaginable. Your guidance and support during this process is appreciated more than you will ever know. I would also like to thank my committee members, George W. Dougherty Jr., Daniel Jones, and Michael R. Glass for their thoughtful comments, patient explanations, and commitment to helping me to develop my best work.

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1.0 Introduction

This dissertation evaluates the Family Self-Sufficiency (FSS) program at the Housing Authority of the City of Pittsburgh (HACP) to determine FSS program entry and exit between January 1, 2010 and October 1, 2017 and analyzes its outcomes. The FSS program was developed in 1990 by the U.S. Department of Housing and Urban Development (HUD) to provide services and resources to residents in the public housing and housing choice voucher programs throughout the country. HUD provides the federal funding and oversight for the public housing authorities and their programs. The FSS program is a voluntary five-year program available to all residents in HACP's public housing and housing choice voucher programs. The FSS program aims to provide resources and supportive services to residents to enable them to overcome barriers to self-sufficiency. Participants in the FSS program work with a service coordinator to develop an individualized training and service plan that establishes a final goal as well as milestones households aim to achieve during the program. Those who complete the FSS program tend to have higher incomes and levels of saving. Despite these economic benefits, there is still low enrollment in the FSS program at HACP and a high rate of attrition. This dissertation uses administrative data and an event history analysis framework to examine FSS participation and outcomes during the seven-year study period.

This study finds that the FSS program at HACP does not lead to self-sufficiency among its participants. There is a low enrollment rate and a very high rate of attrition, indicating that there is a disconnection between the program offered by HACP and the needs of its residents. Over the course of the seven-year study period, there were 1,058 public housing households enrolled in the FSS program. Of those 1,058 participants, only 191, or 18.1%, completed 60 months in the

program and 99, or 9.0%, became program graduates[1]. The rate of completion among the HCV households was even lower. There were 671 HCV households that enrolled in the FSS program during the study period, and of those households, only 72, or 11%, completed 60 months in the FSS program. For HCV households, only 103, or 15.0%, graduated from the FSS program. Some of these participants met the graduation requirements prior the end of the fifth year while others may have graduated after the end of the study period and the end of the calendar year. HACP reported the number of FSS participants who graduated during each calendar year, by housing program. That data was matched to the data set used in this study to compare the number of participants that completed 60 months in the program and the number of participants that graduated. This analysis shows that very few participants complete the 60-month program or meet the graduation requirements. This shows that the FSS program leads to self-sufficiency for a very small number of participants.

I argue that significant changes to the FSS program design are needed to improve the effectiveness of the program. The program was designed 30 years ago and despite numerous studies showing that the program has not achieved the intended outcomes, there have not been any changes to the program design. There have been significant changes in subsidized housing since the 1990s, most notably the shift from public housing to housing choice vouchers. This study will show that there are systematic differences between public housing and housing choice voucher households in terms of their household characteristics and location, which impact their outcomes. The needs of these two different groups of residents are very different, and the FSS program does

[1] It is possible for participants to complete 60 months in the program and still not meet the requirements to graduate. In some instances, households can meet the graduation requirements in less than 60 months in the program.

not respond to those differences and is not meeting the needs of the residents. The low graduation rate among the public housing residents who complete 5 years in the program is further evidence that the program is simply not working. This study will also examine the impact of incentives to enroll and remain in the FSS program to evaluate their effectiveness.

This study provides an in-depth examination of the FSS program at HACP and situates the study in the historical and local context to explain the origin of the FSS program, its implementation in Pittsburgh, and to provide an evaluation of the outcomes of the program. To evaluate the program outcomes, this study utilizes an event history framework which allows for the examination of changes within the participant's household during their participation in the FSS program.

The remainder of this introductory chapter will provide a thorough overview of the FSS program and a discussion of the importance of FSS as well as a critique of the program. Then the research questions and design of this study will be explained, and finally, this chapter concludes with an overview of the context, terms, and organization of the dissertation.

1.1 The Family Self-Sufficiency Program

The FSS program was established in 1990 by the National Affordable Housing Act and later modified by the 1998 Quality Housing and Work Responsibility Act to provide resources and services to families in the public housing (PH) and Housing Choice Voucher (HCV) program to enable them to improve their financial situations, reduce their reliance housing subsidies and public assistance programs, such as Temporary Assistance for Needy Families (TANF), Supplemental Nutrition Assistance Program (SNAP), General Assistance (GA), and the Children's

Health Insurance Program (CHIP). Public housing authorities with FSS program developed cooperative agreements with local TANF agencies to work to improve self-sufficiency among HUD-assisted households receiving TANF (HUD, 2000) HACP defined self-sufficiency as not receiving public assistance from those programs for at least one year prior to FSS graduation. Self-sufficiency is not defined as no longer receiving housing assistance. This is a five-year program that recognizes that many residents will need to improve their education or skills in preparation for the job market.

This program aims to utilize stable and affordable housing as a platform for improving the quality of life, which was the third stated goal of HUD's 2010- 2015 strategic plan. The HUD-designed FSS program is based upon the theory that once families have stable housing that is safe, decent, and affordable, residents can begin to address other hurdles to realizing self-sufficiency, such as education, training, and employment (HUD, 2010). For those living in public housing, there are often community centers or central management offices where residents can go to meet their service coordinator. The service coordinator works with participants to develop an Individualized Training and Service Plan (ITSP) and connect with service providers who can assist the participants in developing the skills they need to achieve their goals. These plans typically include resources, such as educational programs, job training, job readiness, childcare, transportation, or homeownership counseling (HUD, 2011).

To graduate from HACP's FSS program, participants must complete the five-year FSS program, meet the terms of their contract of participation, including established benchmarks and short-term goals, and be employed and free of all forms of public assistance for at least one-year prior to the end of the program (24 CFR §984.303). Ideally, families would move to market-rate housing or homeownership, which would provide greater housing options for the family, and

would allow the housing authority to use the subsidy to assist a family on the waiting list. However, in many cities, there is still a significant gap between the wages earned by low-income families and the cost of market-rate housing that prevents families from transitioning to market-rate housing. The FSS program typically lasts for five years, but under certain circumstances, illness or involuntary loss of employment, participants can extend their participation for up to two additional years. Participants can be dismissed from the program for non-compliance with their FSS contract, however, violation of the FSS program rules is not grounds from removal from the housing program.

To further incentivize residents to enroll and remain in the program, participants are given an opportunity to establish savings through an escrow program. Typically, PH and HCV residents pay 30% of their monthly gross income in rent and as their income increases, their rent payment is recalculated to reflect the increase in income. However, as long as the family is participating in the FSS program, the housing authority diverts the increased amount of the would-be rent into an escrow savings account which accumulates while the family is active in the FSS program. Upon graduation, the escrow funds are given to the family in a lump sum. If participants leave the program prior to graduation, they forfeit their savings. There are some provisions that allow participants to access some of their funds prior to graduation from the program. If a participant has met their interim goals, for instance, they can use their escrow savings for expenses related to their individual plan. For instance, some participants use the advance on escrow funds to pay for tuition or transportation to their job. The escrow account is an important incentive for both enrollment and completion of the FSS program.

Figure 1-1 below shows the FSS program design and the steps that participants are expected to take while enrolled in the FSS program. This program was built based on a theory of

change framework. The theory of change framework is commonly used in program design and evaluation when a program has an identified final objective and then identifies a set of incremental benchmarks to meet during the course of the program as small steps toward the larger goal. The theory of change framework will be discussed in greater detail later in this chapter.

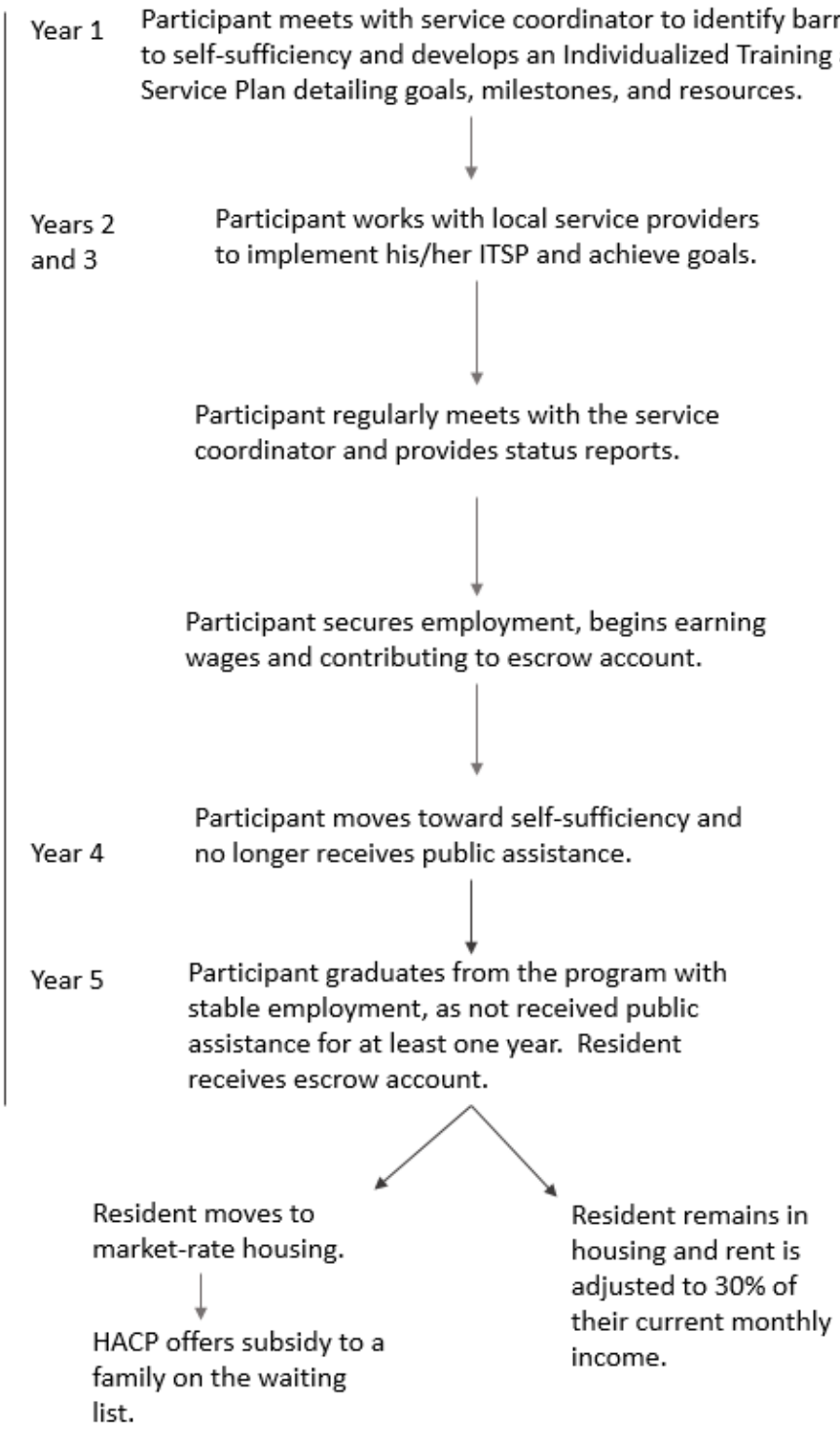

Figure 1-1 FSS Program Timeline

1.1.1 Importance of the FSS program

The FSS program is important for several reasons. First, the FSS program is an integral part in the national efforts to use the public housing and housing choice voucher program as a stable platform upon which low-income households can improve other aspects of life including, employment, education and health (HUD, 2010; HUD, 2011). The FSS program is one program in a set of policies developed in the 1990s as national housing policy shifted from simply providing housing to connecting residents with services, resources, and opportunities (HUD, 1999; Goetz, 2013; Vale, 2013). These policies will be described in greater detail in Chapter 2.

The second reason that the FSS program is important is that success in the FSS program could lead to reduced reliance on housing assistance. Households in the HCV program pay roughly 30% of their monthly income in rent, and the housing assistance payment from HACP to the landlord makes up the difference between the household composition and the rent charged by the landlord. As residents' income increase, their rent payment also increases, which reduces the housing assistance payment from the housing authority. If the housing authority is spending less on that household, they can use those funds to assist a family on the waiting list. Also, as public housing households' income increases, they may choose to move to market rate housing, which would make their housing unit available for a family on the waiting list. Currently the demand for affordable housing far exceeds the supply and shrinking federal budgets have forced housing authorities, including HACP, to rethink their current model of rental assistance. While the FSS program is just one of several approaches to improving the efficiency of subsidized housing, it represents an important opportunity for households to use subsidized housing, paired with supportive services, as a stepping-stone to self-sufficiency (HUD, 2011).

The third reason why the FSS program is significant is that it could offer financial benefits to the housing authority. Because households pay income-based rent, as the residents' income increases, so does rent revenue to the housing authority. Federal funding to housing authorities has declined significantly over the last thirty years, and with an aging housing stock and a demand for subsidized housing that far exceeds the supply, housing authorities are seeking strategies for increasing revenue (Rohe, 2017; Lee & McNamara, 2018). FSS graduates have higher incomes (Geyer, et al. 2017), and thus pay more rent than households with lower incomes.

1.1.2 Critique of the FSS Program

As explained earlier in this chapter, the FSS program has had limited success both in Pittsburgh and in housing authorities across the country (Anthony, 2005; Riccio & Babcock, 2014; Kleit & Rohe, 2015; Lee & McNamara, 2018; Silva et al., 2011; Van Ryzin et al., 2001). The FSS program was designed based on the assumption that the participants work with a service coordinator to identify their barriers to achieving economic independence and develop a plan for enabling them to overcome those barriers. The ITSP consists of a series of milestones that lead the participant to being free of public assistance programs by the fourth year of FSS participation, and then graduating from the program in year 5, and complete the program with higher wages and savings. The problem is that this expectation that the FSS participant make linear progress toward self-sufficiency is not consistent with actuality.

Low employment rates, income variability, and inflexible program policies combined with the expected linear progress toward self-sufficiency is unrealistic for many of the participants. Few households that enroll in this program complete the program in accordance to these terms. HACP reported in its 2017 Annual report that there were 375 public housing participants enrolled in the

FSS program, and of those, only 175, or 46.7%, were working. The report also showed that of the 248 HCV households participating in the FSS program, 156, or 63%, of the households were employed (HACP, 2017).

The FSS program represents an opportunity for subsidized housing to be a stable platform upon which residents can improve their educational and financial outcomes and achieve self-sufficiency (Lee, Smith & Galster, 2017; Lubell, 2015). Some housing authorities, Champagne, IL; Charlotte, NC; Lincoln, NE; and Vancouver, WA (Lee & McNamara, 2018; Webb, 2016) have used their FSS programs to develop work requirements for residents. While public housing in the United States was initially developed as housing for the working poor, the history of public housing will be discussed in greater detail in the following chapter, many current residents, as I will show in Chapters 4 and 5, are unemployed. Housing the working poor - and collecting higher income-based rents - as opposed to the unemployed, would alleviate some of the financial burden to the housing authorities that rely upon rent revenue. Because residents pay income-based rent, the more households earn, the more rent they pay. For the voucher program, if the housing authority is paying smaller housing assistance payments per tenant, then the housing authority could issue more vouchers. While this would lead to a more efficient use of funding and could potentially assist more households, there have also been suggestions by HUD Secretary Carson about instituting work requirements or placing time limits on housing, which threatens the most vulnerable families living in subsidized housing. In Chapter 3, I will discuss HACP's increased minimum rent policy which was designed to incentivize FSS enrollment and increase rent revenue to HACP. The policy is a quasi-work requirement as it raises the minimum rent to $150 a month, the equivalent to having an income-based rent for a person working 15 hours a week at minimum

wage. The policy only applies to work-able households that have not enrolled in the FSS program and is important to understanding the FSS program implementation and outcomes in Pittsburgh.

1.2 Theory of Change Framework

To provide a thorough and effective evaluation, it is essential to examine critical the underlying assumptions of the program and assess the extent to which the program addresses the problem that it aims to alleviate (Weiss, 1996). The theory of change framework enables evaluators to consider the ultimate objective of the program, examine the incremental steps that lead to that ultimate goal, and then articulate and assess the underlying assumptions.

The FSS program was designed based on the theory that affordable housing provides a stable platform upon which the residents can then begin to address their barriers to self-sufficiency, such as education, health, and employment (HUD, 2010; HUD, 2011). The FSS program is designed to address barriers to self-sufficiency at the household level. This program is a prescriptive program that is working off the assumption that if the residents had more education, some basic training, and assistance with their job search, they will be able to overcome the barriers to self-sufficiency and move out of poverty. This approach is designed to only address barriers at the household level, but does not consider the availability of jobs in the local market nor does it acknowledge the complex systemic historical and social factors that contribute to poverty in the United States. These factors will be discussed in depth in the following chapter.

The FSS program design also assumes that housing authorities are in the best position to offer these services to residents in their housing communities. While stable housing is essential, there are two problems with this assumption. The first is that the housing authority is best able to

coordinate the services for its residents to obtain employment. This expands the scope of responsibilities of the housing authority from being a housing provider to also being a social service agency (Bratt & Keyes, 1998). This leads to uneven quality of services as housing authority capacity and the availability of local partners with needed services have a large role in determining the outcomes of the FSS program. The second problem with this assumption is that there is a significant difference in providing services and resources to public housing residents who live in buildings owned and managed by the housing authority and to housing choice voucher residents who live in privately-owned properties throughout the city. This research shows that there is a significant difference in the outcomes of the public housing and housing choice voucher residents, and it is likely attributable to the differences in service availability and delivery.

The FSS program also operates on the assumption that residents will be informed of the FSS program and its offerings, be interested and committed to the program, and be able to follow the ITSP that the participant and service coordinator develop. Prior research which included focus group interviews found that many of the residents at HACP did not know about the FSS program and did not fully understand the program offerings and expectations (Dougherty, 2014). This program further assumes that the residents will make linear progress during FSS participation and will achieve milestones during the five-year program (HUD, 1996). This research shows that many participants do not remain in the FSS program for the entire five-year period, and that the likelihood of remaining in the program is not easily explained by participant and household characteristics. Furthermore, this study also shows that a high number of FSS participants, especially young public housing residents, move out of HACP housing while enrolled in the FSS program, which further questions the long time frame and whether it is reasonable to expect residents to remain in the program if they are not seeing the expected benefits. Another program

assumption is that participant's incomes will increase during FSS participation and that success paired with the escrow savings will serve as a strong incentive for the residents to remain in the program. The escrow savings only works as an incentive for the participants who are able to increase their incomes, and there are no incentives for residents who have not experienced an increase in income during their participation in the program.

The FSS program design is also developed with the assumption that progress will be linear and residents will meet the milestones identified at program entry. As previously discussed, employment rates among FSS participants remains low and many FSS participants experience income variability during their participation and experience periods of employment and unemployment. This may be attributable to the local job market and the insecurity in entry-level jobs, particularly those in the service industry, or it may be attributable to the participant's challenges in maintaining employment.

The FSS program is an ambitious program that has made a lot of assumptions about the needs of the participants, the availability of jobs for those participants, and the housing authorities' ability to deliver an effective program. I have laid out a critique of several of the underlying assumptions of the FSS program which will be tested in this study. This dissertation challenges the assumptions that the five-year time frame is appropriate for this program and that residents will make linear progress toward self-sufficiency while in the FSS program (HUD, 1996; Bratt & Keyes, 1998). This dissertation uses an event history analysis framework to examine changes in income, housing location, and household composition to better understand the changes that participants encounter during their participation in the FSS program. The research design and questions are further detailed in the following section.

1.3 Research Questions and Design

This is a retrospective evaluation examining FSS program participation between January 1, 2010 to October 1, 2017 at HACP. All public housing and housing choice vouchers that participated in the FSS program at any point of time during the study period are included in the initial review of the FSS program. This evaluation uses an event history analysis framework to determine the outcomes of FSS participation, calculate the length of time that a household participated in the FSS program, and analyze the factors that could contribute to the likelihood that participant withdrew from the FSS program.

1.3.1 Research Question 1: What are the outcomes of the FSS program?

There are four possible outcomes of FSS participation: 1) completed the program; 2) withdrew from the program prior to completion; 3) moved from HACP housing, and thus left the program prior to completion; or 4) remained in the program on October 1, 2017, the last day of the study period. An analysis of the administrative data revealed the outcome for each of the households that enrolled in the FSS program on or after January 1, 2010. This question will determine the number of public housing and housing choice voucher households with each outcome of their FSS participation.

1.3.2 Research Question 2: When are FSS participants most likely to leave the FSS program?

A time-series analysis of entry to and exit from the FSS program during the study period determined whether there were any trends in entry and exit based on the calendar year. This analysis determined whether there were seasonal effects in the enrollment and termination of FSS participation.

After testing for seasonal effects, I determined whether there were identifiably points in the program when participants were more likely to leave by using an event history framework to analyze the length of program participation. The number of months that each household participated in the FSS program were calculated starting at 0, the month that the household enrolled in the FSS program and counting each month that the household remained until the household left the FSS program, moved from HACP housing, reached month 60 of FSS participation, or October 1, 2017, the last date of the study period. The number of households in the program at the beginning of each month from 0-60 were recorded in the life table. By examining the number of households that were enrolled in FSS from month 0 to 60, I determined whether there were certain points in the program when participants were more likely to withdraw from the program or move from HACP housing.

1.3.3 Research Question 3*:* What explains withdraw from the FSS program?

After determining whether and when FSS participants were most likely to withdraw from the program, I conducted further analysis of the factors that may impact a participant's likelihood

of leaving the FSS program prior to completion. Based on the literature, I developed two hypotheses about possible explanations of FSS program attrition.

1.3.3.1 Hypothesis 1: Household Characteristics.

These characteristics include 1) whether there are children in the household, 2) change in household size during the program, 3) household income at time of FSS entry and, 4) location and moves within HACP housing during FSS participation. These characteristics may affect the length of program participation for the reasons explained below.

Participants with young children may be less likely to remain in the FSS program than households that do not have children because of childcare responsibilities. Changes in the household may represent changes in household responsibilities, as a wage earner may leave, or a child may join the family. These changes may shift household responsibilities and lead a participant to withdraw from the FSS program.

Participants with work experience and higher monthly incomes when they enrolled in the FSS program may be more likely to remain in the program than those who had lower incomes at the time of enrollment. It is possible that the FSS program may be more effective for households that aim to move from a job to a better job than for households that are trying to move from unemployment to employment.

Participants who reside in neighborhoods that are closer to HACP services or jobs, may be more likely to remain in the FSS program than households who live farther away. Additionally, participants from households that experience moves with the subsidized housing program or have changes in household composition may be less likely to remain in the FSS program. If the household moves within HACP housing from one public housing unit to another, or for voucher households, from one rental unit to another, the change in location may impact the likelihood of

program completion. It is possible that a household may move farther from or closer to HACP programs and resources. That move may impact the household's access to services, transportation, or jobs.

1.3.3.2 Hypothesis 2: Program Characteristics.

There are three programmatic features that may impact the household's likelihood of remaining in the program. The first programmatic feature is whether the household lives in public housing or has a housing choice voucher. Conventional wisdom is that public housing households are more likely to remain in the FSS program than those with vouchers because the public housing residents live closer to the services provided by the housing authority. Conversely, households with a housing choice voucher tend to earn higher salaries that their public housing counterparts, which may lead the voucher households to be more likely to remain in the FSS program.

The second programmatic feature that may impact a participant's likelihood to withdraw from the FSS program is whether the household has escrow savings. Escrow savings is the main incentive for participants to remain in the FSS program, as it is an opportunity to accumulate savings, but if a household has not experienced an increase in income and has not accumulated savings in the escrow account, there is little incentive to remain in the program. For households that have been successful in the FSS program and have experienced an increase in income and have acquired escrow savings, they have an incentive to complete the 60-month program.

The third programmatic feature that may explain the likelihood of remaining in the FSS program is the increased minimum rent policy. This policy will be explained in detail in Chapter 3. HACP implemented an increased minimum rent policy for work-able public housing and housing voucher households that earned less than $6,000 per year. The increased minimum rent policy increased the minimum rent for the work-able public housing residents from $25 per month

to $150 per month and for housing choice voucher households from $50 per month to $150 per month. This policy went into effect in 2010 for public housing households and in 2011 for the housing choice voucher households. Households that paid the increased minimum rent of $150 prior to enrolling in the FSS program may be more likely to remain in the FSS program than household that did not pay the increased minimum rent prior to enrollment. If the household paid the increased minimum rent of $150 prior to enrolling in the FSS program was successful in the FSS program and experienced an increase in income, they will then have savings in the escrow account and may be more likely to remain in the program. If the household did not experience an increase in household income while enrolled in the FSS program, they may still be more likely to remain in the program so that they do not have to pay the increased minimum rent of $150 when they exit the FSS program. While that is a strong explanation for why those households may be more likely to remain in the FSS program, it is also possible that those households will be more likely to withdraw from the FSS program because they may be less interested in the program, and enrolled only to avoid paying the increased minimum rent. That reason alone may not be sufficient for keeping the participant in the program.

These research questions as well as the research design and methods will be presented in greater detail in chapter three.

1.4 Contributions, Parameters and Organization

1.4.1 Contributions of this study

The analysis of HACP's FSS program offers two theoretical contributions. First, it challenges the theory of change framework upon which the FSS program was designed. The FSS program was designed to help households identify long-term goals for their households and identify incremental steps to achieve those goals. The analysis of the administrative data shows that this program design is incongruent with the challenges faces by many households residing in HACP housing programs. The analysis of the income data during the study period shows that there are many households that experience income variability while living in HACP housing. The linear progress expected by the FSS program may be difficult for many of the HACP households to achieve. Many households did not experience a steady and incremental increase in income while living in HACP housing.

The second contribution to the literature is revisiting the notion that subsidized housing is a platform for improving the quality of life. The premise is that once a household has stable and affordable housing, the residents will then be able to turn their attention to improving the household's financial, educational, and health outcomes. This analysis has shown that stable housing does not necessarily translate into successful employment. Furthermore, this analysis also shows that enrolling in the FSS program also does not necessarily lead to better financial outcomes for the household.

My work stems from the academic literature on subsidized housing programs and furthers a small set of FSS program evaluations that have been conducted at the national level (Sard, 2001; Silva et al., 2011), and local in-depth studies of a single housing authority such as: Charlotte, North

Carolina (Rohe & Kleit, 1999; Rohe & Kleit, 1997; Rohe, Webb, & Frescoln, 2015; Kleit and Rohe, 2015) Rockford, Illinois (Anthony, 2005); San Bernardino, California (Distelberg, Martin, Borieux & Oloo, 2015); Boston (Riccio & Babcock, 2014); New York City (Verma et al., 2012); and Pittsburgh (Dougherty, 2014; Deitrick & Bert, 2018; Blackhurst & Briem, 2018; Blackhurst et al., 2019). These studies have provided evidence that the FSS program can enable some families in the public housing and housing choice vouchers to improve their financial situation by obtaining jobs, earning higher wages, and establishing savings. Those who graduate from the program do have better outcomes. However, these studies have also highlighted some of the weaknesses of the program, particularly related to low program enrollment, high rates of attrition, and external challenges in terms of the local labor market, limited resources, and other external factors. While there is agreement that very few participants succeed in the FSS program, the program remains largely unchanged after thirty years. My dissertation provides an additional case study and offers an evaluation of a Moving to Work (MTW) agency that used its MTW status to develop an incentive for residents to enroll and remain in the FSS program. By evaluating the policy, my study contributes to our knowledge of FSS program incentives and quasi work requirements. This builds on the studies mentioned above that have evaluated local efforts to improve the FSS program.

This dissertation will also contribute to policymaking. Policymakers have proposed an expansion of the MTW program to include an additional 100 housing authorities. This expansion will allow for housing authorities in smaller cities to benefit from the flexibility provided through the MTW demonstration to facilitate innovative solutions to local problems. This evaluation of HACP's increased minimum rent policy will be relevant to other housing authorities who are interested in increasing FSS participation and rent revenue. As federal funding continues to

decline, policymakers have suggested implementing work requirements and increasing the minimum rent for public housing and housing choice voucher households, this evaluation of the FSS program and the increased minimum rent policy at HACP is useful to understanding what the impact of work requirements and increased minimum rents in the United States may be.

Lastly, this study will also be useful to decisionmakers at HACP who are interested in understanding the impacts of the increased minimum rent policy on the FSS program, specifically, whether the policy has incentivized residents to enroll and remain in the FSS program. This study finds that the increased minimum rent program was neither effective at incentivizing residents to remain or to enroll in the FSS program, as the participants who paid the increased minimum rent prior to FSS enrollment were not more likely to remain in the FSS program than those who did not. This study also shows that the households earning less than $6,000 who would be impacted by the increased minimum rent were also not more likely to remain in the FSS program than those who earned higher incomes at the time of FSS entry. The increased minimum rent policy will be explained in greater detail in Chapter 3. Furthermore, a better understanding of the length of time that participants remain in the program and the outcomes of FSS participation will be helpful to HACP as they aim to improve the program. By having a careful analysis of program attrition, HACP can better design supports for participants in the program and rethink the five-year program and consider developing some features that are designed to attend to the needs of the housing choice voucher participants.

1.4.2 Limits of this study

This study examines the FSS program in the City of Pittsburgh from January 1, 2010 to October 1, 2017. The households included in this study lived in public housing in the City of

Pittsburgh or had a housing choice voucher issued by HACP and were enrolled in the FSS program during this period of time.

There are many limitations in HACP's FSS data. For this study, the final measure of success in the program is completion of 60 months in FSS. The dataset that I obtained for this research did not identify explicitly the households that officially graduated from the FSS program. This study used length of FSS participation as a proxy for graduation, by determining which participants remained in the FSS program for the full five years – 60 months -- of the program. While I was able to calculate the length of FSS participation, the dataset did not include any information about the other graduation requirements including whether the household was free from public assistance for one year prior to completing FSS and whether the participant achieved the goals set forth in their ITSP. HACP's annual MTW reports show the number of public housing and HCV households that graduated from the FSS program during each calendar year. By comparing those reports with the data used in this report, it is clear that some of the public housing households that completed 60 months in the FSS program did not meet the graduation requirements, and some of the HCV participants graduated early. This will be discussed in greater detail in Chapters 4 and 5.

Second, there is also no data about participant's use of services, accumulated escrow savings, or reason for exit. These data limitations contributed to the decision to focus on early exit from the FSS program and the examination of household and limited programmatic reasons for early exit. Accumulated escrow savings was calculated based on what the savings would be, but there is no information on whether those funds were used prior to program exit. This is explained in greater detail in Chapters 4 and 5. Ideally, there would be information on the services received

by the participants which may lead to a richer explanation of FSS program outcomes and the relationship of those outcomes and the services received by the FSS participant.

This analysis allows for determination of whether and when participants withdraw from the FSS and an analysis of the factors that contribute to the likelihood of a participant leaving the program prior to completion. Further qualitative work on participants' satisfaction with the FSS program and exit interviews would further contribute to our understanding of attrition from the FSS program. Further work could investigate whether exit from the FSS program was voluntary or involuntary and the participants decision making process when they elected to leave the FSS program. In this dissertation I do not speculate about the reasons why households may have left the program, as there are likely to be varied and complicated explanations and it is also possible that participants were dismissed from the program.

1.4.3 Definitions and Terms

The terms families, households, and participants are used interchangeably in this analysis. The data used for this study was collected at the household level, making it difficult to differentiate between the incomes and FSS participation of the individuals in the household. The term families may also refer to a single-person household or a household with two unrelated members. The term affordable housing refers to housing that costs 30% or less of the household's monthly income. In some usage, affordable housing is used as a synonym of subsidized housing.

In this study the term federally-subsidized housing refers only to the public housing and housing choice voucher programs and that my use of that term does not extend to include the privately-owned project-based HUD-subsidized housing, housing constructed using HOME

funding, USDA Rural Development housing, nor housing that was developed by Low-Income Housing Tax Credits.

1.4.4 Organization of this Dissertation

This chapter provided a very brief introduction to this study, the problem that it addresses, the questions it will address, and the research methods and data used to answer those questions. The following chapter offers a review of the relevant literature, discusses the contributions of prior work and they ways that this study builds upon that work to further our understanding of the FSS program design and outcomes. Chapter Three provides additional context for this study and explains the data and methods used in the study. Chapter Four presents the findings of the study for the public housing households and Chapter Five presents the same findings for the housing choice voucher households. Chapter Six concludes the study with a discussion of the findings presented in chapters 4 and 5.

2.0 Literature Review

This chapter will provide an overview of the history of the public housing and the Housing Choice Voucher (HCV) programs in the United States, as well as a review of the literature on the Family Self-Sufficiency (FSS) program. This chapter is divided into four sections. First, I will briefly summarize the origins of public housing in the United States and the housing choice voucher program at the U.S. Department of Housing and Urban Development (HUD). This will include an analysis of the challenges and the policies that addressed those challenges. Second, I will explain the importance of the FSS program and offer a review the empirical literature of the FSS program at the national and housing authority levels. The empirical literature falls into two categories. The first set of studies examines the outcomes of the FSS program while the second set of studies aims to explain why some residents have been more successful than others in achieving self-sufficiency. Third, I will further discuss the recent literature on public housing and access to jobs. Lastly, I will provide a brief conclusion and preview of the following chapter.

2.1 U.S. Housing Policy

This section provides a very brief chronological history of public housing in the United States to provide context for the discussion of the FSS program and its purpose. This context is important to understanding the origins of the FSS program and the historical and political context in which it was created. This contextual information is important to evaluating the underlying

assumptions of the FSS program. The section is arranged chronologically as U.S. housing policy has evolved over time based on trial and error and in response to the broader political zeitgeist.

This section has three sub-sections. The first sub-section discusses the origins of public housing and changes in housing policy from the 1930s to 1980s. The second sub-section discusses housing policies introduced in the 1990s, while the third sub-section discusses policies and challenges from 2000 to present. This very brief overview is important to our understanding of the origins of the FSS program, its goals, and how it is embedded in U.S. housing policy.

2.1.1 Public Housing 1930s – 1980s

In the United States, public housing was originally created to improve the housing conditions of the working poor. The development of public housing was authorized by the 1934 Housing Act which established the Federal Housing Administration (FHA) and its mortgage insurance program, as well as rental assistance program for the working poor. These subsidized housing programs occurred during the same time as President Roosevelt's New Deal policies that provided social services to the working poor following the Great Depression. This was a period where there was political support for poverty alleviation programs and improving the housing conditions for the working poor.

From the 1935 to 1960, public housing was built as an effort to improve the housing conditions of the working poor and to replace substandard housing in urban slums (Vale, 2013). This housing tended to be barrack-style low-rise walkup buildings built around a semi-enclosed court to provide outdoor space to the tenants. Residents tended to be working-class nuclear families, many of which were military families (Goetz, 2013). Recognizing the importance of decent housing and the lack of affordable housing for poor families, the 1949 Housing Act

expanded the public housing program funding to provide decent housing to all (Orlebeke, 2000), with the increased funding to enable housing authorities across the country to development more public housing. Large public housing developments, such as: Robert Taylor and Cabrini Green Homes in Chicago, Rosen Homes and Schuylkill Falls in Philadelphia, Van Dyke Houses in New York, and Pruitt-Igoe Towers in St. Louis, were constructed during this period (Rothstein, 2017, 32). These early public housing developments were built in areas where there was a low supply of housing so that they did not compete with the private rental market. This further contributed to the isolation of public housing communities and the low access to jobs, services, and community resources.

During this time period, public housing was constructed rapidly to meet the expanding need among the low-income working households that could not afford decent housing from the private rental market. This expansion of subsidized housing coincided with the second great migration, during which many African Americans moved from the South to northern cities, including Pittsburgh, in search of jobs (Trotter & Day, 2010). These efforts to build a solution to the problem of large segments of the population being excluded from the private housing market proved to be disastrous.

During the late 1940s and 1950s, many working-class white families moved out of the cities and into the suburbs (Jackson, 1985). FHA mortgage insurance, Veterans Affairs home loans for servicemen returning from World War II, lower construction costs, increased car ownership, and the highway system all contributed to the rise of the American suburbs (Jackson, 1985). As American's preferences shifted to buying single family homes in the suburbs, those who were able, left the cities (Jackson, 1985). By the 1960s, public housing had changed from housing for the working poor to the housing of last resort (Goetz, 2013). The large public housing developments

constructed in the 1940s and 1950s proved difficult to manage and expensive to maintain over time. The image of public housing became dangerous, dilapidated, corrupt, and poorly managed (Vale, 2012) and residents also faced strong stigmas (Hays, 2012). As many jobs left the cities and moved to the suburbs or abroad, manufacturing jobs and low-skilled jobs were harder to find and the wages were lower than they had been in the past (Bluestone & Harrison, 1988; Dreier, et al., 2001).

While white families leaving the cities for the suburbs changed the demographics of cities, urban renewal projects changed the physical landscape. City government and business leaders advocated for urban renewal to attract businesses back to the cities by demolishing housing, improving highway access to cities, and developing commercial centers. Urban renewal projects displaced an estimated 3.8 million people nationwide, the majority of whom were residents of black communities (Dreier et al., 2001). Public housing had become politically unpopular and many communities fought against public housing (Vale, 2013). The federal funding paid for the demolition of the public housing developments, but the decisions about which buildings were demolished was made at the local level. Public outcry and local decision making further contributed to public housing being located in high-poverty neighborhoods and segregated from middle-class neighborhoods (Goetz, 2013, p. 31). The loss of manufacturing and entry-level jobs in many cities coupled with the location of large public housing developments in low-income communities that were often cut off from the city, created a spatial mismatch as blue-collar and entry-level workers were no longer able to access the jobs that they needed to move out of poverty (Kain, 1967).

By the 1960s, public housing in the U.S. primarily housed minority residents (Goetz, 2003). Public housing had financial constraints, and the large public housing developments were

deteriorating (Bloom, 2008). Anyone who was able, moved out of public housing leaving behind residents who simply did not have any alternatives. Large dilapidated public housing projects that housed mostly minority residents, many of which were unemployed, or earned extremely low incomes, were in high-poverty neighborhoods that were disconnected from surrounding communities. In 1973, residents of public housing in Chicago filed a class action lawsuit against the Chicago Housing Authority for intentionally segregating public housing residents in high poverty areas. The case went to the Supreme Court in 1976 as Hills v. Gautreaux, which led to a consent decree mandating that the Chicago Housing Authority desegregate its public housing through scattered-site housing and housing choice vouchers (Polikoff, 2006). This case changed public housing policy and led to efforts to deconcentrated poverty through the housing choice voucher program and through low-density scattered-site public housing units. The use of housing choice vouchers was implemented in the early 1980s, but the efforts to redevelop public housing and shifting from the large high-rise developments to low density housing were not immediate. Those changes to the construction of public housing did not widely occur until the 1990s with HOPEVI.

In the 1980s, there were important policy changes that aimed to house those with the greatest needs. These efforts to continue to house the poorest members of society and use subsidized housing as a means for reducing homelessness, is contradictory to growing concerns about the problems with the deteriorating condition of public housing and concentrated poverty. In the 1980s, public housing authorities awarded preference points to housing applications from those who were currently homeless or had a disability. Housing authorities also limited the number of residents who earned more than 50% of the area median income, while rents were increased from 25% of the household's monthly income to 30% (Vale, 2002). Because the public housing

authorities depended upon rent revenue as part of its budget, these policy changes further exacerbated the maintenance and management problems in public housing as incoming tenants had low incomes. The one notable exception was the New York City Housing Authority, which continued to admit residents with higher incomes and had better management at its sites than other housing authorities (Bloom, 2008). In 1983, the Section 8 Voucher Demonstration was introduced and was fully authorized in 1987. The Section 8 Voucher program, which later became known as the Housing Choice Voucher (HCV) program, was an alternative to public housing (HUD, 2019). Residents in the program are issued a voucher and permitted to choose a rental unit from the private market, so the housing authority does not have any construction or maintenance costs for the rental housing. Furthermore, because the residents select the rental unit, they could move to areas with lower rates of poverty. The housing choice voucher program has become an important part of HUD-subsidized rental assistance, as many housing authorities have shifted its resources from the public housing programs to housing choice vouchers.

2.1.2 Public Housing and Housing Choice Vouchers 1990s

In the 1990s, welfare reform was a political priority with both Republicans and Democrats developing plans for significant changes to the safety net programs. The Republican-developed Contract with America aimed to shrink government-funded social programs and shift toward neoliberal market-based solutions. The 1996 Personal Responsibility and Work Act, redesigned safety net programs and replaced Aid to Families with Dependent Children with Temporary Assistance for Needy Families (TANF), which placed time limits on assistance. The zeitgeist of the early 1990s is apparent in the changes to housing policy in the 1990s as there was a shift to reducing the cost of providing public housing by shifting to vouchers and an emphasis on programs

that sought to enable residents to break the cycle of poverty, move from the unsafe crime-ridden projects, and begin working and moving toward self-sufficiency. Urban crime was also often discussed in the early 1990s and the large public housing developments “the projects” were often cited as an example of the dangerous inner cities. This characterization of these communities further alienated its residents.

It was clear to everyone that a significant change to the housing programs was long overdue. While the housing choice voucher program was promising, there were still serious problems with the condition of public housing. In most cities, the public housing constructed in the 1940s and 1960s were no longer safe or decent. Public housing projects were dilapidated and had high rates of crime and vacancy (Goetz, 2013). Despite public housing developments being officially desegregated in the 1960s, the vast majority of public housing residents were minorities due to de facto segregation through the inequality in access to jobs, homeownership, and rental housing (Rothstein, 2018). Large-scale public housing developments that in many cities made up entire neighborhoods created isolated pockets of concentrated poverty. Residential segregation and the resulting social isolation created an underclass of disadvantaged urban residents (Wilson, 1987), who lived in concentrated poverty with little access to job opportunities (Massey & Denton, 1997). In addition to poor access to jobs, many of these communities had underperforming schools and high-crime rates and were generally avoided by non-residents, which further contributed to the isolation of these communities. The most disadvantaged urban residents were concentrated in these areas (Wilson, 1987). Without access to jobs, transportation, high-quality education, healthy food, healthcare and strong social ties with residents from other communities, public housing residents did not have many opportunities to achieve self-sufficiency and move to market-rate housing.

Until the 1990s, public housing had been treated as a public utility and not as a social service (Goetz, 2013). Yet, it is impossible to study places without considering the people who inhabit them and to study people without considering their environment (Davidson, 2009). In the 1990s, policymakers started seeking opportunities to utilize housing as a platform for improving quality of residents' lives. The theory being that if residents had safe, decent, and affordable housing paired with access to services and jobs, they would be able to improve their family's financial situation and reduce their family's need for subsidized housing. Having stable housing where the family is able to make decisions about where they live and when to move is critical to household outcomes (Lubell, 2015). Furthermore, the stress that comes from unstable housing has a profound impact on household finances (Freeman, 2009). In public housing, residents would be working-class households, where the higher the residents' salary, the higher the housing authority's rent revenue. Having residents who earn higher incomes, and have higher rent payments, would alleviate some of the financial strain on the public housing authorities. Public housing residents pay roughly 30% of their monthly gross income in rent. This is a significant revenue stream for the housing authorities. Housing Choice Voucher residents also pay roughly 30% of their monthly income in rent and the housing assistance payment (HAP) from the housing authority makes up the difference to the landlord between the household's contribution and the rent charged by the landlord. As HCV resident's incomes increase, the amount of HAP paid by the housing authority is reduced, which allows the housing authority to issue more vouchers and assist more households. The hope is that these public housing and housing choice voucher households would eventually have stable incomes that would allow them to move to market rate housing.

A new set of policies aimed to use housing policy to deconcentrate poverty and racial segregation by provide services to residents, enable residents to move out of low-poverty

neighborhoods, and rebuild low-density public housing was integrated into existing communities (Massey, 2007). These policies and programs included a new set of HUD programs coming from the Gatreaux consent decree and the success of the HCV program. These programs aim for public housing tenants and voucher recipients to live in areas with less concentrated poverty and offer new forms of public housing where service provision was part of the new program demonstrations. Those include:

1.) Family Self-Sufficiency Program in 1990;

2.) Moving to Opportunity demonstration in 1992;

3.) Housing Opportunities for People Everywhere (HOPE VI) in 1993; and

4.) Moving-to-Work demonstration (MTW) in 1995.

Until this point, I have described policies and programs in chronological order, but since I have briefly explained the FSS program and MTW demonstration in the previous chapter, and because I will discuss them at length in the following section, I will discuss the housing choice voucher, Moving to Opportunity Demonstration, and HOPE VI programs in this section and the Family Self-Sufficiency and Moving-to-Work Demonstration in the following section. The Moving to Opportunity demonstration and HOPE VI are important to understanding this study of the FSS program because those two programs explain the efforts to improve the quality of housing and service delivery to tenants in public housing and the housing choice voucher program. These two programs have shaped the public housing and housing choice voucher program into the current housing programs.

2.1.2.1 Housing Choice Vouchers Theory and Moving to Opportunity

The housing choice voucher program has reduced costs for public housing authorities since it does not construct, maintain, nor manage the rental units, and has proven popular with residents who wish to select their own rental unit, but there are limitations to the success of the program. First, in most cities, landlords are not required to accept vouchers (Cunningham et al., 2018). Discrimination of source of income is a significant hurdle for housing choice voucher holders who seek housing in middle income neighborhoods (Graves, 2016). While some cities have passed legislation that landlords cannot refuse to accept vouchers, most cities have not. Second, because fair market rents, the amount that a landlord can charge for a housing choice voucher household's rental unit are calculated at the metropolitan statistical area, and in many cities, there are very few rental units that fall into those guidelines. The rental units that do meet the fair market rent requirements are often in low-income neighborhoods, which has limited the ability of the program to deconcentrate poverty. HACP, and other housing authorities across the country, have begun to use small area fair market rents to calculate the fair market rents for geographies smaller than metropolitan statistical areas.

The Moving-to-Opportunity demonstration was implemented in 1994, to determine whether housing choice vouchers paired with housing counseling could enable families to move to diverse communities with lower poverty rates, higher performing schools, and better access to jobs. As stated in the debate about the relationship between housing and quality of life, the theory is that if families were able to move to better neighborhoods, they and their children would experience better financial, educational, and health outcomes. The demonstration was designed as an experiment with a randomly assigned treatment group made up of residents who received vouchers and housing counseling to assist them with moving to a low-poverty community and a

control group that only received vouchers and had no requirement to move to a low-poverty community. The experiment was conducted in Baltimore, Boston, Chicago, Los Angeles, and New York City (De Souza Briggs, et al., 2010; Katz, 2000; Chetty et al. 2016; Goering & Feins, 2003).

Studies have shown mixed results. Many families that participated in the demonstration moved back to their original neighborhoods, or similar neighborhoods after the demonstration ended (De Souza Briggs, et al., 2010). Others indicated that their children still participated in activities in the original neighborhood and did not develop a strong social network in the new neighborhood, which mitigated the anticipated benefits of the new community (Chetty et al., 2016). While safety was a barrier to participation in the former neighborhoods, activity fees, transportation, and childcare prevented children and parents from participating in activities in their new communities (Zuberi, 2010). Those who left for positive reasons, (i.e. increase in income) tended to have better outcomes than those who left for negative reasons (i.e. eviction, non-renewal of lease, etc.) or remained in subsidized housing (Smith et al. 2014).

One of the arguments for public housing and housing choice vouchers is the importance of stable housing for children (Manzo, Kleit & Couch, 2008; Freeman, 2009). Because by providing stable and high-quality homes, children will be better positioned to obtain an education, earn higher salaries as adults, and ultimately break the cycle of poverty. However, studies have shown mixed results in terms of the relationship between children's outcomes and their housing. One study of the impact of public housing demolition on children's educational outcomes showed little effect, and those who were displaced by the demolition, tended to move to neighborhoods that were similar in terms of demographics and poverty rate as the ones that they left (Jacobs, 2004). That study also found that children who were over the age of 14, showed a slight increase in their

likelihood to drop out of high school, which children under 14 showed no effect (Jacob, 2004). Another study suggested that children who were displaced from public housing had better access to the labor market as adults and had better economic outcomes than those who did not move out of the public housing communities (Chyn, 2016). A study has shown that school-aged children under the age of 13 benefited most from moving to low-poverty neighborhoods (Chetty et al. 2016). Children whose families experienced poverty during preschool years had worse educational incomes than children whose families experienced poverty when they were older (Brooks-Gunn & Duncan, 2003). Studies have also shown that boys have worse outcomes than girls when they live in high-poverty neighborhoods (Shroder, 2002) or moved to areas of higher opportunity after the age of 13 (Chetty et al., 2016). Other studies show that students who live in public housing are less likely to be held back (Currie & Yelowitz, 2000), and are more likely to change schools, but not move to better performing schools (Currie & Yelowitz, 2003). However, families with vouchers tended to live near better performing schools that children who lived in public housing or tax credit developments, yet families with vouchers still live near worse schools than low-income families in market-rate housing (Horn, Ellen & Schwartz, 2004).

2.1.2.2 Housing Opportunities for People Everywhere (HOPEVI)

While the Housing Choice Voucher program and the Moving to Opportunity demonstration showed some benefits to residents and public housing authorities, vouchers still didn't resolve the problem with the aging and dilapidated housing (Goetz, 2013). The HOPE VI program, which operated from 1993 – 2010, was a competitive grant program that enabled public housing authorities to redevelop its most distressed public housing units which were not replaced. The objective of the program was to demolish the high-rise public housing projects and rebuild low-density public housing that was integrated into the community and to create partnerships with local

communities to provide supportive services to the residents. These changes are built on the principles of new urbanism, which encourages thoughtful design to create dense communities with mixed-use development, public spaces, and reduce dependence on cars by promoting pedestrian and cyclist-friendly design as well as transit-oriented development (Deitrick and Ellis, 2004). The Manchester HOPE VI development in Pittsburgh is an example of a subsidized housing community that was designed around these principles (Deitrick and Ellis, 2004).

In 1995, the requirement that housing authorities replace demolished units through one-to-one replacement was repealed (Goetz, 2013). This led to fewer public housing units and displacement of many public housing residents who had to move to from their public housing units that were slated for demolition. Some families were able to use the vouchers to find housing within their communities, while others had to relocate to other neighborhoods. Once again, public housing policy had displaced many of the low-income families it aimed to serve, and housing subsidies were given to the working poor (Vale, 2013). Between 1993 and 2006, 78,100 distressed public housing units were demolished (Curley, 2010).

Many public housing communities redeveloped through HOPE VI included mixed-income communities with a mix of subsidized and market-rate housing units. Many of these communities also included mixed-use buildings with commercial buildings on the ground floor and housing on the upper floors. The HOPE VI program also expected public housing authorities to provide supportive services to its residents and expected that residents would become involved in their communities (HUD, 2010). Despite the efforts to improve the conditions in public housing developments, residents still reported that they are unhappy with their housing and communities (Currie and Yelowitz, 2003). A study examining the relationship between employment outcomes of residents in the newly-developed HOPE VI communities found that while the location of

housing was important, there was also a strong relationship between the resident's employment outcomes and the amount of contact that residents had with case managers (Nguyen, et al, 2016), while another study found that relocation of housing and the supportive services were not enough to overcome the barriers to employment faced by residents (Curley, 2010). While one of the goals was to increase social interaction between public housing residents and those of non-subsidized housing, while the physical proximity of housing increased interactions among residents, there are still differences among residents that limit the integration of public housing residents into the community (Kleit, 2005).

The HOPE VI program ended in 2010 and was replaced by the Choice Neighborhood Initiative, which offers $500,000 planning and $20 million implementation grants to public housing authorities across the country to redevelop public housing communities. Learning from the lessons of the HOPE VI program, public housing authorities have taken a three-prong approach to development through the Choice Neighborhoods Initiative, housing, people, and community. This approach continues the housing as a platform for improving the quality of life, and aims to better integrate public housing into the community, offer benefits to homeowners in the community, and strengthen low and moderate-income communities. Additionally, housing authorities aim to develop housing at a one-to-one replacement rate, grant residents a right of return, and minimize the number of moves that the household makes. To the extent possible, housing authorities redevelop housing in phases, allowing residents to move from their current residence to their new residence. When that is not possible, tenants are moved to another public housing unit or given a voucher and relocation assistance to ease the transition to a private-market rental unit and then the transition to their new public housing unit.

2.1.3 Public Housing and Housing Choice Vouchers 2000 – Present

While HOPE VI and the shift toward a tenant-based voucher program improved the quality of public housing and reduced construction and maintenance costs, there are still serious problems that needed to be addressed. First, funding for subsidized housing has decreased and public housing authorities were stretched financially and sought alternatives to achieve their mission in a cost-effective manner. Second, the need for subsidized housing has increased as only 24% of the 19 million income-eligible households live in subsidized housing (Poethig, 2014). Changing labor and urban housing markets alone have created a tenuous situation for low-income families in need of subsidized housing, a situation that has only been exacerbated by shrinking federal budgets that have reduced public housing authorities' budgets. Funding cuts have reduced the housing authorities' formula-based operating fund at only 75% of the amount they should receive (Kleit and Page, 2008). Between the years 1994 and 2012, the public housing stock has decreased by more than 250,000 units (Schwartz, 2015). The worst public housing buildings have been demolished and replaced with low-density mixed-income developments, but at a net loss of affordable units. Nationally, only about one in five eligible households receive subsidized housing (Williamson, 2011), and more than 18% of all households, and 27% of all renters are burdened by housing costs that total more than 30% of their monthly incomes (Schwartz, 2015). The rising cost of housing is particularly devastating to low-income households, many of which are eligible for subsidized housing.

While HOPE VI did help public housing authorities to update and build new public housing stock, there are still public housing buildings that are in need of significant renovation, if not demolition. When the prevailing model of public housing shifted from high-density housing in high-rise developments to low-density townhouses, mixed-income communities, scattered-site

housing and vouchers, housing has continued to be viewed as a platform upon which residents could build a better life for their families. The problems associated with the high-density high-rise buildings in the projects revealed the complexity of poverty in America. Providing shelter was not enough, and without adequate funding, housing authorities were not able to meet the rising needs for subsidized housing. Over the last twenty-five years, there has been a shift from the effort to provide shelter to as many families as possible to providing higher-quality housing for the working poor (Vale, 2012). This new model of housing is viewed not as an end itself, but the stable platform that low-income families need in order to improve other outcomes such as; employment, education, health, and savings. The expectation was that subsidized housing would be a short-term need while families achieve self-sufficiency and which time they would move to market-rate housing and free up a subsidized unit or voucher for a family on the waiting list (Santiago, Galster & Smith, 2017; Riccio & Babcock, 2012).

2.2 Empirical Literature on Moving-to-Work Demonstration and Family Self-Sufficiency

As explained in the previous section, there was a shift in U.S. housing policy in the 1990s as policymakers aimed to overcome the challenges associated with public housing and the housing choice voucher programs. Their primary goal was to use the housing assistance provided through public housing and the housing choice voucher program as a stable base upon which residents can improve the financial, educational, and health outcomes of their families. In the prior section I discussed the HOPE VI and the Moving to Opportunity demonstration as two of these policies. In this section I will discuss two other initiatives that build services models into public housing to improve quality of life. The remaining two programs are the FSS program, established in 1990 by

the National Affordable Housing Act and the Moving to Work (MTW) demonstration, which was established in 1996. Together these policies established a framework for providing a set of services aimed at enabling families to achieve self-sufficiency.

The Moving to Work (MTW) demonstration was established in 1996 to grant select high-performing housing authorities some relief from Federal regulations to accomplish the three goals of the MTW demonstration:

1) increase cost efficiency;

2) improve residents' self-sufficiency; and

3) increase housing choices.

Under the MTW designation, housing authorities have greater leeway in developing programs and policies to achieve optimal outcomes. The first MTW cohort consisted of 30 high-performing housing authorities and the demonstration was later expanded to a total of 39 housing authorities (HUD, 2019). There are plans in place to further expand the program to 100 housing authorities by 2022 (HUD, 2019).

Housing policy is a product of both federal regulations and the organizational decisions made by the housing authorities (Kleit and Page, 2008), and the MTW demonstration aims to allow more local innovation and decision making. Like the Moving to Opportunity demonstration, the MTW demonstration was also influenced by neoliberal policies that aim to find market-based solutions including increasing control at the local housing authority level and decreasing regulation and oversight by the federal government (Webb et al., 2016).

The MTW demonstration is closely tied to the FSS program because the second objective above is to increase resident self-sufficiency. The last goal is to increase housing choices for public housing and HCV residents. Many MTW agencies have tailored their FSS programs to

respond to the needs and resources in their cities. These programs differ from the standard FSS program described in the first chapter. For example, HACP developed the increased minimum rent policy to incentivize residents to enroll in the FSS program. While the federal regulations establish a regulatory framework, housing authority staff and property managers make important policy decisions that shape their housing programs (Kleit and Page, 2008; Lipsky, 1985; Webb et al., 2016).

For example, many MTW housing authority established a rent reform policy to improve cost-efficiency. Those rent reform policies either established an increased minimum rent, created rent bands to decrease the number of rent recalculations, or created a rent ceiling. The review of the MTW plans and reports showed a range of program options from voluntary to mandatory FSS programs, rent reform policies, incentive systems, and services offered. There are eight MTW agencies with work requirements which range between 15 and 35 hours of work per week (Webb et al., 2016). A study of the work requirement implemented by housing authority in Charlotte, North Carolina (Rohe et al., 2016), found that residents generally responded that they thought that the work requirement was fair, and that their reasons for not working had little to do with not wanting to work, but the lack of jobs and the difficulty finding a job. The study also found that the work requirement did not lead to increased evictions (Rohe et al., 2016). Other housing authorities with work requirements include, Lincoln, NE, which requires residents to work 25 hours per week and Vancouver, WA, housing authority which requires a minimum income of $9,000 per year. Other housing authorities, San Bernardino, Tacoma, Tulare, and Delaware State Housing Authority have established time limits for work-able residents (Webb, et al., 2016). A study of economic disincentives to work (Shroder, 2002), showed that there was only a small negative relationship between housing subsidies and employment, and while public housing residents did

work fewer hours, they had circumstances that prevented them from working. The public housing itself did not have a negative impact and a well-designed HCV program can lead to positive outcomes (Ong, 1998).

While it is essential that each housing authority design its FSS program that best serves its residents and uses available resources efficiently, the variation in FSS programs leaves questions about optimal program design unanswered. The leeway granted to housing authorities in designing their programs under the FSS framework, also creates variation in the investment in: 1) the program; 2) resources provided; 3) services; 4) program requirements (Riccio & Babcock, 2014).

The added responsibility and discretion for the housing authorities leads to an uneven provision of services as some housing authorities are better able to utilize private partnerships and tax credits. The local housing market, economy, and politics are also key factors in shaping affordable housing. These environmental elements, program design, and decisions made by the housing authority staff who implement policy shape the housing policies. Limited federal budgets and neoliberal policies has shifted housing development and ownership to the private market through the multifamily housing program, and the current rental assistance demonstration, and tax credits. More recent housing programs and policies such as HOPE VI, FSS, and MTW demonstration, have emphasized the importance of public-private partnership to create hybrids to carryout work that was traditionally in the public sector (Kleit & Page, 2015).

2.2.1 Family Self-Sufficiency Program

The FSS program follows the developments in HUD's policies to deconcentrate poverty, improve the physical quality of housing, and to provide services to improve residents' quality of life. As discussed above, the theory behind the FSS program is that subsidized housing creates the

stability needed to focus on improving other aspects of their lives such as employment, education, and health. When low-income households are faced with numerous financial challenges, the most urgent needs are addressed first, as new urgent needs arise, long-term financial planning and saving become impossible (Wiseman & Riccio, 2015). The intention of the FSS program is to pair subsidized housing with supportive services to enable residents to improve their household's financial situation and achieve self-sufficiency. Since the FSS program was first implemented in the 1990s, the goal of the program has shifted from moving to market-rate rental housing or homeownership to independence from public assistance. For most housing authorities, program success is not measured by leaving subsidized housing, but by residents' improving their household's economic outcomes, and eventually leaving public assistance programs, such as supplemental nutrition assistance program (SNAP), temporary assistance to needy families (TANF), and general assistance.

Subsidized housing creates stability by reducing the housing insecurity related to being severely rent burdened and the insecurity that comes from multiple moves (Manzo, Kleit, and Couch, 2008). It also relieves strains from overcrowding (Currie and Yelowitz, 2000), paying high rents (Aratoni, 2010), and the anxiety and mental stress that is from unstable housing (Bogle, et al., 2016). Stable housing and the elimination of these stressors allow residents to shift their attention and spend money on improving other aspects of life, such as education, employment, and health. The FSS program is designed to capitalize on the benefits of stable housing and use housing as a platform for improving the quality of life (HUD, 2010; Riccio & Babcock, 2014).

The theory of change is a large long-term goal with a series of incremental short-term goals that lead to the final goal. The connection between the contributions of the incremental goals and the desired result is integral to the theory (Weiss, 1996), upon which the FSS program is built, as

stated above. FSS participants meet with their service coordinator to identify the final goals, and to establish the incremental milestones that they will achieve during the program. For many low-income residents, receiving additional education, job training, and assistance with job placement may be necessary pre-conditions for obtaining a job that pays higher wages, offers better benefits, and allows the family to achieve self-sufficiency. The FSS program aims to provide a set of educational, employment, and financial tools to enable the participants to achieve self-sufficiency. The program is designed to help participants to evaluate their needs and establish a plan for overcoming barriers to self-sufficiency.

2.2.2 Empirical literature on the FSS program

This section reviews prior studies of FSS programs at the national and local-levels and summarizes what those studies tell us about the program while also identifying areas where there are still questions about this FSS program's effectiveness.

2.2.2.1 FSS Evaluations

There have been numerous evaluations of the FSS program at the national and local levels since the beginning of the program. Since the FSS program was established in 1990, there have been several studies of the program at the national level (HUD, 2011; Sard, 2001) and evaluation of the local programs in Rockford, IL (Anthony, 2005), Charlotte, NC (Rohe, Webb & Frescoln, 2015; Kleit and Rohe, 2005), Boston, MA (Riccio and Babcock, 2014), Champaign, IL (Lee & McNamara, 2018), and San Bernardino, CA (Distelberg, Martin, Borieux &Oloo, 2015).

Evaluations of the FSS program have examined the FSS program outcomes to determine whether the participants were successful in improving financial outcomes, and asked whether

graduates had higher wages, employment rates, and savings than before starting the program (Kleit & Rohe, 2005; Anthony, 2005). Those studies also provided some insight as to participant and household characteristics that were related to successful outcomes and found that age, household composition, education level, and marital status (Anthony, 2005), prior work history (Rohe and Kleit, 1999), and vocational training (Kleit and Rohe, 2005) may have an impact on the household's success in the FSS program.

In 2011, HUD conducted a national study of the FSS program and found that FSS graduates had higher incomes both before and after participating in the program, and those graduates experienced an average increase in income from $19,902 to $33,390, while those who left the program prior to graduation experienced only a slight increase in income. Graduates also reported a 93% employment rate compared with an employment rate of just 60% for those who left the program early (Silva et al., 2011). This raises the question, did those who left the program early did so because they were not realizing any benefits from the program? According to HUD's study, a third of participants left the program early and half of those early exits were for non-compliance with the program rules. Of those who left voluntarily, about a third of those exits were because the program requirements conflicted with work and family obligations while others left because of an increase in income or marriage (Silva et al., 2011). That study also found that those with a high school diploma were twice as likely to graduate from the FSS program as those who did not have a diploma, but did not find any other significant relationships between participant and program characteristics (Silva, et al., 2011).

A study of FSS participation in Rockville, Illinois (Anthony, 2005), examined nine different participant characteristics and found that single, young adults, without children, and with high school diplomas were most likely to complete the program. The study did not find evidence

to support the culture of poverty hypothesis (Anthony, 2005), but found some support for life cycle and rational choice theories. The study also failed to find a significant difference in FSS outcomes between the outcomes of public housing and HCV households in the FSS program (Anthony, 2005). Those findings contradict a 2002 study that found that younger welfare recipients were less likely to work than older recipients and those with more than six members in the household were also less likely to work (Allard and Danzinger, 2002). Household composition and the number of members in a household, presence of children, and changes in the household may impact the household's ability to earn wages and achieve self-sufficiency.

A study of household resilience moves beyond an analysis of the participant characteristics and considers mental health and social capital (Distelberg, Martin, Borieux & Oloo, 2015), as additional possible explanations of financial outcomes. Escrow accounts are an important incentive for participants as it both negates the work disincentive through rent recalculations and enables residents to establish savings which is critical for achieving economic stability (Rohe and Kleit, 1999).

2.2.2.2 Factors that Prevent Success

There is agreement that FSS programs have shown some success but have limitations. One of the main limitations is the lack of interest from residents and the high attrition rates (Rohe, Webb, and Frescoln, 2016; Santiago, Galster & Smith, 2017; Lee &McNamara, 2018). Some of hesitation to participate may come from the fear of leaving subsidized housing and paying market-rate rent. Other participants noted that family obligations (PD&R, 2011), poor health, lack of childcare, long search times for housing (VanRyzin, et al. 2001) and poor prior experiences with similar programs prevented them from participating (Rohe & Kleit, 1999). One study examined the attrition rates and identified three critical junctures for those exiting the program: after four

months, one year, and two years. The study found that those who left after just four months tended to do so for non-compliance with the program rules, whereas those who left later did so for positive reasons including ineligibility for services or because they moved to be closer to employment or educational opportunities (Santiago, Galster, & Smith, 2017). However, negative exits after one or two years in the program tended to reflect dissatisfaction with the program, financial difficulties and personal and family obligations (Santiago, Galster, & Smith, 2017).

The disappearance of jobs that do not require specialized training, but offer a living wage have disappeared, this has created a barrier for many low-income families that seek self-sufficiency (Bogle et al. 2016). Many families receiving subsidized housing do have wage income, but they work limited hours for low-wages and there is little stability in their employment. Hours can be reduced and jobs can be lost due to no fault of the employee. Program exit was related to the number of barriers, lack of training, education, and work experience at the time of entry were more likely to exit (Santiago and Galster, 2008).

2.2.2.3 No consensus in the literature

While the housing policy literature generally concludes that the program design matters in terms of service provision (Riccio and Babcock, 2014; Furtado, 2014), recruitment, and incentives to participate (Kleit and Rohe, 2015), it offers little explanation of what constitutes a strong program. The literature also suggests the importance of housing location, the local economy and job market, and transportation, but fails to provide clear answers about their relationship. Perhaps most perplexing is the inconclusive and often contradictory findings about the relationship between participant characteristics and outcomes. For instance, a study of FSS participants in Rockville, Illinois, showed that the FSS program led to significant improvement in employment and wages (Anthony, 2005), and a study in Champaign, IL, found that FSS participants an average

increase in incomes of $2,283, with larger impacts for those who had little or no work history (Lee & McNamara, 2018), while another study found that young participants with recent work experienced benefitted most (MDRC, 2014).

Another study suggested that the FSS program does not do enough to provide the training and skills necessary for long-term economic success, nor does it address the other aspects of inequality and relative deprivation, which prevent low-income residents from achieving long-term economic success (Crawford, 2003). While modest improvements are possible through the FSS program, evidence that this will lead to a reduced need for housing assistance remains thin (Riccio & Babcock, 2014). A 2012 study of HCV households in the FSS program at the New York City Housing Authority found no evidence that the FSS program alone led to better financial outcomes of residents. The study also examined an incentive program operated by the housing authority that gave a cash incentive to households that met certain criteria for hours worked. The study found that the incentive was helpful in increasing the wages and hours worked among residents that were already employed at the beginning of the program, but did not help the residents that were unemployed to find jobs (Verma et al., 2012). Additionally, the heavy reliance on partnerships with community-based organizations and contracting the services also proved to be challenging (Verma et al., 2012).

Studies also found that it is difficult to use administrative data to predict success in the program, partly because of the lack of variation in the sample (Van Ryzin, Ronda, & Muzzio, 2001; Rohe & Kleit, 2015), but also because of the role of context in terms of the program design, neighborhood effects, local partnerships, and local job market (Kleit & Rohe, 2005; Bogle, et al. 2016; Lubell, 2017). A 2015 study by Kleit and Rohe ultimately found that it was difficult to predict success based on personal and household characteristics and suggested that other personal

or programmatic elements may be better predictors or success and suggested that additional research on participant goals, motivation, and social capital is warranted (Kleit and Rohe, 2015).

The contradictions in the literature suggest that there are other factors that impact outcomes of the FSS program. Additional studies from cities that have not been studied are needed to better understand how local context in terms of job markets, housing authority policies, and FSS program design and implementation impact FSS program outcomes and the likelihood that participants complete the program, have higher incomes and higher levels of self-sufficiency.

2.3 Employment for public housing and housing choice voucher households

Woven through the first and second sections of this chapter is the running discussion of poverty and low employment rates among public housing and housing choice voucher households. In the first section, I discussed the role of geographic and social isolation from jobs and social networks, the housing policies that contributed to that isolation, and the efforts to reverse that isolation. In the second section, I discussed the FSS program and the incentives and services provided to residents to enable them to improve their household's financial outcomes and achieve self-sufficiency. Then I discussed FSS evaluations and the extent to which the FSS program has been successful in connecting residents to employment.

Reviewing the neighborhood effects literature (Sampson, et al., 2002; Kling et al., 2007; Ludwig et al., 2012; Sharkey & Faber, 2014), FSS program evaluations, and research on the relationship between housing and employment have contributed to our understanding of the complexity of moving to self-sufficiency. Low-income households face challenges in finding affordable housing and employment due to constraints in the housing and labor markets. In many

communities, much needed mobility counseling, training, and services are not available to those who need them. Place-based initiatives, such as Choice Neighborhoods and HOPE VI, must consider the people who will live in those communities in order to create diverse mixed-income communities. Future work on the relationship between housing and education and health must consider both household characteristics and neighborhood effects (Mueller and Tighe, 2007). The rest of this section discusses access to jobs and residential stability and their impact on a household's ability to achieve self-sufficiency. The complexity of self-sufficiency and the impact of spatial mismatch, concentrated poverty, residential instability, and social isolation will be discussed in the following chapter when I discuss housing in Pittsburgh and provide local context for this study of the FSS program at HACP.

2.3.1 Access to jobs

There is a relationship between poverty and place (Jargowsky, 2997). Neighborhood poverty is the result of economic conditions, segregation by race and wealth and disconnection from the labor market and opportunity (Jargowsky, 1997). Studies have had mixed findings about the relationship between proximity to jobs and wages. One study found that proximity to jobs is associated with higher wages and leaving welfare (Allard and Danzinger, 2002), while another study found that there is no connection between proximity to jobs, even when job seekers live in areas with a low poverty concentration (Hu and Giuliano, 2017). These findings challenge the premise of the HCV program and builds on the conclusions of the MTO demonstration, that location alone will not improve individuals' financial outcomes (Oakley & Burchfield, 2019). A third study of vouchers in New York City showed that vouchers did increase mobility and enable residents to access jobs, transportation, and opportunities (Lam, 2015), and a study in Milwaukee

showed that when residents try to get jobs they tend to move to neighborhoods with lower poverty rates and more racial integration and buy a car, both of which appear to be important to improving employment and wages (Shen and Sanchez, 2005). Of these two changes, this study suggests that living in a neighborhood with a lower poverty rate and more diversity is more important than proximity to jobs (Shen and Sanchez, 2005). Zuberi's 2010 work also suggests that geography alone does not enable low-income families to overcome barriers; they also need supportive services.

The local job market, barriers to employment for racial minorities and women and education programs are key factors in determining access to jobs and the long-term success of families who are working to move out of poverty (Bogle, et al., 2016; Clampet, Lundquist, and Massey, 2008; Crawford, 2003; Hannon et al., 2017). The only certain conclusion that one can draw from these conflicting findings is that there is a great deal of variation among different housing authorities in different contexts. This further supports the value of the MTW demonstration and is consistent with the FSS literature.

There were two options for overcoming the spatial mismatch, bring jobs to the people, move the people to the jobs, or reduce the barriers that prevent people from accessing jobs (Gobillon et al. 2007). Despite efforts to reduce the density of public housing and create mixed-income communities, public housing residents still tend to live in high-poverty areas (Lee, Smith, & Galster, 2017). Public housing residents tend to live in areas with entry-level or low-skilled jobs, but there is higher competition for those jobs (Lens, 2014). Low-income residents also face barriers include high search costs, inadequate transportation, and insufficient information about job opportunities (Gobillon et al., 2007).

Economic theory suggests that housing assistance would discourage work because tenant rent payments are calculated as a percentage of their monthly income. Therefore, as residents' income increases, the rent payment is recalculated to reflect the increase in income. A study found that vouchers did not discourage work over the long-term (Wood, Turnham, & Mills, 2008). A study of the Boston Housing Authority tenants found that many residents did work part-time, but due to the inconsistency in their work hours and low wages, they were unable to "earn their way" to market-rate housing (Riccio & Babcock, 2014). A national study also found that nearly half of public housing families who were not elderly or disabled had wage income and stayed in public housing for less than five years and kept their vouchers for over three years. This was longer than families without income that stayed for an average of just under two and a half years, while those with children tended to stay a year longer. These finding suggest that subsidized housing tends to be a short-term solution to families' housing needs, and does provide some level of stability for families who are working or have children (Lubell et al. 2003).

A 2016 study by Bogle et al., which aimed to determine the pre-conditions necessary to move out of poverty found that the local context including the local job market, educational opportunities and barriers experienced by racial minorities and women have a significant impact on families that are working to move out of poverty (Bogle et al, 2016). Studies have shown that the community's demographics and poverty rate can be a predictor of the residents' access to jobs and resources (Clampet, Lundquist & Massey, 2008; Hu & Guilano, 2017). However, this relationship goes both ways, the characteristics of the residents also impact the community and creates the boundaries of the social networks in which the residents interact (Leventhal & Brooks-Gunn, 2000). Studies have also examined the impact of housing subsidies on a household's incentive to work and have found mixed results with some studies showing no effect (Shroder,

2002) and others finding a disincentive to work (Currie and Yelowitz, 2003). While there have been mixed results, vouchers have been shown to reduce homelessness, overcrowding, household size, and the incidence of living in temporary housing situations with friends and family (Wood, Turnham, & Mills, 2008). However, other research suggests that vouchers alone are insufficient for moving out of poverty (Schwartz, 2015). While residents are permitted to choose a rental unit from the private rental market, they are still constrained by the availability of rental units that are within the price range determined by HUD and its calculation of fair market rent. In most cities, the availability and price of rental units, constrains housing choice (Schwartz, 2015).

As the job market has shifted from manufacturing and service jobs toward professional jobs that often require specialized training or education, it has proven difficult for low-income residents to find well-paying jobs that enable them to move out of poverty (Jacobs, 2004). These structural barriers in the labor market and educational systems make it difficult to attain self-sufficiency through individual efforts (Riccio & Babcock, 2014). While the moving to opportunity demonstration which encouraged families to use their voucher to move to areas of higher opportunity, showed that the move to lower poverty neighborhoods did reduce anxiety and stress, it did not improve employment or income (Briggs, Popkin, & Goering, 2010).

2.3.2 Residential stability and instability

For many Americans, housing costs represent the bulk of their households' monthly expenses (Aurand, et al., 2017). Many Americans, and not just those who are considered low-income, pay more than 30% of their monthly income in housing costs. One of the objectives of a housing subsidy is to ensure that low-income families do not have to pay more than 30% of their income for housing, which will hopefully free up additional funds for other expenses including

education and health, while also relieving the stress that comes from not being able to make ends meet (Newman and Harkness, 2002). The HUD requirement that subsidized housing tenants pay 30% of their monthly income in rent comes from the 1969 Brooke Amendment, and recent housing studies have called this standard into question (HUD, 2014)[2]. Studies have found that subsidized housing has reduced overcrowding, rent burdens, housing instability that leads to multiple moves, reduces stress, and does allow families to spend money on other needs (Newman and Harkness, 2002; Casciano & Massey, 2012; Mueller and Tighe, 2007).

While the intention of subsidized housing is to provide affordable and stable housing, there is still a lot of movement in and out of public housing and the housing choice voucher program and movement within public housing and the housing choice voucher program. These moves may be voluntary, as households in subsidized housing may have an increase in income that allows them to move to market-rate housing, or a household in subsidized housing may decide to move in with family or friends. Those moves from subsidized housing could also be involuntary if the household is evicted or a voucher holder is unable to find a rental unit. Moves within public housing could also be voluntary, a household is moving to a unit in a neighborhood or building that they prefer, or involuntary if a household is relocated due to demolition or extensive renovation of their public housing. Households with a voucher have more flexibility with moving and can move from one rental unit to another at the end of its lease. Those moves could also be involuntary, if their landlord does not renew the lease at the end of the contract, forcing residents to find a different rental unit using the voucher. While the voucher offers residents more flexibility

[2] The Brooke Amendment is named for Massachusetts Senator Edward Brooke III, who sponsored Section 213(a) of the Housing and Urban Development Act of 1969 that set the income-based rent payments at 25% of the tenant's monthly income. This was raised to 30% in 1981.

in where the household can live, there is also added instability as landlords can choose to leave the program and may choose to not renew the lease (Nguyen et al., 2016).

Lubell defined residential stability as having control over when, where, and under what circumstances to move (Lubell, 2015). Even if moves are voluntary, moving could still be disruptive to households. A study of the mandatory moves associated with the redevelopment of public housing through HOPE VI, found that prior to moving, there were social ties within the public housing community, children played together and there was a culture of mutual assistance. The forced moved created anxiety, anger and resentment among residents who relied upon the social ties in their community, and while the community was identified as "severely distressed," many residents felt a strong sense of community there (Manzo et al., 2008). Another study found that after moving to mixed-income communities, residents felt that they were treated poorly by the residents who had higher incomes and didn't live in subsidized housing. Residents also reported that changes in screening criteria and management also led to dissatisfaction with housing despite the housing having physical improvements (McCormick & Chaskin, 2012).

2.4 Pittsburgh Context and Background

This section provides an overview of public housing and the HCV program in Pittsburgh. This section shows that public housing and HCV households at HACP face many of the same challenges faces by public housing and HCV residents in the rest of the country.

The history of public housing in Pittsburgh mirrors the nation's history with public housing. The Housing Authority of the City of Pittsburgh, established in 1937, was the first public housing authority in Pennsylvania and among the first in the country (HACP, 2019). Prior to the

introduction of public housing, Pittsburgh, like many cities, had many poor communities with unsafe and overcrowded housing, and developed public housing as a way to improve the quality of housing for low-income residents and to reduce overcrowding.

In Pittsburgh, the flatland along the rivers was primarily used for industry and worker housing was moved to hilltop communities (Kleinberg, 1989). Pittsburgh's early public housing developments constructed in the 1930s and 1940s aimed to improve housing conditions for the working poor and were located in the hilltop communities or away from downtown. In Pittsburgh, planning decisions were affected by political, economic, social, and geographic fragmentation. The development of downtown Pittsburgh and the was prioritized over housing and social considerations (Bauman & Muller, 2006). By the end of the 1940s, eight public housing developments were constructed: Addison Terrace, Aliquippa Terrace, Arlington Heights, Allegheny Dwellings, Glen Hazel Heights, Broadhead Manor, St. Clair Village, and Bedford Hills Apartments (HACP, 2019). Redlining maps from the 1940s shows that these public housing developments, which were clustered in the Hill District, Northside, Glen Hazel, and Garfield, all coincided perfectly with the redlining maps, which indicated areas that were deemed poor investments (Rutan and Glass, 2018). These areas were identified as undesirable and residents would have trouble getting a mortgage to purchase property in these neighborhoods.

Like many cities in the United States, Pittsburgh's neighborhoods were deeply affected by urban renewal which included the construction of highways and the Civic Arena (Fullilove, 2004). The Civic Arena was built in 1958 and surrounding roadways led to the demolition of housing in the lower Hill District, creating a barrier between the Hill District and downtown Pittsburgh (Fullilove, 2004). The Hill District had been a strong and cohesive African American neighborhood known for its jazz clubs and the home of playwright August Wilson and

photographer Teenie Harris. In her book, Fullilove defined root shock as "the traumatic stress reaction to the destruction of all or part of one's emotional ecosystem" (Fullilove, 2004). The physical changes in the neighborhood contributed to significant changes in the social and economic aspects of the neighborhood. Many of those who were displaced moved to other parts of the Hill District or to East Liberty or Homewood. Further isolating the Hill District was the removal of the funicular (Penn Incline) that connected the Hill District to Penn Avenue in the Strip District in 1953 (Fullilove, 2004). Residents of the Hill District relied upon the Penn Incline to commute to work and to shop in the market in the Strip District. Without the incline connecting the community to the Strip District and the street access to downtown through the Lower Hill, the residents were increasingly isolated. This includes the public housing residents who lived in Bedford Hill Apartments and Addison Terrace, two large public housing developments located in the Hill District.

In the 1960s HACP continued to expand its public housing inventory with 12 additional high-rise buildings throughout the city, and began to purchase scattered-site rental units throughout Pittsburgh. In 1976, HACP expanded housing options by implementing a housing choice voucher program which allowed residents to use a voucher to subsidize their rent in a privately-owned rental unit (HACP, 2019). During this time period, community organizing gained momentum and neighborhoods became more vocal about the changes occurring. Organizations such as ACTION housing developed as an advocate for these communities and to engage residents in the planning process (Lubove, 1996).

In the 1970s and 1980s, many of the area steel mills closed, Westinghouse cut jobs, and manufacturing and blue-collar jobs were lost. Between 1979 and 1987, the Pittsburgh metro area lost 127,500 manufacturing jobs (Trotter & Day, 2010). The transition from manufacturing jobs

to service and high-tech jobs was particularly difficult for African Americans in Pittsburgh and the number of black workers decreased from 9,400 in 1970 to 6,000 in 1980 (Trotter & Day, 2010). During this time period there was a conscious shift from manufacturing jobs toward health care and education sector employment (Lubove, 1996). While Pittsburgh was initially seen as a model for post-industrial redevelopment, the engagement of the nongovernmental sector was uneven across the city and wages for nonmanufacturing jobs stagnated (Deitrick, 1999). By 1990, 41% of Pittsburgh's black families were living in poverty and the unemployment rate for black men was 37%, compared to 13% unemployment rate among white men (Trotter & Day, 2010).

In the 1990s and 2000s, HACP aimed to deconcentrate subsidized housing and better integrate subsidized housing into communities (HACP, 2019), initially with HOPE VI projects. By 1990, 70% of the black residents in HACP public housing wanted to move out of public housing (Trotter & Day, 2010). Bedford Hills Apartments, the first public housing in Pennsylvania, was redeveloped through the HOPE VI program. The redevelopment was done in four phases and was finally completed in 2009. Aliquippa Terrace and Manchester public housing were also demolished and redeveloped through the HOPE VI program, which created new mixed-income communities (Deitrick & Ellis, 2004). Despite the housing being in desperate need for redevelopment, there were mixed feelings among the residents about the demolition. Some families welcomed the change, while others felt a strong sense of home in those buildings and were concerned about having to move out of their communities (Trotter & Day, 2010). Development in Pittsburgh continued and in 2009 the first phase of redevelopment at Garfield Heights was also completed.

In 2001 HACP was designated a moving to work (MTW) agency and was granted greater leverage to develop innovative policies to increase residents' self-sufficiency and improve cost-

efficiency (HACP, 2009). The redevelopment of the older properties has helped HACP to achieve all three goals of the MTW demonstration by reducing the cost of property maintenance and management, improve the provision of resident services, and to facilitate public-private partnerships allowing HACP to leverage public funds to attract private investment. In 2003, HACP began to shift to a site-based management approach which was modeled after the private sectors approach to property management. HACP found that the site-based management approach both improved rent collection rates and services to residents (HACP, 2009).

At the beginning of the study period, January 1, 2010, HACP was in the middle of its plan to redevelopment of the older public housing developments. Construction on the second phase of redevelopment at Aliquippa Terrace was underway. Rebranded as Oak Hill, the second phase of development included 670 units of mixed-income units including public housing, low income housing tax credit (LIHTC), and market-rate housing units. During the second phase of redevelopment, the Wadsworth Community Center was also updated. In the same year, the redevelopment of 88 public housing units at Bedford Hill was also completed, as well as the redevelopment of the first phase of mixed-finance redevelopment in Garfield using a combination of public funds, tax incentives, and private investment (HACP, 2009).

By the end of the study period, 2017, HACP had made significant changes to its housing inventory. In 2017, the redevelopment of Addison Terrace in the Hill District was nearing completion as 267 project-based vouchers and 13-market rate units were completed, and the first phase of the Choice Neighborhood Initiative in the Larimer neighborhood was completed, which included 28 project-based voucher units and the second phase of development, which would have 150 mixed-income units and 75 subsidized units in privately-owned housing, was under construction (HACP, 2009).

Figure 2 below shows a timeline of major national policy changes and HACP development, demolition, and programs. This shows that HACP's public housing inventory expanded rapidly in the 1940s – 1970s when those properties had fallen into disrepair and were no longer meeting the maintenance standards, HACP demolished many of its high-rise and large housing developments and replaced them with smaller mixed-income developments through the HOPE VI program and Choice Neighborhood Initiative.

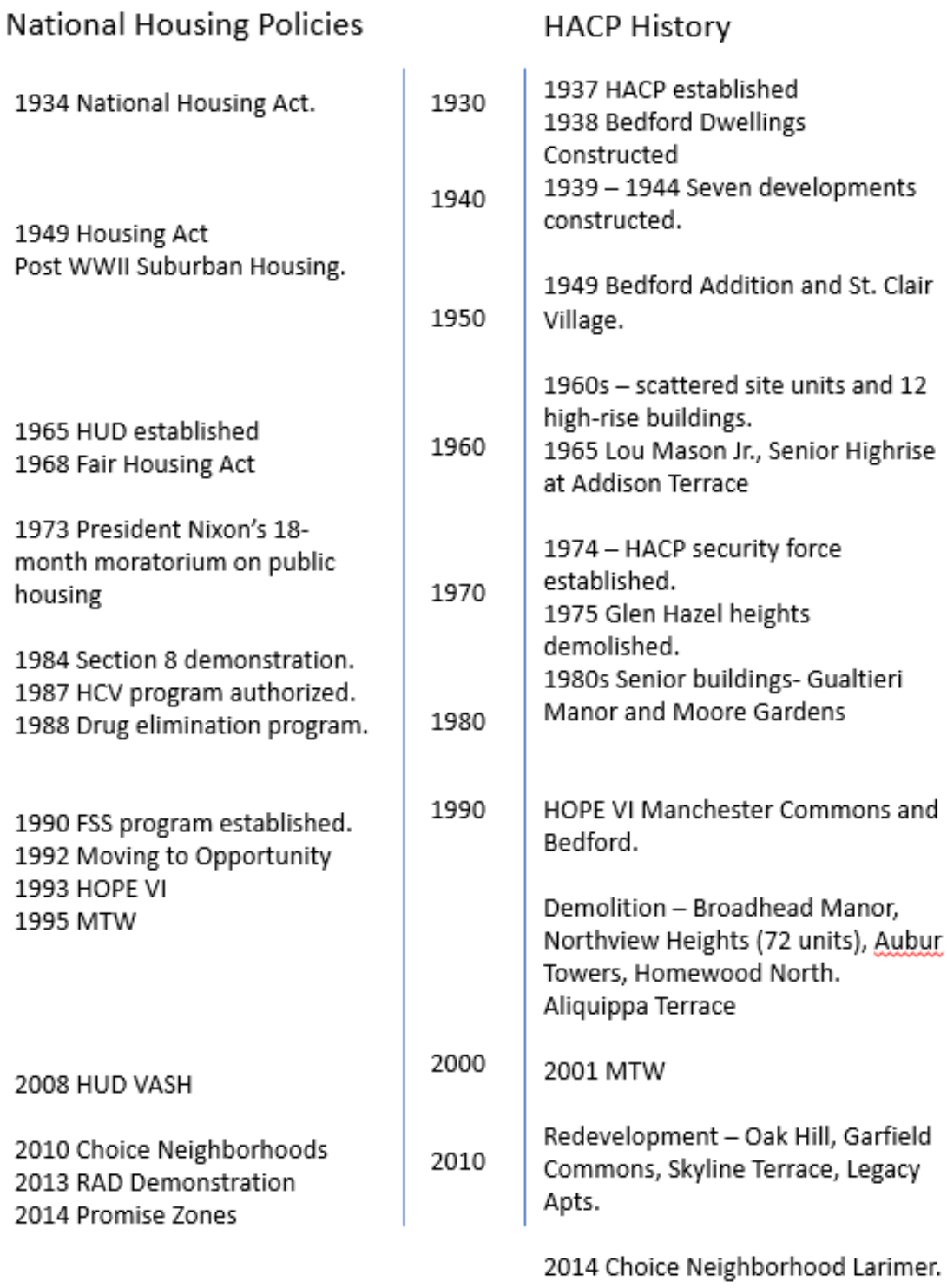

Figure 2-1. Timeline of major national housing policies and HACP initiatives

2.5 Current HACP Housing Development and Programs

HACP continues to redevelop older housing and to connect that residents to resources offered within the community. One example of these recent efforts is the $20 million Choice Neighborhood Initiative grant awarded to HACP in 2009, to redevelop public housing in Larimer. Building from the lessons of the HOPE VI program, the Choice Neighborhood Initiative takes a three-prong approach to redeveloping public housing communities: housing, people, and community. Along with redeveloping the public housing units, this initiative has also included broader community benefits including the redevelopment of parks and green space, reusing vacant buildings, development new community spaces, and providing employment and supportive services. By leveraging the federal funds and engaging with local partners, the Choice Neighborhood Initiative has benefitted local homeowners by providing funding for façade improvements for homes in the neighborhood.

Each public housing development partners with various community partners to offer services to its residents. Community partners provide education, employment, health, and food access programs to the public housing residents (HACP, 2019). These services are available to all residents regardless of their participation in the FSS program. The Bedford Hope Center, located in Bedford Dwellings in the Hill District, serves as a community center with a range of programs and services ranging from 24-hour childcare, computer labs, community rooms, to the creative arts center.

The evolution of housing programs in Pittsburgh reflects the development of national U.S. housing policy over the last ninety years. A more thorough explanation of U.S. housing policy and the political context is provided in the following chapter. Pittsburgh is an important case for understanding how those policies affect local communities and residents.

2.6 Conclusions Drawn from the Literature

Public housing in the United States has undergone significant changes during its history from slum clearance and improve housing conditions among the most vulnerable to efforts to house the working poor and provide the services and resources needed to improve their financial outcomes and achieve self-sufficiency. The FSS program is central to these efforts, yet the program is not effective. Numerous studies have indicated that the FSS program works for very few residents, yet the program remains largely unchanged. These questions may be answered by additional studies of more cities and the relationship between local job markets, housing authority policies, and FSS participant outcomes.

There is agreement in the literature that well designed and implemented FSS programs do lead to higher rates of employment, increased wages, and escrow savings among those who complete the program. However, there is no consensus on how to design and implement a successful FSS program that encourages and enables residents to achieve success. Many FSS programs have low participation rates and high rates of attrition, with few families making the move from subsidized to market-rate housing, which questions the definition of the term self-sufficiency. Housing policy scholars offer little evidence on the factors that lead to successful FSS programs and the relationship between participants, place, and programs. We know that these programs can help those who complete the program, but we're not entirely sure why. We also don't know what the optimal program looks like, how to leverage resources efficiently, nor do we understand the factors that lead to program attrition.

This leads us to conclude that the FSS program is a promising avenue for reducing poverty, enabling families to realize better outcomes for their families, and could lead to some families

being successful in market-rate housing. However, as it is currently designed, the program is not leading to successful outcomes for most of the participants.

The FSS program is designed with the expectation that participants will develop a plan, make consistent and linear progress meeting milestones during the program, and will continue to improve in accordance with the set plan, which is inconsistent with the literature. In the current literature on the relationship between housing and self-sufficiency, there are three types of studies; studies of the relationship between housing subsidies and work, studies on housing subsidies paired with services, and studies of housing subsidies and work incentives (Newman, 2008). This dissertation aims to partially bridge this gap, by offering a city-level study that examines the relationship between the increased minimum rent which serves as both a pseudo work requirement and financial incentive to enroll in the FSS program, and the outcomes of the households that receive the services from FSS program.

3.0 Methodology

The primary objective of this study is to determine whether and when FSS participants leave the FSS program prior to completion. The focus of this analysis are the households that left the FSS program prior to completion and explaining which participants are more likely to leave the program prior to completion than others. The dependent variable in this study is exit from the FSS program. The contribution that this study makes to the literature is its examination on FSS program exit using the event history analysis framework. The focus on the households that did not complete the program, as opposed to those who did, allows for a clearer analysis of the barriers to completing the self-sufficiency program.

My main critique of the FSS program is that it assumes that the participants will develop and follow a linear path to self-sufficiency, meeting their pre-selected milestones in a timely fashion as they gradually and incrementally move toward self-sufficiency. This underlying assumption of the FSS program is not realistic for the participants. This assumption does not acknowledge the complexity of poverty and the dynamics in a household over a five-year period.

My analysis of HACP's administrative data confirms that a very small percentage of FSS participants complete the program, that finding is consistent with the literature. My analysis also shows is that a high percentage of FSS participants move from HACP public housing while enrolled in the FSS program. Additionally, this analysis also examines changes within the household, such as moves within HACP housing, change in the number of household members, and changes in income during the program.

The Family Self Sufficiency (FSS) participants at the Housing Authority of the City of Pittsburgh (HACP) and their outcomes in the in the program are the primary focus of this study. This study determines the number of participants who left prior to completion, when they left the program, when they left the program, and explores some possible explanations for their exit. To answer these questions, I used administrative data from HACP and an event history analysis framework. This chapter provides additional context for this study by providing a preliminary description of the study subjects, the public housing and housing choice voucher households that participated in the FSS program, and HACP's FSS program design. After providing the background for this study, I will describe the data that is used in this study and discuss the limitations of the data. That explanation will lead into a discussion about event history analysis and why this methodological framework was selected for this study, how those methods answer the questions asked and the available data. That will lead into a very detailed discussion of the research questions, the use of the data, the selected variables and their measurement, and the methods that were used to this study. Finally, I will provide a brief summary of the chapter that will put all the pieces together and lead into Chapters 4 and 5 which provide the findings for this study.

3.1 Context for this study

While the FSS program is intended for work-able residents under the age of 62, all HACP public housing and housing choice voucher residents are eligible to participate in the FSS program. In 2017, the last year of this study, there were 2,381 families residing in public housing and 6,894 families with housing choice vouchers in the City of Pittsburgh (HACP, 2017). At the end of the

previous chapter, I discussed the demolition and redevelopment of many of the large public housing buildings in Pittsburgh. When the public housing developments were rebuilt, the new communities had far fewer public housing units than the building they replaced. During the demolition and redevelopment process, residents were either relocated in available public housing in other communities or given a housing choice voucher. During this study there was redevelopment of public housing buildings. During the redevelopment, residents were either moved to other public housing buildings or given a tenant protection voucher, which works similarly to a housing choice voucher. The tenant protection voucher allows the resident to rent a rental unit from the private rental market, provided that it met the requirements for the physical inspection, fell within the Fair Market Rent guidelines, and the landlord agreed to accept the voucher. When the redevelopment of the public housing communities was complete, there were fewer public housing units and, in some instances, residents were able to return to the new community and in other cases, they remained in housing that they moved to. This further contributed to the expansion of the housing choice voucher program. This is very important because this study will show that there are systematic differences between the public housing and housing choice voucher households in terms of the characteristics of the residents and the ability to provide services to those tenants. The widespread demolition of public housing units and shift to vouchers occurred after the FSS program was designed, and the FSS program was not adjusted to respond to those changes in the housing programs. This is further evidence that the FSS program design should be reconsidered as it may be beneficial to redesign the program for the HCV households.

The demand for subsidized housing in Pittsburgh far exceeds the supply. HACP cannot meet the demand for subsidized housing and, due to the high number of applicants on the waiting

lists, the waiting lists for many public housing developments and the housing choice voucher program are usually closed. HACP periodically opens the HCV waiting list for a short period of time to add new applications to the waiting list. The most recent period when HACP accepted HCV applications was in December 2018. Before that, the last time that HACP accepted HCV applications was in Fall 2015, when the housing authority received approximately 7,000 applications (HACP, 2017). HACP uses a site-based waiting list for its public housing where residents can apply to reside in specific public housing buildings. Site-based waiting lists allow the applicants to select the communities where they would like to live and since residents aren't randomly assigned to housing units, there may be differences between the residents in different housing communities. For instance, those who apply to live in scattered-site housing may be different from the residents who apply to live in apartment buildings, or those who apply to live in one part of the city could differ from those who apply to live in a different part of the city.

Waiting lists are periodically opened for a short period of time ranging from two weeks to a month. When the waiting lists are opened, HACP advertises the opportunity in the local newspaper, on its website, and on social media. HACP accepts housing applications through its website, and applicants who do not have Internet access or need additional assistance can visit HACP's office to use a computer to apply for housing. Applications are reviewed by HACP staff to ensure that the applicant is eligible, and the application is complete, then the applications are randomly assigned to a position on the waiting list. In many cases applicants wait more than a year for a housing unit to become available. When an applicant nears the top of the waiting list, the applicant is contacted to ensure that he or she is still interested and eligible for housing. When a public housing unit or housing choice voucher becomes available, the applicant goes through the screening process, confirms that they are income-eligible, and the housing authority completes the

background and credit check. If the applicant passes the screening process, their rent is calculated based on their income and the household either moves into public housing or issued their housing choice voucher.

Households in need of housing assistance often wait years for the opportunity to apply for housing and then spend years waiting for housing. The online application process and the relatively short application window makes it difficult for the most vulnerable households to apply for housing.

Households earning less than 80% of the Area Median Income (AMI) are income-eligible for public housing and those earning less than 50% are income-eligible for the housing choice voucher program. Table 3.1 Below shows the area median income for the Pittsburgh metropolitan statistical area at the beginning of this study period in 2010 and the end of the study period in 2017. Eligibility for public housing and the housing choice voucher program is calculated based on the metropolitan statistical area, which has higher median income than the City of Pittsburgh.

Table 3-1. Area Median Income for Pittsburgh Metro Statistical Area and City of Pittsburgh in 2000 and 2017

	2010	2017
City of Pittsburgh Median Income	$36,019	$44,092*
Pittsburgh MSA Median Income	$67,000	$72,000
80% of AMI (Family of Four)	$50,400	$36,300
50% of AMI (Family of Four)	$31,000	$36,300

Source: HUD User: https://www.huduser.gov/portal/datasets/il.html#2017
Source: American Factfinder https://factfinder.census.gov/faces/tableservices/jsf/pages/productview.xhtml?src=CF
**American Community Survey 2013- 2017*

After an HCV household is issued a voucher, the resident finds a rental unit on the private rental market. If the landlord is willing to accept the voucher, the rent falls within HUD's fair

market rent guidelines. When the unit passes inspection, the resident signs the lease. In Pittsburgh, the fair market rent for a two-bedroom apartment was $730 in 2010 and $822 in 2017. After this study period, HACP has used its MTW status to develop small area fair market rent, using zip codes to determine the fair market rent instead of the metropolitan statistical area. That will allow HACP to adjust the value of the voucher to reflect the housing costs in the zip code rather than the region at large. This will increase housing choices for voucher holders by giving them access to neighborhoods that otherwise may not have had rental housing that fell within the MSA-level fair market rent levels.

Participants in HACP's FSS program successfully navigated the application process, met HACP's screening criteria, and either accepted a public housing unit or completed the process of leasing a rental unit with a voucher. Chapters 4 and 5 will discuss FSS participant characteristics relevant to this study such as: race, age, sex, household composition, household income, and housing location.

3.2 HACP's Minimum Rent Policy and FSS Program Design

The first chapter provided an explanation of the FSS program goals and design and the previous chapter provided an explanation of the MTW demonstration and the ways that housing authorities in the MTW can develop their own programs and policies to further resident's self-sufficiency and reduce costs to the housing authority. This section explains HACP's increased minimum rent policy and its connection to the FSS program. This policy is very important to understanding the extra incentive that HACP residents earning incomes less than $6,000 have to enroll and remain in the FSS program. This work builds off of a 2018 study by Deitrick and Bert

which examined the impact of the increased minimum rent policy on FSS enrollment. That study concluded that the increased minimum rent policy was not a strong incentive for residents to enroll in the FSS program (Deitrick & Bert, 2018). This study builds upon that work and aims to determine whether the increased minimum rent policy is an incentive for residents to remain in the FSS program after they enroll.

As an MTW agency, HACP changed its minimum rent policy in 2010 for Public Housing residents and in 2011 Housing Choice Voucher households. The policy increased the minimum rent for Public Housing households from $25 to $150 and increased the minimum rent for Housing Choice Voucher households from $50 to $150 for households in the housing choice voucher program.

The minimum rent policy had two objectives:

1. To incentivize households without wage income to participate in the Family Self-Sufficiency (FSS) program; and
2. To increase rent revenue for the HACP.

At first glance, these could be regarded as conflicting goals. Participation in FSS means households pay substantially lower monthly rent payments. That also means that HACP collects less from them in rent. Households that enroll in the FSS program and have higher incomes in the future will pay higher rents to the housing authority because residents pay a rent that is roughly 30% of their monthly income. As their income increases, so does the rent payment. Alternatively, those household may choose to leave subsidized housing and rent from the private rental market, which frees up their housing subsidy for another household to use. These outcomes are all compatible with the HACP's goals and the goals of the MTW demonstration. If the household

does not enroll in the FSS program, HACP charges a higher rent which increases its rent revenue. Either way, there is a benefit to the housing authority, either the household pays higher rent because their income increased through the FSS program, or the resident was charged a higher rent through the increased minimum rent policy.

The increased minimum rent policy affects households that earn less than approximately $500 per month, because those households have an income-based rent that is calculated at less than $150 per month because tenants pay roughly 30% of their monthly gross income in rent. The minimum rent policy does not affect households with an adjusted monthly income greater than $500, because those households have an income-based rent calculated at more than $150 per month. Others who are exempt from the new minimum rent policy include:

1. Households headed by senior citizens;
2. Those with disabilities that prevent them from working;
3. Those with an approved hardship exemption; and
4. Recipients of full Temporary Assistance to Needy Families (TANF) benefits.

For those households earning less than $500 per month who choose not to participate in the FSS program, HACP collects an additional $100 per month or $1,200 per year from housing choice voucher households and $125 per month or $1,500 from public housing residents in rent payments. HACP depends upon rent revenue as part of its budget and satisfies the first goal of the MTW demonstration, to increase cost efficiency. The increased minimum rent policy and FSS program address the third goal of the MTW demonstration in a more indirect manner. While not a stated goal of the FSS program, the underlying theory of the FSS program lies on the theory of subsidized

housing as a platform for improving the quality of life. The theory is that affordable housing provides the stability families need to address other challenges related to education and employment. When a family has stable and affordable housing, the family can then focus on addressing its barriers to self-sufficiency. As residents begin to earn more money and establish savings, they will be able to move to market-rate housing. By enabling families to realize self-sufficiency, HACP is increasing the number of housing choices available to the family. Some FSS participants enter homeownership programs or move to the private rental market. The FSS program is an important part of the MTW demonstration. Each housing authority tailors its program to meet the needs of its residents and to best utilize the available resources.

Aside from the increased minimum rent policy, HACP's FSS program follows the typical FSS program design that was described in the introduction and throughout this study. HACP's FSS program provides numerous services and programs related to education, employment, health, that are available to adults and their families. Educational programs include classes at Allegheny Community College, health professionals training program, computer training, GED prep, and driver's education. HACP also provides numerous employment services including: resume writing, interview preparation, job fairs, and assistance with finding clothing for job interviews. HACP also has programs to assist young justice-involved residents and a program promoting a drug-free lifestyle. Additionally, HACP partners with Catholic Charities and 412 Food Rescue to provide essentials to low-income residents in need of assistance with food and clothing. Programs for children include: community gardening, afterschool and summer programs, and the creative arts corner, with recording studios are located in the Bedford Hope Center and at Northview Heights (HACP, 2019).

3.3 HACP Administrative Data

The administrative data used in this study comes from HACP's data program that was designed to submit data to HUD electronically. The priority is placed on the last record that is submitted to HUD, and that is the record that is most commonly and easily viewed, and HUD rarely conducts longitudinal studies looking at changes over time. HUD's priority when it reviews the administrative data is to see the overall occupancy rate and to ensure that the rents are calculated properly. This is important to understanding the what data was collected and how the system is designed because it led to a large and complicated dataset. This section will further explain the data collection and cleaning process, as well as the limitations of the dataset.

3.3.1 Data Collection

All public housing authorities are required to collect data about public housing and housing choice voucher households and submit the data to HUD in accordance with federal regulations through the Public Housing Information Center (PIC) (HUD, 2016). The data are used by HUD for regular monitoring to ensure that the housing authorities are administering the housing programs in accordance with the regulations. These data are recorded on the standard HUD-50058 form, used by all housing authorities. Housing authorities are required to enter information about each household at the time that they enter and exit housing, and, at minimum, on a biennial basis while the household lives in subsidized housing. Housing authority staff are also required to make an entry when the household experiences a change in income or household composition. The main reasons for these entries are to show public housing occupancy, housing choice voucher utilization, and ensure that the housing authority is charging households the correct amount of rent.

A record is created in the system when a new resident enters the housing program. For public housing residents, that record is given an action code of 1, to indicate that the record was created for a new admission to the housing program. After the household is admitted to HACP housing, the staff conducts a recertification every two years, to confirm that there haven't been any changes in household size or income. The staff member then submits a new record to the system with action code 2, annual recertification. When there are changes in the household's income or composition between the biennial certifications, a new action is made using code 3 "interim reexamination." Residents are responsible for alerting the housing authority to changes in their household or income, but there is an additional safeguard. HUD uses the Enterprise Income Verification (EIV) system, which communicates with the Social Security Administration to ensure that all changes in income are reported. Therefore, the Housing Authority is not relying solely upon the household to report their changes in income. Because the rent is calculated as a percentage of the household's income, residents are incentivized to report any decrease in income immediately, while they are disincentivized the report any increase in income, as that would lead to an increase in their rent payment. The EIV system ensures that the housing authority has an accurate income reported for each household at all times.

For housing choice voucher households, the record differs slightly, for those households the first record is given action code 10, issuance of voucher. This reports to HUD that the housing authority has issued a voucher to that household and they are currently seeking a rental unit from the private market that adheres to the fair market rent parameters and meets the inspection standards. After the household with the voucher locates a suitable unit and signs the lease, the next entry in the record as an Action Code 1, New Admission.

The action codes used in this study, either as part of the data cleaning or data analysis are listed below with a brief description.

Table 3-2 HUD 50058 Action Codes

Action Code	Name	Description
1	New Admission	Used when a public housing household enters housing and when an HCV household leases a rental unit.
2	Annual re-examination	Routine examination conducted every two years
3	Interim re-examination	Conducted when income or household size changes between the bi-annual re-examinations
4	Portability Move-in (HCV)	An HCV household moved to Pittsburgh from another housing authority and will use their voucher in Pittsburgh
5	Portability Move-Out (HCV)	A HACP HCV household moves to another housing authority and will continue to use its voucher.
6	End of participation	Left HACP housing
7	Change of unit	Moved from one HACP public housing unit to another HACP public housing unit.
14	Historical Readjustment	Corrects a prior record
15	Void	Voids the record immediately before this entry

3.3.2 Data Cleaning

In 2017, HACP and the University of Pittsburgh's University Center for Social and Urban Research (UCSUR) partnered on two projects (Deitrick & Bert, 2018; Blackhurst & Briem, 2018; Blackhurst, et al., 2019). One was a study of the small area fair market rent in the City of Pittsburgh, to determine a better payment standard for the HCV program. Prior to the study, HACP used the metropolitan statistical area to calculate fair market rent for the voucher program. This study provided the data necessary for a policy change from the MSA level to the zip code level.

The second study was an evaluation of the increased minimum rent policy to determine the extent to which that policy incentivized households earning less than $6,000 per year to enroll in the FSS program. The study also calculated the increase in rent revenue for HACP from the households that paid the increased minimum rent of $150 per month. The data used in this dissertation is the dataset that was collected for the increased minimum rent study.

HACP collected the data for this set of studies by generating a report of its records from 2010 to 2017. The HUD-50058 form requests information to identify the resident, demographic information, household information, information about the household's income, information about the housing authority's rent calculation for that particular household, and information about services received by the household. For this study, HACP provided only de-identified data. Typically, households are identifiable by the social security number or name of the head of household. HACP removed that information and replaced it with a unique household identifier. Each record containing a separate transaction number, date that the record was submitted, effective date, and action code, allowing a household's records to remain together sequentially for analysis.

The initial dataset included duplicate entries and data that had been voided or corrected by the housing authority. The data had to be cleaned so that only the correct entries appeared in the dataset that was used in this analysis.

3.3.3 Abilities and Limitations of the Data

As explained above, the data from HACP are primarily used by HUD to ensure that the housing authority maintains an acceptable public housing occupancy and housing choice voucher utilization levels and that the rents are calculated properly. While the housing authority does collect additional information on its FSS program, that data was not included in the dataset,

because the dataset was initially created for the two UCSUR studies. Unfortunately, the information on residents' level of education, services received while in the FSS program, use of escrow funds and sources of income were not available for this study.

Those limitations aside, this data does record every change in household location, income, and household composition throughout the household's participation in the FSS program as well as basic information about the participants such as: age, race, and sex. Each change in the data are date stamped allowing for a very thorough understanding of changes in this household during FSS participation. These data are important to answering the questions about whether and when the participants left the FSS program and the changes that occurred in household's during FSS participation. The following section will explain how these data are used in the event history analysis framework.

3.4 HACP FSS Program and Event History Analysis

The administrative data collected by HACP from January 1, 2010 to October 1, 2017, included all of the entries made to the system during that time period. Those entries included data on the household demographics and composition, household location, and income. Because I had multiple entries for each household, I was able to identify changes in household composition, location, and income during the study period. I was also able to identify the point when households entered and left FSS, which allowed me to calculate the length of FSS participation. This data were ideal for an event history analysis that aimed to determine whether and when households left the FSS program.

3.4.1 HACP FSS Program Design

The figure at the end of this subsection depicts the various paths that residents could follow while in HACP's public housing or housing choice voucher programs. The figure starts with all residents of an HACP housing program. Households with a head of household that is over the age of 62 or has a disability that prevents them from working are not considered to be work-able. Those households may reside in housing that is designated for seniors or persons with physical disabilities, or they may live in a general occupancy "family" development. Those households are not subject to HACP's increased minimum rent policy and, while they are certainly welcome to participate in the FSS program and receive services from HACP, they are not the target audience of the FSS program.

While all residents in HACP's housing programs are eligible for the FSS program, the program is designed for households with a head of household who is under the age of 62 and without a disability that prevents them from working. The households with a head of household that is over the age of 62 or have a disability that prevents them from working are not subject to the increased minimum rent policy. FSS participation is voluntary and is available to residents in both the public housing and housing choice voucher programs. Residents can voluntarily enter or exit the FSS program at any time and for any reason. Residents who earn monthly incomes of more than $500 pay roughly 30% of their monthly income in rent, $150 or more regardless of whether they are enrolled in the FSS program. Households earning less than $500 per month have the option to enroll in the FSS program and continue paying the same amount in rent, but if they do not enroll in the FSS program, they will be charged $150 in rent, in accordance with HACP's increased minimum rent policy. Households that initially opt to pay the increased minimum rent of $150 always have the option of enrolling in the FSS program and paying the higher of 30% of

their monthly income in rent or the former minimum rent of $25 for public housing households and $50 for housing choice voucher households.

For the households that enroll in the FSS program, they will follow the FSS program rules and working with their service coordinator to develop their personalized Individualized Training and Service Plan (ITSP) and begin to take strides toward self-sufficiency by addressing their personal barriers to employment. If the participant does not make satisfactory progress toward their goals in accordance, they can be dismissed from the FSS program. Those households are then subjected to the increased minimum rent if their household income is less than $500. If their income is higher than $500, they pay income-based rent of 30% of their monthly income.

As mentioned earlier, another reason that participants commonly leave the FSS program is that they leave HACP housing and either move to market-rate housing, or in some cases, transfer to housing provided by a different housing authority. If the FSS participant is in good standing when they leave HACP housing, they receive their escrow savings. If they transfer to a different housing authority, their escrow account transfers with them, and they resume the FSS program at the other housing authority.

For the households that remain in the FSS program for the full five-year program, achieve the goals set forth in their ITSP, and are free from other forms of public assistance for one year prior to FSS completion, they graduate from the FSS program and receive their escrow savings in a lump sum. Those households may remain in HACP after FSS completion, and will pay income-based rent, 30% of the household's income. Figure 3 below shows this process in a flow chart.

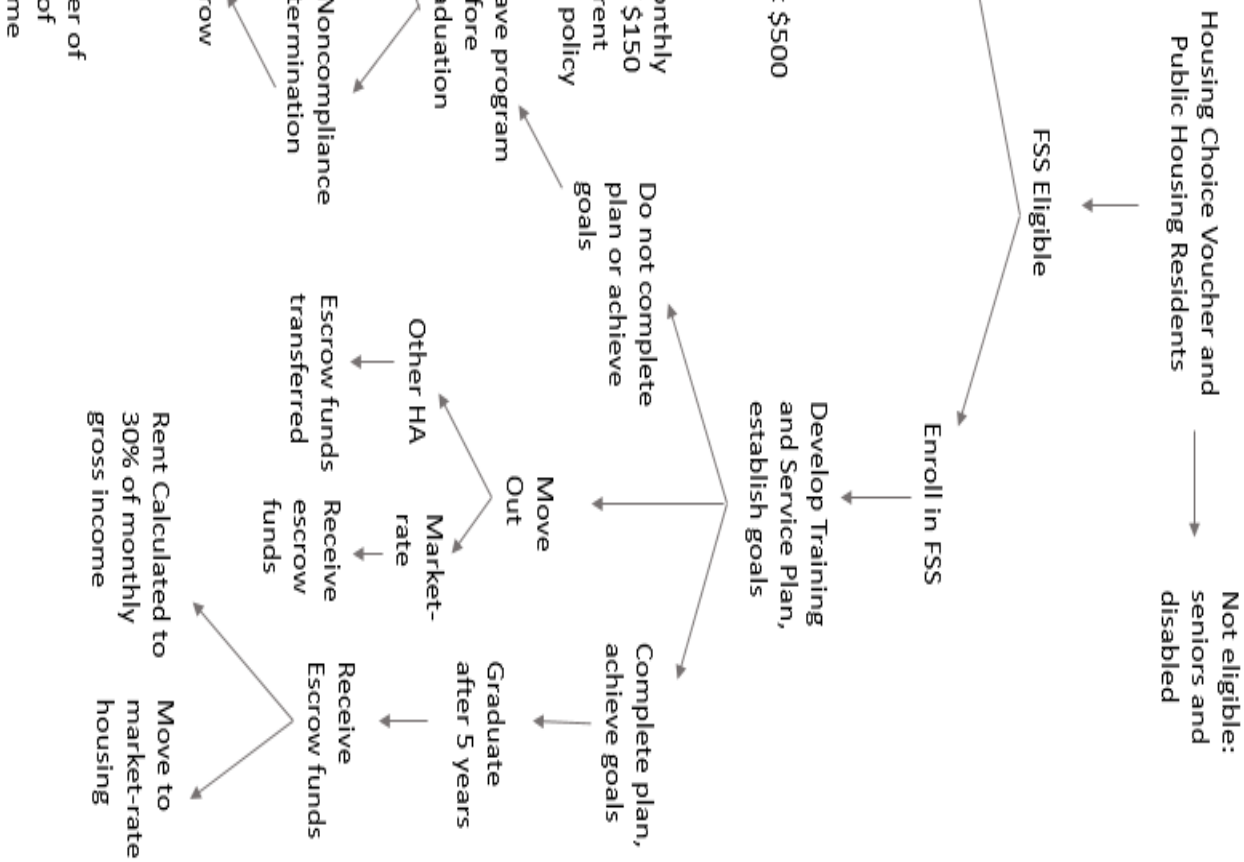

Figure 3-1 HACP FSS program and Increased Minimum Rent policy.

The process described above reflects the FSS program design but does not consider other changes within participants' households while they are participating in the FSS program. The analysis in the following two chapters will show that many FSS participants experience significant changes within their households while enrolled in the FSS program. These changes include moves

within HACP housing, changes in their household composition, and income variability as participants are employed and unemployed.

3.4.2 Event History Analysis Framework

Event History Analysis, also called survival analysis, is often used in medical research to better understand a patient's likelihood of survival after a medical intervention. It is also widely used in engineering to measure the lifespan of a machine, bridge, or other product. This method can also be applied to social sciences and any other discipline when researchers are trying to answer questions about whether or when a particular event will occur (Box-Steffensmeir & Jones, 2004). Event history analysis is appropriate for this study because we are interested in knowing whether an FSS participant left the FSS program, and if so, when did they leave the program. Event history analysis allows for an examination of all of the households that entered the FSS program after January 1, 2010 to calculate the length of time that the participant was in the program. The households that did not complete the program or remained in the FSS program at the end of the study period are included in the models for the period that their participation was observed. This allows for a much richer analysis because it includes a larger number of study subjects.

Because so many participants left the program prior to completion, it would be difficult to use typical longitudinal analysis techniques because there would be very unbalanced panels and so few participants have 60 observations. Event history analysis is specifically designed for datasets such as this where there is a high rate of attrition from a program. There are two data requirements for an event history analysis. First, there has to be a failure event that represents the dependent variable that is being explained. In this study, the failure event being explained is

withdrawing from the FSS program prior to completion. Second, there has to be a consistent measurement of time to event (Singer & Willet, 2003; Cleves, et al. 2016). In this study, the measurement of time is in months. This dataset has satisfied both of these requirements.

In the following section, I will revisit the research questions and provide the details about why those research questions were selected, and how the data was used to answer those questions.

3.5 Research Questions and Variables

This research answers three questions about HACP's FSS program using an event history analysis framework.

3.5.1 Research Question 1: What are the outcomes of FSS participation?

The first step in this analysis was to identify the outcomes of FSS participation. There are four possible outcomes of FSS participation.

1.) Participant left the FSS program prior to completing the 60-month program but remained in HACP housing. These households are the focus of this study.
2.) Participant completed 60-months in the FSS program.
3.) Participant moved from HACP housing while enrolled in the FSS program, and thus left the FSS program.
4.) Participant remained in the FSS program on October 1, 2017, the last day of the study period.

This analysis starts by identifying the households that were enrolled in the FSS program for any period of time during the study period, which started January 1, 2010 and ended on October 1, 2017. After identifying the households that participated in the program, I then identified the households that entered the program prior to the beginning of the study period. Because the households entered the FSS prior to the beginning of the study period, their entry to the FSS program was not observed and their length of FSS participation cannot be calculated and their outcomes in the FSS program cannot be determined.

In this study, time is measured in terms of the length of FSS participation. The time of FSS entry is T=0 and the length of program participation is measured by the number of months in the program between 1 and 60. Participants who remained in the FSS program for 60 months reached the end of 5-years in the FSS program and have completed the full term of the program. Months were selected as the unit of analysis because households pay rent on a daily basis and any change in rent goes into effect on the first day of the following month. By examining the data at the month level, I was able to offer a finer analysis than if the analysis was done by year. Using the month as the unit of analysis allows for up to 60 observations per households, whereas an analysis using year as the unit of time would only offer up to five observations per household.

In addition to identifying whether or when an event occurs, event history analysis is useful in instances when data is censored, meaning that there is only a partial record for a particular participant where either FSS entry or exit were not observed (Box-Steffensmeier & Jones, 2004; Singer & Willet, 2003). In this study there are three reasons why a participant's data may be censored.

1. Left censored – a participant entered the FSS program prior to the beginning of the study period, January 1, 2010 and the participants' entry to the FSS program is not

observed. Therefore, their length of FSS participation cannot be determined. As described above, these households were not included in the analysis as their length of participation and outcomes could not be determined.

2. Right censored – the participant remained in the FSS program on the last day of the study period, October 1, 2017, and their outcome in the FSS program was not captured in the dataset. While the outcomes of these participants cannot be determined, they are included in the dataset for the period of time they are observed.

3. Moved from HACP housing – these participants moved from HACP housing while enrolled in the FSS program and their outcome in the FSS program cannot be determined. It is impossible to determine whether those households would have completed the FSS program had they not moved from HACP housing. For statistical purposes, these participants are treated like the right censored participants and are included in the study for the period of time during which they were observed.

Figure 3-2 below shows the four possible outcomes of participants in this FSS study. Again, the left censored households were not included. As an example, the first scenario (from top to bottom) shows a household that left the FSS program after 7 months of participation. This household left the FSS program but remained in HACP housing. This is the group of participants that are the focus of the study and their exit is the event that is being explained by the analysis. The second scenario shows a participant who remained in the FSS program for 60 months, even though the figure only captures the first 16 months and completed the FSS program. The third scenario shows a participant moved out of HACP housing after only 3 months in the program.

This household was handled the same way as the right censored households, and its data was included in the analysis for the three months that the household was observed. The fourth and final scenario is that the household remained in the FSS program on October 1, 2017, the last day of the study period and is considered right censored. In this example, the household was only observed in the dataset for the first 12 months of its FSS participation. The data for those 12 months is included in the study, but the final outcome is unknown.

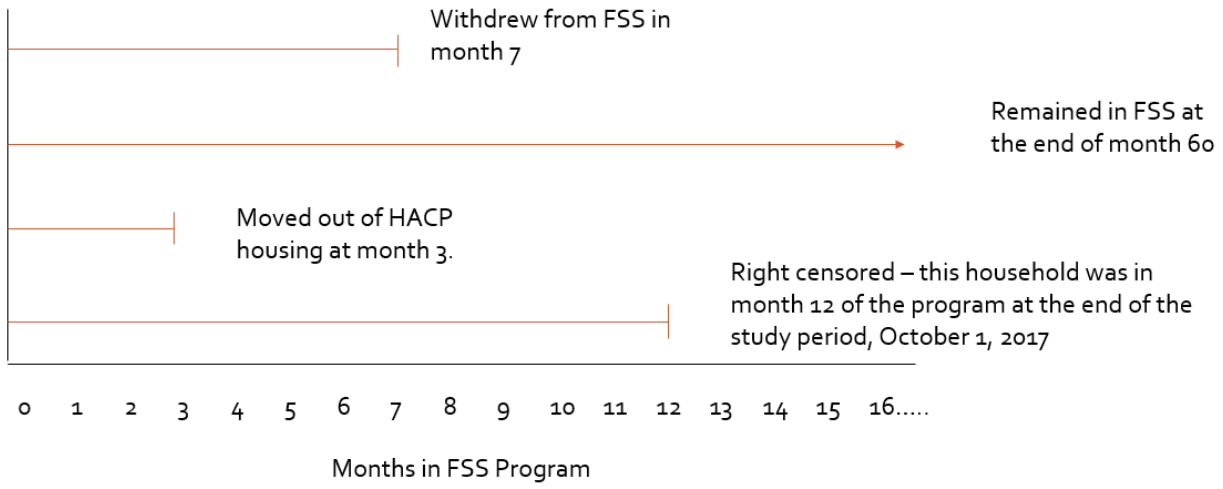

Figure 3-2 Possible Outcomes of FSS Participation

The expectation of HACP is that the increased minimum rent policy will create a sufficient financial incentive for its residents earning less than $500 per month to enter the FSS program and once in the FSS program, the residents will work with their service coordinator to establish a plan to achieve self-sufficiency during the five-year program. In the next two chapters, I will show that the program is not working as HACP had intended. The increased minimum rent policy did not create a sufficient incentive for residents to enroll in the FSS program, and those who did enroll, are unlikely to remain in the program. The figure on the following page compares the ideal

scenario, where the FSS participant follows the expected linear path through the program making incremental progress along the way. The figure also shows some of the other possible outcomes of participants and some of the factors that may contribute to those outcomes. This list of alternative scenarios is not exhaustive and represents only some of the scenarios that occurred for FSS participants.

Figure 3-3 Scenarios for FSS Outcomes

3.5.2 Research Question 2: When are FSS participants most likely to leave the FSS program?

After determining the outcomes of FSS participation, I wanted to know whether there were certain times when households were more likely to leave the FSS program than others. First, I tested seasonal effects to determine whether there were particular times during the year when residents were more likely to leave the program. I expected to find that residents may be more likely to leave the program in the summer when children are out of school because there is a change in childcare responsibilities. I also expected to find that there may be changes in FSS participation around the winter holidays when there may be a change in seasonal work patterns.

After testing seasonal effects, I then tested to see whether there was a particular point in the program when households were likely to leave. Using the event history analysis framework described in the previous section, I calculated the length of FSS participation for each household in terms of the number of months they participated in the program. I then constructed two life tables, one for public housing and the other for housing choice vouchers. The life tables are discussed in greater detail in Chapters 4 and 5, that present the findings of the analysis and the tables are in Appendix A.

The tables also show the number of households that withdraw from the FSS program each month, the number of households that moved from HACP housing during the month, and the number of participants that were right censored at the end of the month. The life table identifies the median lifetime, or the point when 50% of the participants remained in the program. This point is very important to identify as it allows for an understanding of whether participants tend to leave early or late in program participation.

The table is also used to calculate the hazard function, or the proportion of the participants at the beginning of the month who left during the month, and the survival function, the participants that were still enrolled in the FSS program at the end of the month. The life table allows for identification of periods of time in the program when participants were more likely to withdraw from FSS. The table for the public housing households is in Chapter 4 and the life table for the housing choice voucher households is in Chapter 5. The life table is also the basis for the Kaplan-Meier survival estimates that were used throughout this study as a way of graphically showing when participants leave the program. That analysis is described in greater detail in the following section about the possible explanations for FSS program exit.

3.5.3 Research Question 3: What explains exit from the FSS program?

After answering the first two questions, whether and when households leave the FSS program, I wanted to explore some of the factors that may explain FSS program exit. Based on the literature and conversations with HACP staff, I developed two hypotheses for explaining exit from the FSS program. The first hypothesis is that household characteristics can explain the likelihood of an FSS participant leaving the FSS program prior to completing five years in the program. The second hypothesis is that FSS program characteristics that were created by HACP and HUD can explain the likelihood that a participant will leave the FSS program prior to completion. The null hypothesis is that household and program characteristics do not explain exit from the FSS program.

3.5.3.1 Hypothesis 1: Household Characteristics.

There were four variables that were tested in the household characteristic hypothesis: household income at the time of FSS entry, whether the household moved within HACP housing during the FSS program, and whether there was a change in household composition during participation in the FSS program[3].

1. Children under the age of 18 in the household.

Households with children under the age of 18 may be less likely to complete the FSS program because of childcare responsibilities and may have less time to complete the FSS program. These were recorded as a binary variable, either there were children under the age of 18 in the household or there were not. Additionally, I tested variables preschool and school-aged children to see if there was a difference in the likelihood of leaving the FSS program prior to completion in households with preschool children who were under the age of 5 and households with school-aged children between the ages of 5 and 17. This builds off of prior FSS evaluations that tested whether having children in the household impacted the likelihood of FSS completion (Anthony, 2005; Kleit & Rohe, 2015). There were contradictory findings in the literature, so this variable is included in this study to determine whether having children in the household impacted the likelihood of FSS completion for HACP residents.

2. Changes in household composition

[3] Race was not considered in this analysis because more than 90% of heads of household were Black.

Similarly, I was also interested in knowing whether households that had family members entering or leaving the household were as likely to complete the program as households that did not have changes in household composition. Households that had an adult leaving the household may be less likely to complete the FSS program because of changes in their household responsibilities. Also, households that had additions to the household may also be less likely to complete the program because of a change in their household responsibilities. The variable "HH change" indicated whether or not there was a change in household composition during participation in the FSS program. Households with at least one change in the number of household members received a "1" while households with the same number of occupants during FSS participation received a "0."

3. Household Location and Moves

The underlying objective of public housing and housing choice vouchers is to provide stable housing. As discussed in Chapter 2, frequent moves can be disruptive to households and can make it difficult for residents to improve their educational, health, and employment outcomes (Manzo, et al.,2008; Bogle, et al., 2016). Subsidized housing paired with the FSS program aim to create a stable platform for improving the quality of life while providing resources and services needed for residents to achieve their goals (HUD, 2010; Riccio & Babcock, 2014).

While income-based rent payments do provide some stability, it is still not uncommon for public housing and housing choice voucher residents to move within HACP housing while participating in the FSS program. These moves may be voluntary or involuntary. Voluntary moves are done at the residents' request and may be a move to a community that is closer to family or employment or may be to a housing unit that the resident prefers. Involuntary moves occur

when HACP is redeveloping its property or repairs need to be performed on a particular unit. While there aren't any indicators in the dataset about whether the moves are voluntary or involuntary, Addison Terrace was redeveloped during this study period and caused involuntary moves (HACP, 2016). I was interested in understanding whether households that moved within HACP housing were as likely to complete the FSS program as households that remained in the same housing unit for the duration of its FSS participation. This builds off of the Moving to Opportunity and housing mobility literature discussed in Chapter 2. I created a variable named "moves" by determining whether a household had multiple addresses listed while they participated in FSS. Households with two or more addresses listed received a "1" while households that only had one address listed received a "0".

4. Income at FSS entry

I wanted to know whether households that entered the FSS program with a higher household income would be more likely to remain in the programs than households that had less income at the time that they entered the program. Participants with higher incomes had some work history and may be more successful in the FSS program than households that did not have any wage income when entering FSS. Households that were working when they entered the FSS program and had employment history may be able to use the FSS program to find their next job, which would be a better paying job or offer more hours than the job that they had at the time of the FSS program entry. Those households may be more likely to remain in the program than households that were seeking their first job. To create an easily testable dichotomous variable, I found the median household income at the time of FSS entry and determined whether the household's income at entry was above or below the median. Households with an income above the median at

the time of FSS entry were assigned a 1 and households with an income below the median were assigned a 0.

3.5.3.2 Hypothesis 2: Program Characteristics.

The second hypothesis tests two program characteristics to determine whether they explain exit from the FSS program. This builds off the finding from Kleit and Rohe (2015) that program characteristics impacts the participants likelihood of success. The first variable tested is whether the household paid increased minimum rent prior to enrolling in the FSS program. This variable is unique to HACP housing as it is the only housing authority in the country that implemented an increased minimum rent policy to incentivize residents to enroll in the FSS program. The second variable that was tested was the amount of escrow savings that a household had. The escrow savings program was developed by HUD in 1990 as part of the initial FSS program as an incentive for FSS participants to remain in the FSS program.

1. Paid increased minimum rent prior to participating in the FSS program.

The increased minimum rent policy was designed to incentivize households to enroll in the FSS program. This policy may also incentivize those households to remain in the FSS program so that they did not have to pay the increased minimum rent of $150 when they left FSS. To measure this variable, first, I reviewed the administrative data to identify the households that paid the increased minimum rent during the study period. In order to identify those households, I looked for households that had a value in column "TTP_9H" of $150 indicating that the minimum rent for that household was the increased minimum rent of $150. Households that only had a value of $25 for PH households or $50 for HCV households, were excluded from the study as they were

exempt from the increased minimum rent policy. I confirmed that the households with $150 recorded in the hardship column were not exempt by ensuring that there was a "N" recorded in the column that indicates that the household was not exempt from paying the increased minimum rent due to a hardship.

After I identified the households that could be charged the increased minimum rent during the study period, I identified the households that had a total tenant payment, which is 30% of the households adjusted monthly income, calculated at less than $150, recorded in column "TTP_9F" which is the total tenant payment based on the adjusted income. Then as a double check, $150 was recorded in column "TTP_9J" which is total tenant payment that was charged.

I then performed the same analysis of the households that participated in the HCV program. Once I determined whether the household paid the increased minimum rent during the study period, I created a variable to identify households that had paid minimum rent during the study period and assigned a 1 to households that had paid the increased minimum rent of $150 during the study period and a 0 to households that did not. Then I identified the households that paid the increased minimum rent and participated in the FSS program, and finally, I determined whether the household paid the increased minimum rent before or after participating in the FSS program. I created a variable to identify households that paid the increased minimum rent prior to FSS entry and those who had were coded with a "1" and households that did not were coded with a "0."

2. Escrow Savings

Escrow savings is the primary incentive for households to remain in the FSS program. Escrow savings is a standard part of the FSS program that is utilized by most housing authorities. HACP has not made any changes to the escrow savings incentive. As previously explained, public

housing and housing choice voucher households pay income-based rent, which is roughly 30% of the households' monthly income. As the household's income increases, the rent is recalculated to reflect 30% of the current income. One of the benefits of FSS participation is that participants are permitted to divert the would-be rent increase into an escrow savings account and receive it in a lump sum upon FSS graduation. If the household does not graduate from the FSS program, they forfeit the money to the housing authority.

The escrow savings amount for each household was not included in the dataset, but easy to calculate. I used the rent payment at FSS entry as the base rent and then calculated any rent increases during FSS participation and multiplied it by the number of months in order to calculate the cumulative escrow savings amount for each household. Then I calculated the median escrow savings and created a variable "escrow savings above median" and households with escrow savings above the median receiving a "1" and those with escrow savings below the receiving a "0." I also used this data to conduct additional analysis to examine the differences among households with differing amounts of escrow savings.

The increased minimum rent policy is an incentive for households to enroll and remain in the FSS program for the households who had annual incomes of less than $6,000. The escrow savings account is an incentive for the households who have increased their earnings, and savings, during the FSS program to complete the program.

The below table summarizes the hypotheses and variables tested, the data source for those variables, and a connection to the literature. These hypotheses are embedded in the literature. These hypotheses and selected variables further the literature and what is known about the FSS program by testing hypotheses that have been tested in other studies with inconclusive outcomes,

or outcomes from a particular study which may or may not be consistent with the findings of this study.

Table 3-3 Crosswalk for Variables

Hypothesis 1: Household Characteristics		
Variable	**Data Source From HUD-50058**	**Prior Studies**
Children in the household	Field 3h = Y	Lee & McNamara, 2018; Rohe & Kleit, 1997; Wood, Turnham & Mills, 2008.
Moved	Field 5a more than one address listed for the household during study period.	Lubell, 2015; Manzo, Kleit, & Couch, 2005; McCormack, Joseph & Chaskin, 2012; Shin, 2019.
Income at entry	Field 7i	Lee & McNamara, 2018
Household composition change	Field 3T change during study period.	Shroder, 2002
Hypothesis 2: FSS Program Characteristics		
Public Housing or Housing Choice Voucher	Field 1c	Ong, 1998; Nguyen, et al., 2016
Escrow Savings	Calculated field 9j – 9j at FSS entry, multiplied by the number of months.	Santiago, Galster & Smith, 2017; Sard, 2001; Ficke & Piesse, 2004; Rohe &Kleit, 1999.
Increased Minimum Rent	Y if 9h = 50, and 9j <150, and 9k=150.	Lee & McNamara, 2018; Rohe, Webb & Frescoln, 2016; Verma, et al., 2013.

3.5.4 Testing the Hypotheses

The first hypothesis that household characteristics, such as children in the household, changes in household composition, moves within HACP housing, and income at the time of FSS program entry may explain the likelihood of an FSS participant leaving the program prior to completion. The null hypothesis is that these household characteristics do not impact the likelihood of leaving the FSS program prior to completion.

The first step in the analysis was to create a basic table showing the number of households that had children in the household and those that did not and show those numbers by FSS program outcome, left the FSS program, completed the FSS program, moved from HACP housing, and right censored.

Then I compared the likelihood of survival (remaining in the FSS program) for the households that had children in the household and those that did not by using the Kaplan-Meier survival estimate. The Kaplan-Meier survival estimate uses the observed data to describe the distribution of event occurrence (Willet & Singer, 2003). This survival estimate provides a clear graph showing the survival estimate for participants in each group. The graphs for the public housing households is in Chapter 4 and for housing choice voucher households, it is in Chapter 5.

The first step is to calculate the conditional probability of event occurrence at time j.

$$\hat{p}(t_j) = \frac{\text{n events}}{\text{n at risk}}$$

The Kaplan Meier survival estimates are the conditional probability showing the likelihood that an FSS participant remains in the FSS program for the next month given that they had remained in the FSS program up to that point in the program.

$S(t_{ij})$ is the probability that an individual will remain in the program past time period j.

$$S(t_{ij}) = Pr[T1 > j]$$

$\hat{s}(t_j)$ = the number of participants who have not left FSS during time period j / n in the data set.

$$\hat{S}(t_j) = \hat{s}(t_j - 1)\,[1-\hat{h}(t_j)]$$

The survivor function starts at 1 and declines toward 0 during the time in the program. By plotting the data, one can identify the point in the program when participants are most likely to leave the program. The Kaplan-Meier survival estimate is particularly useful for examining the survival curves of two different groups in univariate analysis (Singer & Willet, 2003).

After creating the Kaplan-Meier survival estimate for the variable, children in the household or no children in the household at time of FSS entry, I wanted to compare the two survival estimates to determine whether there was a significant difference between the two groups. To do that comparison, I completed a log-rank test of equivalency.

3.5.5 Log-rank tests

Log-rank is a test of equivalency and uses a X^2 test of the null hypothesis that there is no statistical difference between the expected survival of two groups (Cleves, et al, 2016). The log rank test is a non-parametric test that does not make any assumptions about the distribution of the data. The log rank test determines how many events are expected for each group if the likelihood of failure were equivalent between the groups, then compares the number of expected observations against the number of observed observations to determine whether one group was statistically more likely to experience a particular outcome. The log-rank compares the observed number of participants who withdrew from the FSS program during a particular month with the number of

participants are expected to withdraw from the FSS program if the two groups have the same risk of leaving the program. The test statistic is the sum of (Observed – Expected)^2 /E for each group. The log-rank test tells us whether one group is statistically more likely to withdraw from the FSS program than the other group.

Then I repeated this process for each of the variables in the first hypothesis, household characteristics, and then conducted the same analysis for the variables in the second hypothesis, program characteristics.

3.5.6 Logistic Regression

After completing the univariate analysis of each of the variables in the study, I fitted several logistic regression models to better understand the relationship between the explanatory variables and the likelihood that a household would leave the FSS program. In this logistic regression, the outcome variable is left the FSS program prior to completion. The households included in the regression have either left the FSS program prior to completion, 1, or completed the FSS program, 0. The households that moved from HACP housing during the study period or were still in the program at the end of the study period were not included in the regression analysis because their FSS outcome could not be determined. The logistic regression determines that likelihood that a household would leave the FSS program prior to completion given a set of explanatory variables. The below equation shows that the probability of y=1 given x (Wooldridge, 2016).

$$P(y=1|x) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + \ldots \beta_n x_n$$

The logistic regression produces the odds ratio, which allows for comparison between the two groups, those that withdrew from the FSS program prior to completion (y=1) and those who

did not drop out of the FSS program and completed the 60-month program (y=0) (Sperandei, 2014).

3.6 Chapter Summary

This chapter provided additional context for carrying out this study in Pittsburgh and explained HACP's FSS program and its increased minimum rent policy which aimed to incentivize households to enroll in the FSS program. This chapter provided an in-depth explanation of the data used in this study including the origin of the data, data management, and the strengths and limitations of the dataset. Then I provided an explanation of the methodological framework for this study with a discussion about the use of event history analysis and justification for why it was selected for this study. Then I returned to the research questions that were originally posed in the introduction to provide additional information about how the data were used to answer those questions and provided information about the hypotheses tested and variables used in the study. Then I explained the statistical testing and the use of tools of event history analysis: life tables, Kaplan-Meier survival estimates, and log-rank tests of equivalency. I explained the benefits and the shortcomings of those univariate methods and explained how the logistic regression was able to complement that analysis by providing a multivariate analysis to examine interactions between the variables.

This chapter sets up the next two chapters, Chapter 4 which presents the findings of the study for the public housing households and Chapter 5 which presents the findings for the housing choice voucher households. The analysis of the FSS program was split by public housing and housing choice voucher households because there are stark differences between the nature of the

housing program and between the residents themselves. The analysis for the two groups is identical and each analysis starts with a detailed description of the FSS participants and their characteristics. In the final chapter of this study, Chapter 6, I will provide a comparison of the FSS program between the public housing and housing choice voucher residents and compare and contrast the outcomes of the analysis. That chapter will provide the evidence that supports my argument that these two housing programs serve different groups in different ways and these groups have very different experiences in the FSS program. I further argue that there should be adjustments to the FSS program based on these differences. The findings in the following two chapters will provide the evidence used in my argument which will be discussed in the final chapter.

4.0 Public Housing Findings

This chapter presents the findings of the analysis of the public housing households that were enrolled in the Family Self-Sufficiency (FSS) program during the study period of January 1, 2010 to October 1, 2017. This chapter is divided into five sections. The first section addresses the first research question: What are the outcomes of FSS participation? That section describes the FSS participants and determines the outcomes of the FSS participants, which will set the base for the rest of the study.

The second section addresses the second research question: When do participants leave the FSS program? This question seeks to determine whether exit from the FSS program is determined by time and whether there is a particular time in the calendar year or point in the program when participants are most likely to leave. First, the time series analysis shows FSS program exit to identify whether there was time when the number of exits from the FSS program were particularly high. Second, the event history framework is used to calculate the length of time that each household participated in the program and uses a life table and Kaplan-Meier survival estimate to determine whether there was a point in the program when households were particularly likely to leave.

The third research question is: What explains exit from the FSS program? It is divided into two hypotheses, household characteristics and program characteristics. The third section of this chapter presents the findings of the first hypothesis, household characteristics. The household characteristics are: household composition, changes in household composition, location of HACP housing, moves within HACP housing, and income at time of FSS entry. As discussed in chapter

two, these variables were selected based upon the literature and contradictory findings in prior studies.

The fourth section of this chapter presents the findings of the second hypotheses, program characteristics and the fifth and final section concludes the chapter with a multivariate logistic regression analysis and comparison of those results to the results of the Kaplan-Meier survival estimates and Log Rank tests of equivalency. Then I used a multivariate logistic regression to determine whether there were relationships among the variables tested in the univariate Kaplan-Meier survival estimates and the Log Rank tests of equivalency.

4.1 Research Question 1: What are the outcomes of FSS participation?

This section examines FSS participation of public housing households at HACP to determine the extent to which households leave or complete the 60-month FSS program. First, I determined the number of participants that complete the FSS program and the number of households that left the FSS program prior to completion. The households that participated in the FSS program during the study period had one of the following outcomes: left censored, completed the FSS program, withdrew from FSS, moved from HACP housing, or right censored.

Table 4-1 Outcomes of FSS participants between January 2010 and October 2017

Outcome	Number	Percent
Left Censored – households that enrolled in the FSS program prior to January 1, 2010	593	35.9
Withdrew from the FSS program prior to month 60	202	12.2

Completed 60 months in the FSS program	191	11.6
Moved from HACP housing while enrolled in FSS program – which ended participation in FSS program	436	26.4
Right Censored – remained enrolled in the FSS program on the last day of the study period, October 1, 2017	229	13.9
Total	1,651	100

Households that are left censored entered the FSS program prior to January 2010, and their entry into the FSS program is not observed. Because their entry into the FSS program is not observed, the duration of their participation in the FSS program cannot be calculated. For that reason, these households are noted in this first section but not included in any further analysis. The left censored households accounted for a total of 593 (35.9%) of the public housing households that participated in the FSS program for some period of time during the study period. These participants are compared to the households that have an observed entry to the FSS program to determine whether those households were different from those who enrolled later in terms of demographics.

Households that remained in the FSS program for at least 60 months completed the FSS program. This does not necessarily mean that the household graduated from the FSS program as the data set does not provide information about whether the household has been free of other public assistance programs (Temporary Assistance for Needy Families, Supplemental Nutritional Assistance Program, or General Assistance) for at least one year prior to program completion. In some cases, households can graduate from the FSS program in less than five years if they met the graduation criteria of being free of public assistance for one year and have completed the steps identified in their Individualized Training and Service Plan (ITSP) (HUD, 2016). The households categorized as completed FSS have completed the standard 60 months of the FSS program. A total

of 191 (11.6%) public housing households participated in the FSS program for at least 60 months. There were occasions when households participated in the FSS program for longer than 60 months, which is permissible if HACP staff agrees to extend the FSS contract. If a household has had extenuating circumstances such as an illness or being laid off from a job, the household can remain in the FSS program for a longer period of time to allow extra time for the household to achieve its stated goals and to allow for a chance to establish self- sufficiency from other types of public assistance (HUD, 2016). For the purposes of this study, those households were identified as having completed 60 months in the program.

Households that withdrew from the FSS program completed fewer than 60 months of the FSS program. There are a number of reasons why these households may have left the program such as; the program didn't meet their needs, they didn't like the program, they weren't seeing positive results, they did have time to participate, were dismissed by HACP for noncompliance, or left for other reasons. These households entered the FSS program after January 1, 2010 and left the program prior to completion. Their entry and exit from the FSS program are observed and these households remained in HACP housing for at least one month after withdrawing from the FSS program. There were 202, or 12.2%, of public housing households that withdrew from the FSS.

There was a large number of households that did not have an observable exit from the FSS program. These households fall into two categories: 1) moved from HACP housing while enrolled in the FSS program and 2) those who remained in the FSS program at the end of the study period, October 1, 2017, and together they comprised 40.3 percent of the original group of FSS households. The households that moved from HACP housing while in the FSS program are included in the survival analysis for the length of time that their participation in the FSS program can be observed. These 436, or 26.4%, public housing households moved from HACP while

enrolled in the FSS program between January 1, 2010 and October 1, 2017. For statistical purposes, these households are considered right censored, however, the fact that these households moved from HACP housing is informative from a policy standpoint. One of the underlying assumptions of the subsidized housing and the FSS programs is that these programs provide stability to low-income households and aim to reduce the rent burden, overcrowding, and number of moves that a household makes. The high number of households that move within this study period is worthy of note, and raises questions about whether 5 years is an appropriate length of time for the FSS program. Those households were kept separate from the households that remained in the FSS program at the end of the study period for greater comparison.

Similarly, right censored households, those that were enrolled in the FSS program on the last day of the study period, October 1, 2017, also provided limited information about their FSS program participation. Like the households that moved from HACP housing, the right censored households are included in the survival analysis for the period of time that their FSS participation is observed, but because these household remained in the FSS program on October 1, 2017, their outcome in the FSS cannot be observed using this dataset.

While there were 1,651 FSS participants in the full dataset, only 393 FSS participants had an observed entry and exit from the program during the study period. Table 4-2 below shows the outcomes of the 393 with an observable entry and exit from the FSS program less than half, 48.6%, completed the FSS program. It is important to note that some of the right-censored households, those who were in the FSS program may complete the program after the study period, but of the households with an observed entry and exit during the seven-year study period, less than half completed the program.

Table 4-2 Withdraw and Completion of FSS Program Among Households that Completed or Withdrew from the FSS Program.

	Withdraw from FSS		Complete FSS		Total	
	N	%	N	%	N	%
Public Housing	202	51.4	191	48.6	393	100

Despite 191 households completing the FSS program, only 99 participants met the graduation requirements (see Table 4-3). HACP's MTW Annual reports provided the number of public housing households that graduated from the FSS program each year (HACP, 2017), showing that only 99 public housing participants completed the FSS program during the study period, far less than the 191 households that completed five years in the program. It is important to note that while this study is focused on attrition from the FSS program, that does not imply that those households met the FSS graduation requirements.

Table 4-3 PH Households that Graduated by Year

Year	**N**
2017	40
2016	32
2015	27
Total	99

Of the public housing households that participated in the FSS program, the majority of households (84.5%) had a female head of household. Table 4-4 below shows the breakdown of the sex of the head of household by FSS program outcome, to determine whether the sex of the

head of household was related to the outcome in the FSS program. This table clearly shows that the FSS outcomes are not related to the sex of the head of household.

Table 4-4 Public Housing FSS Outcomes by Sex of Head of Household

Outcome	Left Censored		Completed FSS		Withdrew from FSS		Moved from HACP		Right Censored		Total	
Sex	N	%	N	%	N	%	N	%	N	%	N	%
Female	499	84.1	161	84.3	162	80.2	386	88.5	187	81.7	1,395	84.5
Male	94	15.9	30	15.7	40	19.8	50	11.5	42	18.3	256	15.5
Total	593	100.0	191	100.0	202	100.0	436	100.0	229	100.0	1,651	100.0

The below table, Table 4-5 shows that 95% of the public housing households that participated in the FSS program during the study period had a head of household who was Black. Of the 1,651 households, only 71, or 4.3%, of households had a white head of household. Only three households had an Asian head of household and 7 households had an American Indian or Native Hawaiian head of household.

Table 4-5 Public Housing FSS Outcomes by Race of Head of Household

Variable	Left Censored		Completed FSS		Withdrew from FSS		Moved from HACP		Right Censored		Total	
Race	N	%	N	%	N	%	N	%	N	%	N	%
Black	570	96.1	179	93.7	196	97.0	404	92.7	221	96.5	1570	95.1
White	21	3.5	12	6.3	6	3.0	25	5.7	7	3.1	71	4.3
Asian	1	0.02	0	0	0	0	2	0.5	0	0	3	0.2
American Indian / Hawaiian	1	0.02	0	0	0	0	5	1.1	1	0.4	7	0.4
Total	593	99.7	191	100.0	202	100.0	436	100.0	229	100.0	1,651	100.0

Of the 1,651 public housing households that participated in the FSS program during the study period, only 18, or 1.1%, identified as Latino/a.

Table 4-6 Public Housing Households Participating in the FSS Program by Ethnicity

Variable	Left Censored		Completed FSS		Withdrew from FSS		Moved from HACP		Right Censored		Total	
	N	%	N	%	N	%	N	%	N	%	N	%
Latino/a	4	0.07	3	1.0	2	1.0	7	1.6	2	0.9	18	1.1
Non-Latino	589	99.3	188	98.4	200	99.0	429	98.4	227	99.1	1,633	98.9
Total	593	100.0	191	99.4	202	100.0	436	100.0	229	100.0	1,651	100.0

After comparing the FSS outcomes by sex and race of the head of household, I compared the FSS program outcomes by the age of the head of household. Table 4-7 below shows the number of public housing households that participated in the FSS program by the age of the head of household at the FSS entry and the outcome of the household's FSS participation. Of the 1,651 households that participated in the FSS program, 51.6% were under the age of 30. This analysis shows that households with a young head of household under the age of 30 were more likely to leave HACP housing than households with an older head of household. Of the 436 households that left HACP housing while enrolled in the FSS program, 70.6% had a head of household under the age of 30. There was not much difference between the age of the head of household of those who completed the FSS program and those who left the FSS program.

Table 4-7 Public Housing Age of Head of Household

Variable	Left Censored	Completed FSS	Withdrew from FSS	Moved from HACP	Right Censored	Total

Age	N	%	N	%	N	%	N	%	N	%	N	%
Under 20	27	4.6	11	5.8	13	6.4	54	12.4	6	2.6	111	6.7
20-24	142	23.9	51	26.7	55	27.2	171	39.2	68	30.0	487	29.5
25-29	83	14.0	22	11.5	24	11.9	83	19.0	42	18.3	254	15.4
30-34	58	9.8	24	12.6	20	9.9	34	7.8	31	13.5	167	10.1
35-39	49	8.3	12	6.3	15	7.4	29	6.7	27	11.8	132	8.0
40-44	50	8.4	21	11.0	19	9.4	16	3.7	20	8.7	126	7.6
45-49	53	8.9	22	11.5	25	12.4	20	4.6	11	4.8	132	8.0
50-54	61	10.3	17	8.9	11	5.5	14	3.2	9	3.9	112	6.8
55-59	40	6.7	10	5.2	10	5.0	6	1.4	10	4.4	76	4.6
60+	30	5.1	1	0.5	10	5.0	7	1.6	5	2.2	53	3.2
Age Totals	593	100	191	100	202	100.1	436	99.6	229	100.2	1,651	99.9

Figure 4-7 below shows the age of households for the public housing residents that participated in the FSS program during the study period. This figure includes households that were left censored, completed the FSS program, left the FSS program prior to completion, moved from HACP housing, and those who were right censored and remained in the program on October 1, 2017. Figure 4-7 below shows that most of the FSS participants were under the age of 30, with a high proportion of FSS participants between the ages of 20 and 24 years of age.

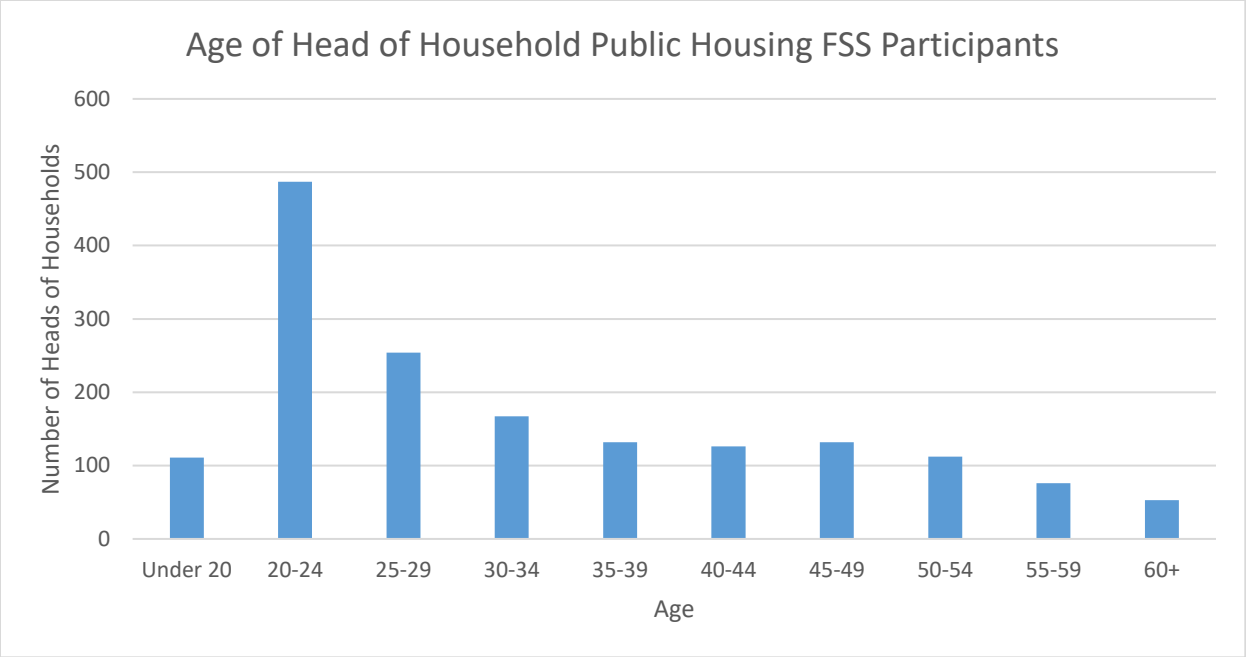

Figure 4-1. Public Housing Age of Head of Household

This section has shown the number of households that participated in the FSS program during the study period and identified the small portion of the participants who had both an observed entry and exit from the FSS program. Of that group, less than half completed the FSS program. This section also showed the number of households that had an observed entry to the FSS program but an unobserved exit, either because they moved from HACP housing while enrolled in the FSS program or remained in the program on the last day of the study period, October 1, 2017. Those households with an observed entry but not exit, were included in the analysis in the following three sections for the length of time that their participation in the FSS program was observed. While we cannot make any inferences about their outcomes, they are informative while observed in the program. As previously mentioned, the left-censored households, those who enrolled in the FSS program prior to January 1, 2010, the first day of the study period, were less informative as I could not calculate the length of their participation in the FSS program. Those

households were included in the demographic tables to show that they did not differ from the participants who enrolled in the FSS program after January 1, 2010, in any systematic way.

Now that I have identified the possible outcomes of FSS participation and the number of households in each of the five categories, I will examine the exit from the FSS program in terms of calendar year and length of time in the program to determine whether time, by either measure, explains FSS program exit.

4.2 Research Question 2: When do FSS participants leave the FSS program?

This section examines FSS entry and exit by calendar date to determine whether there were seasonal patterns in FSS enrollment or exit. One possible explanation for FSS exit is that households are more likely to withdraw from the FSS program during the summer months when children are no longer in school and adults may have more childcare responsibilities. Examining FSS entry and exit by calendar date may show other seasonal or temporal patterns in the data that may explain exit from the FSS program.

The below time series (Figure 4-2) shows FSS enrollment and exit by public housing households during the study period. This shows that there is a gentle downward trend in FSS enrollment. The scale is relatively small with the variation in FSS entry ranging from 30 households in a month in October 2011, to just one participant entering the program in January, March, May, and September of 2017. Aside from a decline in the number of FSS enrollment that seems to start in January 2014, there are not any other detectable patterns in enrollment based on calendar date. This figure includes the households that completed the FSS program, left FSS prior

to completion, moved from HACP housing and those that were right censored, remained in the program on October 1, 2017.

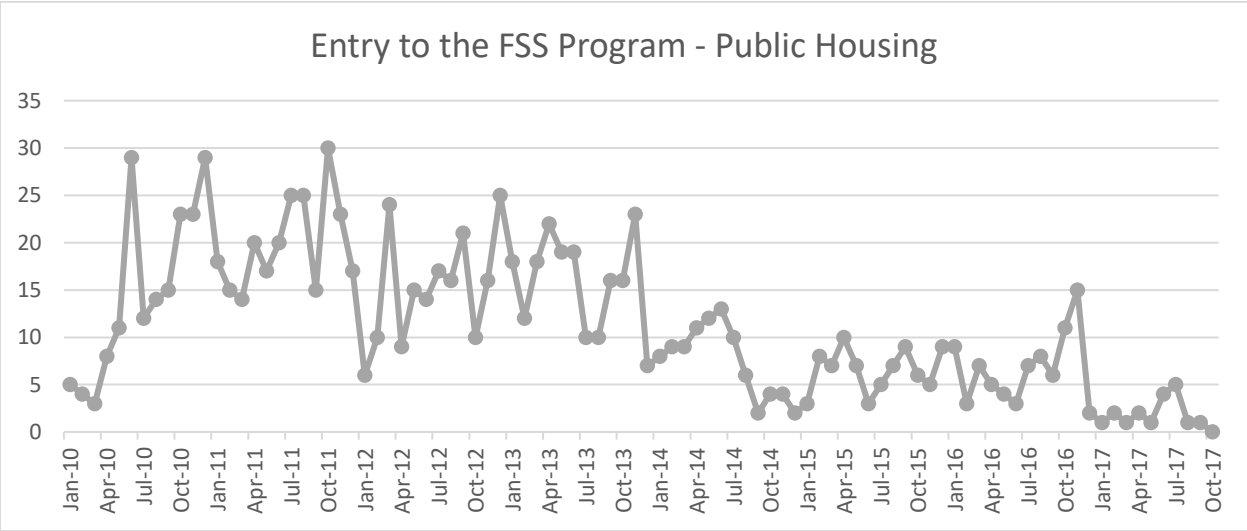

Figure 4-2. Number of Participants Entering the FSS Program by Month

Figure 4-3 below shows exit from the FSS program and participants that left HACP housing. This shows that more FSS participants moved from HACP while enrolled in the FSS program than the number of FSS participants who withdrew from the FSS program but remained in HACP housing. A major contributor to the low FSS graduation rates among public housing households is the high number of households that leave HACP housing. The graph and survival tables both show that the number of participants were generally higher than the number of FSS participants who left the FSS program but remained in HACP housing. While this graph appears to have a drastic change in the number of households exiting each month, it is important to note that the scale is small and the number of exits from the FSS program range from zero to 13, and the number of households that left HACP housing during the study period range from zero to 14.

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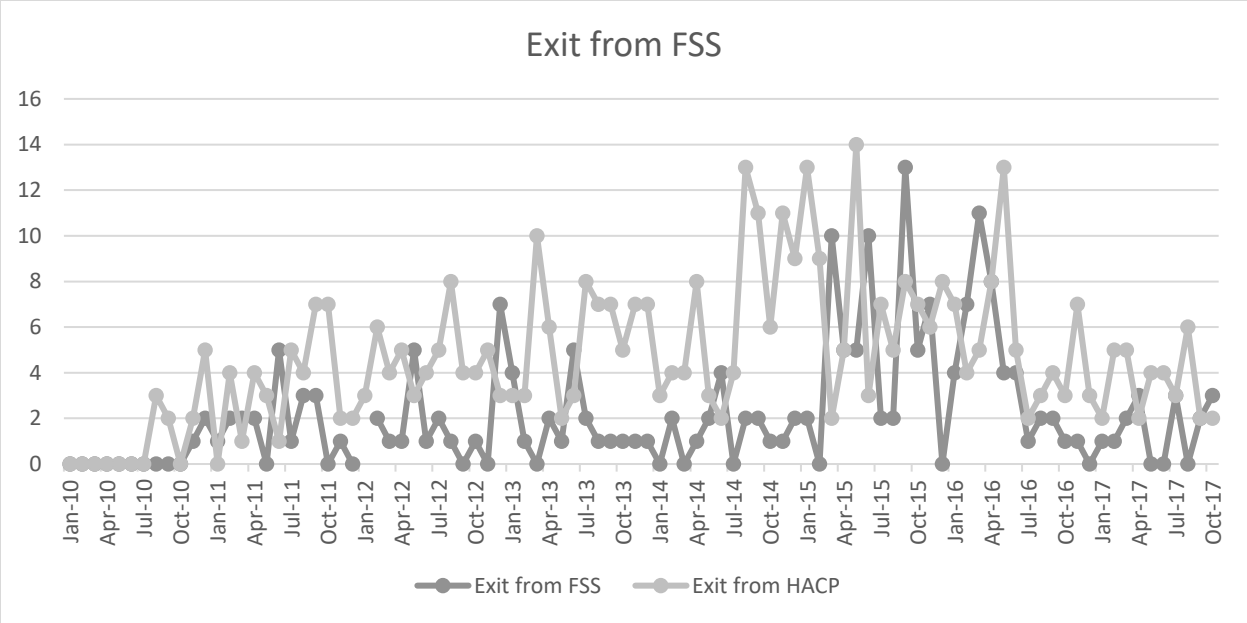


Figure 4-3. Number of Participants Exiting the FSS Program Due to Move from HACP Housing or Exit from the FSS Program and Remaining in HACP Housing.

The time series analysis of FSS program entry and exit, and exit from HACP housing while enrolled in the FSS program does not support the hypothesis that there were certain points in the calendar year when participants were more likely to enter or leave the FSS program.

4.2.1 Life Table: Public Housing Households

The time series analysis showed that entry and exit from the FSS program cannot be fully explained by factors related to calendar dates. This survival analysis examines whether FSS exit is related to the length of time that the household has participated in the FSS program. Rather than being more likely to exit the FSS program on a certain date on the calendar, households may be more likely to exit at a certain point in the program, for instance, FSS participants may be more likely to leave FSS after participating in the FSS program two or three years.

The life table shows the number of FSS participants enrolled in the FSS program each month during the 60-month program. This table does not include the public housing households that were left censored because they enrolled in the FSS program prior to the beginning of the study period and their length of FSS participation could not be determined.

The life table includes the FSS participants with an observed entry to the FSS program and calculates the number of participants at each month. The number of FSS participants decline each month due to participants leaving the FSS program, leaving HACP housing, or right censoring. The life tables, located in Appendix A, are divided into public housing and housing choice voucher households because there is a marked difference in the survival rates of PH and HCV households.

The life tables show the number of households enrolled in FSS each month, the number of participants that leave the FSS program during the month and the percentage of participants remaining and the hazard rate, which is the inverse of the survival rate. The left censored households are not included in this analysis because their length of participation in the FSS program cannot be calculated. The two types of right censoring, those that moved from HACP housing while participating in FSS program and those who remained in the FSS program at the end of the study period, October 1, 2017, are included in the analysis for the period of time that they are observed. Those right censored households are included in the count of the number of households that were enrolled in the FSS program at the beginning of each month, and when their FSS participation is no longer observed, either because they left HACP housing or the study period has ended, those households drop off the analysis and are removed from the count of the number of households enrolled in the FSS program at the beginning of the month.

Column 1 of the life table identifies the month, 0 – 60 of the FSS program. Column 2 displays the number of households that are at risk of the event, withdrawing from the FSS program,

during the month. Column 3 identifies the number of FSS participants that left the program during the month, but remained in HACP housing. Column 4 identifies the number of households that were lost either due to moving from HACP housing or were in the group of households that were right censored, and were at that particular point in the FSS program on October 1, 2017. Those households may remain in the program, but their participation during the next month was not observed in the data. Column 5 shows the probability that the participant would remain in the FSS program during each month, given that the participant was enrolled in the FSS program on the first of the month.

The life table also shows the median survival time. The median of 1,058 is 529, and by consulting the below table, we see that during month 30, there were 529 public housing households remaining in the FSS program. This happens to coincide with the middle point of the 60-month program, which provides additional evidence that the decline in the number of FSS participants is gradual during the course of the 60-month program.

The table shows that attrition from the FSS program was particularly high in the first three months of the program, it was also high at the 2-year point, 24 months, when 10 participants left the program. Aside from those two time periods, attrition from the program was gradual.

[See Appendix Table 1. Public Housing Life Table]

4.2.2 Survival Function: Public Housing Households

As explained in Chapter 3, the Kaplan-Meier survival estimate measures the probability that the FSS participant will remain in the FSS program past time *t*. The estimate is the number of FSS participants that remained in the FSS program at the end of the month divided by the number of FSS participants who were in the program. The right censored participants, those who

left HACP housing or were enrolled on October 1, 2017, are not included in the denominator. Only those FSS participants that are "at risk" for leaving the FSS program are included. For instance, at the beginning of the first month of the FSS program, there were 1,058 public housing FSS participants enrolled in the FSS program. During the first month, five participants were lost due to censoring. Of those five participants, four moved out of HACP housing and one was in their first month of the FSS program on October 1, 2017. During the first month, 11 FSS participants left the FSS program. The survival rate for the first month is 1,047 / 1,058= 98.9%. The below Kaplan-Meier survival estimate shows the 98.9% survival rate on the second step of the curve. The survival curve starts at 1 and declines toward 0 as participants leave the program, either due to program attrition or right censoring.

Figure 4-4 shows the Kaplan-Meier survival estimate, which indicates that the slope is flatter during the first 24 months of the program and slightly steeper in the following 36 months. Showing that households may be slightly more likely to leave later in the program.

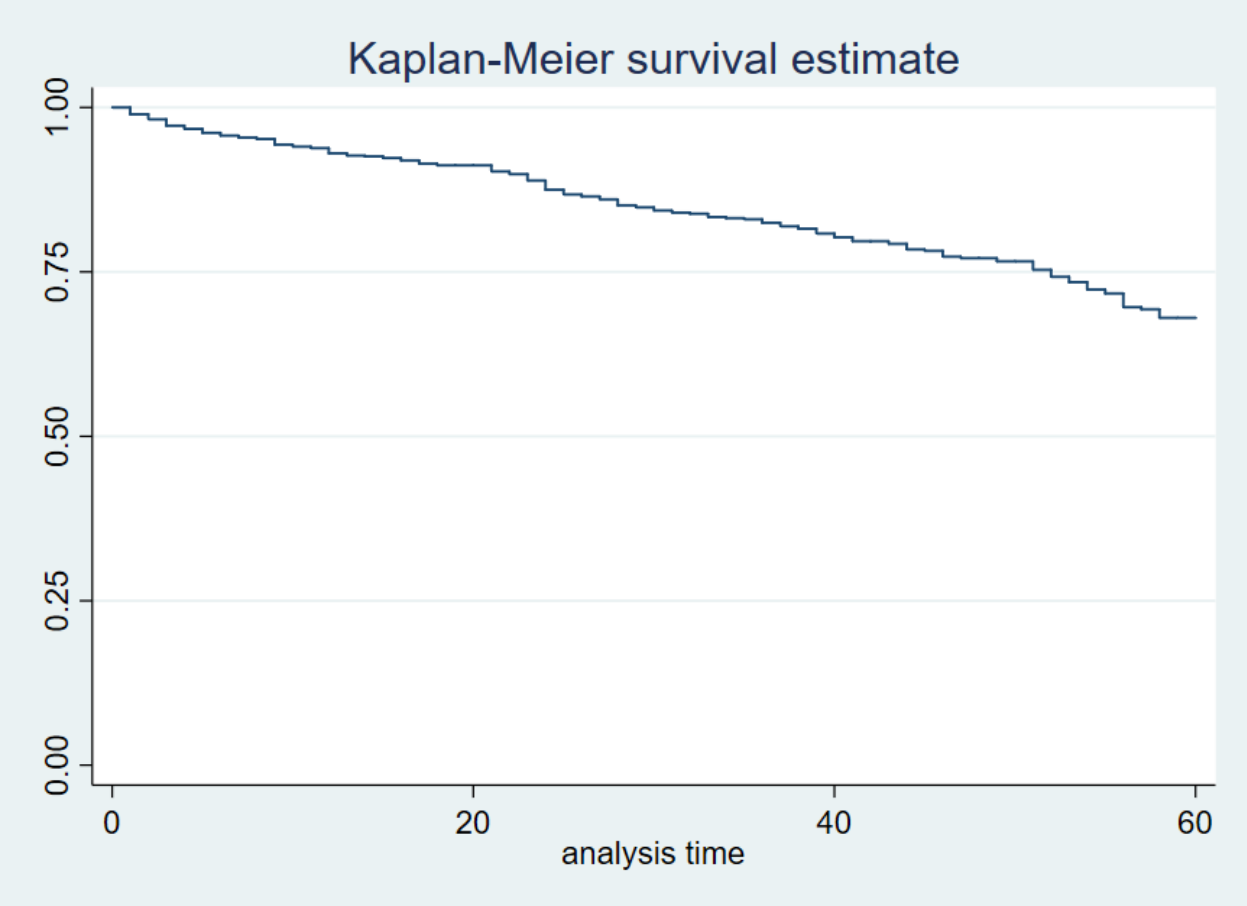


Figure 4-4. Kaplan-Meier survival estimate for public housing households

Because it is difficult to determine whether there were significant changes in the likelihood of exit from the program at the month level of analysis using the Kaplan Meier survival estimate, I also examined the changes in FSS participation by year. The analysis of the month level shows little change between the months, but the analysis by year shows that more FSS participants withdrew during years one and two than the other years, but left at the highest rates during the first year (6.5%) and the fifth year (10.1%). Households that moved from HACP housing while enrolled in the FSS program were also more likely to do so during the first and second year of the FSS program. One possible explanation for households being more likely to remain in the program if they made it to the third year is the incentive to complete the program and receive the savings in

the escrow account. That hypothesis will be tested in the final section of this analysis when I examine the impact that different programs have on the household's likelihood of remaining in the FSS program.

Table 4-8. Public Housing Households that Withdraw from FSS by Program Year

Beginning of Year	# enrolled in FSS at beginning of year	# Left FSS during the year		Moved from HACP		Right Censored	
	N	N	%	N	%	N	%
1	1,061	69	6.5	148	14.0	38	3.6
2	803	42	5.2	104	13.0	50	6.2
3	607	32	5.3	75	12.4	40	6.6
4	460	27	5.9	76	16.5	40	8.7
5	317	32	10.1	33	10.4	64	20.2
End of Year 5	191						

This section has shown that time does not fully explain exit from the FSS program. The hypotheses that there are seasonal effects or a particular point in the program when participants are more likely to leave the FSS program were not supported by the data.

4.3 Research Question 3: What explains exit from the FSS program?

In the first section, I determined the number of households who left the FSS program prior to completion. In the second section I examined the time, measure both by calendar date and length of time in the program to determine whether either of those measurements explained exit

from the FSS program. Neither of those offered a meaningful explanation of FSS exit. In the next section I will examine the household characteristics to determine whether they offer an explanation of which households are more likely to exit the FSS program prior to completion.

4.3.1 Hypothesis 1: Household Characteristics

The variables examined in this section are: household composition, change in household composition, housing location, moves within HACP housing, and income at time of FSS entry. Each variable and its relationship to the hypothesis that household characteristics explains FSS exit will be explained in greater detail in each subsection.

4.3.1.1 Household Composition

There is not a consensus in the literature regarding whether public housing households with children are more or less likely to complete the FSS program. Households with children may be less likely to complete the FSS program because childcare responsibilities prevent them from meeting the program requirements. On the other hand, households with children may be more likely to complete the FSS program because the children provide a motivation for the head of household to earn more money. Table 4-9 below shows the number of public housing households that do and do not have children identified by FSS program outcome.

Table 4-9. Public Housing Households – Number of Household Members

	Completed FSS		**Withdrew from FSS**		**Moved from HACP**		**Right Censored**		**Total**	
No. of Household Members	N	%	N	%	N	%	N	%	N	%
One HH member	60	31.4	63	31.3	122	28.0	51	22.3	296	28.0
Two or More	131	68.6	138	68.2	314	72.0	178	77.7	762	72.0
Total	**191**	**100.0**	**202**	**99.5**	**436**	**100.0**	**229**	**100.0**	**1,058**	**100.0**

Households that have more than one adult may be more likely to complete the FSS program when there is another adult in the household to share the household duties. Table 4.10 below shows that more than 83% of all households have only one adult in the household. Table 4.10 shows that households that completed the FSS program had a smaller portion of one-person households, only 74.3% than the other outcomes. Households that moved from HACP had the highest portion of single adult households, 92.0%. This may be at least partially explained by the high number of FSS participants under the age of 30 who moved out of HACP housing.

Table 4-10. Public Housing Household Composition

Variable	Completed FSS		Withdrew from FSS		Moved from HACP		Right Censored		Total	
Household	N	%	N	%	N	%	N	%	N	%
One Adult	142	74.3	163	80.7	401	92.0	178	77.7	884	83.6
Married	3	1.6	2	1.0	5	1.1	8	3.4	18	1.7
Full-time Student	10	5.2	14	6.9	1	0.2	14	6.0	39	3.7
Other Adult	36	18.8	23	11.4	29	6.7	29	12.7	117	11.1

Total	191	99.9	202	100	436	100	229	99.8	1,058	100

Table 4-11 shows the number of public housing households that had and did not have children in the household and the outcomes of those households. This analysis shows that nearly half of the FSS households have children.

Table 4-11. Households with and without children by FSS program outcome

	Completed FSS		**Left FSS**		**Moved from HACP**		**Right Censored**		**Total**	
	N	%	N	%	N	%	N	%	N	%
Children	109	57.1	136	67.3	306	70.2	179	78.2	730	68.9
No Children	82	42.9	66	32.7	130	29.8	50	21.8	328	31.0
Total	191	100.0	202	100.0	436	100.0	229	100.0	1,058	99.9

The Kaplan-Meier survival estimate shows that there is little difference in likelihood of completing the FSS program for public housing households that had children under the age of 18 and those that did not.

[See Appendix Figure 1. Kaplan Meier Survival Estimate for public housing households with and without children.]

The below table showing the log-rank test for equivalency shows that public housing households with children are not significantly more likely to withdraw from the FSS program than those that do not have children. In fact, households with and without children under the age of 18 are almost equally likely of leaving the FSS program prior to completion.

Table 4-12. Log-Rank Test for Equivalency: Public Housing Households with and without children under 18.

	Observed	Expected
No children under 18	82	81.25

Children under 18	120	119.75
Total	202	201.0

Chi2= 0.00 Pr>chi2= 0.9712

4.3.1.2 Changes in Household Composition

People entering and leaving the household could create different levels of support and stress on the FSS participant. For instance, the addition of a new baby could prevent the FSS participant from participating in the program and meeting the program requirements. On the other hand, an additional adult may provide additional support to the FSS participant and those household may be more likely to complete the program. Changes in household composition are coded as 0 if there were no changes in the number of household members during participation in the FSS program and a 1 if there was a change in the number of household members during participation in the FSS program.

Table 4-13. Number of Households that Experienced a Change in Household Composition While Partcipating in the FSS Program by Outcome.

	Completed FSS		**Withdrew from FSS**		**Left HACP Housing**		**Right Censored**		**Total**	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**	**N**	**%**
HH Change	79	41.4	62	31	107	24.5	78	34.1	326	30.8
No HH Change	112	58.6	140	69	329	75.5	151	65.9	732	69.2
Total	**191**	**100**	**202**	**100**	**436**	**100**	**229**	**100**	**1,058**	**100.0**

This shows that households were more likely to have a change in household composition than they were to move from one public housing unit to another. Of the households that completed

the FSS program, 41.4% experienced a change in household composition, while 31% of the households that withdrew from the FSS program experienced a change in household composition.

The Kaplan-Meier estimate shows that households that had a change in composition were more likely to remain in the FSS program at all times during the FSS program.

[See Appendix Figure 2. Kaplan Meier Survival Estimate Public Housing FSS participants with changes in household composition.]

Table 4-14 below shows that households that had a change in household composition were significantly, $p<0.001$, more likely to remain in the FSS program than those participants who did not experience a change in household composition. I expected to find that household members entering and exiting the household would create a disruption that would lead to the FSS participant being less likely to complete the program, but in fact, households that experienced changes were more likely to complete the program. Table 4-14 below shows that of the 202 public housing households that did not complete the FSS program, 140 public housing households did not experience a change in household composition.

Table 4-14. Log-Rank Test of Public Housing Households that Experienced a Change in Household Composition while enrolled in the FSS Program.

	Observed	**Expected**
No Change in HH composition	140	110.11
Change in HH Composition	62	91.89
Total	202	202

Chi2 = 17.92 Pr>Chi2 = 0.0000

This above analysis compared the public housing households who had a change in household composition while enrolled in the FSS program and those who did not experience a change to determine whether households with a change in household composition represented a disruption in the households that led those households to being more likely to leave the FSS program than households who did not experience a change in household composition. Due to the mechanics of this analysis, households who remained in the FSS program for a longer period of time had more time to experience a change in household composition then the households who remained in the FSS program for a shorter period of time. To determine whether this test measures the impact of changes in household composition rather than length of time in the FSS program, I compared public housing households who experienced a change in household composition early in FSS participation, during the first 24 months of the program, with the public housing households who did not experience a change in household composition while enrolled in the FSS program. There were 47 public housing households that experienced a change in household composition and left the FSS program within the first two years of the FSS program, and there were 140 public housing households that did not experience a change in household composition during that time period. There were an additional 15 public housing households that experienced a change in household composition while enrolled in the FSS program and left the program after month 24 but before month 60.

Table 4-15. Public Housing Households that Experienced a Change in Household Composition During the First 24 months of FSS Participation Compared to Those who did not Experience a Change.

	Observed	Expected
0	140	131.57
1	47	55.42

Total	187	187.00

Chi2: 1.84 Pr>Chi2: 0.1750

This analysis shows that the public housing households who had a change in household composition during the first 24 months of the FSS program did not experience a disruption that led them to be more likely to leave the FSS program than the public housing households who did not experience a change. This test also shows that the public housing households who experienced a change in household composition early in FSS participation were less likely to remain in the FSS program.

4.3.1.3 Public Housing Location

This section examines the outcomes of FSS participation by location of the public housing development to determine whether there are public housing developments where participants are more likely to remain in the program than others. If residents of some buildings are more likely to remain in the program than others, it may suggest that service delivery is uneven across HACP's housing portfolio. Figure 4-5 below shows the location of the public housing development where the FSS participants when they enrolled in the FSS program.

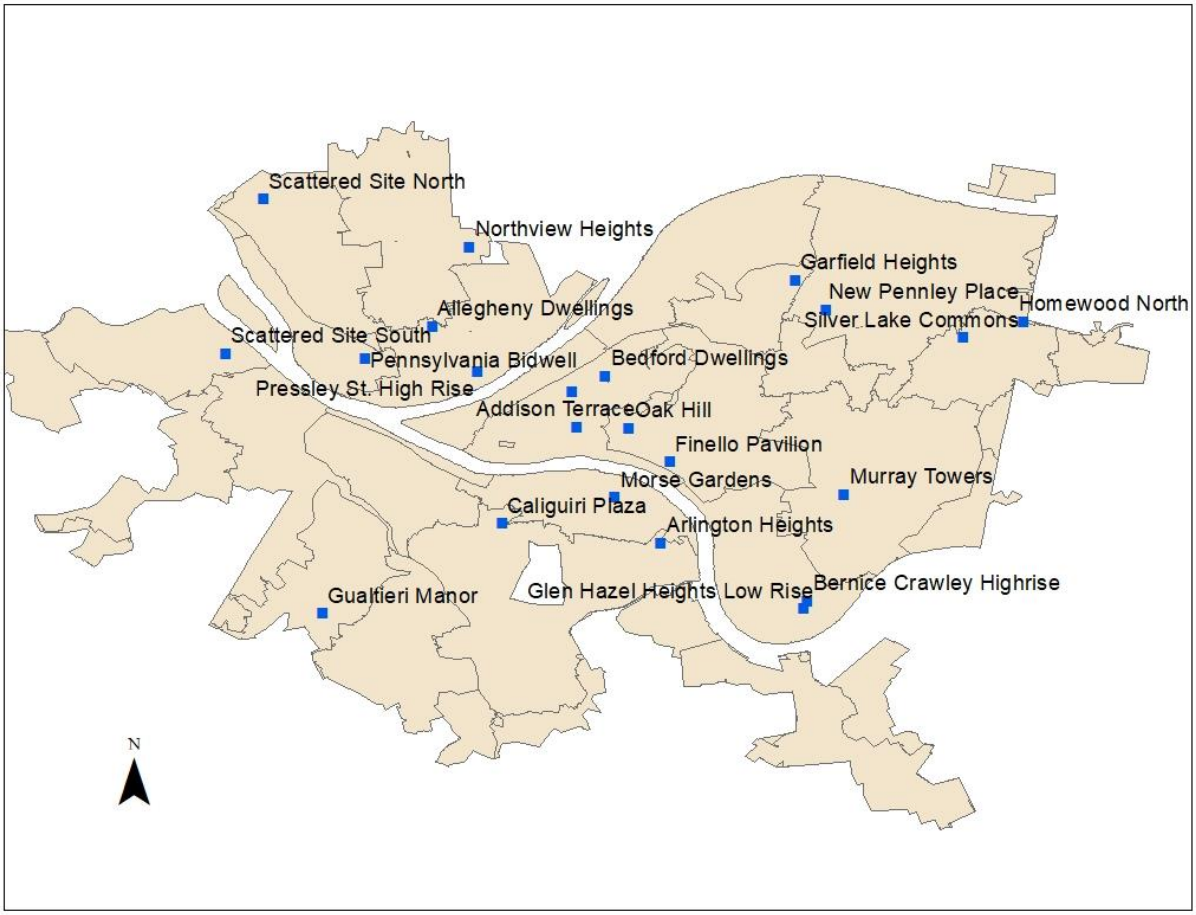


Figure 4-5. Location of PH FSS Participants at FSS enrollment.

Table 4-16 below shows the outcomes of FSS participation by location at the time of FSS enrollment. The following section will address moves within HACP housing. As mentioned in Chapter 3, Addison Terrace was redeveloped during the study period, which led to many of its residents being rehoused in other public housing communities or exiting public housing to move to market-rate housing or moving from public housing with a housing choice voucher.

Table 4-16. Outcomes of FSS Participation by Housing Location at FSS Enrollment

Development Name	Left FSS	Completed	Moved from HACP	Right Censored	Total

	N	%	N	%	N	%	N	%	N	%
Addison Terrace	2	3.9	1	2.0	48	94.1	0	0	51	100
Bedford Dwellings	25	12.7	41	20.8	94	47.7	37	18.8	197	100
Arlington Heights	29	26.6	13	11.9	50	45.9	17	15.6	109	100
Allegheny Dwellings	33	20.4	17	10.5	83	51.2	27	17.9	160	100
Northview Heights	27	12.4	47	21.7	79	36.4	62	29.5	215	100
Pennsylvania – Bidwell	5	50.0	1	10.0	2	20.0	2	20.0	10	100
Pressley Street	1	14.3	0	0	3	42.9	3	42.9	7	100.1
Homewood North	12	10.4	12	10.4	42	36.5	49	42.6	115	99.9
Scattered Sites South	11	29.7	18	48.6	5	13.5	3	8.1	37	99.9
Murray Towers	1	50.0	1	50.0	0	0	0	0	2	100
Glen Hazel Heights	21	41.2	9	17.6	12	23.5	9	17.6	51	99.9
Bernice Crawley	9	81.8	2	18.2	0	0	0	0	11	100
Scattered Sites North	2	5.3	9	23.7	12	31.6	15	39.5	38	100.1
Caliguiri Plaza	1	50.0	1	50.0	0	0	0	0	2	100
Finello Pavilion	2	100	0	0	0	0	0	0	2	100
Morse Gardens	3	75.0	1	25.0	0	0	0	0	4	100
Gualtieri Manor	1	100	0	0	0	0	0	0	1	100
Oak Hill	10	43.5	6	21.7	4	17.4	4	17.4	24	100
Silver Lake Commons	0	0	0	0	1	100	0	0	1	100
Bedford Hill	3	33.3	6	55.6	0	0	2	11.1	9	100
Garfield Heights	4	30.8	6	46.2	1	7.7	2	15.4	13	100.1
Total	202	19.0	191	17.9	436	40.9	232	22.2	1,061	100

4.3.1.4 Moves Within HACP Housing

This subsection examines the impact that moves from one public housing unit to another within HACP housing has on public housing household's likelihood to complete the FSS program. The analysis shows that 16.97% of households moved from one public housing unit to another during their participation in the FSS program. This represents a fairly small number of FSS participants. The table below shows the number of households that moved by outcome: completed FSS, withdrew from FSS, left HACP housing, and right censored. Moves within HACP housing were coded as 0 if the household remained in the same residence for the duration of its participation in the FSS program and a 1 if the household moved at least once within HACP public housing while participating in the FSS program.

This table shows that while most households did not move within HACP housing while in the FSS program, those who did move were more likely to complete the FSS program. While I expected to find that moves within HACP housing would be disruptive and would have a negative impact on the household's likelihood to complete the program, the opposite was true. This suggests that moves within HACP public housing were positive and lead to better outcomes for the household. Unfortunately, the data does not indicate whether these were voluntary moves or forced moves. There are some instances when public housing families have to move within public housing due to construction or rehabilitation of a public housing building. Also, families can request to move to a different development or unit due to changes in household composition, problems at their former residence, or other preferences.

Table 4-17. Number of PH Households that Moved Within HACP by FSS Program Outcome

	Completed FSS		Withdrew from FSS		Left HACP		Right Censored		Total	
	N	%	N	%	N	%	N	%	N	%
Moved within HACP	50	26.2	38	18.8	45	10%	47	20.5%	180	17.0
Did not move	141	73.8	164	81.2	391	89.7%	182	79.5%	878	83.0
Total	191	100	202	100	436	99.7%	229	100%	1,058	100.0

The table below shows that many of the moves within HACP housing during the study period were from Addison Terrace to other public housing developments. These were involuntary moves due to redevelopment of the Addison Terrace property which was transformed into the mixed-income property, Skyline Terrace. During the redevelopment, some tenants were relocated to other properties. In addition to moves from Addison Terrace, there were 12 households that moved within their development from one unit to another. This could have been to accommodate the resident's request for a different unit, or due to a change in household composition that lead to the participant moving to a larger or smaller unit depending upon the size of the household. Other moves between public housing units occurred at a smaller level with one household moving from one public housing development to another. For brevity, they are not included in this table.

Table 4-18. Households that completed the FSS program and moved while enrolled in FSS

Moved From	Moved To	Count
Addison Terrace	Bedford Dwellings	7
Addison Terrace	Northview Heights	6
Addison Terrace	Arlington Heights	3
Addison Terrace	Allegheny Dwellings	2

Allegheny Dwellings	Arlington Heights	2
Moved within property	Moved within property	12

Table 4-19 below shows the moves within public housing of the FSS participants who left the FSS program prior to completion.

Table 4-19. Households that Moved by did not complete the FSS program

Moved From	Moved To	Count
Addison Terrace	Arlington Heights	2
Addison Terrace	Bedford Dwellings	2
Addison Terrace	Oak Hill	2
Addison Terrace	Allegheny Dwellings	3
Addison Terrace	Morse Gardens	2
Bedford Dwellings	Allegheny Dwellings	2
Within Property	Within Property	3

The Kaplan-Meier survival curve below shows the difference in the probability that a household would remain in the FSS program at any given time during the five-year program based on whether or not that household moved within HACP public housing during the program. This graph shows that the households that moved within HACP housing were more likely to remain in the FSS program than the households that did not move. It is important to note that the Kaplan Meier survival estimate is very similar for both groups throughout most of the analysis with a difference between the two at the end of the analysis time, between months 55 and 60. This result is concerning and may indicate that there are other factors at the end of this analysis that impact the likelihood of those households that moved during FSS participation. For instance, households

that are right censored or moved from HACP housing during the study period are included in the survival estimate for the period of time that their participation was observed. Therefore, those households were not observed at the end of the 60-month analysis time and those households may explain why there was a change in the trajectory of the households that moved within HACP public housing and those that did not. Another possible explanation is that the redevelopment of Addison terrace on the trajectory of the households. This variable will be tested again in the logistic regression at the end of the chapter.

[See Appendix Figure 3. Kaplan Meier Survival Estimate Public Housing FSS participants who moved while enrolled in FSS.]

The below table shows that households that moved were significantly more likely to remain in the FSS program than households that did not. However, there was a fairly small number of households that moved during FSS participation and many of those moves were related to the redevelopment of Addison Terrace.

Table 4-20. Log-Rank Test of Equivalency for Public Housing Households that Moved Within HACP Housing

	Observed	**Expected**
No Moves	164	146.7
Moved	38	55.3
Total	202	202.0

Chi2 = 7.52 Pr>Chi2 = 0.0061

This analysis determines whether the public housing households moved while enrolled in the FSS program were more likely to remain in the FSS program than households who did not move within public housing while enrolled in the program. Households that participated in the

FSS program for a longer period of time had more time to move while enrolled in the FSS program than those who did participated in the program for a shorter period of time. To test whether the above result, that the public housing households who moved while enrolled in the FSS program were not more likely to leave the FSS program prior to completion was a result of those households participating in the FSS program for a longer period or time, or because the households that moved were in fact less likely to leave the FSS program, I examined the outcomes of the public housing households who moved early in their FSS participation, within the first 24 months, and those who did not move at all. From this analysis, I found that the public housing households who moved while enrolled in the FSS program were more likely, but not significantly, to complete the FSS program. There were only 30 public housing households who moved during the first 24 months of the FSS program, which is a small number, but represents more than half of the public housing households who moved while enrolled in the FSS program.

Table 4-21. Public Housing Households Who Moved During the First 24 Months of the FSS Program Compared to Those Who Did Not Move During FSS participation.

	Observed	Expected
0	164	166.18
1	30	27.82
Total	194	194.00

Chi2: 0.20 Pr>Chi2: 0.6539

This analysis shows that when considering the time of the household's move, households that moved during the first three years of the FSS program had a similar likelihood of leaving the FSS program as those participants who did not move from one public housing unit to another

during the program. If there was an equal likelihood of exit among the FSS households that did and did not move while in the FSS program, there would be about 168 public housing households who did not move and about 28 public housing households that did move. The observed number of FSS participants who did not move, 164, and FSS participants who did move, 30, are very similar to the expected outcomes. Therefore, moves within the FSS program are not related to the participants' likelihood of completing the FSS program.

4.3.1.5 Income at time of FSS program entry

The average income of the PH FSS households at the time of FSS entry was $8,288 and the median income was $3,792, largely due to the high number of households that reported no income at the time of FSS program entry. There were 360, or 33.9%, public housing households that reported zero income when they enrolled in the FSS program. Another 344, or 32.4%, of public housing households reported incomes of less than $6,000.

Table 4-22. Public Housing Annual Incomes at FSS Entry

Annual Income	Number	%
0	360	33.9
1-6,000	344	32.4
6,001- 12,000	158	14.9
12,001 – 18,000	79	7.4
18,001 – 24,000	56	5.3
24,001 +	64	6.0
Total	1,061	99.9

The Kaplan-Meier survival estimate shows that public housing households with annual incomes above and below the median of $3,792, have a very similar likelihood of completing the FSS program. The log-rank test of equivalency shows that households with incomes higher than the median are not statistically more likely to complete the program than those with annual incomes of less than $3,792.

[See Appendix Figure 4. Kaplan Meier Survival Estimate for Public Housing Households by median income at FSS entry.]

Table 4-23. Log-Rank Test of Equivalency between households with incomes above and below the median at FSS entry.

Variable	Observed	Expected
Income below Median	106	96.18
Income Above Median	96	105.82
Total	202	202

Chi2 = 1.95 Pr> Chi2 = 0.1627

While public housing households with annual incomes of above the very low median annual income of $3,792 were not statistically more likely to complete the program than the households earning less, I was interested to examine other income amounts to see if there was an income level that was a better predictor of success in the FSS program. It is possible that households with higher incomes may be more likely to remain in the FSS program than those with very low annual incomes at entry. It is also possible that households with higher incomes may be less likely to remain in the program if they already have a job. I conducted the same test using an annual income of $10,000 as the dividing point to see if households earning more than $10,000 were more likely to remain in the FSS program than those earning less. I recognize that $10,000

is still an extremely low annual income, but those households are likely to have some wage income. There simply are not enough households with higher incomes to test higher income levels.

Table 4-24. Public Housing Households with Incomes Above and Below $10,000 at FSS Entry

	Completed		Left FSS		Moved from HACP		Right Censored		Total	
	N	%	N	%	N	%	N	%	N	%
HH Inc. Greater than $10,000	48	25.1	57	28.2	67	15.4	64	27.6	236	22.3
HH Inc. less than $10,000	143	74.9	145	71.8	369	84.6	165	72.0	822	77.7
Total	191	100	202	99.0	436	100.0	229	100.0	1,058	100.0

The Kaplan Meier Survival Estimate shows that the public housing households with incomes above $10,000 were not more likely to complete the FSS program than households with incomes of less than $10,000. That is confirmed by the log rank test of equivalency. **Error! Reference source not found.**

Table 4-25 below shows the log-rank test of equivalency which shows that households earning more than $10,000 per year are not statistically more likely to complete the FSS program than households earning less than $10,000.

[See Appendix Figure 5. Kaplan Meier Surivival Estimate Public Housing Participants with Income Above $10,000 at FSS Program Entry.]

Table 4-25. Log Rank Test of Equivalency for Households with Incomes Above and Below $10,000.

	Observed	Expected

Income below $10,000	142	152.89
Income above $10,000	57	46.11
Total	199	199.00

Chi2 = 3.38 Pr>Chi2 = 0.0662

Then I conducted the same analysis on the public housing households that had zero reported income when they entered the FSS program. Households with zero income do not have wages and are not receiving TANF, alimony, social security, or child support.

Table 4-26. Public Housing Households with Zero Reported Incomes at FSS Entry

	Completed FSS		Left FSS		Moved from HACP		Right Censored		Total	
	N	%	N	%	N	%	N	%	N	%
Zero Income	65	34.0	54	26.7	176	40.4	62	26.7	357	33.6
Income $1 +	126	66.0	148	73.3	260	59.6	170	73.3	704	66.4
Total	191	100.0	202	100.0	436	100.0	232	100.0	1,061	100.0

The Kaplan Meier survival estimate shows that public housing households that reported zero income at the time of FSS enrollment were more likely to complete the FSS program than those who reported an income of $1 or more.

[See Appendix Figure 6. Kaplan Meier Survival Estimate PH FSS Households by Zero Income at Entry]

The below log rank test of equivalency confirms that households that reported zero income at the time of FSS enrollment were significantly ($p<0.05$) more likely to complete the FSS program than those who had reported an annual income of $1.00 or more at the time of FSS entry.

Table 4-27. Log Rank Test of Equivalency for Public Housing Households with Zero Income at FSS Entry

	Observed	Expected
Income of $1 or more	148	131.66
Zero Income	54	70.34
Total	201	202

Chi2 = 5.89 Pr > Chi2 = 0.0153

4.3.2 Hypothesis 2: Program Characteristics

This section examines the impact that different programs have on a household's likelihood of withdrawing from the FSS program prior to completion. Two hypotheses are tested in this section. The first hypothesis is that households that paid the increased minimum rent of $150 prior to enrolling in the FSS program will be more likely to complete the FSS program than households that did not pay the increased minimum rent prior to entering the FSS program so that they will not have to pay the increased rent. This program is unique to HACP, and there haven't been prior studies to guide this analysis. It is also possible that households that paid the minimum rent of $150 will be more likely to withdraw from the FSS program because they may have enrolled in the FSS program only to avoid paying the increased minimum rent and not because of a genuine interest in participating in the program.

The second hypothesis is that participants who do not have money in their escrow account will be more likely to withdraw from the FSS program. Participants' who have not experienced an increase in income while enrolled in the FSS program do not have money in their escrow savings account, and do not have a financial incentive to remain in the FSS program, as they do not have escrow savings that would be forfeited when they leave the program.

4.3.2.1 Paid Increased Minimum rent of $150 prior to FSS enrollment

The increased minimum rent policy had two stated goals, the first was to incentivize residents to enroll in the FSS program and the second was to increase rent revenue. There were 974 public housing households that paid the increased minimum rent for at least one month between January 1, 2010 and October 1, 2017. Of those 974 households, 447 also participated in the FSS program during the study period, and of those 474 households, only 312 households participated in the FSS program after paying the increased minimum rent of $150. The remaining 135 households paid the increased minimum rent after participating in the FSS program.

Table 4-28 Public Housing Households that Paid Increased Minimum Rent During the Study Period

	N	%
Paid increased minimum rent and did not participate in FSS	527	54.1
Paid increased minimum rent before FSS participation	312	32.0
Paid increased minimum rent after FSS participation	135	13.9
Total	974	100.0

The households that entered the FSS program after paying the increased minimum rent may have been more likely to remain in the FSS program than other households so that they would avoid paying the increased minimum rent. On the other hand, those households may be less likely to remain in the FSS program if their primary motivation for enrolling was to avoid paying the increased minimum rent and not to improve other skills.

The Kaplan Meier Survival Estimate graph below shows the survival estimate for the public housing households that paid the increased minimum rent of $150 prior to enrolling in the FSS program. The graph shows that the households that did pay the increased minimum rent had a higher survival estimate for most of the FSS program participation, but the survival estimates at the end of the FSS program were not different for those who did and did not pay the increased minimum rent.

[See Appendix Figure 7. Kaplan Meier Survival Estimate for Public Housing Households that Paid Increased Minimum Rent Prior to FSS Enrollment.**]**

The below Log-Rank Test of Equivalence shows that there is not a statistically significant different in the likelihood of completing the FSS program between households that did and did not pay the increased minimum rent prior to FSS enrollment.

Table 4-29. Log Rank Test of Equivalency for Public Housing Households that Paid Increased Minimum Rent Before Enrolling in FSS

	Observed	Expected
Did not Pay increased minimum rent prior to FSS enrollment	150.0	138.4
Paid increased minimum rent prior to FSS enrollment	52.0	63.6
Total	202.0	202.0

Chi2 = 3.10 Pr>Chi2 = 0.0781

4.3.2.2 Escrow Savings

The escrow savings account is the primary incentive for FSS participants to remain in the program. Typically, public housing residents pay roughly 30% of their monthly income in rent, and as their income changes, the rent is recalculated. When households enter the FSS program, they are permitted to pay the rent that they paid at the time of FSS entry throughout the program, and as their income increases, the would-be increased rent is diverted into an escrow savings account where is accumulates until the participant graduates from the FSS program. Upon graduation, the participant receives their savings in a lump sum. If the participant does not graduate from the program, the savings is forfeited to the housing authority.

The table below shows the average, median, and range of escrow savings by FSS outcome. Those who completed FSS had a higher average and median escrow savings amount than those who withdrew from the FSS program.

Table 4-30. Public Housing FSS Participants Escrow Savings at End of FSS Participation

FSS Outcome	Average Escrow	Median Escrow	Range
Completed FSS	$4,134	$2,232	$0 - 45,278
Withdrew	$1,638	$125	$0 - 20,203
Moved from HACP	$1,257	$132	$0 - 27,327
Right Censored	$2,490	$392	$0 - 32,330

The median escrow savings across all outcome types was just $311 and the average was $2,110. The table below shows the number of households with escrow savings above and below the median of $311 by FSS outcome.

Table 4-31. Public Housing Households with Escrow Savings Above and Below Mediat at the End of FSS Participation

	Above Median	Below Median	Total
Completed FSS	141	51	192
Withdrew	80	122	202
Moved from HACP	193	244	437
Right Censored	118	115	233

The Kaplan Meier survival estimate for the households with escrow savings above and below the median. The households with escrow savings above the median were significantly more likely to complete the FSS program than those who had escrow savings below the median.

[See Appendix Figure 8. Kaplan Meier Survival Estimates PH FSS Households with escrow savings above median]

Table 4-32. Log Rank Test of Equivalency for Public Housing Households with Escrow Savings Above and Below the Median

	Observed	Expected
Escrow below median	121	70.15
Escrow above median	80	130.85
Total	201	201.00

Chi2 58.98 Pr>0.000

The above log rank test of equivalency and the Kaplan Meier survival estimate shows that public housing households that had escrow savings higher than the median were more likely to remain in the FSS program than those who had escrow savings less than the median.

There were many households that left the FSS program despite having high levels of escrow savings. There are a few possible explanations for this. The first is that the escrow savings calculation was done by calculating the increased income from the income at the time of program entry and calculating what the rent would have been at that income level and subtracting the rent at the time of program entry. Under certain circumstances, households are allowed to withdraw money from their escrow funds prior to completion of the FSS program. Common reasons for withdrawing funds include: tuition or job training expenses; car repair that is essentially for getting to work; purchasing uniforms, shoes, or tools that are needed for a job. A review of the households that had estimated escrow savings of more than $5,000 but left the FSS program prior to completion tended to fall into one of two categories. The first are households that had participated in the FSS program for about two years, and during that time period had a significant increase in income, and had more than one adult in the household, and in many cases had a full-time student in the household. Those households may have used the escrow funds for educational and job-related expenses and did not actually forfeit a large amount of escrow savings when they left the FSS program.

The second common scenario was households that had no or very little income at the time of FSS enrollment and then had a modest increase in household income, which may be from wages or from public assistance programs. Those households tended to remain in the FSS program for a longer period of time which allowed them to accrue escrow savings of more than $5,000. Those households tended to have household incomes of less than $10,000 but because they were only

pay $25 per month in rent tended to remain in the FSS program for more than 3 years, their escrow savings accrued. It is likely that those households may have been dismissed for noncompliance with the FSS program rules when they had still not secured employment and may have continued to receive some form of assistance such as SNAP or TANF in the later years of the FSS program.

Another possible explanation for households that left the FSS program is that it is possible that they had a physical or mental health issue or had family obligations that prevented them from continuing to fully participate in the FSS program and their participation ended either voluntarily or they were dismissed from the housing authority for noncompliance with the program requirements. Unfortunately, the data do not indicate whether the household left the program voluntarily or involuntarily.

Section 5: Logistic Regression

The prior section provided a univariate analysis of the relationship between the household characteristic and program characteristic variables to examine the impact of those variables on the FSS participants' length of FSS participation. That univariate analysis provided important information for better understanding the relationship between leaving the FSS program prior to completion, and the variables. That analysis also showed that having children in the household, moving within HACP public housing, having an income above the median at FSS entry and paying increased minimum rent prior to FSS enrollment did not explain exit from the FSS program prior to completion. The Kaplan Meier survival estimate curves for those predictors cross, and further examination indicated that there are not proportional hazards, which violates the assumption of the multivariate Cox Proportional Hazards model. The predictors household change, zero income, and escrow savings are statistically significant in the univariate analysis and are worthy of further analysis in the multivariate logistic regression model, particularly because there could be a

relationship between escrow savings and zero income at FSS entry because those households with no income at FSS entry had the greatest opportunity to benefit from the escrow incentive.

To further examine these variables, I used a multivariate logistic regression. The dependent variable in this analysis is FSS exit prior to completion.

Logistic regression models were fit to test the association between the likelihood of leaving the FSS program prior to month 60 and the predictor variables related to household and program characteristics. This analysis includes the 392 public housing households with an observed entry and exit from the FSS program and either left the FSS program or completed the FSS program. This logistic regression includes the following independent variables: children in the household, household change, zero income at FSS entry, households that moved within HACP housing, and households that paid the increased minimum rent prior to FSS enrollment. The table below reports the odds ratios for the tested variables. Model 1 shows the coefficients for those variables in the logistic regression model. The model shows that households that moved and households with a change in household composition significantly less likely to leave the FSS program prior to completion. That finding is consistent with the findings of the univariate Kaplan Meier survival estimates and the Log Rank tests of equivalency. In the multivariate model, zero income at the time of FSS entry was not significantly related to the outcome.

Table 4-33. Logistic Regression for Public Housing Households that Completed or Witdrew from the FSS program

Variables	Model 1	Model 2	Model 3	Model 4
Children	1.322628	1.391262	1.058309	1.44295

Household Change	0.5785632**	0.575103**	0.6298494*	0.5432758*
Moved	0.475097**	0.4302421**	0.4400879**	0.4286537**
Zero Income at Entry	0.7302772	0.6205173*	0.7834158	0.7536129
Min Rent before FSS	0.9665463	0.8444736	0.8579151	0.8118502
Location FE		X		
Entry Year FE			X	
Age FE				X
N	391	383	304	355
Pseudo R^2	0.0351	0.1363	0.0375	0.0831

*p <0.1 **p<0.05 ***p<0.01

Model 2 includes location fixed effects based on the project number. This analysis is important because it allows for an analysis of the impact of location. Six observations were dropped because they predicted success or failure perfectly due to a small number of observations. Interestingly, when considering location fixed effects, household change and moved within HACP housing are significant at the 5% level and zero income at entry is significant at the 10%. Further examination revealed that residents in scattered-site North were significantly at the 10% level to remain in the FSS program, and residents at scattered sites Northview Heights and scattered-site South and Bedford Hill, redeveloped through the HOPE VI program, were more likely to complete the FSS program, though not significantly more likely. Scattered-site housing is housing that is owned and managed by HACP, but in homes throughout the community, rather than being in a large public housing development.

Model 3 tests for cohort effects based on year of FSS entry. This analysis showed that the FSS participants who entered the program in 2012 were significantly (10% level) to complete the

program than those who entered in prior years. Because many of the participants who entered in later years remained in the program at the end of the study period, observations from 2013, 2014, 2015, 2016, and 2017 were dropped because of the small number of observations that perfectly predicted FSS program exit. The households that may go on to complete the program were still in the program and right censored.

Model 4 uses age of head of household fixed effects to determine whether there is a relationship between the age of the head of household and FSS program outcome. Model 4 shows that when controlling for head of household age, both households with a change in composition and households that moved within HACP public housing were significantly (5% and 10% level respectively) less likely to withdraw from the FSS program. This is important because the age of households may be related to work experience and life cycle indicators such as household change.

The analysis in this section is largely consistent with the findings of the univariate analysis. Households that experienced a change in household composition and households that moved within HACP housing during the FSS program were less likely to withdraw from the FSS program prior to completion. Households with escrow savings above the median were also statistically less likely to leave the FSS program prior to completion, but median escrow savings is a poor predictor variable because it is so closely tied to FSS program success. When considering location fixed effects, I found that those who lived in Manchester Commons, a scattered-site community redeveloped under HOPE VI were statistically more likely to complete the FSS program. The analysis also showed that while not statistically more likely to complete the program, those who lived in scattered-site North and scattered-site South or Bedford Hill were more likely to complete the FSS program. It is interesting to see that those in scattered-site communities performed so well considering that those households do not receive services onsite. That contradicts one of the

assumptions that public housing residents are more likely to complete the FSS program than HCV households because they receive onsite services. HACP has a site-based waiting list which allows residents to apply to live in a particular property, therefore residents in scattered-site housing may differ systematically than those who live in traditional public housing units.

The following chapter, Chapter 5, will provide a similar analysis of the findings of the housing choice voucher households. In Chapter 6, I will provide a full discussion of the findings and compare the outcomes of public housing and housing choice voucher households in greater detail.

5.0 Housing Choice Voucher Findings

This chapter presents the findings of the housing choice voucher (HCV) households that were enrolled in the Family Self-Sufficiency (FSS) program during the study period of January 1, 2010 to October 1, 2017. For continuity and ease of comparison, this chapter mirrors the presentation of the findings of the public housing households presented in Chapter 4. Like the previous chapter, this chapter is divided into five sections. First, I will determine the outcomes of the FSS program for the HCV households and compare those outcomes to the public housing FSS participants. Second, I will conduct the time series analysis to determine whether there are seasonal effects that explain exit from the FSS program. Second, I will use the event history analysis framework to determine whether there are particular times in the FSS program when the HCV households are more likely to leave the program. Third, I will compare the results of the HCV analysis to the analysis of the public housing households provided in the prior chapter. Fourth, I will address the third research question, what explains exit from the FSS program. I will test the same to hypothesis tested in the prior chapter, household and program characteristics. The household characteristics are: household composition, changes in household composition, location of HACP housing, moves within HACP housing, and income at time of FSS entry. I will then compare the results of the analysis of the HCV participants to the analysis of the public housing participants.

Lastly, I will conclude the analysis of the HCV FSS participants with the multivariate logistic regression models, that further examine the outcomes of the univariate analysis and test for fixed effects, including: location of housing, year of FSS entry, and age of the head of

household. The following chapter, Chapter Six, will conclude this dissertation with a discussion of the findings.

5.1 Research Question 1 What are the Outcomes of FSS Participation?

This section determines the outcomes of the housing choice voucher households that participated in the FSS program between January 1, 2010 and October 1, 2017. First, I will describe the outcomes of the FSS program, like the public housing households, the possible outcomes are left censored, completed the FSS program, withdrew from the FSS program prior to completion, moved from HACP housing, or were right censored. Second, I will provide the demographic information for the households in each category to determine whether there are discernable characteristics of the households that experience certain outcomes of FSS participation.

5.1.1 FSS Program Outcomes

There were 1,210 HCV households enrolled in the FSS program during the study period, January 1, 2010 and October 1, 2017. Of those 1,210 households, 540 (44.7%) of the FSS participants enrolled in the program prior to January 1, 2010. Because those participants enrolled in the FSS program prior to the beginning of the study period, their entry to the FSS program was not observed and their length of FSS participation cannot be calculated. Those 540 entries are considered left censored and while they are included in the initial review of the demographics of the study participants, they are not included in further analysis.

Table 5-1. HCV Households that participated in the FSS program during the study period, January 2010 – October 2017

Households	Count	Percent
Left Censored, FSS enrollment prior to January 2010, the beginning of the data set	540	44.7
Right Censored, Household is enrolled in FSS on October 1, 2017 the end of the study period	207	17.1
Households that exited from HACP while enrolled in FSS	128	10.6
FSS participants who left the FSS prior to completion (60 months)	262	21.7
FSS participants enrolled in FSS for 60 months or more	72	6.0
Total Number of HCV households enrolled in FSS during the study period.	1,209	100.0

There were 207, or 17.1%, FSS participants who were enrolled in the FSS program on October 1, 2017, the last day of the study period. Because those participants were still enrolled in the program at the end of the study period, the end of their FSS participation is not observed, and the full length of their participation cannot be calculated. These entries are right censored, and do not provide any information about the outcome of their FSS participation, but we can observe their entry to the FSS program and can observe their participation during the study period. These right censored entries are included in the survival analysis for the period that they are observed in the FSS dataset.

There were 128, or 10.6%, FSS participants who left HACP housing while they were enrolled in the FSS program. Because the exit from the FSS program coincides with exit from HACP housing, we cannot accurately say that the FSS participant deliberately left the FSS program. These entries are considered right censored, with no observable FSS exit, and are treated the same as the entries for FSS participants who were enrolled in the FSS program at the end of the study period.

Of the 1,210 HCV households that were enrolled in the FSS program during the study period, 875, or 72.3%, participants had partial FSS records and either their entry or exit from the FSS program could not be observed using this dataset. Meaning that of those 1,210 HCV households, there are 335, or 27.7%, participants that have complete records and the entirety of their FSS participation can be observed. Of those 335, 262 households withdrew from the FSS program but remained in HACP housing and 72 households completed the 60-month program. Table 6.1 below, shows the distribution of HCV participants by outcome.

Of the 334 participants with an observed FSS program entry and exit, 72, or 21.5%, completed 60 months in the FSS program and 262, or 78.5%, left the FSS program prior to completion of the 60-month program.

Table 5-2. HCV Households with an observed entry and exit from the FSS Program

Households	Count	Percent
HCV Households that withdrew from FSS prior to completion	262	78.5
HCV Households that Completed the FSS program	72	21.5
Total	334	100.0

As mentioned in the prior chapter, completing the 60-month program does not necessarily mean that the household graduated. There are some households that completed the FSS program prior to the end of the five-year period and others that completed the 5-year period and did not meet the graduation requirements. A 2011 study by Silva, et al. found that approximately 25% of the HCV households that graduated did so before the end of the five-year period (Silva et al., 2011). Data from HACP's MTW reports shows that 103 HCV households in the study group graduated from the FSS program between 2015 and 2017. Also, it is important to note is that this study period ended on October 1, 2017, so it is possible that some of the HCV households that remained in the program on October 1, 2017 graduated by the end of the calendar year.

Furthermore, other HCV households likely graduated prior to the end of the five-year period. It is important to note that while this study examines length of FSS participation, that length of participation does not indicate graduation.

Table 5-3. HCV Households that Graduated from the FSS Program 2015-2017

Year	N
2017	29
2016	33
2015	41
Total	103

5.1.2 FSS Participants

This section examines the demographic characteristics of the HCV households that participated in the FSS program during the study period.

The tables below show the demographics and some characteristics of the households that experienced by FSS outcome. These data confirm the findings of other researchers that there is little demographic variation in the FSS participants. Most participants are single, Black women under the age of 40, who are the only adult in the household.

Table 5-4 shows that more than 90% of the heads of household in the households that participated in the FSS program are women. The table shows the number of male and female-led households in the FSS program broken down by program outcome. This is slightly higher than the percentage (84.5%) of the public housing households that had a female head of household.

Table 5-4. FSS Participants' outcomes by sex of head of household

Variable	Left Censored		Completed FSS		Withdrew from FSS		Moved from HACP		Right Censored		Total	
Sex	N	%	N	%	N	%	N	%	N	%	N	%
Female	510	94.4	67	93.1	245	93.5	112	87.5	190	91.8	1,124	93.0
Male	30	5.6	5	6.9	17	6.5	16	12.5	17	8.2	85	7.0
Total	540	100	72	100	262	100	128	100	207	100	1,209	100.0

Furthermore, more than 90% of the FSS participants were black. Table 5-5 below shows the FSS program outcomes by race of the head of household. For comparison, 95.1% of the public housing households participating in the FSS program had a black head of household.

Table 5-5. HCV FSS Participants' outcomes by race of head of household

Variable	Left Censored		Completed FSS		Withdrew from FSS		Moved from HACP		Right Censored	
Race	N	%	N	%	N	%	N	%	N	%
Black	507	93.9	65	90.3	246	93.9	118	92.9	188	90.8
White	30	5.6	6	8.3	15	5.7	9	7.1	16	7.7
Asian	1	0.2	0	0.0	1	0.4	0	0	3	1.4
American Indian / Hawaiian	2	0.4	1	1.4	0	0	1	0.8	0	0
Total	540	100	72	100	262	100	127	100	207	100

There were only a few households that identified as Latino. There were two Latino households that withdrew from the FSS program and one that is still in the FSS program and is counted as right censored.

Figure 5-1 shows that most of the heads of households of households that participated in the FSS program are under the age of 35.

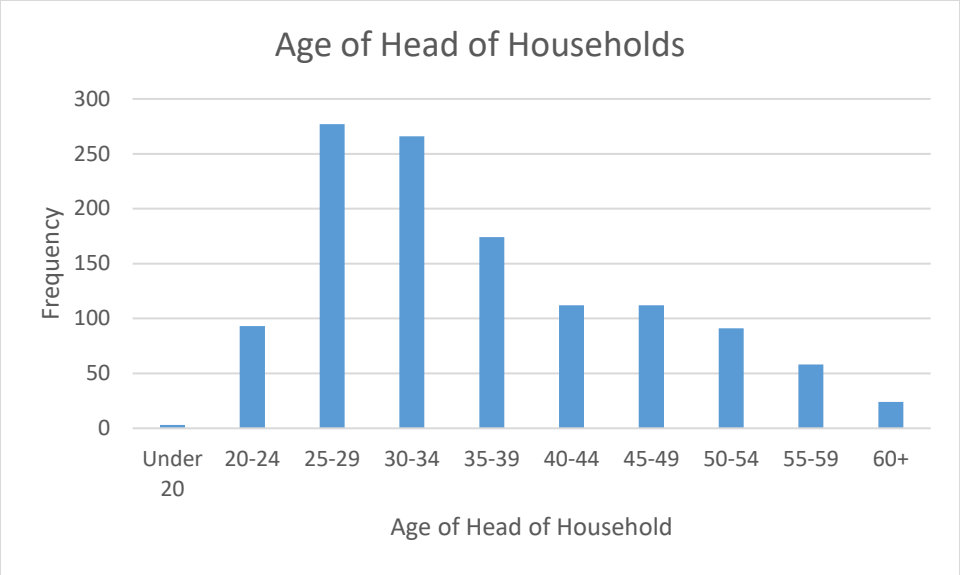


Figure 5-1. HCV FSS Participants by age of head of household

Of the 72 HCV households that completed the FSS program, only 8, or 11.1%, households had a head of household under the age of 30. There were 36, or 50.0%, heads of household were in their 30s, and 28, or 38.9%, heads of household were over the age of 40. (See Table 5-6).

Table 5-6. HCV FSS Participants by Age of Head of Household

Variable	Left Censored		Completed FSS		Withdrew from FSS		Moved from HACP		Right Censored		Total	
Age	N	%	N	%	N	%	N	%	N	%	N	%
Under 20	3	0.6	0	0	0	0	0	0	0	0	3	0.02
20-24	49	9.1	0	0	29	11.1	9	7.1	6	2.9	93	7.7
25-29	124	23.0	8	11.1	64	24.4	28	22.0	53	25.6	277	22.9
30-34	130	24.1	20	27.8	55	21.0	25	19.7	36	17.4	266	22.0
35-39	71	13.1	16	22.2	27	10.3	23	17.3	37	17.9	174	14.4
40-44	51	9.4	5	6.9	20	7.6	17	13.4	19	9.2	112	9.3

45-49	49	9.1	10	13.9	25	9.5	6	4.7	22	10.7	112	9.3
50-54	38	7.0	10	13.9	19	7.3	12	9.4	12	5.3	91	7.5
55-59	18	3.3	3	4.2	14	5.3	6	4.7	17	8.2	58	4.8
60+	7	1.3	0	0	9	3.4	2	1.6	6	2.9	24	2.0
Total	540	100.0	72	100.0	262	99.9	128	99.9	207	100.1	1,209	99.92

Heads of households who completed the FSS program tended to be older than those who left the FSS program prior to completion or moved from HACP housing. Of the 262 participants who withdrew from the FSS program, 93, or 35.5%, heads of household were under the age of 30 and 82, or 31.3%, heads of households were in their 30s, and 87, or 33.1%, heads of household were over the age of 40. Of those HCV households that moved from the HACP while enrolled in the FSS program, 37, or 29.1%, had a head of household under the age of 30 and 48, or 37%, had a head of household between the age of 30 and 39, and 43, or 33.8%, had a head of household age 40 or older.

This is very different from the public housing households, which tended to have a younger head of household. Of the public housing FSS participants, more than half (51.6%) were under the age of 30. Additionally, many of the young public housing FSS participants, 308, or 19.0%, of the public housing participants moved from HACP housing while enrolled in the FSS program. For comparison, only 37, or 3.1%, HCV households with a head of household under the age of 30 moved from HACP housing while enrolled in the FSS program. The HCV participants tended to be older than the public housing participants, and less likely to move from HACP housing while enrolled in the program.

This section showed the outcomes of the participants in the FSS program. It shows that of the 334 FSS participants with an observed entry and exit from the FSS program, more than ¾ of the FSS participants left the program prior to completion. This section also reviewed the demographics of the FSS participants and showed that a high percentage of the participants were young, single, black women. This finding is consistent with the literature.

5.2 Research Question 2: When do HCV FSS Participants Leave the FSS Program?

This section addresses the second research question, when do HCV FSS participants leave the FSS program to determine whether there are particular times during the calendar year or the FSS program when participants are more likely to leave the program. First, I will conduct a time series analysis to show when FSS participants left the FSS program during the study period of January 1, 2010 and October 1, 2017. Second, I will use the event history analysis framework to create a life table to show participants' exits during the 60-month program.

As explained in the prior section, there were 262 HCV FSS participants who left the FSS program prior to completion. Figure 5-2 below shows the month and year that those 262 households left the FSS program. This chart does not include the exit from the FSS program from those who moved out of HACP housing. This shows that there was a spike in exit from the FSS program in March 2013, when 63 participants left the program. Those 63 participants make up 24% of the exits from the FSS program. With the exception of the spike in exits in March 2013, exits from the program are generally fewer than five each month with a few exceptions.

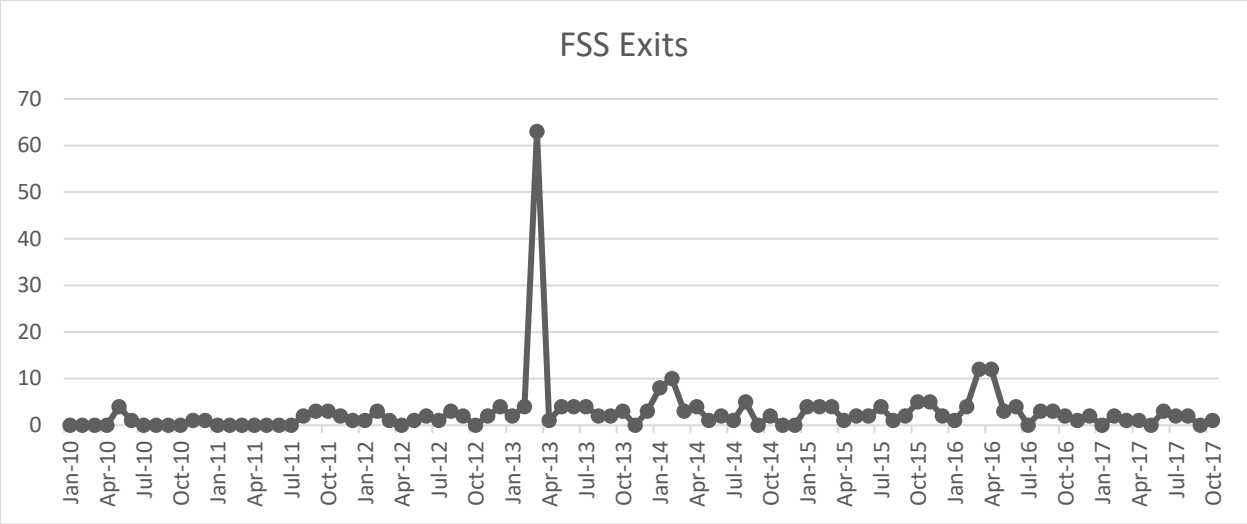


Figure 5-2. HCV Participants who left the FSS program and remained in HACP housing from January 2010 to October 2017.

The 63 FSS participants that left the FSS program in March of 2013, were enrolled in the FSS Program for a period of between 4 to 39 months before leaving the program. Figure 5-3 below shows the length of time that those households participated in the FSS program. A review of the demographics, household composition, location, and income levels does not show any patterns for those households that exited from the FSS program on March 1, 2013. The high number of exits in March 2013 cannot be explained by this data set. This spike in exits likely reflects a data issue at HACP.

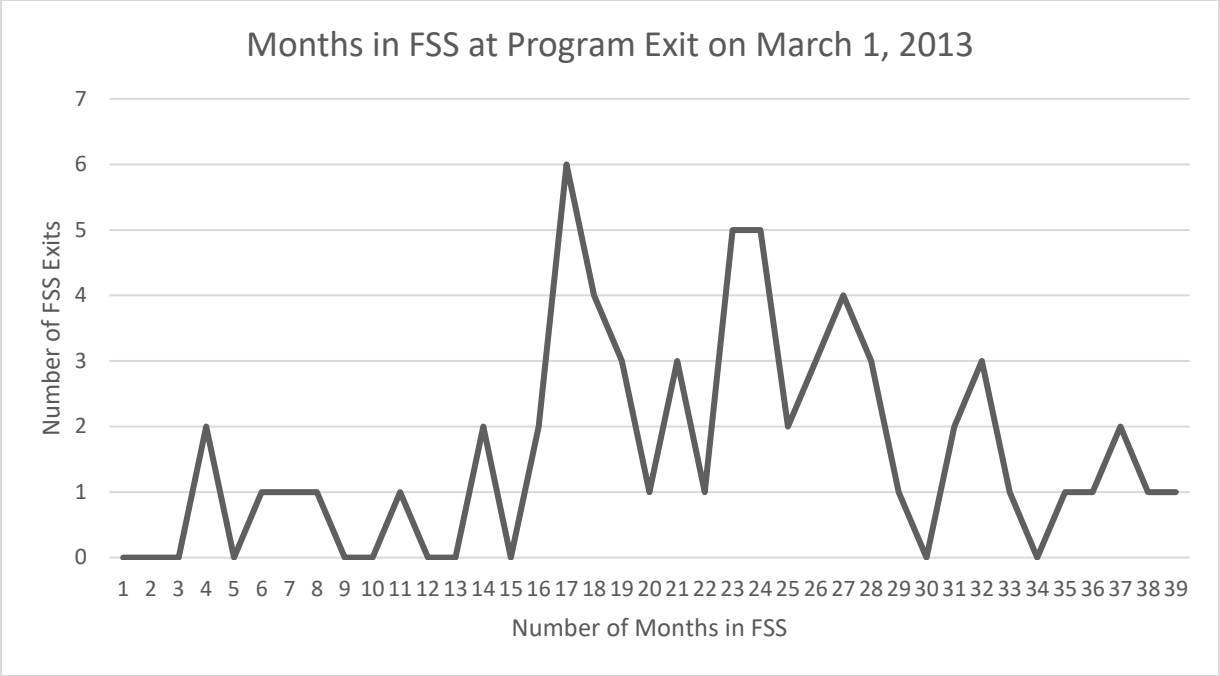


Figure 5-3. Length of FSS participation by HCV FSS participants who exited the program on March 1, 2013

5.2.1 Life Table: HCV Households

The life table for the HCV participants, in Appendix A, displays the number of FSS participants enrolled in the FSS program during the 60-month program.

[See Appendix Table 2. Housing Choice Voucher FSS Life Table]

The Life Table shows the number of HCV FSS participants who exited from the FSS program during each month of the 60-month program. This analysis provides an examination of points during the program when an FSS participant may be more likely to leave the program. The table calculates the participants' length of FSS participation starting with month 0, when the participant entered the program and calculating participation in the number of months between 0 and 60. Participants who remained in the program for 60 months completed the FSS program.

The format of the life table for the HCV participants is the same as for the public housing participants. The first column shows the time interval, which is a month. The second column shows the number of FSS participants enrolled in the FSS program at the beginning of the time interval. The third column shows the number of participants that withdrew from the FSS program during the month, the fourth column shows the number of households that moved out of HACP housing, and the fifth column shows the number of households that were right censored. Column six shows the survival rate which is the likelihood that the FSS participants that began the month in the FSS program will remain in the program for the entire month. Column seven is the error estimate and Columns eight and nine are the confidence intervals.

The median survival time, when 50% of participants remain in the program occurred between months 24 and 25, showing that more HCV households left during the first two years than the last three years. This is different than the public housing data that showed that the median survival time for public housing households was month 30, which was the midpoint in the program.

In Figure 5-4, the below Kaplan-Meier survival estimate shows the survival estimates for the FSS participants. The graph shows a steady decline during the first three years of the program which then seems to flatten out after year three.

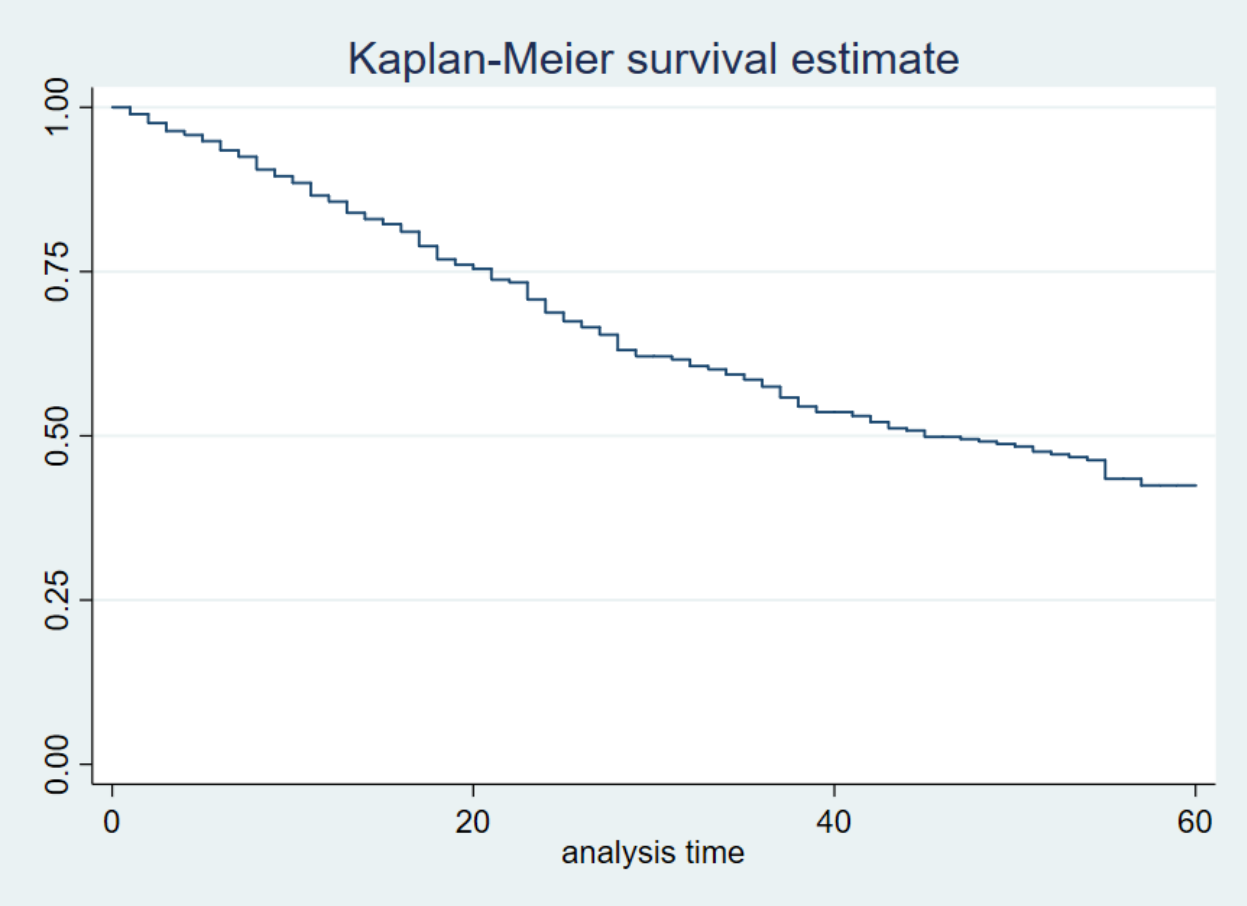


Figure 5-4. Kaplan-Meier survival estimate for all HCV FSS participants

There was little difference in the percentage of HCV households that left the FSS program between the years (see Table 5-7). The highest percentage of exits from the FSS program was during year 2 when 16.6% of FSS participants withdrew from the program. Years 1 and 5 had the lowest percentage of HCV participants leaving the program, 12.5% and 12.4% respectively. The households that exited during year 4 may have completed the program requirements early and graduated from the FSS program prior to the end of the fifth year. Still, there was not a considerable change in the percentage of households that left over the course of the program, suggesting that exit from the FSS program was not time dependent. The prior analysis, which looked at exit by

calendar time as well as this analysis looking at exit in program time, suggests that time is not related to the outcomes.

Table 5-7. HCV Households and FSS Outcomes by Year

Beginning of Year	# at beginning of year	% remaining at beginning of year	# Withdrew from FSS during the year	% Withdrew from FSS during the year	Moved from HACP	Right Censored	Completed FSS
1	671	100.0	84	12.5	53	64	
2	470	70.0	78	16.6	35	37	
3	320	47.7	51	15.9	23	26	
4	220	32.8	31	14.1	11	41	
5	137	20.4	17	12.4	9	39	
End of Year 5							72

This section has shown that there were not strong seasonal effects that explain exit from the FSS program. There was not a consistent increase in exits at the beginning of the summer to suggest that participants were more likely to leave the program when children were out of school. The analysis of exit by calendar date did show a high number of exits from FSS on March 1, 2013, which is likely explained by a data processing issue by HACP. The hypothesis that there was a point in the program when participants were most likely to leave was not supported by the data. Exit from the FSS program was not explained by time. The next section will test participant characteristics to see if they can explain the likelihood of exit from the FSS program.

5.3 Research Question 3: What explains exit from the FSS program?

5.3.1 Hypothesis 1: Household Characteristics

In the first section, I identified the number of households who left the FSS program prior to completion. In the second section, I examined the time, measured both by calendar date and length of time in the program, to determine whether either of those measurements explained exit from the FSS program. Neither of those offered a meaningful explanation of FSS exit. In this section, I will examine the household characteristics to determine whether they offer an explanation of which households are more likely to exit the FSS program prior to completion.

The variables tested in this section are: household composition, change in household composition, housing location, moves within HACP housing, and income at time of FSS entry. Each variable and its relationship to the hypothesis that household characteristics explains FSS exit will be explained in greater detail in each subsection.

5.3.1.1 Household Composition

The number and age of household members may impact a participant's likelihood of completing the FSS program. Households with a single parent who may be less likely to complete the FSS program than a participant who is in a single-person household or a with more than one adult. Table 5-8 below shows that more than ¾ of the HCV households in the FSS program have two or more members in the household. Households with only one household member were not more likely to remain in the program than those who had more members of their household. This is very similar to the public housing households, where 72% of public housing FSS participants

lived in a household with two or more people and only 28% of participants lived in a single-person household.

Table 5-8. HCV Participants' Household Composition by FSS Outcome

	Completed FSS		Withdrew from FSS		Moved from HACP		Right Censored		Total	
Household	N	%	N	%	N	%	N	%	N	%
One-Person Household	17	23.6	59	22.5	23	18.1	49	23.7	148	22.2
Households with Two or more people	55	76.4	203	77.5	104	81.9	158	76.3	520	77.8
Total	72	100	262	100	127	100	207	100	668	100.0

Most HCV households (81%) had one adult in the household. Households that completed the FSS program may be more likely to have more than one adult, however, there were only 17 households with more than one adult who completed the FSS program, because that number is so low, it is difficult to determine whether having an additional adult in the household makes an FSS participant more likely to complete the program. A very small percentage of HCV households in the FSS program had married couples or other adults in the household. While households with more than one adult may be more likely to complete the FSS program, the number of those households was very small and difficult to test using statistical methods. Other adults are adults in the household that are not spouses or full-time students. They may be adult children, parents, relatives, or partners of the designated head of household. Additionally, some households have full-time students who are over the age of 18 but attend school full-time.

Table 5-9. Number of adults in the HCV FSS household

	Completed FSS		Withdrew from FSS		Moved from HACP		Right Censored		Total	
Household	N	%	N	%	N	%	N	%	N	%
Spouse	2	2.8	2	0.8	4	3.1	4	1.9	12	1.8
OtherAdult	11	15.3	29	11.1	25	19.7	23	11.1	88	13.2
Full-Time Students	4	5.6	11	4.2	12	9.4	0	0	27	4.0
One Adult	55	76.4	220	84.0	86	67.7	180	87.0	541	81.0
Total	72	100.1	262	100.1	127	99.9	207	100	668	100.0

Table 5-10 below shows the number of HCV households enrolled in the FSS program that do and do not have children in the household. One theory is that households that have children will be less likely to complete the FSS program because of childcare responsibilities. The table below shows that most (69.6%) of these households have children. This is very similar to the public housing households, where 68.9% of the households participating in the FSS program had at least one child in the household.

Table 5-10. HCV FSS Households With and Without Children by FSS Outcomes

	Completed FSS		Withdrew from FSS		Moved from HACP		Right Censored		Total	
Household	N	%	N	%	N	%	N	%	N	%
Children	49	68.1	185	70.6	90	70.9	141	68.1	465	69.6
No children	23	31.9	77	29.4	37	29.1	66	31.9	203	30.4
Total	72	100	262	100.0	127	100.0	207	100	668	100.0

The Kaplan-Meier survival estimate shows that households that did and did not have children had nearly the same likelihood of success in the program and the number of households

with children than withdrew from the FSS program are nearly identical to the number of households that were expected by the model to withdraw from the FSS program.

[See Appendix Figure 9. Kaplan Meier Survival Estimate HCV Households with Children]

Table 5-11 below shows the log-rank estimates of the expected outcomes for households that had children. This analysis shows that there is not a significant difference between the households that have children and those that do not in terms of the likelihood to complete the FSS program. Therefore, the hypothesis that households who had children under the age of 18 may be less likely to complete the program due to childcare responsibilities has not held true. This result is very similar to the result of the comparison of the public housing households that did and did not have children in the household. Like these HCV households, Public housing households who did and did not have children in the household had a nearly equal likelihood of completing the FSS program.

Table 5-11. Log Rank Estimate- HCV Households with Children at FSS entry

	Observed Events	Expected Events
No Children	77	76.57
Children	185	185.43
Total	262	262

Chi2 = 0.00 Pr>chi2 = 0.9532

5.3.1.2 Change in Household Composition

Changes in household composition, when a household member enters or leaves the household may create a disruption that may lead to the participant being more likely to leave the FSS program. The analysis shows that households that had a change in household composition while enrolled in the FSS program were more likely to remain in the program that households that did not experience a change in household composition. Of the 262 HCV households that left the

FSS program prior to completion, 43 (15.8%) households experienced a change in household composition. This provides some evidence that having a change in the household composition, the addition and subtraction of household members may not be disruptive to progress in the FSS program. In fact, households with a change in household composition were more likely to remain in the FSS program than households that did not have a change. This is consistent with the results of the same test for public housing households. The result is significant at the $p<0.001$ level therefore, we can reject the null hypothesis that changes in household composition negatively impact the likelihood of withdrawing from the FSS program. Of the 43 households that had a change in household composition, 29 had the addition of at least one family member and 12 had a reduction in the number of household members. Further analysis showed that the addition of children to the household did not affect the household's outcomes in the FSS program.

Table 5-12. HCV Changes in household composition while enrolled in the FSS program

	N	%
Changes in HH Composition	219	84.2
No Change in HH Composition	43	15.8
Total	262	100.0

The Kaplan-Meier Survival Estimate shows the survival estimates for the FSS participants that did and did not have a change in household composition while enrolled in the FSS program. This shows that households that had a change in household composition had a higher survival estimates than those who did not have a change in household composition.

[See Appendix Figure 10. Kaplan Meier Survival Estimate HCV households with a change in composition.]

The below log rank test of equivalency shows that households with a change in household are significantly more likely to remain in the FSS program than households that did not have a change in household composition. This is contrary to my expectation that changes in the household composition would create a disruption that would lead to the FSS participant leaving the program. This is particularly interesting because 29 of the households that an addition to their household.

Table 5-13. Log-Rank Test of Equivalency for HCV Households with a change in household composition.

	Observed Events	Expected Events
No Change	219	167.94
Change	43	92.06
Total	262	260.00

Chi2: 44.38 Pr>Chi2 0.000

Due to the mechanics of this analysis, HCV households that remained in the FSS program for a longer period of time had more time to experience a change in household composition while enrolled in the FSS program than the households who left the FSS program earlier. To test whether this result reflected the length of FSS participation, or the effect of household changes, I conducted the same analysis with households that moved early, within the first 36 months of the FSS program, and the households who did not experience a change in household composition to determine whether this finding reflects the impact of change in household composition accurately. The Kaplan Meier survival estimate, located in the appendix, and the log rank test of equivalency, Table 5-14 below, show that households who experienced a change in household composition during the first 36 months of FSS participation were significantly less likely to leave the FSS program prior to completion than households that did not experience a change in household composition. There were 34 HCV households that had a change in household composition during

the first 24 months of the FSS program and did not complete the FSS program. There were three additional households that experienced a change in household composition during their FSS participation and left the program later in the program, between months 25 and 59.

Table 5-14. Log Rank Test of Equivalency: HCV Households that Experienced a Change in Household Composition within the first 24 months of FSS participation and households that did not experienced a change in household composition while in FSS.

	Observed	Expected
0	219	206.89
1	34	46.11
Total	253	253.00

Chi2: 3.98 Pr>Chi2: 0.460

5.3.1.3 Income

The median household income at the time of FSS program entry was $8,929 and the mean income was $11,511. The minimum household income was 0 and the maximum was $49,685. For the households that completed at least 60 months in the FSS program, the median annual income was $11,848 at FSS entry and the average was $15,773. The median annual income for FSS participants who left the program prior to completing 60 months was $9,335 and the average annual income for those households was $11,474 at FSS entry. This is similar to the amounts for all households at the beginning of the FSS program, with the median income being slightly lower and the mean income beings slightly higher than the statistics for those entering the FSS program.

Table 5-15. HCV FSS Participants by income at FSS entry

Income Level at FSS Entry	N	%

0	99	14.7
$1-6,000	161	24.0
$6,001 – 12,000	128	19.0
$12,000 - $18,000	109	16.2
$18,001 - $24,000	82	12.2
$24,001 +	93	13.8
Total	672	99.9

The Kaplan-Meier survival estimate shows that there was ultimately little difference in the likelihood of withdrawing from the FSS program among households earning more or less than the median income at the time of FSS entry. Households earning less than the median household income were slightly more likely to remain in the FSS program but was not statistically significant. [See Appendix Figure 11. Kaplan Meier Estimates HCV Households with Income above median at FSS entry.]

The below log-rank test for equality of survival functions among households that did and did not earn more than the median household annual income at the time that the household entered the FSS program is below. This test confirms that while the households that earned less than $11,474, were slightly more less likely to withdraw from the FSS program, it was not statistically significant. Therefore, the null hypothesis that there is not statistical difference between the likelihood of leaving FSS between the two groups cannot be rejected.

Table 5-16. Log Rank test of equivalency for HCV participants with income above and below the median at FSS entry.

	Events Observed	Events Expected
Income below median at FSS entry	155	158.42
Income above median at FSS entry	107	103.58

Total	262	262

Chi2 = 0.19 Pr>chi2 = 0.6647

Table 5-17 below shows the incomes of the FSS participants at the last observation, either the date that the participant left the FSS program, moved from HACP housing, completed the FSS program, or for the right-censored households, their income on October 1, 2017, the last day of the study period.

Table 5-17. HCV Income at Last Observation by FSS Outcome

Income level	Completed FSS	Left FSS	Moved from HACP	Right Censored	Total
0	5	30	7	16	58
1-6,000	13	63	22	34	132
6,001-12,000	18	65	20	48	151
12,001-18,000	9	39	16	31	95
18,001-24,000	7	36	23	30	96
24,000 +	21	29	40	48	138
Total	72	262	128	207	669

5.3.1.4 HCV Household Location and Moves

This section examines the housing choice voucher households to determine whether the location or moving from one housing unit to another impacted their likelihood of withdrawing from the FSS program prior to completion. Figure 5-5 below shows the location of the HCV FSS participants by zip code. The map shows the number of FSS participants with a voucher in each zip code at the time of FSS enrollment. There is a higher number of HCV households enrolled in

the FSS program who live in zip codes 15206, 15210, and 15219 with between 58 and 90 HCV households participating in the FSS program in those zip codes. These results are not surprising because rental housing tends to be less expensive in Northwest and South Pittsburgh (Blackhurst & Briem, 2018; Blackhurst et al., 2019).

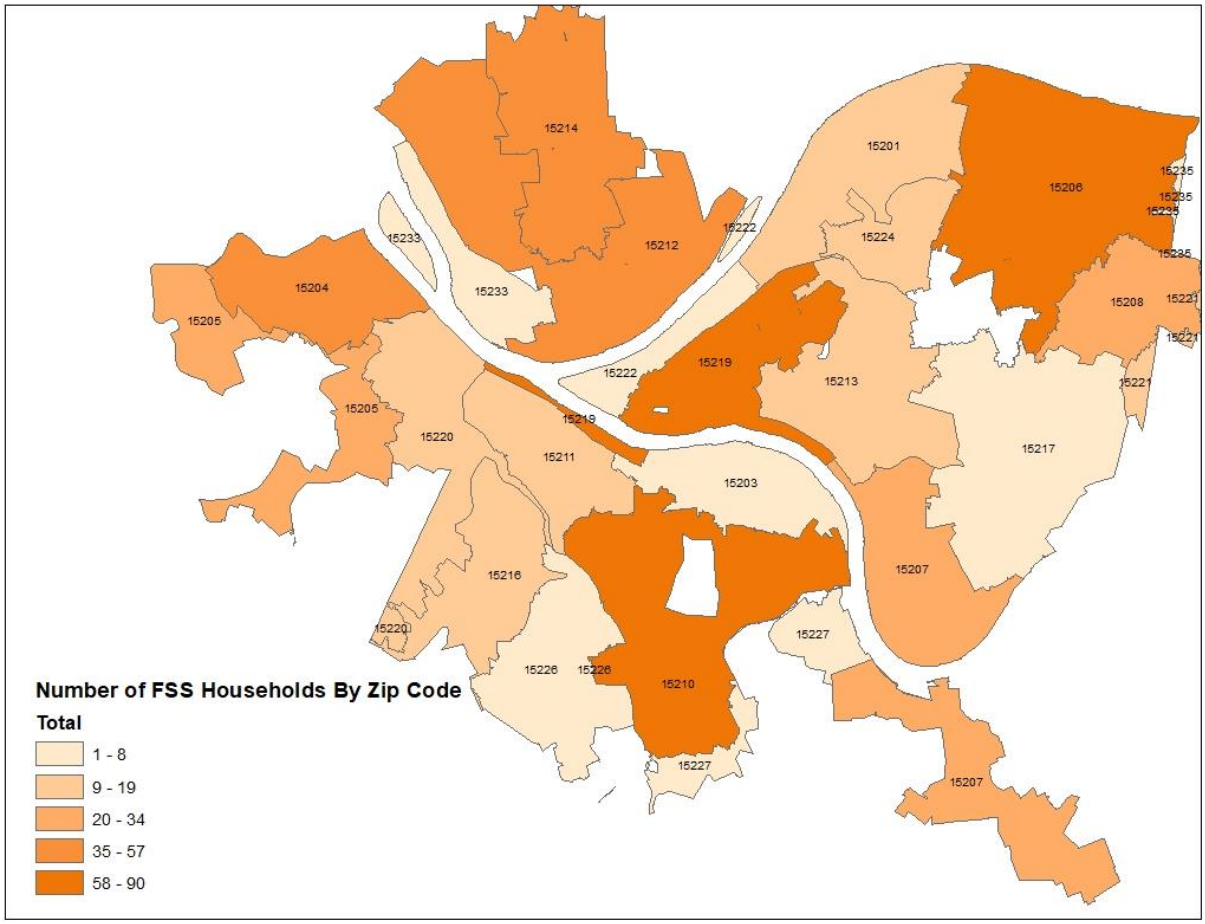


Figure 5-5. Number of HCV households enrolled in FSS by zip code.

Table 5-18 below shows the location of the HCV household's unit by program outcome. This table shows that while HCV households tend to be concentrated in particular zip codes, the location of housing does not seem to determine the outcomes of FSS participation. Neighborhoods with the highest number of voucher holders included Carrick (90), Hill District / Uptown (86),

East Liberty/Larimer (84), and the Northside (57). When split among outcomes, the number of households in each category is relatively small, with just a few households in most categories.

Table 5-18. HCV Participants' Location by Zip Code

Zip Code	Neighborhood	Left FSS	Completed FSS	Moved From HACP	Right Censored	Total
15201	Lawrenceville	8	1	5	4	18
15203	Strip District	1	1	0	2	4
15204	Sheraden	15	4	8	16	43
15205	Westwood/Carnegie	7	3	4	10	24
15206	E. Liberty	30	10	20	24	84
15207	Homestead	7	3	6	14	30
15208	Homewood	15	5	4	10	34
15210	Carrick	35	9	15	31	90
15211	Duquesne H.	3	4	3	6	16
15212	Northside / Brighton Heights	25	6	14	12	57
15213	Oakland	6	2	2	4	14
15214	Northview Heights / Perry North	18	3	9	10	40
15216	Beechview	6	0	3	1	10
15217	Sq. Hill / Greenfield	1	0	0	0	1
15219	Hill / Uptown	41	2	11	32	86
15220	Elicott	5	1	1	4	11
15221	East Hills	7	1	3	3	14

15222	Downtown	0	0	2	1	3
15224	Bloomfield/Garfield	7	0	5	7	19
15226	Brookline	0	1	2	0	3
15227	Hays	1	0	0	2	3
15233	Manchester	5	1	0	2	8
15235	Penn Hills	1	0	0	0	1
County	Allegheny County	18	7	11	12	48
Total		262	72	128	207	669

Of the 669 housing choice voucher households that participated in the FSS program, 148 moved from one rental unit to another while observed in the FSS program. Of those, 21 households later moved out of HACP housing all together. Of the 334, that completed or dropped out of the FSS program, 53 who moved while enrolled in FSS ultimately left the FSS program while 31 ultimately completed the program.

Table 5-19. Number of moves among HCV households while enrolled in the FSS program

	Left FSS	Completed FSS	Exit from HACP Housing	Right Censored	Total
Number of moves	53	31	21	43	148

Table 5-20 below shows at the neighborhood and zip code level the moves by households that completed the FSS program. There were a few instances where multiple households moved from the same zip code to the same zip code.

Table 5-20. Moves for Households that completed the FSS program

From Neighborhood	From Zip Code	To Neighborhood	To Zip Code	Count
Lawrenceville	15201	Lawrenceville	15201	1
Lawrenceville	15201	Northside	15212	1
Lawrenceville	15201	Allegheny Co.	Allegheny Co.	1
Sheraden	15204	Sheraden	15204	2
Sheraden	15204	Carrick	15210	1
Sheraden	15204	Summer Hill	15214	1
Sheraden	15204	West End	15220	1
Westwood/Carnegie	15205	Sheraden	15204	1
E. Liberty/Larimer	15206	Westwood/Carnegie	15205	1
E. Liberty/Larimer	15206	E. Liberty/Larimer	15206	2
E. Liberty/Larimer	15206	Hill / Uptown	15219	1
Homestead	15207	Southside	15203	1
Homestead	15207	E. Liberty/Larimer	15206	1
Homewood	15208	Allegheny Co.	Allegheny Co.	1
Carrick	15210	Westwood/Carnegie	15205	1
Carrick	15210	Carrick	15210	1
Duquesne Heights	15211	Carrick	15210	1
Northside	15212	Sheraden	15204	1
Northside	15212	E. Liberty/Larimer	15206	1
Northside	15212	Duquesne Heights	15211	1
Northside	15212	Northside	15212	1
Northside	15212	Allegheny Co.	Allegheny Co.	1
Summer Hill	15214	Northside	15212	1
Hill / Uptown	15219	Oakland	15213	1
Hill / Uptown	15219	Hill / Uptown	15219	3
Hill / Uptown	15219	Allegheny Co.	Allegheny Co.	1

Manchester	15233	Northside	15212	1

Table 5-21 below shows the households that moved within HACP housing while participating in the FSS program. These participants exited the FSS program prior to completion. This table shows that many of these households lived in East Liberty, Northside, Carrick, and Homewood, there weren't any patterns in where the households moved to. Households tended to move between the aforementioned neighborhoods, where less expensive rental housing is available. There were also a number of households that moved within their neighborhood. It is possible that those households wanted to remain in their neighborhood but wanted to live in a different rental unit. The neighborhoods where the FSS participants who did not complete the FSS program are not different from the neighborhoods where the participants who completed the program lived.

Table 5-21. HCV Households that moved within HACP housing while participating in the FSS program.

Zip Code	Neighborhood	Zip Code	Neighborhood	Count
15201	Lawrenceville	15201	Lawrenceville	1
15204	Sheraden	15220	Elicot	1
15204	Sheraden	15204	Sheraden	1
15204	Sheraden	15214	Northview	1
15204	Sheraden	15206	E. Liberty	1
15205	Carnegie	15210	Carrick	1
15205	Carnegie	15204	Sheraden	1
15206	E. Liberty	15208	Homewood	1
15206	E. Liberty	15221	East Hills	1
15206	E. Liberty	15224	Bloomfield	1
15206	E. Liberty	15206	E. Liberty	1
15206	E. Liberty	15201	Lawrenceville	1
15206	E. Liberty	15213	Oakland	1
15206	E. Liberty	15201	Lawrenceville	1
15206	E. Liberty	15214	Northview	1
15206	E. Liberty	15207	Homestead	1
15206	E. Liberty	15219	Hill / Uptown	1
15207	Homestead	15207	Homestead	1
15207	Homestead	15208	Homewood	1

15208	Homewood	15208	Homewood	2
15208	Homewood	15212	Northside	2
15208	Homewood	15219	Hill / Uptown	1
15208	Homewood	15206	E. Liberty	1
15210	Carrick	15210	Carrick	1
15210	Carrick	15233	Chateau	1
15210	Carrick	15224	Bloomfield/ Garfield	1
15210	Carrick	AC	Allegheny Co.	1
15210	Carrick	15219	Hill / Uptown	1
15210	Carrick	15210	Carrick	1
15211	Duquense H.	15214	Northview	1
15211	Duquense H.	15212	Northside	1
15212	Northside	15219	Hill / Uptown	1
15212	Northside	15212	Northside	1
15212	Northside	15214	Northview	1
15212	Northside	15208	Homewood	1
15213	Oakland	15210	Carrick	1
15214	Northview	15212	Northside	1
15214	Northview	15211	Duquesne H.	1
15216	Beechview	15208	Homewood	1
15219	Hill / Uptown	15219	Hill / Uptown	3
15219	Hill/Uptown	AC	Allegheny Co	1
15219	Hill / Uptown	15216	Beechview	1
15220	Elicot	15214	Northview	1
15221	East Hills	AC	Allegheny Co	1
15224	Bloomfield/ Garfield	15212	Northside	1
15224	Bloomfield/ Garfield	15224	Bloomfield/Garfield	2
15227	Hays	15220	Elicot	1
15233	Chateau	15212	Northside	1

Table 5-22 below shows the number of HCV households that moved while enrolled in the FSS program by FSS outcome. This table shows that a higher percentage of households that completed the FSS program moved while they were enrolled in the FSS program. This table also suggests that moving while enrolled in the FSS program did not create a disruption that lead to the FSS participant from withdrawing from the program.

Table 5-22. HCV FSS Participants Who Moved While Enrolled in the FSS Program

	Completed FSS		Withdrew from FSS		Moved from HACP		Right Censored	
	N	**%**	**N**	**%**	**N**	**%**	**N**	**%**
Moved	30	41.7	53	20.2	21	16.4	43	20.8
Did Not Move	42	58.3	209	79.8	107	83.6	164	79.2
Total	72	100	262	100	128	100	207	100

The Kaplan Meier survival analysis below shows that households that moved with their voucher were more likely to remain in the FSS program than households that did not move. This analysis also shows the likelihood of leaving the FSS program among movers and non-movers over time. This finding is contrary to the hypothesis that moving while participating in the FSS program would create a disruption and would lead to the household being less likely to continue FSS participation. An alternative explanation is that FSS participants were able to use their vouchers to move to areas that were closer to jobs and family and remained connected to the FSS service coordinators.

[Appendix Figure 13. Kaplan Meier Survival Estimate HCV Households that Moved During FSS]

The Kaplan-Meier survival estimate shows that the households that moved while enrolled in the FSS program were more likely to remain in the program than those who did not. The below log-rank test of equivalency shows that the households that moved are significantly more likely to remain. Of the 262 households, only 53 households, or 20.2%, moved.

Table 5-23. Log Rank test of equivalency for HCV Households that Moved with their voucher while Enrolled in FSS

	Observed	Expected
Did not move	209	155.53

Moved	53	106.47
Total	262	262

Chi2 45.77 Pr>Chi2 0.000

The number of household members determines the size of the rental unit for which the household is eligible. If there is a change in household composition, the household could be given a new voucher to reflect the change in household size. For that reason, some of the households that moved may have moved because of a change in household composition. Of the 53 households that moved, 17, or 32%, households also had a change in household composition. Upon further review, I found that only three of those 17 households had a move and change a in household composition that occurred at approximately the same time. The move may have been a reflection of the change in household size. There were also 14 HCV households that moved and had a change in household composition, while going on to complete the program. Of those, only three households moved at the same time or soon after a change in household composition, which may indicate that there was a relationship between the change in household composition and the move. The other households had a change in household composition that occurred at a different time than the move and the move is likely to be because of a reason other than the change in household. Of note, with those much smaller numbers for HCV households, we can be less certain of drawing conclusions with that combination, but this analysis suggests that there is not a strong relationship between moving and change in household composition change.

Table 5-24. HCV FSS Participants who moved and had a household change while enrolled in FSS.

	Moved	HH Change	Both Moved and HH Change	Moved at or soon after HH change
Left FSS	53	41	17	3
Completed FSS	31	30	14	3

This analysis determined that moving while enrolled in the FSS program did not create a disruption effect that would lead to the HCV households who moved to be more likely to leave the FSS program prior to FSS completion than the households that did not move. Due to the mechanics of survival analysis, households that remained in the FSS period for a longer period of time had more time to move while enrolled in the FSS program. As a robustness check, I examined the households that moved early in their FSS participation, within the first 24 months, and the households that did not move at all. I confirmed that the HCV households that moved from one rental unit to another using their voucher while enrolled in the FSS program were not more likely to leave the FSS program than the households that remained in the same rental unit for the duration of their FSS participation. In fact, the HCV households that moved during the first 24 months of FSS participation were significantly ($p<0.001$) more likely to remain in the FSS program than households that remained in the same rental unit for the duration of their FSS participation.

Table 5-25. HCV Log Rank Test of Equivalency: HCV Households that Moved within the first 24 months of FSS program participation

	Observed	Expected
0	209	185.15
1	40	63.85
Total	249	249.00

Chi2: 13.54 Pr>Chi2: 0.0002

The above table shows there were 40 HCV households that moved within the first 24 months of their FSS participation who left the FSS program prior to completion. If HCV households who moved and those who did not move had an equal likelihood of leaving FSS prior to completion, there would have been about 63 households who moved, rather than the 40 households that did move.

This section shows that household characteristics are related to FSS program outcome, but not in the way originally hypothesized. Having children in the household did not explain the likelihood of FSS exit. Like the public housing households, HCV FSS participants who moved with their voucher or had changes in household composition were more likely to remain in the FSS program than households that did not. Changes in household composition and moves appear to be positive changes for a household that were not disruptions to prevent the participant from completing the FSS program.

5.3.2 Section 4: Hypothesis 2: Program Characteristics

The prior section examined the household characteristics and their relationship to the household's FSS outcomes. This section examines the impact of two program characteristics: the increased minimum rent policy, and the escrow savings account. Two hypotheses are tested in this section. The first is that that households that paid the increased minimum rent of $150 prior to enrolling in the FSS program will be highly likely to complete the FSS program than households that did not pay the increased minimum rent prior to entering the FSS program. The increased minimum rent policy is unique to HACP, which used its MTW status to develop the policy in 2010. HACP is the only housing authority in the country with this program. For that reason, there haven't been prior studies to guide this part of the analysis. The alternative is that households that paid the minimum rent of $150 will be more likely to withdraw from the FSS program because they may have enrolled in the FSS program only to avoid paying the increased minimum rent and not because of a genuine interest in participating in the program.

The second hypothesis is that participants that do not have money in its escrow account will be more likely to withdraw from the FSS program. There are two reasons for this. First, the

escrow account is an important incentive for remaining in the program. As a participant's escrow account increases, the participant has greater incentive to remain in the program to receive the funds as a lump sum when they complete the 60-month program. The second reason is that participants that do not have savings in the escrow account will be more likely to withdraw from the program because those households have not experienced an increase in earnings during the program, which is a signal that the program is not helping that person to achieve self-sufficiency. If the participant has not had an increase in income while enrolled in the FSS program, they may leave the program because they were not receiving any financial benefits from participating.

5.3.2.1 Increased Minimum Rent

This sub-section determines whether households that paid the increased minimum rent prior to enrolling in the FSS program will be more likely to remain in the program so that they will not have to pay the increased minimum rent when they leave FSS before completion of the program.

Table 5-26. HCV Households that Paid Increased Minimum Rent Before Enrolling in FSS

	N	%
No Min Rent Before FSS	487	72.8
Min Rent Before FSS	181	27.1
Total	669	99.9

The below Kaplan-Meier survival estimate shows that the participants who paid increased minimum rent prior to enrolling in the FSS program were more likely to remain in the FSS program than those who did not. This is contrary to the findings of the Public Housing analysis which

showed that there was not a significant difference in FSS completion between those who did and did not pay the increased minimum rent prior to FSS enrollment.

[See Appendix Figure 14. Kaplan Meier Survival Estimate for HCV Households that Paid Increased Minimum Rent Prior to FSS.]

This analysis shows that the hypothesis was correct, households that paid the increased minimum rent prior to entering the FSS program were more likely to complete the program than households that did not pay the increased minimum rent prior to enrolling in the FSS program. The below log-rank test for equality shows that households that paid the increased minimum rent before entering FSS were significantly more likely to remain in the FSS program.

Table 5-27. Log-Rank Test of Equivalency HCV Households that Paid Increased Minimum Rent

	Observed Events	Expected Events
No Min Rent Before FSS	216	176.36
Min Rent Before FSS	46	85.64
Total	262	262

Chi2 = 27.55 Pr>chi2 = 0.0000

5.3.2.2 Escrow Savings

The hypothesis is that HCV households that have higher than median escrow savings will be more likely to remain in the FSS program than households that have low levels of escrow savings. There are two reasons for this. First, households that have a high level of escrow savings will be more likely to remain in the FSS program so that they will receive those funds in a lump sum upon FSS completion. The second reason is that escrow savings is a sign of increased income, which likely means that the household is successful in the FSS program, if they are achieving positive outcomes, they will be more likely to stick with the program that is working. The median

cumulative savings was just $214, and the average is $2,075. Table 5-26 below shows the average and median escrow savings by FSS outcomes.

Table 5-28. HCV FSS Participants with Escrow Savings by FSS Outcome

	Completed FSS	Left FSS	Moved from HACP
Average Escrow Savings	$5,624	$886	$2,083
Median Escrow Savings	$3,348	$22	$323
Range of Escrow Savings	$0-29,403	$0-20,782	$0-30,452

The alternative explanation is that households that completed the FSS program are likely to have higher levels of escrow savings in part because they spent more time in the program and had more time to accrue savings. HCV households who left HACP housing often are able to keep their escrow savings, particularly if they are moving to home ownership or to market-rate rental housing.

Of the HCV households who left the FSS program prior to completion, only 23 households had escrow savings of more than $2,200. Of the households who left FSS with calculated escrow savings, a few patterns emerged. First, there were many households who earned very little income at the time of FSS enrollment, and when they gained employment, their income increased significantly, typically to more than $20,000, and their escrow savings accumulated quickly. With increased incomes and savings, those households tended to leave the FSS program soon after gaining employment. Most of those households were before the midpoint of the program and may have not wanted to continue with the program if they achieved their goal of finding employment. Of the 23 HCV households that left the FSS program with escrows savings of more than $2,200, nine participants fell into this category.

The second pattern that emerged were households that earned little income when they enrolled in the FSS program, the participant earned very little income when they enrolled in the FSS program, obtained employment, and started earning wages of more than $20,000, but then lost the job while still in the FSS program and received public assistance funds through TANF, SNAP, general assistance or social security. These households tended to participate in the FSS program for a longer period of time, many of them remaining for 55 months before leaving the program. Those participants may have met the graduation requirements prior to month 60 and graduated from the FSS program early. Many of these exits from the FSS program may have been involuntary after the participant failed to meet the program requirements. This was the case of 10 of the 23 households.

The remaining four households that did not fall into one of these two categories either had extremely low incomes at the time that they enrolled in the FSS program and while their incomes remained low, were able to accumulate some escrow savings while enrolled in the program, or did not seem to have a discernable pattern. Like the public housing households, it is possible that some of these participants withdrew some of the escrow savings for education or job-related expenses during the program and did not actually forfeit escrow funds.

[See Appendix Figure 14. Kaplan Meier Survival Estimate for HCV Households that Paid Increased Minimum Rent Prior to FSS.]

Table 5-29 below shows the log rank test of equivalency which shows that households that had escrow savings above the median were significantly more likely to remain in the FSS program than those who did not.

Table 5-29. Log Rank Test of Equivalency HCV FSS Participants with Escrow Savings Above Median

	Events Observed	Events Expected
Escrow Savings Above Med.	174	84.50
Escrow Savings Below Med.	88	177.50
Total	262	262

Chi2 = 149.63 Pr>Chi = 0.000

This section shows that HCV households that paid the increased minimum rent and had escrow savings above the median were more likely to remain in the FSS program. This is different than the findings for the public housing FSS participants, which showed no statistical difference in the likelihood of FSS completion between the households that did and did not pay increased minimum rent prior to FSS enrollment. Both HCV and PH FSS participants with higher levels of escrow savings were more likely to remain in the FSS program than those who did not for both public housing and HCV. The escrow savings accrued while the participant was in the program, therefore, residents who remained in the program for a longer period of time, had a greater opportunity to accumulate escrow savings. The opportunity to receive the escrow savings is a strong incentive for the participants for both the public housing and housing choice voucher programs, who have saved money to remain in the FSS program until graduation. As explained in Chapter 3, residents accumulate escrow savings when their incomes increase. As the participant's income increases, their rent is recalculated to reflect 30% of the household's income, but rather than paying the difference in rent to the housing authority, the FSS participant is able to divert that increased amount into an escrow savings account, which the participant in able to withdraw in a lump sum upon graduation from the FSS program. The escrow savings is a strong

incentive for residents to remain in the FSS program, but only for those participants who have experienced an increase in income and have been able to acquire savings. For the participants who have not had an increase in income, it is not a strong incentive. Residents of both the public housing and the HCV program who remained in the FSS program for the full 60 months were more likely to have an increase in income and escrow savings.

5.4 Logistic Regression

This previous section tested the hypotheses that HCV household characteristics or program characteristics may explain exit from the FSS program. The univariate analysis showed that HCV households with a change in household composition, participants who moved using their voucher, households that paid increased minimum rent, and HCV households that had escrow savings above the median were statistically more less likely to leave the FSS program than households that did not have those characteristics. This section will use multivariate regression analysis to further explore those findings and see if they remain true in a multivariate analysis.

Model 1 tests the household and program characteristics used in the univariate analysis to show that in the multivariate regression analysis, participants in an HCV household that had a change in household composition during FSS participation were significantly, at the 5% level, less likely to leave the FSS program prior to month 60 than those who did not experience a change. Those participants who moved using their housing choice voucher were more likely (10% level) to remain in the program. The multivariate analysis did not include escrow savings as a variable because it was so closely related to success in the program. As explained in the prior section, households who remained in the FSS program for a longer length of time and had higher increases

in income had higher levels of escrow savings. Because the variable was so closely related to success in the program, it was omitted from the logistic regression.

Model 2 includes location fixed effects to determine whether there is a relationship between housing location by zip code and FSS program exit. The results for this model were very similar to the others. HCV residents in zip code 15211, which covers Mount Washington and Duquesne Heights were significantly (at the 10% level) more likely to complete the FSS program than households living in other zip codes.

Model 3 examines the data to determine whether there are cohort effects and systematic differences depending upon the year that the FSS participant entered the program. This analysis finds that participants that entered the program in 2012 were statistically (at the 5% level) less likely to leave the program prior to completion and those that entered in 2013 were statistically (10%) level less likely to leave the program than those that entered during other years. Like the public housing analysis, those that entered in years 2016 and 2017 were dropped from the analysis. When controlling for cohort effects, households that moved with their vouchers were not more likely to complete the FSS program, suggesting that the households that moved being more likely to complete the program may be related to when they entered the program.

Model 4 shows that controlling for the age and sex of the head of household, participants with change in the household composition were statistically less likely (at the 1% level) to leave the FSS program prior to completion. Households that moved using their vouchers were also less likely (at the 5% level) to leave the FSS program prior to completion.

Table 5-30. Logistic Regression Model

Variables	**Model 1**	**Model 2**	**Model 3**	**Model 4**
Children	0.7465909	0.652413	0.6621437	0.6449482

Household Change	0.3432417***	0.3399558***	0.2881029***	0.3082136***
Moved with HCV	0.4107304**	0.3795965**	0.6385128	0.3793532**
Income at Entry Above Med.	1.069746	1.022253	1.273124	1.67848
Paid Increased Min. Rent	0.7493885	0.8536645	0.3905519**	0.8907111
Location FE		X		
Year of FSS Entry FE			X	
Age/Sex FE				X
N	333	315	298	269
R^2	0.0782	0.1077	0.1746	0.1911

*p <0.1. **p<0.05. ***p<0.01

The findings of the multivariate logistic regression are similar to the findings of the univariate analysis in the prior section with some exceptions. Paying the increased minimum rent prior to FSS entry did not predict FSS program outcome, except when controlling for the year of FSS program entry. Households that moved with their voucher while enrolled in the FSS program were more likely to complete the FSS program, except when controlling for year of program entry.

5.5 Summary

This chapter shows that the HCV households that participated in the FSS program were similar to the public housing participants, in some regards but not all. FSS outcomes were not affected by children in the household or the income level at the time of FSS entry. Changes in

household composition, moving within HACP housing were shown through the survival estimates and log rank test of equivalency and logistic regression that they were significantly related to FSS outcomes. The survival estimate and the log-rank test of equivalency showed that households that paid the increased minimum rent were more likely to complete the FSS program than those who did not pay the increased minimum rent prior to FSS participation, however, the logistic regression showed that paying increased minimum rent prior to FSS enrollment was not significantly related to the outcome.

6.0 Discussion of Findings and Conclusion

This chapter concludes this study with a brief review of the study, an overview of the key findings, and a thorough discussion of the findings of the study including a comparison of the outcomes of the public housing (PH) and Housing Choice Voucher (HCV) participants, a review of the impact of household composition and changes in the household, a discussion of the location of the FSS participant's housing and moves within Housing Authority of the City of Pittsburgh (HACP) housing and moves from HACP housing. In this, I will also discuss the impact of the financial incentives of the FSS program — the escrow savings accounts and the increased minimum rent policy. I will then revisit the arguments that I raised in the introduction and provide evidence from this study to further support those arguments. Following that discussion of the key findings, I will summarize the findings and will conclude the chapter by situating this study into the academic literature, with suggestions for policy design and future research.

6.1 Study Overview

This study confirmed the findings of prior studies of FSS programs that showed that despite FSS leading to higher incomes and levels of savings for some participants, there is a very high rate of attrition from the FSS program (Silva et al, 2011; HUD, 2011; Lee & McNamara, 2018; Rohe & Kleit, 1997; Kleit & Rohe, 2005; Ficke & Piesse, 2004; Anthony, 2005). While there is agreement in the literature about the outcomes, there is inconclusive analysis for the prospective reasons for the high attrition rates from the program. This gap is filled by an examination of the

differences in the participants' characteristics of the PH and HCV participants and their outcomes from the FSS program — completion of the 60-month program, those who left FSS prior to the end of 60 months, those who moved from the HACP housing program while enrolled in the FSS, and those who remained in the FSS program on the last day of the study period, October 1, 2017. If this study only focused on those who successfully completed the FSS program, my study would be limited to 191 public housing households and 72 housing choice voucher households. By looking at the FSS from a different perspective, my study included 1,058 public housing households and 669 housing choice voucher participants, which led to a richer analysis of the outcomes of those who enrolled in the FSS program. It is important to consider the outcomes of all FSS participants, including HCV residents because there are some important differences between these two groups of housing residents in Pittsburgh.

This study addressed three research questions. 1.) What are the outcomes of FSS participation? 2.) When do FSS participants leave the program? 3.) What explains exit from the FSS program? To answer the third question, I tested two hypotheses related to program and participant characteristics. The first hypothesis was that participant characteristics: children in the household, changes in the household composition, housing location, moves within HACP housing, and income at FSS entry may explain a participant's likelihood of completing the program. The second hypothesis was that the participant's likelihood of completing the FSS program could be explained by program characteristics: whether the participant lived in public housing or had a housing choice voucher, whether the household paid increased minimum rent prior to entering the program, and whether the household had escrow savings above or below the median.

This study analyzed administrative data collected by HACP from January 1, 2010 to October 1, 2017. The data was collected by HACP on the standard HUD-50058 form in

accordance with HUD regulations. The primary purpose of data collection is to confirm program eligibility, measure occupancy, and calculate rent payments. However, the data also include information about household characteristics including, age, sex, race, ethnicity, number of household members, age of household members, whether the household participated in the FSS program, income, changes in income, locations of housing, and changes in location of housing. Entries were made when the household entered HACP housing and then on a biennial basis, unless the household had a change in income or household composition in the interim. A final entry is also recorded when the household leaves HACP housing. This dataset allowed me to calculate length of FSS participation and examine key household and program characteristics that may have affected the households' outcomes.

Because I was interested in examining length of FSS participation, I used an event history framework to calculate length of participation among the public housing and housing choice voucher participants, based on certain household and program characteristics. Using event history analysis not only allowed me to examine those who left the FSS program prior to completion, but the framework also handles attrition well. If I had conducted a panel study, I would have been limited to studying the households that completed the program and had 60 observations. Using an event history analysis framework allowed me to examine the households that had fewer observations either because they withdrew from the program, moved from HACP housing during the study period, or remained in the FSS program at the end of the study period. By using binary variables, I was able to group the participants and compare the outcomes for those groups using the Kaplan Meier survival estimates and Log Rank test of equivalency. After conducting the univariate analysis, I then used a logistic regression to conduct a multivariate analysis of the households that completed and withdrew from the FSS program.

6.2 Findings

6.2.1 Research Question 1: What are the outcomes of the FSS program?

The possible outcomes for the FSS participants are:

1) Completed 60 months in the FSS program;

2) Left the FSS program prior to completion but remained in and HACP housing program;

3) Moved from an HACP housing program while enrolled in the FSS program; or

4) Remained in the FSS program on the final day of the study period, October 1, 2017.

For reference, the table displaying the number of public housing and housing choice voucher households with each outcome is below[4].

Table 6-1. Outcomes of FSS participants between January 2010 and October 2017

	Withdrew from FSS		Completed FSS		Moved from HACP Housing		Right Censored		Total	
	N	%	N	%	N	%	N	%	N	%
Public Housing	202	43.5	191	72.6	436	77.3	229	52.5	1,058	61.3
Housing Choice Voucher	262	56.5	72	27.4	128	22.7	207	47.5	669	38.7
Total	464	100.0	263	100.0	564	100.0	436	100.0	1,727	100.0

My first conclusion is that there are significant differences between the outcomes of the PH and HCV households. Table 6-1 shows that more than half, or 61.3%, of FSS participants,

[4] This table does not include the FSS participants who enrolled in the program prior to the beginning of the study period. Those participants were discussed in chapters 4 and 5.

were public housing residents. There were far fewer HCV residents enrolled in the program, despite there being more households in HCV housing than public housing.[5]

There stark differences between the PH and HCV participants continue throughout the study. Of the FSS participants who completed the FSS program, 191, or 72.6%, were public housing residents and only 72, or 27.4% were HCV households. This shows that there were far fewer HCV participants who completed the 60-month program during the study period. This research provides evidence to support the argument that PH and HCV participants may need to have FSS programs that are tailored to better meeting their needs. As discussed in Chapter 2, prior research has focused on successful PH participants in the FSS program, but few studies have included the HCV participants or compared the differences in outcomes among the participants of the two different housing programs. By looking at the data a different way, we see that 191 of the 1,058, or 18.1%, of public housing households that enrolled in the FSS program during the study period completed the FSS program compared to the 72 of the 669, or 10.8%, HCV households that enrolled in the FSS program during the study period. The HCV households are far less likely to initially enroll in the FSS program, and when they do enroll, they are far less likely to complete the FSS program than the PH households. With that in mind, the analysis shows that a small proportion of both PH and HCV households complete the programs, but the completion rate is far worse for the HCV households.

As expected, a high number of FSS participants from both the PH and HCV programs withdrew from the FSS program prior to completion. Of the 1,058 public housing participants, 202, or 19.1%, withdrew from the program but remained in HACP housing. Of the 669 HCV

[5] At the beginning of the study period, there were 4,463 HCV non-elderly/non-disabled households and 2,879 public housing non-elderly/non-disabled households (HACP, MTW Plan 2017).

households in the FSS program, 262, or 39.1%, withdrew from the FSS program, but continued to use their voucher. When comparing FSS program exits of the public housing and the HCV households, we see that more HCV households in raw numbers withdrew from the FSS program than public housing households, despite there being many more PH households enrolled in the program. This shows that the HCV households were far more likely to withdraw from the FSS program but remain in HACP housing that the public housing participants. This was expected because it is typically easier for those in public housing to access the services because they are often offered on-site. A study from Kleit and Rohe (2015) suggests that contact with FSS service coordinator is an important determinant of success. Because PH residents live in housing that is owned and managed by the housing authority, it is much easier for public housing residents to have regular contact with the service coordinator than housing choice voucher households that live farther away from the HACP properties. As explained in Chapter 2, FSS participants work closely with their service coordinator to develop their Individual Training and Service Plan (ITSP), which lays out the participant's plan for overcoming the barriers to self-sufficiency including the services the resident will receive and the incremental milestones they will meet. The proximity of the PH FSS residents to their service coordinators and services may explain why there is a significant difference between the likelihood of an HCV participant and a public housing participant leaving the FSS program prior to completion.

Additional evidence of these differences between the PH and HCV households' length of FSS participation is shown in the Kaplan Meier survival estimate in Figure 6-1. The top line represents the survival estimate for the public housing participants while the bottom line represents the survival estimate for the HCV households. The graph shows that the FSS participants with a housing choice voucher are significantly more likely to leave the FSS program prior to completion

than the FSS participants who lived in public housing. That is further confirmed by log rank test of equivalency, see Table 6-2 below.

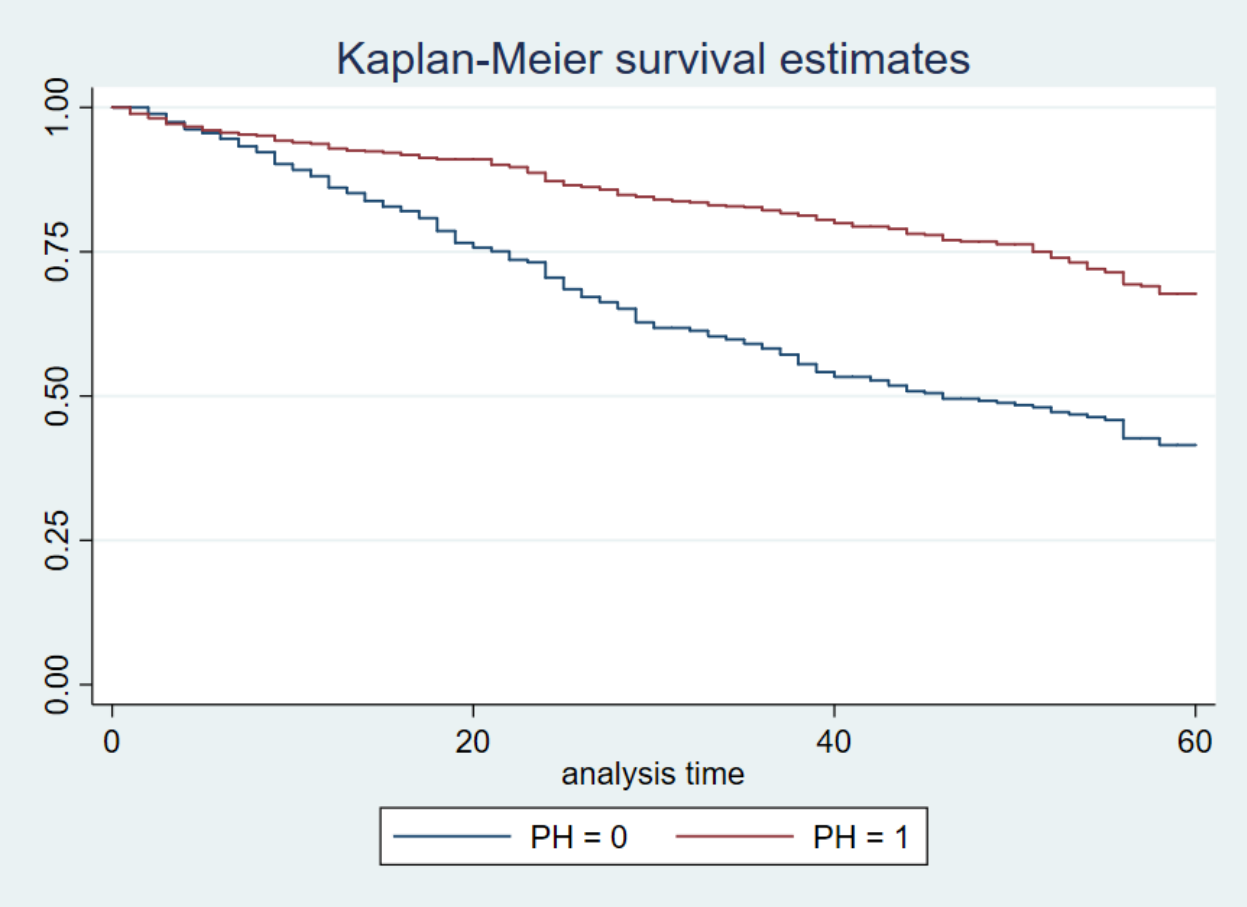


Figure 6-1. Kaplan- Meier survival estimates public housing and housing choice voucher FSS participants

Again, the results of the log rank test of equivalency shows that the housing choice voucher participants are significantly ($p<0.001$) more likely to withdraw from the FSS program prior to completion than the participants who lived in public housing. If the public housing and housing choice voucher participants were equally likely to exit the FSS program, there would be 299 public housing households leaving the FSS program and 165 HCV participants leaving the program.

Table 6-2. Log Rank Test of Equivalency for Public Housing and Housing Choice Voucher FSS Participants

	Events Observed	Events Expected
Public Housing	202	299.2
Housing Choice Voucher	262	164.8
Total	464	464.0

Chi2 = 91.60 Pr>chi2 = 0.0000

When evaluating the outcomes of the FSS program, I also analyzed the demographic characteristics of households to determine whether there were any discernable patterns that warranted further examination. As in other FSS studies, the PH and the HCV FSS participants in Pittsburgh did not have significant differences in terms of sex, race, ethnicity or marital status. As explained in Chapters 4 and 5, the majority of PH and HCV FSS participants in Pittsburgh were unmarried African American women who had children in the household. This is consistent with prior studies of FSS program participants which showed that differences in FSS outcomes are not attributable to these participant characteristics (Anthony, 2005; Kleit and Rohe, 2015).

A striking outcome that was less expected was the high number of public housing households that moved from HACP while enrolled in the FSS program. Table 6-1 in the previous section shows the outcomes of the public housing and housing choice voucher households. The 436 public housing participants that moved from HACP housing while enrolled in FSS represent the largest group of FSS participants who enrolled in the program after January 1, 2010. Of those 436 public housing households that moved from HACP housing while enrolled in the FSS program, 308, or 70.6%, were under the age of 30. This represents another key difference between the public housing and the HCV households. The public housing households, particularly those with a head of household under the age of 30 are far more likely to move from HACP public

housing than the HCV households. There are two possible explanations for this. First, as explained in Chapter 5, the public housing FSS participants tended to be younger than the HCV participants. For those young public housing residents, a five-year program may be too long for those residents and they may be better served by a shorter program. The second explanation, as shown in Chapter 2, significant numbers of public housing units were demolished during the study period. Many of those moves may have been involuntary because of a development was rebuilt or closed.

HCV participants were less likely move from HACP housing. Only 128, or 19.1, of the HCV households left HACP housing during the study period. HCV households with a head of household under the age of 30 were less likely to move, with only 37 (28.9%) of the 128 housing choice voucher households that moved during the FSS program. This may signal that the housing choice voucher residents were more satisfied with their housing than the public housing residents. Unfortunately, information about tenants that leave HACP housing has not been collected in a systematic way. Having more information about participants who move from HACP housing and whether they moved to market-rate housing, were evicted, or moved in with friends or family, would be helpful. It would allow us to determine whether the FSS program is providing the resources needed for those households to achieve self-sufficiency even if they did not complete the full 60 months in the program. The FSS program should be more flexible to meet client needs. The program could be shorter or longer, depending upon the needs of the participants.

Further examination revealed that the public housing participants tended to be younger than their housing choice voucher counterparts. Of the public housing FSS participants, 852 (51.6%) were under the age of 30. Housing Choice Voucher heads of households were more evenly distributed by age, with 373 (30.9%) heads of household under the age of 30.

Table 6-3. Outcomes of Public Housing and Housing Choice Voucher FSS Participants Under the Age of 30.

	Completed FSS		Withdrew from FSS		Moved from HACP		Right Censored		Total	
	N	%	N	%	N	%	N	%	N	%
Public Housing	84	14.0	92	15.3	308	51.3	116	19.3	600	99.9
Housing Choice Voucher	8	4.1	93	47.2	37	18.8	59	29.9	197	100

This section has shown that there are significant differences between the PH and the HCV FSS participants which suggest that the standard FSS program may not meet the needs of these two distinct groups of program participants. For instance, young public housing residents under the age of 30 were more likely to move from HACP housing while enrolled in the FSS program, while that was not true of the young HCV participants. While the young HCV participants were not more likely to move than the older HCV residents, very few, only 8, completed the FSS program. That suggests that the FSS program wasn't meeting the needs of the young HCV participants either. A program that recognizes the needs of young participants and is tailored to the needs of participants under the age of 30 may lead to higher success rates. It may also help those young residents to gain critical skills and begin to establish a strong work history at a young age which may lead to higher incomes and reduced reliance on housing subsidies in later years.

The FSS program represents an opportunity for young residents to gain education, earn a GED, receive job training, and establish work history at a young age, all of which contribute to their employment and financial status later in life. However, the high number of moves suggests that the five-year FSS program is not the most appropriate program for young public housing residents who are more mobile than the older public housing and housing choice voucher residents.

While HCV FSS participants under the age of 30 are less likely to move than the young public housing FSS participants, only 8, or 4.1%, of the 197 HCV participants under the age of 30 completed the FSS program, compared with 84, of 14%, of the young public housing participants.

6.2.2 Research Question 2: When do FSS participants enter and exit from the FSS program?

The research shows that contrary to my expectations, there is no seasonal variability in entry or exit from the FSS program. My analysis of the seasonal effects shows there was one point in the program, March 2013 for HCV residents, when there was a higher than usual number of exits. If there was a significant change in program operation or quality of services during the study period, there may have been a noticeable exit from participants. The sudden spike of 63 FSS exits from the HCV households in March of 2013 (see Figure 5-2) seems to be an isolated event, and may have reflected a data correction by HACP or a concentrated review and dismissal of those who were failing to meet FSS program requirements.

This research showed that there were no points in the FSS program where participants exited. There is also no difference in this between PH and HCV households. I introduced this question because Santiago, Galster, and Smith identified critical points, after 4 months, after 12 months, and after 24 months, when the participants of an enhanced FSS program in Denver were more likely to leave the program (Santiago et. al, 2017). My findings from the HACP case study showed that there were not identifiable points in the FSS program when PH or HCV participants were more likely to leave.

My conclusion was further supported by the Kaplan-Meier survival estimates that showed that decline in FSS participation was gradual for both the public housing and housing choice voucher participants. I had expected to find that there was an increased likelihood of exit from the FSS program after the first or second year, and was surprised to find that exit from the FSS program was not time dependent. This analysis of exits from the FSS program also showed that exit from the FSS program could not be explained by length of time in the program, or by the calendar date, and may be related to other factors, which were tested in the final section of the analysis.

This study is unique because it considers the role that time, measured as both calendar time and length of time in the program, may have on FSS enrollment and exit. Prior FSS studies have not used the event history analysis framework, and, with the exception of Santiago, Galster, and Smith's 2017 article, the literature tends to focus on explaining success or failure in the FSS program without looking at the relationship of time to the outcomes. While the analysis of time of exit and length of program participation do not explain program exit, confirming that there isn't a time when participants are more likely to leave the program is important to policymakers and our understanding of program participation.

6.2.3 Research Question 3: What explains withdraw from the FSS program prior to completion?

After identifying the PH and HCV households that completed and withdrew from the FSS program, and determining that exit from the FSS program could not be explained by time, I tested two additional hypotheses for explaining FSS program exit: household characteristics and program characteristics. This study finds that household characteristics — children in the household,

changes in household composition, and moves within HACP housing programs — do not explain the household's likelihood of completing the FSS program. This study found that public housing households earning less than $10,000 when they enrolled in the FSS program were significantly ($p<0.10$) less likely to leave the FSS program than households with incomes higher than $10,000, and public housing households that reported no income at FSS enrollment were also significantly ($p<0.05$) less likely to leave the FSS program than households with higher earnings at FSS enrollment. This was not true for the HCV households, where income at FSS entry was not significantly related to the length of FSS participation.

This study also examined three program characteristics: 1) whether the FSS participant paid increased minimum rent prior to FSS entry, 2) whether the household had escrow savings, and 3) compared the outcomes of the public housing and HCV households which were discussed in the first section of this chapter. This study found that the public housing households that paid increased minimum rent prior to FSS entry were significantly ($p< 0.10$) less likely to leave the FSS program prior to completion that the public housing households that did not pay the increased minimum rent prior to enrollment. For the HCV households, those that paid the increased minimum rent prior to FSS enrollment were significantly ($p<0.001$) less likely to withdraw from the FSS program than the HCV households that did not pay the increased minimum rent. The study also found that both public housing and housing choice voucher households that had escrow savings above the median were significantly ($p<0.001$) less likely to leave the program prior to completion than participants with escrow savings below the median.

A thorough discussion of these findings is provided in the remainder of this section.

6.2.3.1 Hypothesis 1: Household Characteristics

The household characteristics tested in Chapters 4 and 5, examined household composition, change in household composition, household location, change in household location within HACP housing, and income at time of FSS program entry. These variables test three important questions that were raised in the literature. The first was the impact of having children in the household. Having children in the household could lead to participants leaving the FSS program because of having childcare responsibilities that made it difficult to complete the program.

Some prior studies (Kleit & Rohe, 2015; Van Ryzin, et al., 2001) suggest that due to the lack of variation in the household characteristics, it is difficult to use household characteristics to predict a household's success in the FSS program, while others found that household characteristics such as: children in the household (Lee & McNamara, 2018; Rohe & Kleit, 1997; Wood, et al., 2008), adults in the household (Shroder, 2002), family obligations (HUD, 2011), marital status (Anthony 2005) do impact FSS outcomes. This study found that children in the household did not impact the public housing or HCV participant's FSS outcomes, and because so few participants were married, marital status were not tested.

Changes in Household Composition

During the 5-year FSS program, many public housing and HCV participants experienced changes in their households. The changes included new babies and children joining the household, adults entering and exiting the household, or children reaching adulthood. I hypothesized that those changes in the household could impact the household's likelihood of the household completing the FSS program. Any change in the number of household members could create a change in the functioning of the household, and those changes may lead to financial changes or

changes in childcare responsibilities, which may create barriers to completing the FSS program. In addition to the logistical challenges that may arise when household members enter or exit the household, there may also be emotional stress as well that could impact the likelihood that an FSS member is able to complete the program.

In both the PH and HCV households, those that experienced a change in household composition were statistically more likely ($p<0.001$) to complete the FSS program than those who did not experience a change in household composition. This is contrary to the hypothesis that changes in household composition would lead the participant to be less likely to complete the FSS program. Due to the mechanics of the survival analysis, the households that remained in the FSS program for a longer time period had more time to experience a change in household composition during FSS participation. When I conduced the same analysis for the FSS participants who experienced a change in household composition within the first 24 months of FSS participation, I found that the public housing participants with a change early in FSS participation were more likely, but not significantly more likely ($p<0.18$), to remain in the FSS program. HCV households that experienced a change in household composition were slightly less likely to complete the FSS program than those who did not experience a change in household composition. For the public housing households, my hypothesis that changes is household composition may increase the likelihood that the participant does not complete the FSS program was incorrect. Changes in household composition did not decrease the likelihood of the public housing participant's completing the program. For the HCV households, the hypothesis may be correct, but additional analysis is necessary to better understand what types of changes impact the likelihood of completing the FSS program.

Table 6-4 shows that housing choice voucher households were also far more likely to experience a change in household composition than public housing households.

Table 6-4 Comparison of Household Change in Public Housing and HCV Households that did not complete the FSS program

	Household Change		No Household Change		Total	
	N	**%**	**N**	**%**	**N**	**%**
Public Housing	62	30.7	140	69.3	202	43.5
Housing Choice Voucher	219	83.6	41	15.6	262	56.5
Total	281	60.6	181	39.0	464	100

Location and moves within HACP housing

This study did not find that the location of public housing and HCV participants had a strong impact on the household's FSS outcomes, but the small number of FSS participants in each public housing development and zip code, made it difficult to conduct a statistical analysis of the relationship between housing location and FSS program outcomes.

While public housing residents are limited in their housing options to the available public housing units operated by HACP, voucher households may have more flexibility in choosing their home. However, there are still some constraints of the housing options for voucher households because they must find a landlord who is willing to accept the housing choice voucher and offer a unit that passes the physical inspection and has a rent that is under the fair market rent. These criteria restrict the number of housing options for voucher households and causes HCV households to be clustered in lower-income neighborhoods. Prior studies of the relationship between housing

location and employment outcomes have had mixed results with some studies finding that physical proximity to jobs was associated with higher wages (Allard & Danzinger, 2002) while another study found no connection between location and employment (Hu & Giulano, 2017). Other studies (Oakley & Burchfield, 2019; Zuberi, 2010) suggest that housing location alone does not lead to higher incomes and the availability of social services is important. Studies of HCV households also had mixed results with one study (Lee, et al., 2017) finding that residents still live in high poverty neighborhoods, while other studies found that voucher residents who got jobs moved to lower-poverty neighborhoods (Shen & Sanchez, 2005) or moved to neighborhoods with better access to jobs (Lam, 2015).

During the five-year FSS program, many participants moved. Of the 1,058 public housing FSS participants that entered FSS during the study period, 436, or 41.2%, moved out of HACP public housing while enrolled in the FSS program. In addition to nearly half of public housing participants leaving HACP housing during the program, and additional 180, or 16.9%, moved within HACP housing. These moves include voluntary and involuntary moves, and the data does not indicate whether these households move voluntarily or involuntarily. Involuntarily moves from HACP housing may be evictions, and involuntary moves within HACP housing may be because of the redevelopment of the building, urgent maintenance, or being rehoused after a change in household composition. During the study period, redevelopment in Addison Terrace started and it is likely that many of the moves from Addison Terrace were involuntary. Additionally, families are often rehoused when there is a change in household composition so that there is an appropriate number of bedrooms for the family. Families that are in stable housing are able to make decisions about whether, when, and where they move (Lubell, 2015). Involuntary

moves can create stress and disrupt social ties (Manzo, et al., 2008) while voluntary moves to better neighborhoods may reduce stress (Briggs et al., 2010).

I expected to find that moves within HACP public housing would create a disruption that would make those participants less likely to complete the FSS program. The analysis did not support that hypothesis and showed that public housing residents who moved while in the FSS program were significantly, $p<0.05$, less likely to leave the FSS program than participants who remained in the same housing unit for the duration of their FSS participation. There are several possible explanations for this. First, the FSS program staff could have made an additional effort to ensure that residents who moved continued to be supported by the FSS program's services. Second, those who moved from Addison Terrace may have moved to newer housing that they preferred. Third, those who moved voluntarily may have selected another housing development that they preferred, and were closer to family, friends, work, or other supports that increased their likelihood of completing the FSS program. Like the analysis of the household composition, the public housing households that remained in the FSS program for a longer time period, had more opportunities to move while in the FSS program. I tested the outcomes of the public housing participants who moved within the first 24 months of their FSS participation to the outcomes of the public housing participants who did not move while enrolled in the FSS program to determine whether there were still significant differences between to two groups. The analysis found that the likelihood of public housing households that moved within the first 24 months of their FSS participation and the public housing participants that did not move while enrolled in the FSS program had a nearly equal likelihood of leaving the FSS program prior to completion. Therefore my hypothesis that moving within public housing created a disruption that would lead participants to leave the FSS program prior to completion was not supported.

The housing choice voucher households were less likely to leave the HACP housing program than the public housing residents. Of the 669 HCV households that enrolled in the FSS program during the study period, 128, or19.1%, moved from HACP housing and returned their voucher while enrolled in the FSS program. Furthermore, of those 669 households, with an observed entry into the FSS program, 148, or 22.1%, moved with their housing choice voucher from one rental unit to another during the study period. Like the public housing households, it is impossible to know whether those were voluntary or involuntary moves. Involuntary exits from HACP's voucher program may have been a result of eviction or landlord not renewing the lease and the voucher holder was unable to find another housing unit. While vouchers may increase a voucher household's housing choices, there is still some degree of instability as landlords may leave the program or decide not to renew a lease (Nguyen, 2018). Voluntary moves may have been to homeownership, market-rate rental units, moving in with family, or leaving the area. Moves with the housing choice voucher from one rental unit to another could also be voluntary or involuntary. Without additional information, it is impossible to know whether those moves were by choice. Reasons for involuntary moves could be that the landlord did not renew the lease, the rental unit did not pass inspection, or the household had a change in household composition that necessitated a rental unit of a different size. Voluntary moves could include: moving to a better unit or moving closer to family, friends, work, or to a preferred neighborhood. HACP voucher households that moved to Allegheny County are identified in the data set and were permitted to remain in HACP's FSS program. There were 48 HCV households that moved from the City of Pittsburgh to Allegheny County during the study period. Of those 48 households, 7 (14.6%) left the FSS program prior to completion.

Like the public housing households, the HCV households that used their voucher to move from one rental unit to another rental unit during the study period were statistically ($p<0.001$) less likely to leave the FSS program than households that did not move. Again, this contradicts the theory that households that moved during the FSS program would be less likely to finish due to the disruption of moving. When I compared the outcomes of the HCV households that moved within the first 24 months of FSS participation to the HCV participants who did not move while enrolled in the FSS program, I found that the households that moved early in FSS participation were significantly ($p<0.001$) more likely to remain in the FSS program than the HCV households that did not move while enrolled in the program. These households may have been able to use their voucher and the flexibility of the HCV program to find housing closer to work or HACP services. While additional analysis is needed to determine exactly why the voucher households who moved were more likely to remain in the program, these results suggest that some of the participants were able to make positive moves. My hypothesis that moves while enrolled in the FSS program would create a disruption and would lead to the HCV households leaving the FSS program prior to completion was not supported.

Income at Time of FSS Program Entry

I expected to find that households that had higher incomes when they enrolled in the FSS program would be more likely to remain in the FSS program than those who had lower incomes. This would support the theory that prior work history explains the likelihood of success in the FSS program, (Anthony, 2005; Lee & McNamara, 2018; Rohe & Kleit, 1999; Santiago, Galster & Smith, 2017) the idea being that the FSS program may be more beneficial to residents who are looking for a better job than the job that they have, but they have work history and experience. In order to test that theory, I found the annual median income at the time of FSS entry for both public

housing households, ($3,792) and housing choice voucher households ($11,848), and coded households as either being above or below the annual median income.

The public housing households have extremely low annual incomes, with two-thirds of public housing households reporting incomes of less than $6,000 at the time of FSS program entry and one-third of public housing households reporting no income at all. The analysis showed that having an income above or below the median for public housing households, $3,792, did not significantly impact the likelihood of completing the FSS program. Because that income level was so low, I was interested in seeing if public housing residents earning more were more likely to remain in the program. I conducted the same analysis using $10,000 as the threshold and tested public housing residents with an annual income above or below $10,000 at the time of FSS entry and found that public housing households earning less than $10,000 were significantly ($p<0.10$) less likely to leave the FSS program than households earning more than $10,000.

A 2018 study by Lee and McNamara found that FSS benefits were greatest for those with little to no work history. I conducted the same analysis for public housing residents who reported no income at all at the time of FSS entry. I found that those households with zero income were significantly ($p<0.05$) more likely to remain in the program than households earning an income at the time of FSS enrollment. This finding was significantly less important when the additional analysis was added with the multivariate logistic regression. The finding that households with no income at FSS entry is contradictory to prior studies (Anthony, 2005; Rohe & Kleit, 1999; Santiago, et al., 2017; MDRC, 2014) that suggest that FSS participants with prior work history are more successful in the FSS program than households with little or no work history. The households with no income may have had the most to gain from the FSS program, as they were not even receiving public assistance funds such as TANF or social security at the time of their FSS

entry. Households with zero income at the time of FSS entry also had more potential to increase their incomes while enrolled in FSS and thus to increase escrow savings. In this study I used income at FSS entry as a rough proxy for work history, and of course it is likely that some of these participants may have worked in the past, but were unemployed when they entered the FSS program. There is room for additional research on the relationship between work history and FSS outcomes to better understand the relationship between work history, the financial incentive of the escrow savings, and FSS program outcomes.

For the housing choice voucher households, I found that there was not a significant difference in FSS outcomes between the HCV households that earned less than the median income $8,929, and those that earned less at the time of FSS enrollment.

Summary of Hypothesis 1: Household Characteristics

This analysis has shown that there are some substantial differences between the public housing and the HCV participants in terms of age of the head of household, likelihood of leaving HACP housing programs, and income at the time of FSS entry. While public housing households were significantly more likely to complete the FSS program than the HCV households, these household characteristics did not explain that difference.

- Having children in the household did not have a significant impact on the likelihood of public housing or HCV households completing the FSS program.

- Change in household composition seemed to be related to positive FSS outcomes for both public housing and HCV households, but when considering time of change,

there was no difference between households with early changes in household composition and no change for either public housing or HCV households.

- Household moves also seemed to be related to success for both the public housing and HCV households, but when considering the time of move, only HCV households were significantly ($p<0.001$) more likely to remain in the FSS program than non-movers. Public housing households that moved within the first 24 months and public households that did not move while enrolled in FSS had a similar likelihood of completing the FSS program.

- Income at FSS entry was related to FSS program success for the public housing households. Public housing households that had no income at FSS entry were significantly ($p<0.05$) to remain in the FSS program and public housing households with incomes of less than $10,000 were significantly ($p<0.10$) to remain in the FSS program than households with higher incomes at FSS enrollment. HCV households with incomes above and below the median at FSS entry had a similar likelihood of completing the FSS program.

6.2.3.2 Hypothesis 2: Program Characteristics

So far, we have learned that outcomes of the FSS program are not easily explained by time or household characteristics. I will now discuss the test of the second hypothesis, program characteristics to determine whether they explain the outcomes of FSS participation.

First, I will examine the households that paid the increased minimum rent prior to entering the FSS program to determine whether or not those households were significantly more likely to

withdraw from the FSS program prior to completion than households that did not pay the increased minimum rent prior to enrolling in the FSS program. Second, I will examine the impact that escrow savings had on FSS participants likelihood of withdrawing from the FSS program prior to graduation.

Increased Minimum Rent

I expected to find that the households that paid the increased minimum rent of $150 prior to entering the FSS program would have different outcomes than households that did not pay the increased minimum rent. A review of the academic literature did not yield any studies that addressed the impact of an increased minimum rent policy, or other rent reform programs, on FSS outcomes. A review of the annual plans and reports of the other moving to work agencies showed that while some housing authorities had implemented rent reform policies, none of those housing authorities had a policy comparable to HACP's increased minimum rent policy. I expected to find that households that paid the increased rent prior to entering the FSS program may be more likely to remain in the FSS program in order to avoid paying the increased minimum rent. As long as those households remained in the FSS program, they could continue to pay rent based upon their household income, with the minimum being $25 for public housing and $50 for housing choice voucher households. On the other hand, those households may be more likely to withdraw from the FSS program because they may have only joined the program to avoid paying the increased minimum rent and not because a genuine interest in participating in the program.

The univariate analysis of the HCV data revealed that households that paid the increased minimum rent were significantly ($p<0.001$) less likely to withdraw from the FSS program than households that did not pay the increased minimum rent prior to enrolling in the FSS program. Of

the 181, or 27.1%, HCV households that paid the increased minimum rent prior to enrolling in the FSS program, only 46 withdrew from the FSS program during the study period. There were 216 households that did not pay the increased minimum rent prior to FSS enrollment that did not complete the FSS program. However, the logistic regression showed that those who paid the increased minimum rent prior to FSS enrollment were not significantly more likely to leave the FSS program prior to completion. The difference between these two outcomes may be that the univariate analysis using the Kaplan-Meier survival curve includes the households that moved from HACP housing and those that remained in the program at the end of the study period, while the logistic regression only included those that had an observed end to their FSS participation either by completing the 60-month program or by exiting the program. Additionally, the number of households that paid the increased minimum rent and exited the FSS program prior to completion was only 46 households, this small number may also explain the difference in significance between the two models. I recommend that further analysis be conducted in the future when there are more observations which may lead to a more accurate analysis of the impact of the increased minimum rent policy on FSS completion.

The public housing households that paid the increased minimum rent prior to FSS enrollment were also significantly ($p<0.10$) less likely to withdraw from the FSS program than the public housing households that did not pay the increased minimum rent prior to FSS enrollment. The multivariate logistic regression showed that the households that paid the increased minimum rent prior to FSS enrollment were not significantly more likely to remain in the program than those that did not pay the increased minimum rent prior to FSS enrollment. I recommend further analysis of the impact of the FSS program when there have been more FSS participants who have paid the increased minimum rent prior to FSS enrollment.

Escrow Savings

The main incentive for households to remain in the FSS program is the escrow savings account. During the FSS program, participants continue to pay the rent that they paid when they entered the FSS program, and rather than having their rent increase when their income increases, participates are able to divert the would-be rent into an escrow savings account that they are able to withdraw upon graduation from the FSS program. It was challenges to conduct the analysis of the escrow savings account because the escrow savings amount is closely tied to length of time in the program. Therefore, households that remained in the program longer, tend to have higher amounts of escrow savings. Despite this challenge, the analysis showed that those that completed the FSS program did have higher incomes and levels of savings than those who left the program early.

Households that have escrow savings are expected to be less likely to withdraw from the FSS program because if they withdraw from the program, they will forfeit the savings in their accounts. However, there were still a group of public housing and housing choice voucher households that left the FSS program when they may have had high levels of escrow funds. As you may recall from Chapter 4, the calculation of escrow funds was not included in the data set and was calculated based on what the escrow funds could have been. It is possible that the households that would have had considerable escrow funds may have withdrawn the money early for educational or employment-related expenses.

The public housing households that may have had high levels of escrow funds when they left the FSS program tended to fall into one of two categories. The first were households that had very low incomes when they enrolled in the FSS program and any increase in income allowed

them to accrue a significant amount of savings during their long participation in the FSS program. Those households tended to leave the FSS program in the last year, and it is likely that they were dismissed from the program for non-compliance.

The second category of public housing participants who had high escrow savings when they left the program also had a full-time student in their household, and it is more than likely that they withdrew those funds for education-related expenses prior to leaving the FSS program. This is evidence that the household did have an increase in household income and used the funds for an eligible expense, and even though they did not complete the program, the household is likely better off at the end of their FSS participation than at the beginning both in terms of income and education.

Of the HCV households, there were only 23 FSS participants who left the FSS program with escrow savings of more than $2,200. Those participants also mostly fell into one of two categories. The first category is the households that enrolled in the FSS program with very low incomes and started earning salaries of more than $20,000 while in the program. Those households accumulated escrow savings very quickly and tended to leave the FSS program shortly after experiencing an increase in wages. Again, it is possible that those households had used some of their escrow savings for education or job-related expenses and did not actually forfeit savings of a few thousand dollars. Of the 23 households that may have had escrow funds of more than $2,200 when leaving the FSS program, nine households fell into this category.

The second category of HCV households that left the FSS program when they may have had escrow savings of more than $2,200 also enrolled in the FSS program with low wages, and experienced a sharp increase in wages, often earning more than $15,000 or $20,000 followed by a sudden decrease in income when their income dropped to less than $10,000. That suggested that

those households were no longer earning wages and were once again receiving public assistance, and may not meet the requirements for FSS graduation. Those households tended to leave the FSS program at or around the 55-month mark. Those participant's exit at that late point in the program suggests that they may have been dismissed from the program for not meeting the FSS graduation requirement of being free of public assistance for at least one year prior to the end of their FSS contract. FSS participants who experienced a job loss may, under some circumstances have their FSS contract extended and remain in the FSS program for up to two additional years. Without additional information about why the participant left the FSS program, it is impossible to determine whether those FSS exits were voluntary or involuntary. Again, it is also possible that these households had used their escrow savings for educational or employment-related expenses during the time period that they were working and did not forfeit escrow funds when they left the program.

Without knowing whether the household had used their escrow funds for eligible expenses or if they forfeited those funds when they left the FSS program, it is difficult to assess the extent to which the escrow savings were an incentive for remaining in the program or make inferences about the participants decision making process. What this calculation does offer, is a means for quantifying income change while in the FSS program. What we learn from this is that even if the public housing or housing choice voucher household did not complete the 60-months in the FSS program, they may have benefitted from the program. There may have been instances where the household participated in the FSS program until they secured employment, and if that was their ultimate goal, they stopped participating in the program. In the case of the public housing households that had full-time students in the household, they may have been able to use money that would have been spent on rent and instead used it to pay tuition expenses. Even though those

households did not complete 60-months in the program, the FSS program may have enabled them to obtain educational services that otherwise would have been unaffordable.

What is distressing is the high number of public housing and housing choice voucher households that did not experience an increase in escrow savings, which indicates that they did not have an increase in income or escrow savings during their time in the program. Many households from both housing programs completed 60 months in the program with little increase in income. Also distressing is the high number of HCV households that experienced multiple periods of employment and unemployment, suggesting that the linear trajectory of the FSS program, which was built upon the theory of change model, is not reflective of the experience of low-income households that are trying to obtain and retain employment. For the households in this category, supportive services to help participants to keep jobs that they have may be as beneficial as the services to help them to obtain their first job.

Summary of Hypothesis 2: Program Characteristics

This section has shown that program characteristics may offer a better explanation of FSS outcomes than household characteristics. Earlier in the chapter I compared the outcomes of the public housing and HCV participants and showed that the public housing participants were significantly more likely to remain in the FSS program than the HCV participants. The prior section also tested two other program characteristics: paying increased minimum rent prior to FSS enrollment and escrow savings, to determine whether these program characteristics impacted FSS outcomes.

- The increased minimum rent policy may have an impact on FSS outcomes, but further research is needed to determine how the policy affects FSS outcomes.

- The analysis also shows that both public housing and HCV households that had high levels of escrow savings were significantly more likely to remain in the FSS program.

6.3 Summary of Findings

This study has shown that the FSS program isn't working as it is currently designed. More participants from both public housing and housing choice voucher households drop out of the program than complete it, and many residents do not remain in either HACP housing program for the duration of the program. Furthermore, many of the public housing households that complete 60 months in the program do not meet the requirements to officially graduate from the program. This is consistent with the findings of other FSS programs reviewed in Chapter 2 (Anthony, 2005; Kleit & Rohe, 2005; Bloom et al., 2005; HUD, 2011; Lubell et al., 2003). While the FSS program isn't working for the majority of participants, the outcomes are significantly worse for the HCV participants than the PH participants. Both the enrollment and completion rates for the HCV households are significantly lower than for the PH households. The poor outcomes for both the HCV and PH participants is the likely explanation of low enrollment and high attrition rates. This study and others (Anthony, 2005; Kleit & Rohe, 2005; HUD, 2011) have looked at the FSS participants and their families to try to explain their lack of success in the program.

The program characteristics hypothesis also provided important information. This analysis showed that paying increased minimum rent prior to FSS participation was not a good incentive

for participants to remain in the FSS program. In this instance, finding that this policy is not meetings its objective of increasing FSS participation, is very important because it provides important information to policymakers who are considering whether to adjust the increased minimum rent policy. Knowing that paying the increased minimum rent prior to FSS enrollment does not impact the likelihood of remaining in the FSS program may help HACP to develop a policy that does encourage residents not only to enroll, but to remain in the FSS program.

This study also showed that households with escrow savings were more likely to remain in the FSS program that those who did not. Escrow savings is an important incentive for residents to remain in the FSS program (Rohe & Kleit, 1999; Sard, 2001; Ficke & Piesse, 2004; HUD, 2011) and the findings of this study that households with higher escrow savings were more likely to complete the program were consistent with prior studies.

The analysis of the households who left the FSS program when they may have had some money in the escrow account was also interesting, even if it did not provide a definitive explanation of the household's decision-making process. For instance, those households may have used their escrow savings for eligible education and job-related expenses while enrolled in the FSS program (24 CFR§305). While the data allowed for an analysis of the escrow savings, it did not provide any information about FSS funds used while enrolled in the FSS program. Also, identifying households that may have left the program involuntarily was also interesting. While the escrow savings account is an important incentive for participants to remain in the program, there are some households that had savings, despite not having a successful outcome in the program. The HCV households that experienced periods of higher and lower employment are one important example. That example shows that these households did not continue to make linear progress toward self-sufficiency and experienced periods of employment and unemployment. In general, participants

who are successful in the program and have increased their income significantly over a substantial time period have escrow savings. For those residents, the escrow account is an incentive to remain in the program, but it does little to incentivize those who have not found employment and realized financial benefits to FSS participation.

The differences between the public housing and HCV households in terms of age, income at program entry, and ease of service delivery suggests that there may be benefits to developing different programs for residents in public housing and the housing choice voucher program. This study has shown that the public housing residents tended to be younger, have lower income, and be more likely to move from the FSS program during the five-year period. For those residents, a different approach catering to young residents who aim to develop the skills needed to begin their careers and need assistance getting into the workforce may be more appropriate.

Both of the hypotheses, household and program characteristics, provided important insight to the outcomes of FSS participation. Households that experienced changes in location within HACP housing and had changes in household composition were more likely to remain in the FSS program than those that did not experience those changes. This showed that these were positive changes and were not disruptive to the household's FSS participation.

Another interesting finding that calls the program design into question was the high number of young public housing residents who moved from HACP housing during the program. For these household's the five-year program was not appropriate and they may be better served by a shorter program. For the HCV households that are more likely to leave FSS prior to completion, a different approach to provide services to help residents remain employed or find steady employment may be more successful.

The public housing and HCV housing program provides income-based rent to residents, which may reduce the stress and anxiety associated with high housing costs (Newman & Harkness, 2002). While these housing programs may provide increased stability to low-income residents, public housing tends to be located in low-income neighborhoods (Lee, et al., 2017) and HCV residents have constraints on their housing choices (Blackhurst et al., 2019), which may leave residents far from the services and employment opportunities they need to achieve self-sufficiency and transition to market rate housing. The main assumption of the FSS program is that the PH and HCV programs will create stable housing that enables residents to participate in the FSS program, receive services, and find stable employment. This study has shown that there is a high number of moves both within the PH and HCV housing programs and a high number of moves out of the PH and HCV housing programs. Furthermore, public housing buildings and HCV residents tend to be clustered in low-income neighborhoods that are not necessarily in close proximity to services and jobs. While the income-based subsidized housing programs certainly provide some level of stability for many families, there are many other important factors to achieving self-sufficiency that are not met by the FSS program.

6.4 Surprises

The biggest surprise was finding that households that had changes in household composition and location were more likely to remain in the FSS program than participants that did not have a change in household composition or a move within HACP housing. I expected to find that having household members entering or leaving the household would create a disruption in the household that would impact FSS participation. The changes could affect the household income,

childcare responsibilities, and other dynamics within the household. Similarly, I expected to find that moves within public housing or moves from one rental unit to another using the housing choice voucher would impact the likelihood of the participant leaving the program. In actuality, households with these changes were more likely to remain in the program, than those who did not. These moves could have been positive moves for the household to housing that they preferred or housing that was situated in an area that was closer to employment, services, or family. While I expected to find that these changes would be disruptions, it seems that they were positive changes and improvements for the participants.

The second surprise was that income at the time of FSS entry did not affect the outcome of FSS participation. I expected to find that FSS participants who had wages over $10,000 at the time of FSS entry may be less likely to complete the FSS program because they would have less potential for escrow savings or they may feel that the FSS program was less helpful to them if they already had a job. I also expected to find that households with no or extremely low incomes may be more likely to remain in the program because they had more to gain from FSS participation. They may be able to develop the skills that they needed to become employed and the supports that they need to remain employed. Those households also had the highest potential for establishing escrow savings if they increased their income while in the program. I was surprised to find that level of income at FSS enrollment did not have a significant impact on FSS outcomes fort either public housing or housing choice voucher households.

6.5 Conclusions

This section concludes the study with a discussion of the contribution of this study, implications for action, and recommendations for future research as well as some closing remarks.

6.5.1 Contribution

This study contributes to the literature on FSS evaluations by adding a case study from Pittsburgh. The Pittsburgh case is important because it used its MTW designation to develop an increased minimum rent policy to incentivize households to enroll and remain in the FSS program. Amid policy discussions about implementing work requirements for those receiving housing assistance, this study has shown that even with the supports offered through the FSS program, it is still difficult for many residents to obtain steady employment at a livable wage. The analysis of the escrow savings, which serves as a metric for increase in income during FSS participation, revealed that many HCV households cycled through multiple periods of employment and unemployment, and that retaining work seemed to be a significant challenged.

By using the event history framework, this study also used a different approach that examined exit from the FSS program rather than studying success. The FSS framework also allowed for the analysis of the households that moved from HACP housing during the study period and those who remained in the program on October 1, 2017. Other methods of analysis are not as well equipped to analyze those who did not have observed outcomes during the study period.

6.5.2 Implications for Action

As an MTW agency, HACP has greater leeway in designing its FSS program than non-MTW agencies (Webb et al., 2016). Designing an FSS program that provides the appropriate level of support and incentives for FSS enrollment and completion are critical to the FSS program's success and HACP's ability to meet the objectives of the MTW demonstration program (HUD, 1996). As discussed in Chapter 1, FSS is based on a theory of change model that affordable housing provides a stable platform upon which residents can address barriers to self-sufficiency and move to economic independence. This research shows that with the results discussed, the program does not address much that perhaps is needed by participants to stay in the program. This study supports prior studies suggesting that FSS program design is a better determinant of FSS program success than household characteristics (Kleit & Rohe, 2015; Kleit & Page, 2008; Riccio & Babcock, 2014). For that reason, my recommendations to HACP and HUD are to use the findings of this study and other FSS program evaluations to redesign the FSS program. HUD has allowed the selected MTW agencies to tailor their FSS programs to best meet the needs of its residents and utilize community resources. HUD should take the lead on evaluating the MTW agencies' program changes and consider allowing the non-MTW agencies to benefit from those findings and incorporate promising practices into their FSS programs. My three recommendations: 1) create effective financial incentives; 2) tailor the FSS program to public housing and HCV households; 3) consider shorter timeframes and increasing program flexibility.

In this study the increased minimum rent policy and the escrow savings accounts both serve as important financial incentives for remaining in the FSS program. Households that paid the increased minimum rent prior to enrolling in the FSS program and the households that had escrow savings were more likely to remain. Other MTW agencies such as: Charlotte, NC; Lincoln NE;

Vancouver, WA; New York, NY; and Boston, MA have used their MTW status to develop financial incentives for FSS participants ranging from work requirements to financial benefits (Rohe, 2015; Webb, et al., 2106; Verma et al, 2018; Riccio & Babcock, 2012). While the reviews of these programs offer mixed results, there is strong evidence that financial incentives are important to successful FSS programs. A 2018 study of a self-sufficiency program at the New York City Housing Authority suggests that early financial incentives proportional to the accomplished goal lead to both higher enrollment and engagement by residents (Verma et al., 2018). My critique of the FSS program design is that the escrow savings is a strong incentive for those who are successful in the program but does not incentivize those who have not had an increase in wages. Small financial incentives early in the program may help to retain some of the participants who do not experience an increase in wages in early in the program. For instances, there could be financial incentives for meeting an educational goal before the participant finds a new job.

This study raised questions about HACP's increased minimum rent policy and its ability to incentivize residents to remain in the FSS program. This analysis builds previous research on the impact of the increased minimum rent policy on FSS enrollment and rent revenue at HACP (Deitrick & Bert, 2019). When examining the relationship between paying the increased minimum rent prior to FSS program enrollment and FSS program outcomes, the results of this study were inconclusive, but suggested that the increased minimum rent policy is a weak incentive, at best, for FSS participants to remain in the FSS program. Furthermore, there was a set of households who paid the increased minimum rent after leaving the FSS program. While the data do not indicate whether these participants left the FSS program voluntarily, it is interesting to see that there is a number of households that paid the increased minimum rent of $150 after leaving the

program. This provides additional evidence that the increased minimum rent policy was not effective in incentivizing participants to remain in the FSS program. My recommendation to HACP is to revisit the increased minimum rent policy and consider whether there are other incentives that may be more useful.

The second implication for action is that there is a significant difference in outcomes among public housing and housing choice voucher household participating in the FSS program. This study has shown that the households from the housing choice voucher program were far less likely to complete the FSS program than those who lived in public housing. This outcome was expected because it is much harder for the housing authority to provide services to those who have vouchers because they live farther away. Prior research (Kleit & Rohe, 2015) suggested that the amount of contact between the service coordinator and FSS participants is an important factor in determining whether the participant will complete the program. There may be ways for the housing authority to adjust the FSS program for HCV participants and increasing the amount of contact, either in person or by telephone. Another option may be to identify additional resources in the community where the HCV participant lives, and allow them to design a training and service plan that includes local services on a case-by-case basis. That way, HCV participants would have more flexibility in receiving services in their community and may be more likely to continue to participate in the program. Lastly, there may be some options to create an additional or different financial incentive for HCV households. Since the escrow savings account has proven to be a strong incentive, there may be an opportunity to adjust the increased minimum rent policy to allow the households to divert the increased minimum rent, $75 for HCV households, into an escrow savings account. This would jump-start their escrow savings and create an opportunity for HCV

households to save up to an additional $4,500 if the household was able to save $75 each month for 60 months.

The third implication for action is that there was a high number of moves from HACP housing among the public housing residents. FSS participants in public housing tended to be younger than the participants who had housing choice vouchers and were also far more likely to move from HACP public housing while enrolled in the FSS program. Unfortunately, there isn't any information on why those households left HACP housing, and it is not possible to determine whether those households left voluntary or involuntarily. If there is a high number of evictions among the young FSS participants, HACP could introduce some housing counseling or budgeting assistance into the FSS program. If those young FSS participants are moving voluntarily, there may be an opportunity for HACP to redesign the FSS program to tailor to the needs of its younger and more mobile residents. HACP could consider changing the timelines from a five-year program, to a series of one-year programs. Residents may be more likely to enroll in a one-year program than a five-year program, and by having a shorter-term goal, it may make the program and success seem more attainable. If residents should leave HACP housing prior to the end of five years, they could still leave with some achievements that could serve them well in the future.

6.5.3 Recommendations for Future Research

While this research has provided important information about the outcomes of the FSS program in Pittsburgh, there are still some unanswered questions. There are three good opportunities for future research. The first is to expand upon this work with additional quantitative and qualitative research. Exit interviews with FSS participants, whether they completed or left the FSS program prior to completion, would provide important information for improving the

program. These exit interviews would help researchers to identify the reasons why participants leave early and learn about the success of FSS program graduates. By having a better understanding of barriers and motivators, HACP could better address the strengths and weaknesses of its program. Toward the end of the study period, HUD issued a notice to public housing authorities about FSS data collection and reporting (HUD, 2016). The notice was issued because HUD found discrepancies in the Housing Authorities' reports and the electronic data submission to HUD in the 50058 records. The notice provides specific instructions for all housing authorities to submit the FSS records for each participant to HUD on an annual basis at minimum and to ensure that the FSS addendum is included with any additional data submissions from FSS participants during the course of the year (HUD, 2016). This improved data collection should lead to more precise evaluations of the FSS program, and resolve the discrepancies between the outcomes reported in the housing authorities' annual reports and the data that are submitted to HUD.

A second opportunity for research is to expand this work to include more MTW housing authorities and conduct a comprehensive study of the various ways that MTW housing authorities have used their MTW status to create different policies for their FSS program. While HACP's increased minimum rent policy did not lead to the expected outcomes, there may be other housing authorities have made successful adjustments to their FSS programs. That may help other current MTW agencies, and future MTW agencies when the demonstration expands to include additional housing authorities. Standardizing the FSS reporting in the annual reports would also improve evaluations as it would allow for a better comparison of FSS program outcomes across housing authorities and enable researchers to pinpoint which housing authorities experience better FSS

program outcomes than others. While those annual reports are publicly available, the uneven reporting does not allow for a comparison across the MTW agencies.

A third opportunity for additional research is a close examination of the role of the service coordinator and the services provided to residents. A thorough understanding of the services offered, services utilized, and the outcomes of the residents may lead to a better understanding of the residents' outcomes and satisfaction with the FSS program. A 2015 study by Kleit and Rohe found that consistent and frequent contact between the service coordinator and residents was an important component to success in the FSS program. A social network analysis approach that examines the service network and the relationship to HACP and its residents may provide a more complete understanding of resident outcomes. Establishing a strong network of service providers in the community that is built on trust and mutual goals is critical to providing social services within a community (Deitrick, 2007). The trust between community organizations, the housing authority, and residents is a critical factor in FSS success. That link has not been explored in this study.

6.5.4 Concluding remarks

The FSS program is designed with the expectation that participants will meet incremental milestones as they work toward self-sufficiency. The primary financial incentive, the escrow savings, is designed to reward those who have increased wages, but there are no incentives for those who are not having success to remain in the program. This study has shown that FSS program exits tend to be gradual throughout the course of the program and program exit may reflect dissatisfied and discouraged participants. An FSS program that offers financial incentives to reward smaller achievements may give participants the incentive and encouragement they need

to remain in the program. This study also showed that there was a large group of public housing residents under the age of 30 who moved out of HACP housing while enrolled in the FSS program. For those residents the 5-year time frame is unrealistic. A program that targets the young residents with the services that they need may be more effective, even if it is a shorter program.

The FSS program represents an important opportunity for connecting low-income households with the resources they need to help them to improve their household's financial outcomes. This study contributes to a set of FSS evaluations that have shown that this program is not effective. Hopefully the MTW agencies will learn from one another and begin to take advantage of their opportunity to redesign their programs and create effective incentive structures and programs that will lead to improved outcomes for their residents. The MTW demonstration is expected to expand to include an additional 100 housing authorities, as the FSS program is an integral part of the MTW demonstration, it is important that these agencies reconsider their programs to better serve their residents.

Appendix A Public Housing and Housing Choice Voucher Tables and Figures

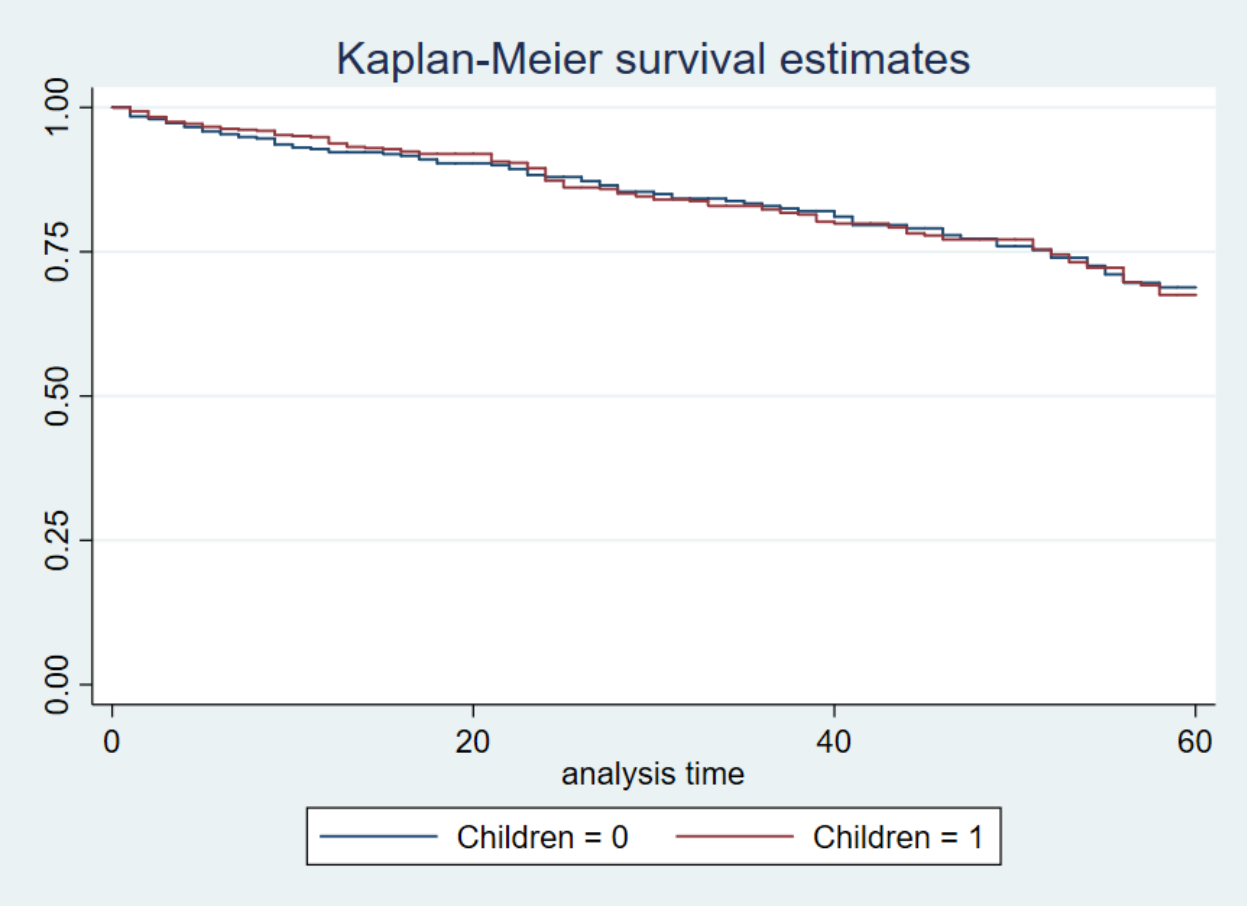
Appendix A provides the large tables and Kaplan-Meier survival estimates that were not included in Chapters 4 and 5 for readability purposes.

Appendix Table 1. Public Housing Life Table

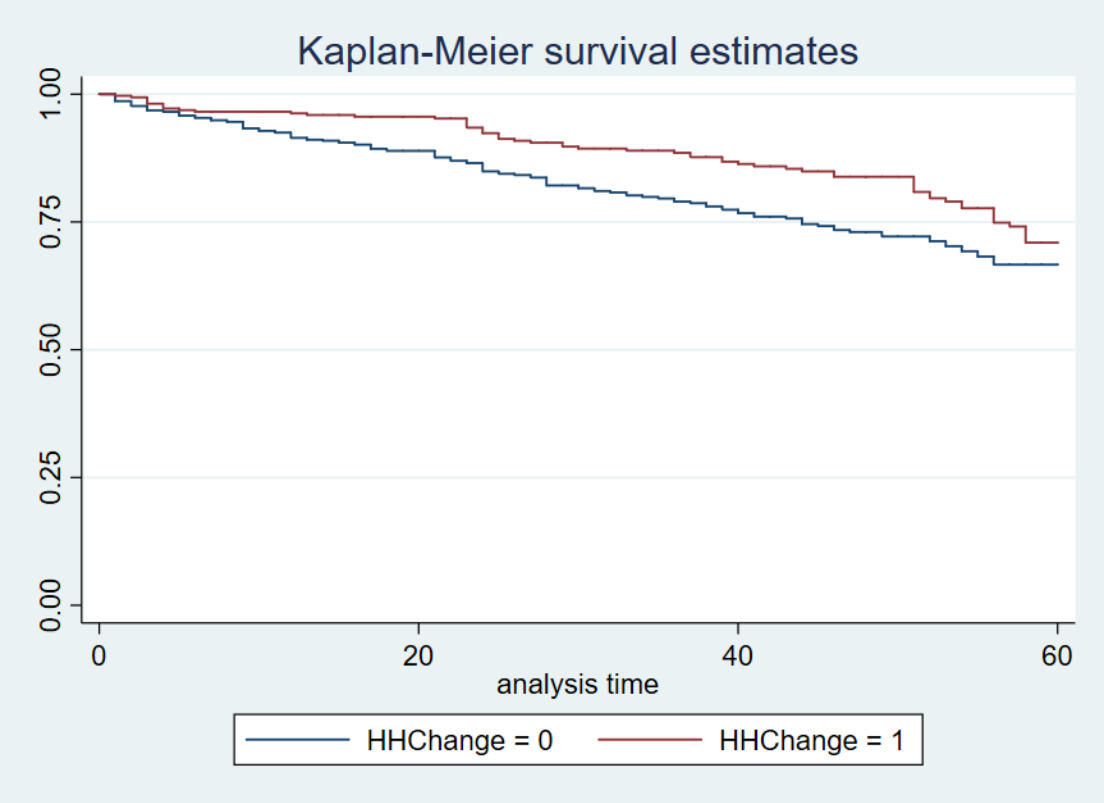
Interval	Total	Left FSS	Lost	Std. Survival	Error	95% Confidence Interval	
1,2	1,056	11	5	0.9895	0.0031	0.9812	0.9842
2,3	1,039	8	14	0.9819	0.0041	0.9717	0.9884
3,4	1,017	8	17	0.9741	0.0049	0.9624	0.9822
4,5	992	5	25	0.9691	0.0054	0.9566	0.9781
5,6	962	6	12	0.9630	0.0059	0.9495	0.9730
6,7	944	4	12	0.9589	0.0062	0.9448	0.9695
7,8	928	3	11	0.9558	0.0064	0.9412	0.9668
8,9	914	2	14	0.9537	0.0066	0.9388	0.9650
9,10	898	8	16	0.9451	0.0072	0.9291	0.9576
10,11	874	3	10	0.9419	0.0074	0.9254	0.9548
11,12	861	2	22	0.9396	0.0076	0.9229	0.9528
12,13	837	7	28	0.9317	0.0081	0.9139	0.9458
13,14	802	3	16	0.9281	0.0083	0.9100	0.9428
14,15	783	1	15	0.9269	0.0084	0.9086	0.9417
15,16	767	2	15	0.9245	0.0085	0.9059	0.9396
16,17	750	2	12	0.9220	0.0087	0.9031	0.9374
17,18	736	4	13	0.9170	0.0090	0.8974	0.9329
18,19	719	2	4	0.9144	0.0092	0.8946	0.9307

19,20	713	0	11	0.9144	0.0092	0.8946	0.9307
20,21	702	0	11	0.9144	0.0092	0.8946	0.9307
21,22	691	7	15	0.9050	0.0097	0.8841	0.9224
22,23	669	3	15	0.9009	0.0100	0.8795	0.9187
23,24	651	7	11	0.8912	0.0105	0.8686	0.9100
24,25	633	10	14	0.8769	0.0113	0.8529	0.8973
25,26	609	5	11	0.8697	0.0116	0.8449	0.8907
26,27	593	2	12	0.8667	0.0118	0.8417	0.8880
27,28	579	3	6	0.8622	0.0120	0.8367	0.8840
28.29	570	6	16	0.8530	0.0125	0.8266	0.8756
29,30	548	2	11	0.8498	0.0126	0.8232	0.8728
30,31	535	3	8	0.8450	0.0128	0.8180	0.8684
31,32	524	2	7	0.8418	0.0130	0.8144	0.8655
32,33	515	1	17	0.8401	0.0131	0.8126	0.8640
33,34	497	3	5	0.8350	0.0133	0.8070	0.8593
34,35	489	1	6	0.8333	0.0134	0.8051	0.8578
35,36	482	1	8	0.8316	0.0135	0.8032	0.8562
36,37	473	3	8	0.8262	0.0137	0.7974	0.8514
37,38	462	3	7	0.8208	0.0140	0.7915	0.8465
38,39	452	2	11	0.8172	0.0142	0.7874	0.8431
39,40	439	4	11	0.8096	0.0145	0.7792	0.8363
40,41	424	3	10	0.8038	0.0148	0.7729	0.8310
42,43	399	0	8	0.7979	0.0151	0.7664	0.8257

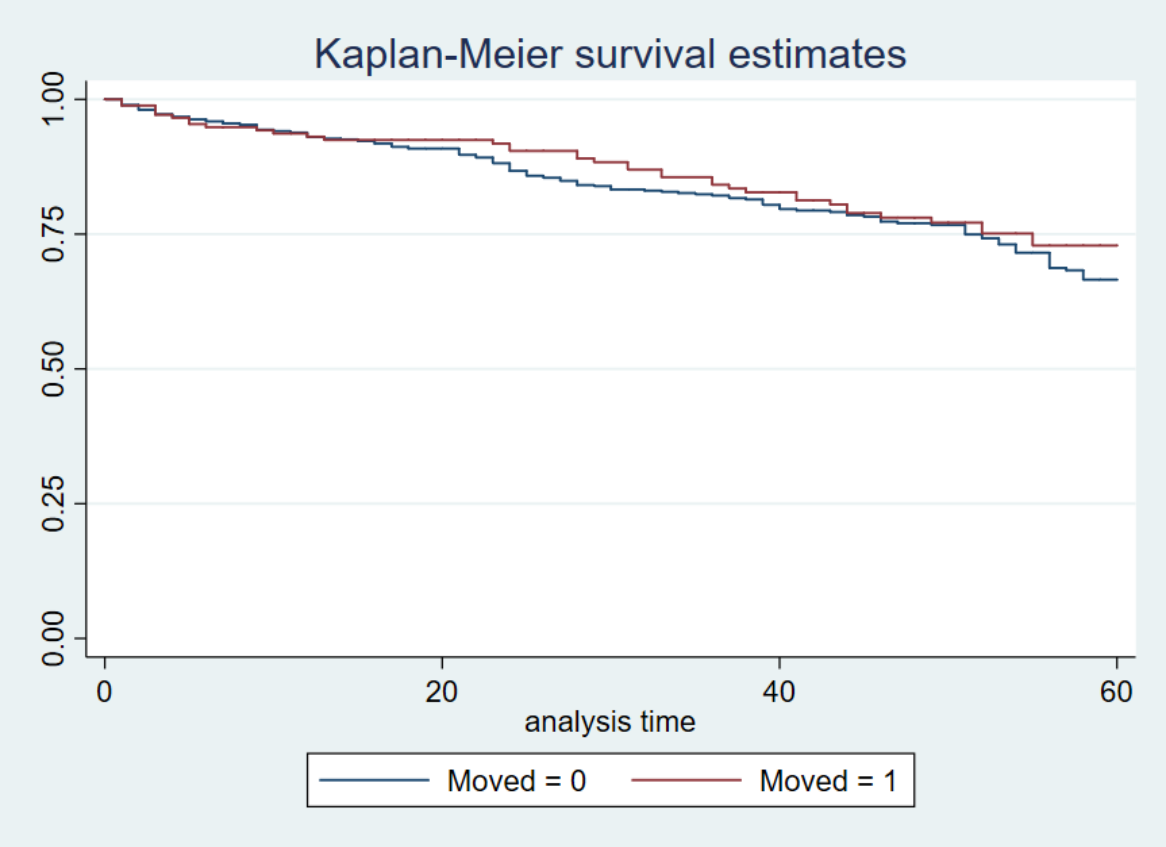
43,44	391	2	16	0.7937	0.0153	0.7618	0.8219
44,45	373	4	7	0.7851	0.0157	0.7524	0.8141
45,46	362	1	7	0.7829	0.0157	0.7500	0.8121
46,47	354	4	6	0.7740	0.0163	0.7402	0.8041
47,48	344	1	9	0.7717	0.0164	0.7377	0.8020
48,49	334	0	14	0.7717	0.0164	0.7377	0.8020
49,50	320	2	11	0.7668	0.0166	0.7323	0.7976
50,51	307	0	11	0.7668	0.0166	0.7323	0.7976
51,52	296	5	6	0.7537	0.0174	0.7177	0.7859
52,53	285	4	10	0.7430	0.0179	0.7059	0.7762
53,54	271	3	6	0.7347	0.0184	0.6967	0.7687
54,55	262	4	11	0.7232	0.0189	0.6841	0.7584
55,56	247	2	5	0.7173	0.0192	0.6776	0.7530
56,57	240	7	11	0.6959	0.0203	0.6541	0.7337
57,58	222	1	9	0.6927	0.0205	0.6506	0.7308
58,59	212	4	7	0.6794	0.0211	0.6360	0.7188
59,60	201	0	12	0.6794	0.0211	0.6360	0.7188



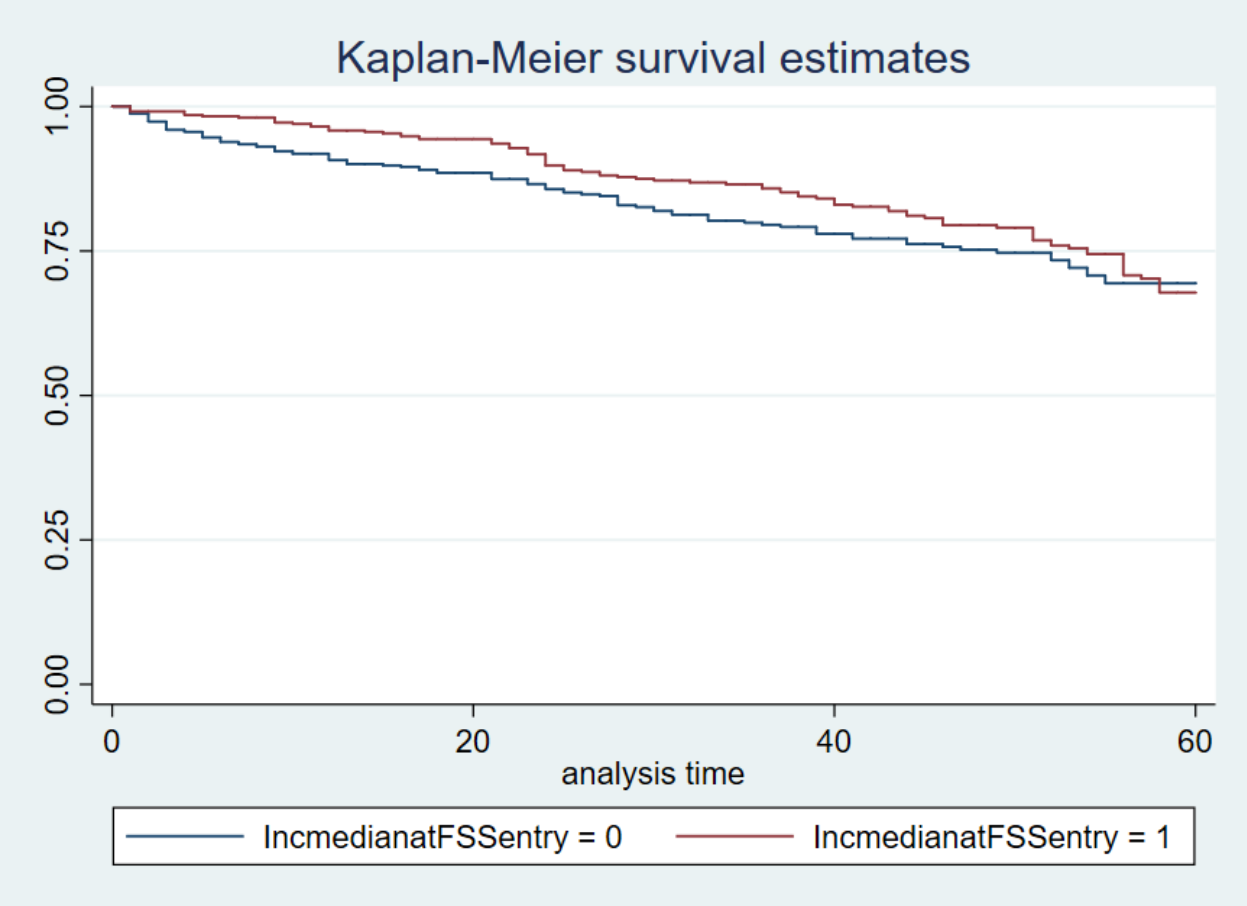
Appendix Figure 1. Kaplan Meier Survival Estimate for public housing households with and without children.



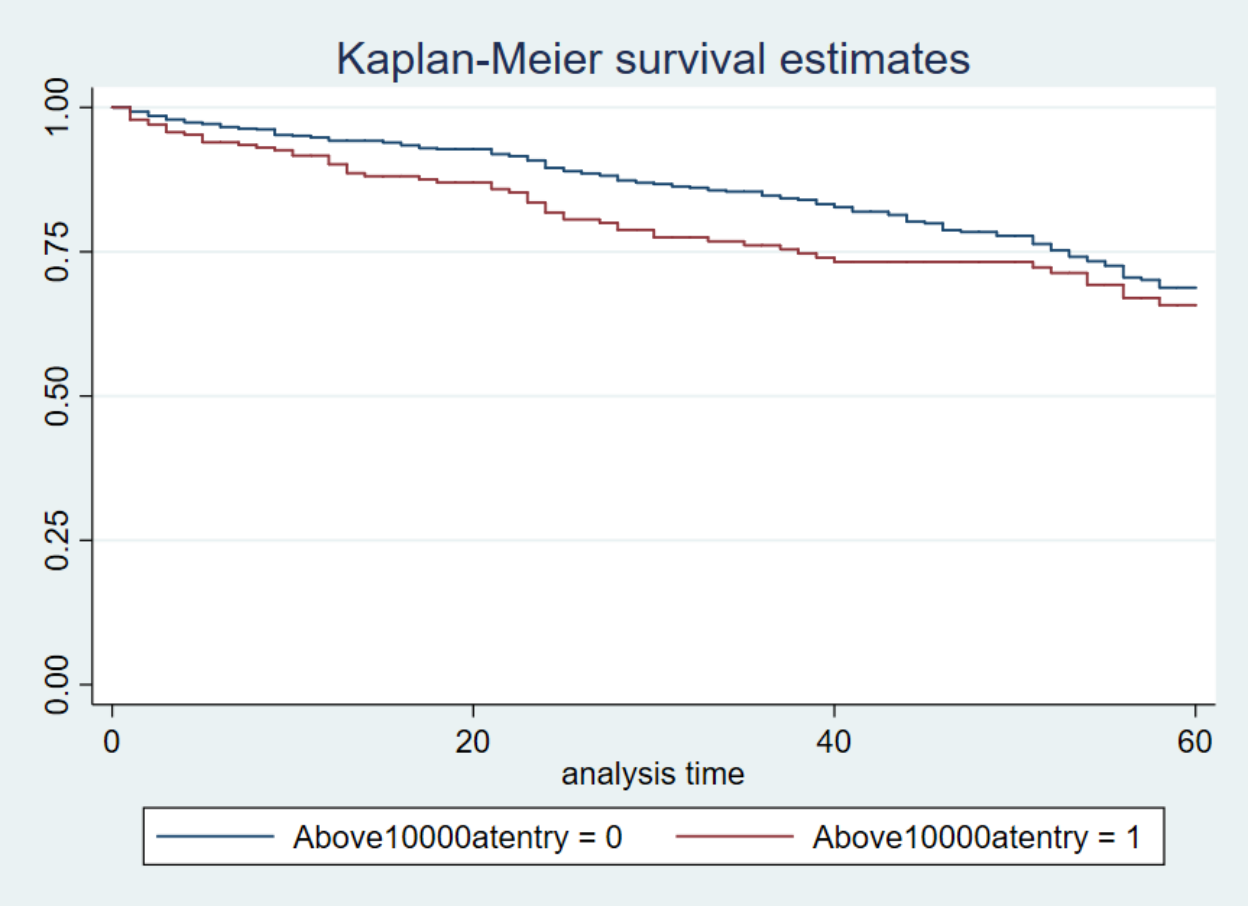
Appendix Figure 2. Kaplan Meier Survival Estimate Public Housing FSS participants with changes in household composition.



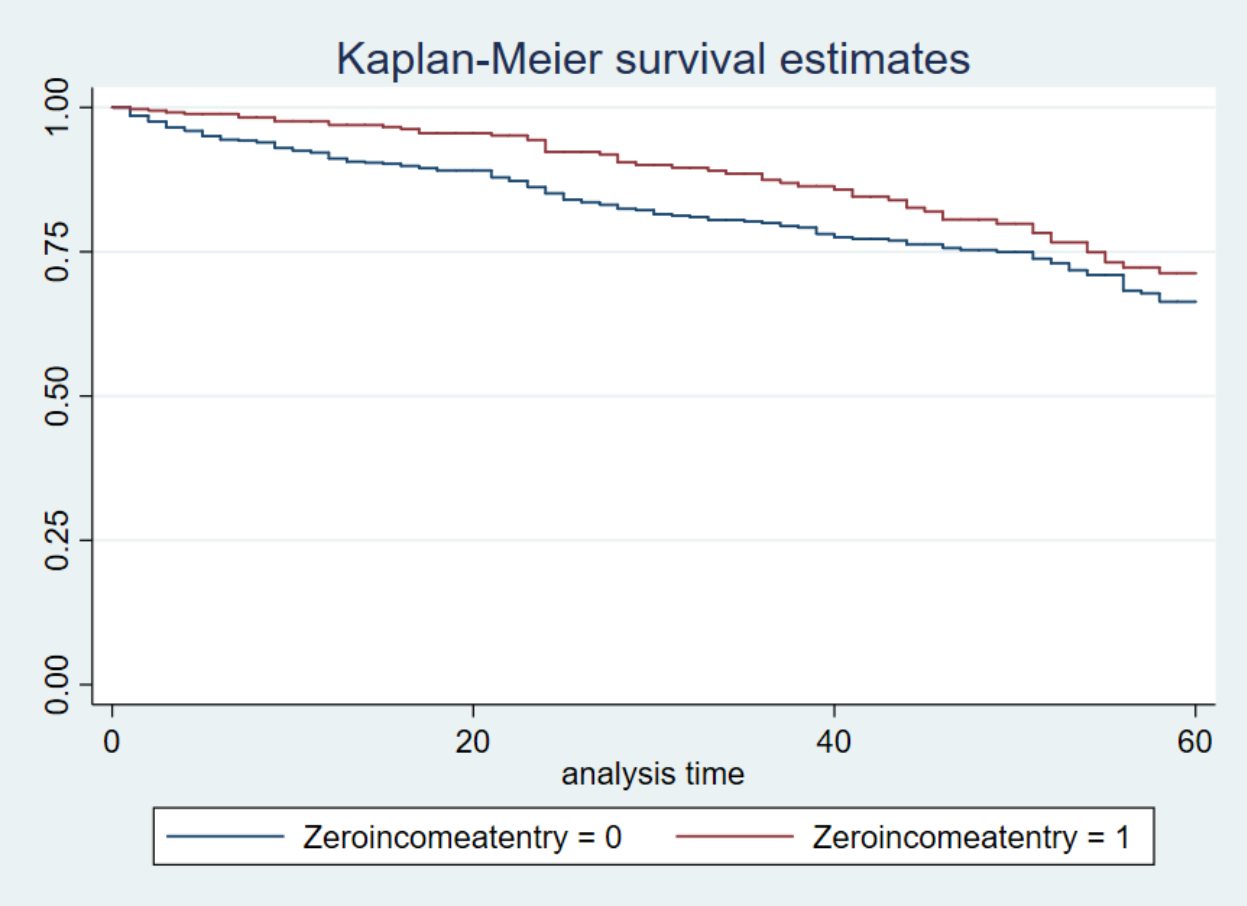
Appendix Figure 3. Kaplan Meier Survival Estimate Public Housing FSS participants who moved while enrolled in FSS.



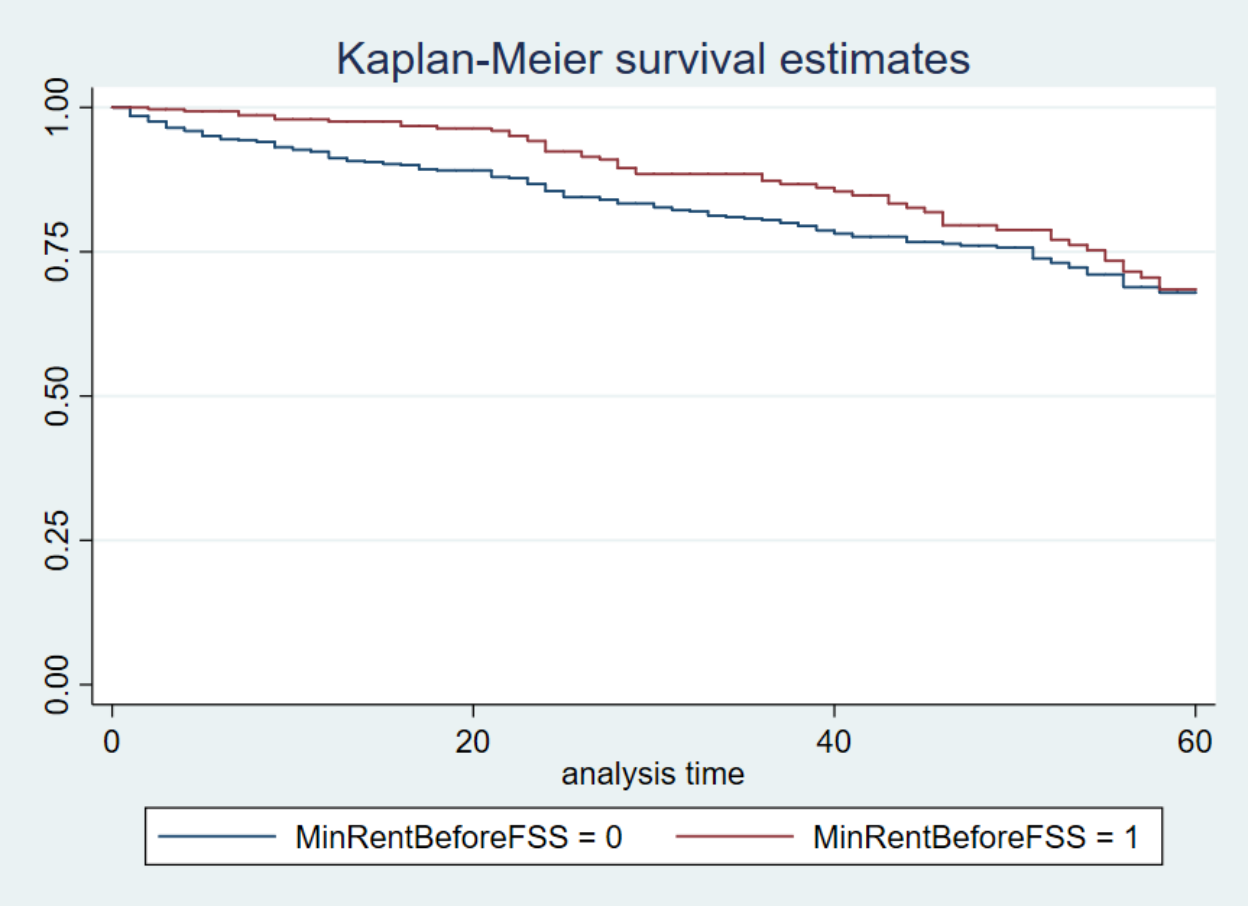
Appendix Figure 4. Kaplan Meier Survival Estimate for Public Housing Households by median income at FSS entry.



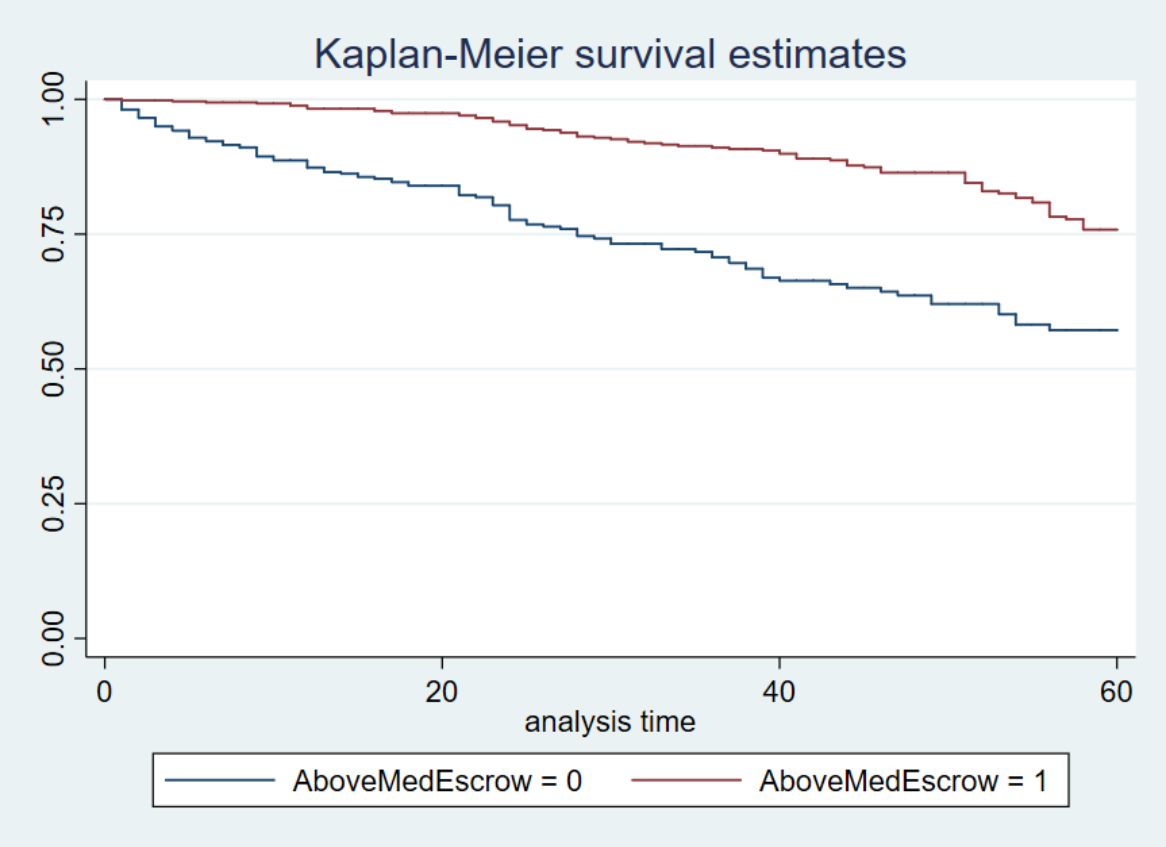
Appendix Figure 5. Kaplan Meier Surivival Estimate Public Housing Participants with Income Above $10,000 at FSS Program Entry.



Appendix Figure 6. Kaplan Meier Survival Estimate PH FSS Households by Zero Income at Entry



Appendix Figure 7. Kaplan Meier Survival Estimate for Public Housing Households that Paid Increased Minimum Rent Prior to FSS Enrollment.



Appendix Figure 8. Kaplan Meier Survival Estimates PH FSS Households with escrow savings above median

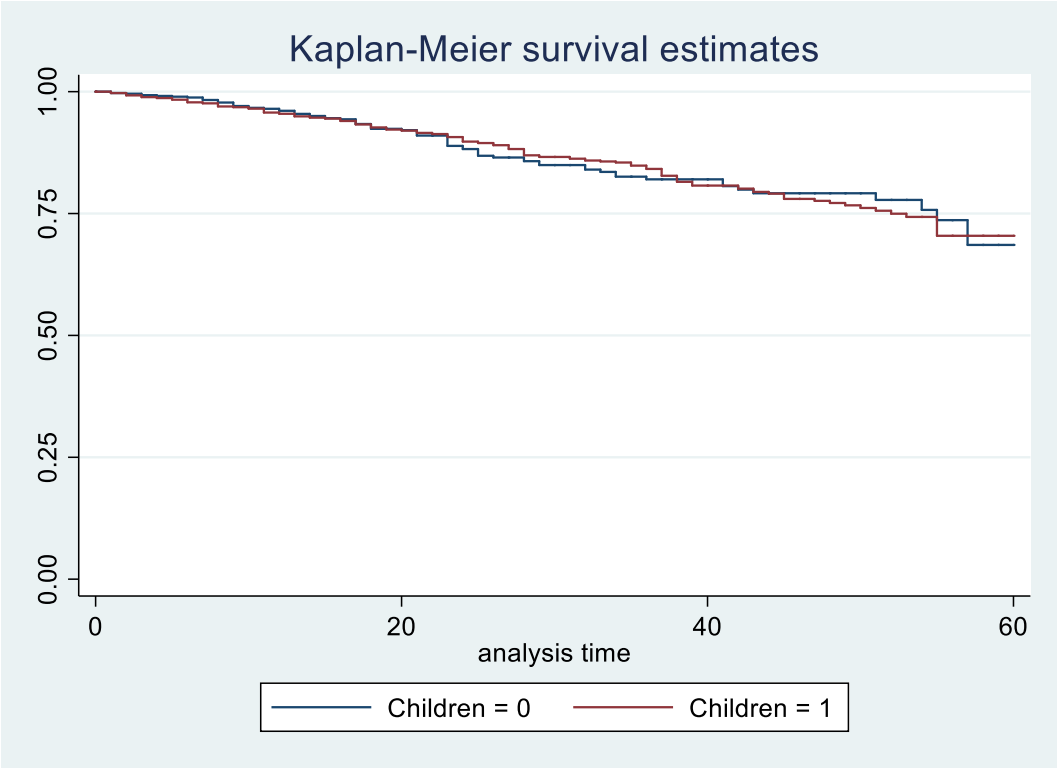
Appendix Table 2. Housing Choice Voucher FSS Life Table

Month	FSS Participants at beginning of month	Exit FSS	Moved from HACP	Right Censored	Survival	Error	95% C.I.	
1,2	671	7	3	1	0.989	0.004	0.978	0.995
2,3	660	9	3	2	0.976	0.006	0.961	0.985
3,4	645	8	4	1	0.964	0.007	0.947	0.976
4,5	632	4	3	4	0.958	0.008	0.939	0.971
5,6	621	6	9	4	0.948	0.009	0.929	0.962

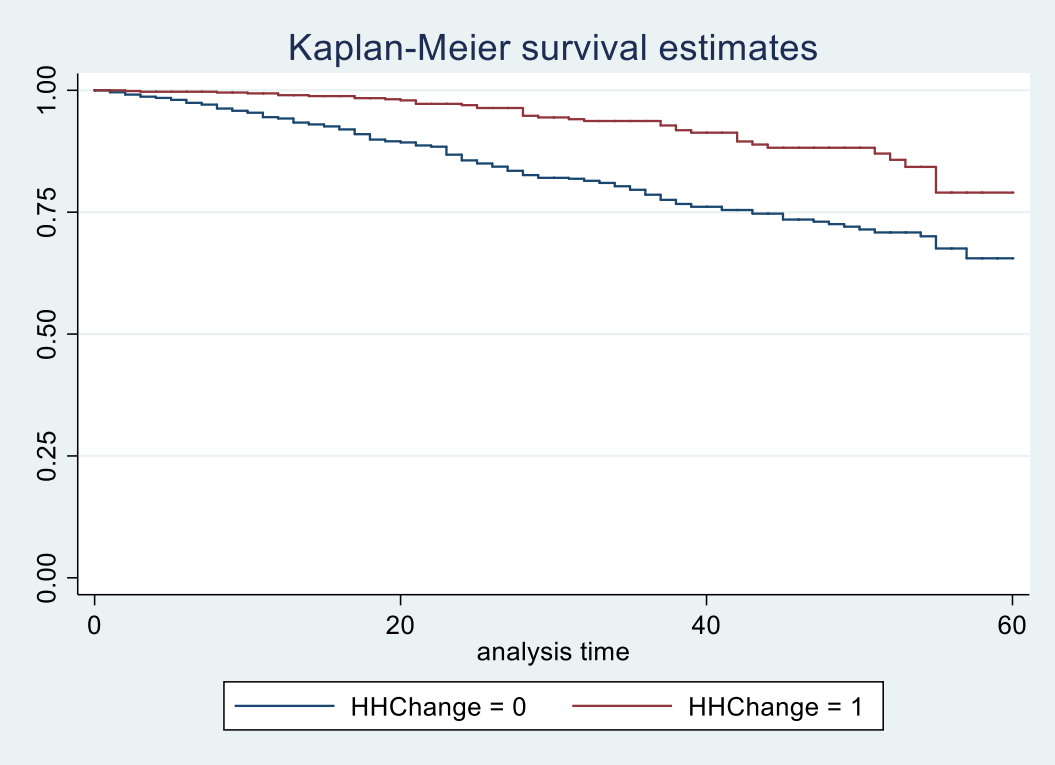
6,7	602	9	6	6	0.934	0.010	0.912	0.951
7,8	581	6	3	7	0.924	0.010	0.901	0.942
8,9	565	12	5	3	0.905	0.012	0.879	0.925
9,10	545	6	6	9	0.894	0.012	0.867	0.916
10,11	524	6	3	10	0.884	0.013	0.856	0.907
11,12	505	11	6	17	0.864	0.014	0.835	0.889
12,13	470	5	4	7	0.855	0.014	0.824	0.881
13,14	454	9	2	2	0.838	0.015	0.806	0.865
14,15	441	5	4	2	0.828	0.016	0.796	0.857
15,16	430	4	1	4	0.821	0.016	0.787	0.849
16,17	421	5	3	2	0.811	0.016	0.777	0.849
17,18	411	11	5	2	0.789	0.017	0.753	0.820
18,19	393	10	2	3	0.769	0.018	0.732	0.802
19,20	377	4	0	4	0.761	0.018	0.723	0.794
20,21	369	3	1	1	0.754	0.018	0.716	0.788
21,22	364	8	4	4	0.738	0.019	0.699	0.772
22,23	348	2	5	3	0.733	0.019	0.694	0.768
23,24	338	12	4	2	0.707	0.020	0.666	0.744
24,25	320	9	1	0	0.687	0.020	0.646	0.725
25,26	310	6	0	2	0.674	0.021	0.632	0.712
26,27	302	4	5	1	0.665	0.021	0.622	0.704
27,28	292	5	1	5	0.653	0.021	0.610	0.693
28,29	281	9	5	3	0.632	0.022	0.588	0.673

29,30	264	4	1	1	0.622	0.022	0.578	0.663
30,31	258	0	0	2	0.622	0.022	0.578	0.663
31,32	256	2	2	1	0.618	0.022	0.573	0.659
32,33	251	4	1	8	0.608	0.022	0.563	0.649
33,34	238	2	2	2	0.602	0.022	0.557	0.644
34,35	232	3	2	1	0.595	0.022	0.549	0.637
35,36	226	3	3	0	0.587	0.023	0.541	0.629
36,37	220	4	1	4	0.578	0.023	0.530	0.619
37,38	211	6	1	1	0.559	0.023	0.513	0.603
38,39	203	5	1	1	0.546	0.023	0.499	0.590
39,40	196	3	3	3	0.537	0.023	0.490	0.582
40,41	187	0	2	3	0.537	0.023	0.490	0.582
41,42	182	2	2	4	0.531	0.024	0.484	0.576
42,43	174	3	0	6	0.522	0.024	0.474	0.567
43,44	165	3	0	1	0.512	0.024	0.464	0.558
44,45	161	1	0	2	0.509	0.024	0.461	0.546
45,46	158	3	1	2	0.499	0.024	0.451	0.546
46,47	152	0	0	4	0.499	0.024	0.451	0.546
47,48	148	1	0	10	0.496	0.024	0.447	0.542
48,49	137	1	1	2	0.492	0.024	0.443	0.539
49,50	133	1	2	1	0.488	0.025	0.440	0.535
50,51	129	2	1	4	0.485	0.025	0.436	0.532
51,52	123	2	1	2	0.477	0.025	0.427	0.524

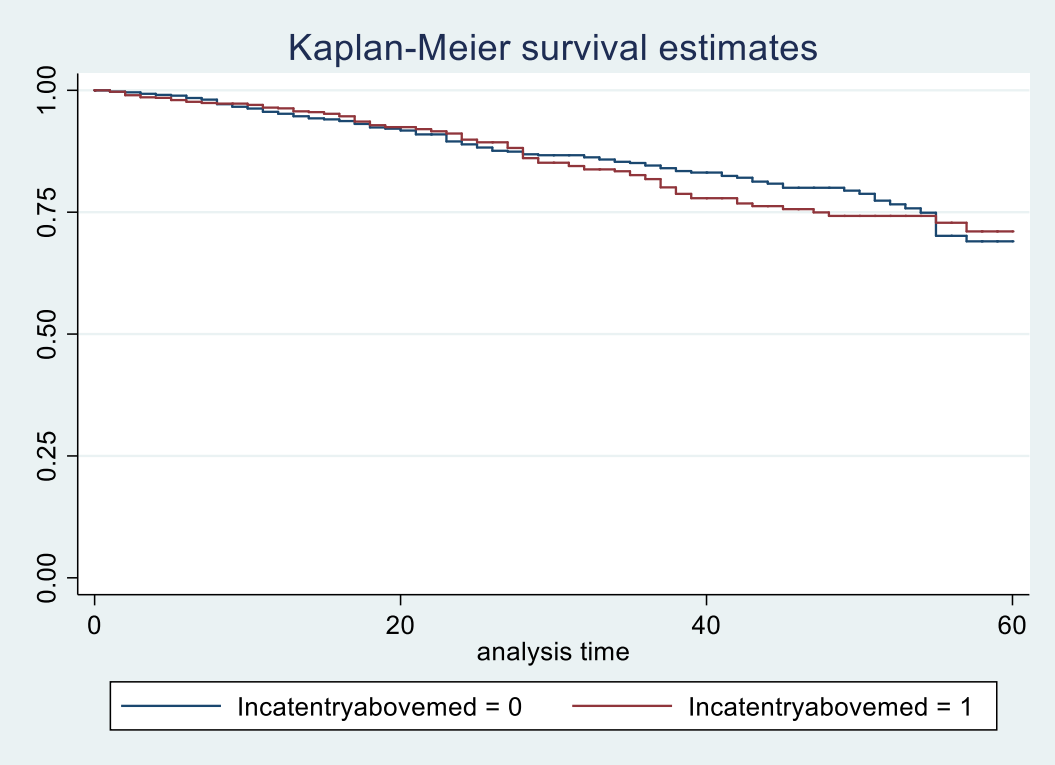
52,53	118	1	1	4	0.472	0.025	0.423	0.520
53,54	112	1	0	8	0.468	0.025	0.418	0.516
54,55	103	1	0	3	0.463	0.025	0.413	0.512
55,56	99	6	0	2	0.435	0.026	0.383	0.486
56,57	91	0	0	4	0.435	0.026	0.383	0.486
57,58	87	2	1	7	0.425	0.027	0.372	0.476
58,59	77	0	2	3	0.425	0.027	0.372	0.476
59,60	72	0	0	0	0.425	0.027	0.372	0.476



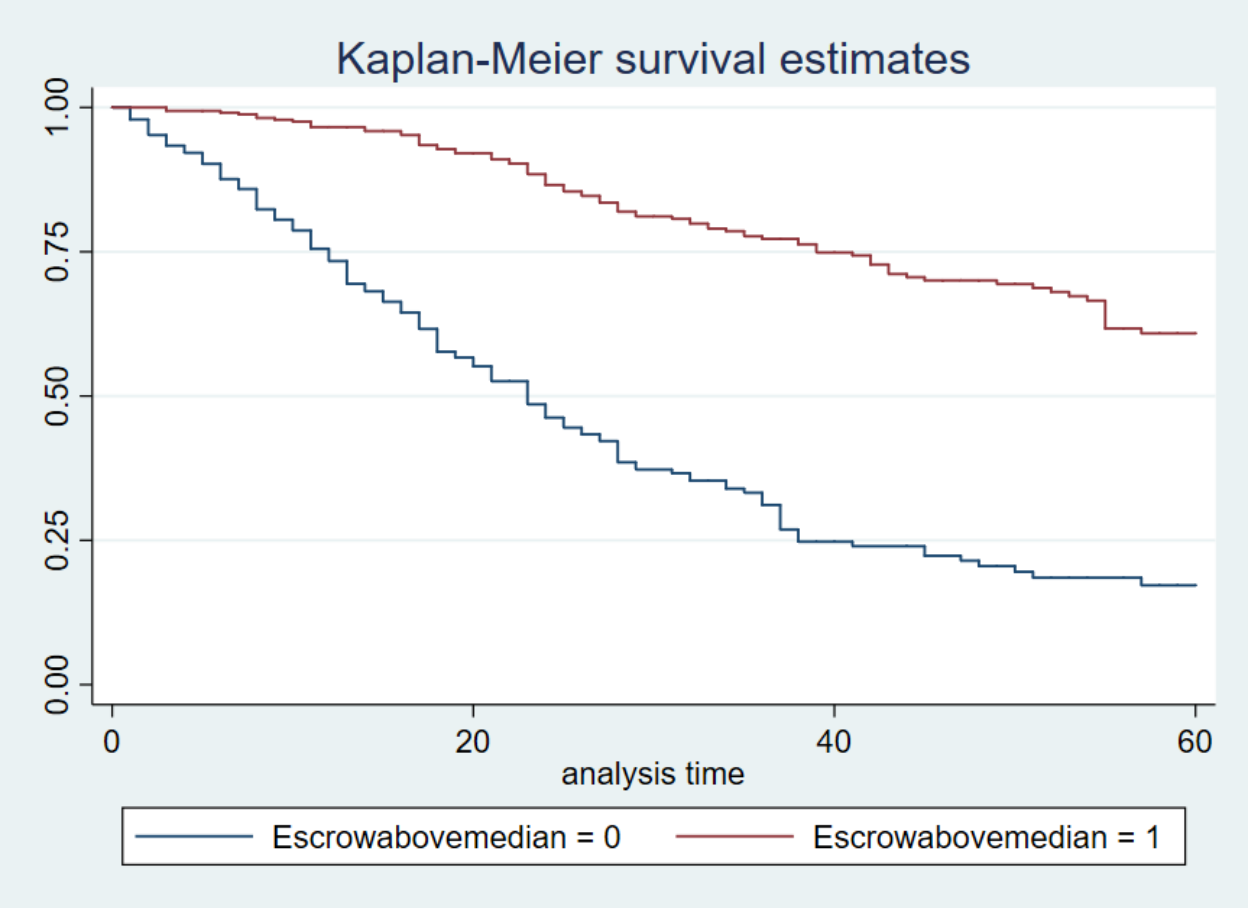
Appendix Figure 9. Kaplan Meier Survival Estimate HCV Households with Children



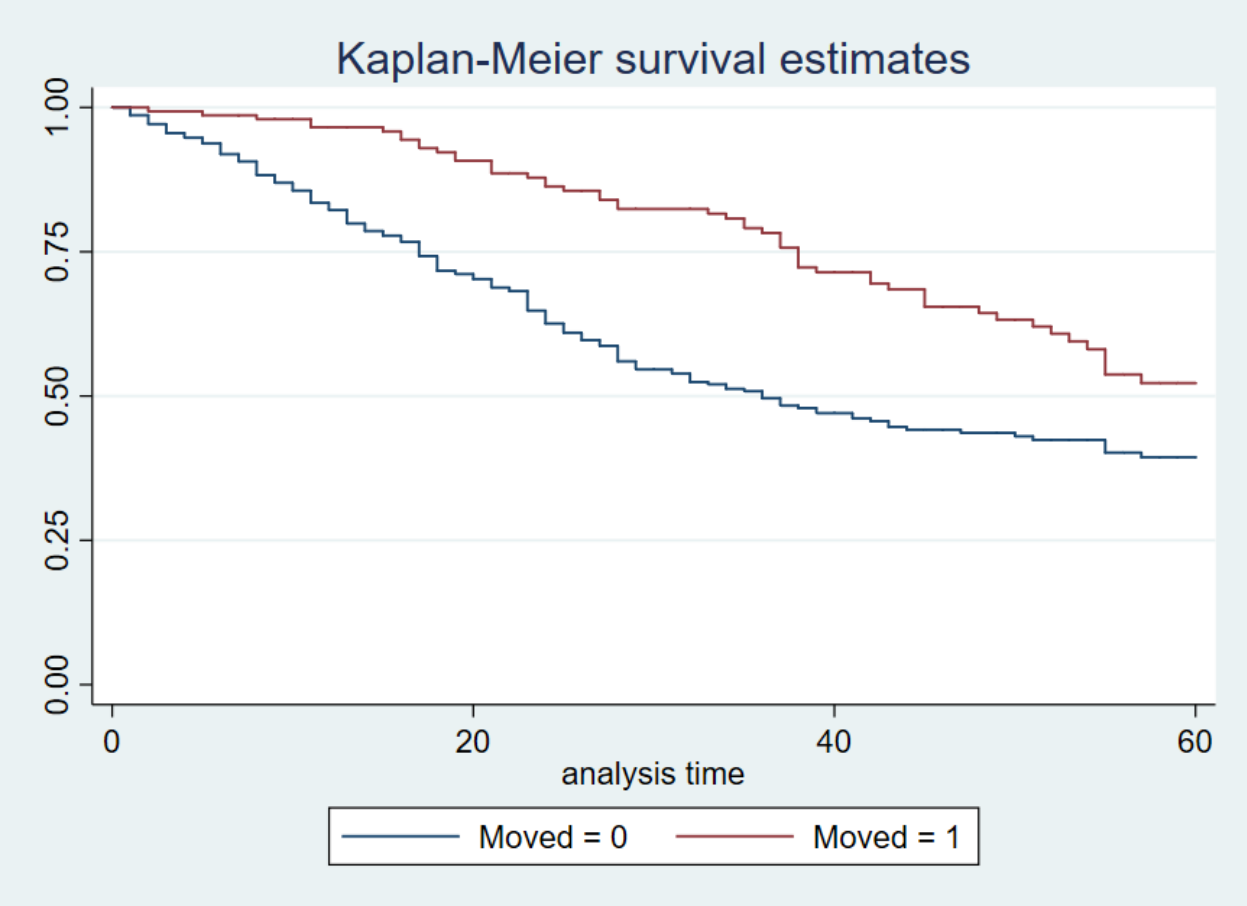
Appendix Figure 10. Kaplan Meier Survival Estimate HCV households with a change in composition.



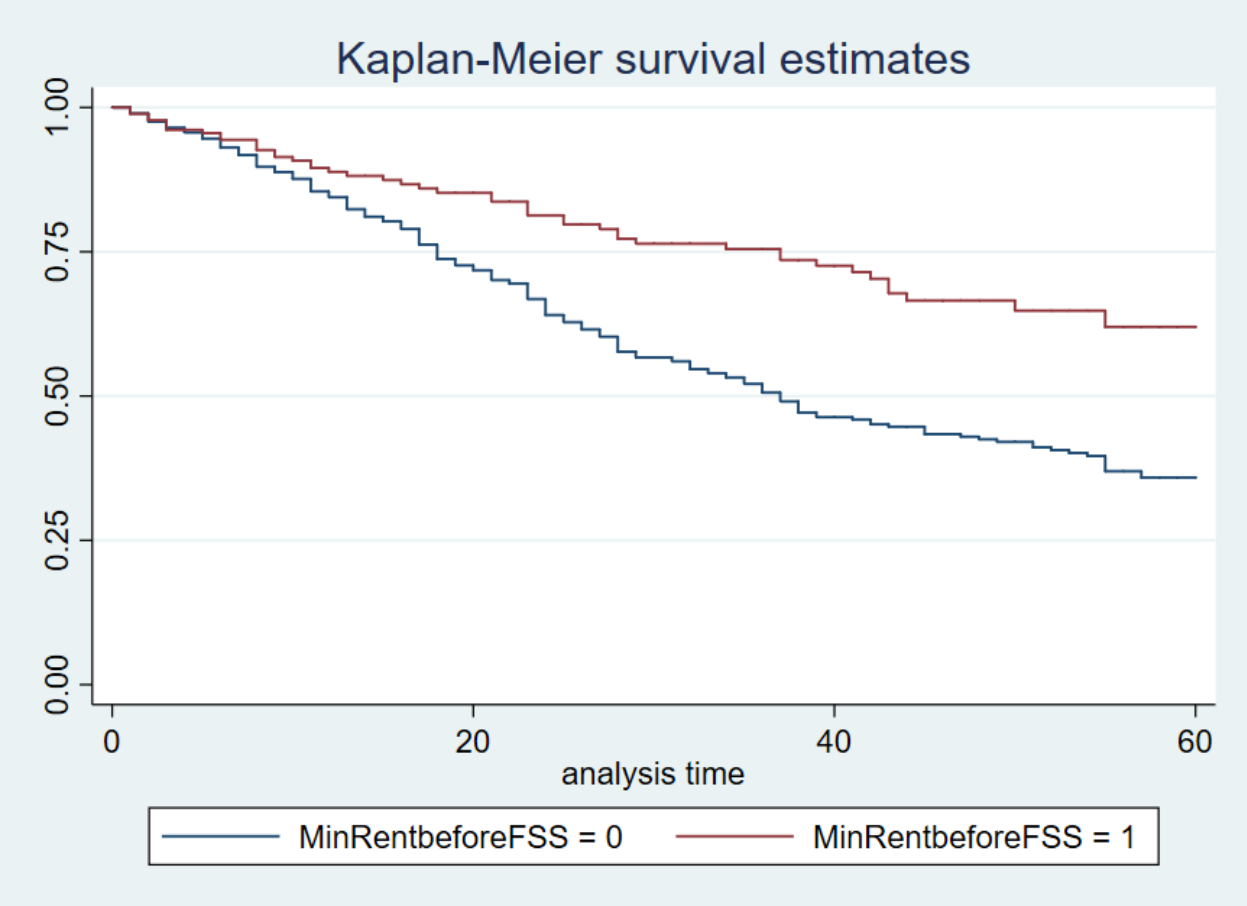
Appendix Figure 11. Kaplan Meier Estimates HCV Households with Income above median at FSS entry.



Appendix Figure 12. Kaplan Meier Survival Estimate HCV Households with Escrow Above the Median at FSS Entry



Appendix Figure 13. Kaplan Meier Survival Estimate HCV Households that Moved During FSS



Appendix Figure 14. Kaplan Meier Survival Estimate for HCV Households that Paid Increased Minimum Rent Prior to FSS.

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