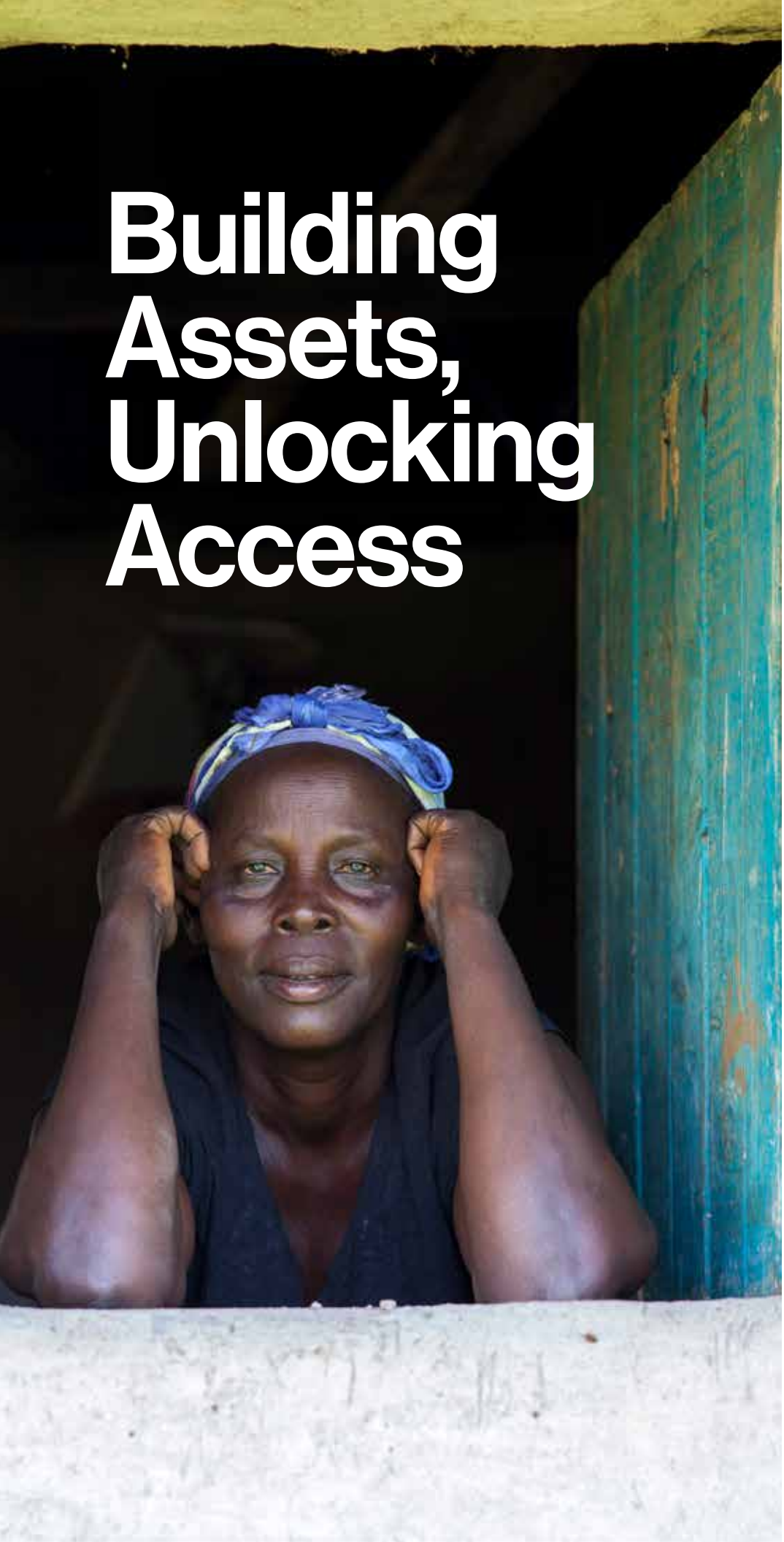
Building Assets, Unlocking Access



KWFT Housing Microfinance Impact Evaluation Final Report

June 2018

Habitat for Humanity®

Terwilliger Center for Innovation in Shelter

mastercard foundation

KWFT BANKING ON WOMEN

Elaborated by G:ENESIS UNLOCKING VALUE

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We also wish to acknowledge KWFT's research and product development team, who worked tirelessly to coordinate this study, alongside Habitat's Terwilliger Center team, and the branch staff who tirelessly mobilized the clients for this evaluation.

In pursuit of its social performance management strategy, KWFT resolved to partner with Habitat for Humanity's Terwilliger Center and the Mastercard Foundation to conduct this impact evaluation study on the Nyumba Smart Loan product, developed under the Building Assets, Unlocking Access project.

Special thanks to the KWFT clients and their families who were interviewed in this study for their time and the valuable information that constitutes this report.

Habitat for Humanity's Terwilliger Center for Innovation in Shelter would like to thank our valued partner the Mastercard Foundation for its support of Building Assets, Unlocking Access: Shelter Solutions for the Poor.

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Last but not least, we would like to thank Genesis Analytics. Their professionalism and capacity to implement the impact evaluation has been an asset to successfully completing the evaluation.

About the partnership

Habitat for Humanity Canada, Habitat for Humanity International and the Mastercard Foundation partnered to implement a six-year project in Africa titled "Building Assets, Unlocking Access." This project, carried out by Habitat for Humanity's Terwilliger Center for Innovation in Shelter, provided technical assistance to six leading financial institutions in Uganda and Kenya as they developed housing microfinance products and nonfinancial support services for people living on less than US$5 per day. The aim was to enable these people to secure adequate and affordable housing and improve their living conditions.

About the Mastercard Foundation

The Mastercard Foundation seeks a world where everyone has the opportunity to learn and prosper. The foundation's work is guided by its mission to advance learning and promote financial inclusion for people living in poverty. One of the largest foundations in the world, it works almost exclusively in Africa. It was created in 2006 by Mastercard International and operates independently under the governance of its own board of directors. The foundation is based in Toronto, Canada. For more information and to sign up for the foundation's newsletter, please visit mastercardfdn.org. Follow the foundation at @MastercardFdn on Twitter.

About Habitat for Humanity International

Driven by the vision that everyone needs a decent place to live, Habitat for Humanity began in 1976 as a grassroots effort on a community farm in southern Georgia. The Christian housing organization has since grown to become a leading global nonprofit working in more than 70 countries. Habitat for Humanity operates in 12 countries in Sub-Saharan Africa through a number of housing initiatives. It has witnessed a growing demand for financial services that address housing needs among microfinance institutions and clients. For more information, visit **habitat.org**.

About the Terwilliger Center for Innovation in Shelter

This project is implemented by Habitat for Humanity's Terwilliger Center for Innovation in Shelter. Habitat established the Terwilliger Center to work with housing market systems by supporting local firms and expanding innovative and client-responsive services, products and financing so that households can improve their shelter more effectively and efficiently. Habitat can have exponentially more impact by improving systems that make better housing possible for millions more families. The role of the Terwilliger Center stays true to Habitat for Humanity's original principles of self-help and sustainability by focusing on improving systems that enable families to achieve affordable shelter without needing ongoing direct support. To learn more, visit **habitat.org/TCIS**.

Executive summary

Genesis Analytics, along with the Leibniz Institute for Economic Research, or RWI, were contracted by Habitat for Humanity's Terwilliger Center for Innovation in Shelter in 2013 to conduct an impact evaluation of the Building Assets, Unlocking Access project in Kenya.

Building Assets, Unlocking Access is a six-year project in Africa implemented by Habitat for Humanity's Terwilliger Center in partnership with the Mastercard Foundation to provide technical assistance to six leading financial institutions in Uganda and Kenya as they develop housing microfinance products and nonfinancial support services for people living on US$5-10 per day. The aim is to enable these people to secure adequate and affordable housing and improve their living conditions progressively with small, short-term loans that have affordable payment schedules, allowing them to complete incremental construction on their homes.

In 2015, after the successful design of the Nyumba Smart Loan housing microfinance product as part of the Building Assets, Unlocking Access project, KWFT partnered with Habitat's Terwilliger Center to conduct the impact evaluation, commissioned to Genesis, with a sample of clients of the new product.

This impact evaluation assesses the attributable impact that Building Assets, Unlocking Access has had on improving a range of outcomes for clients of Kenya Women Microfinance Bank, or KWFT, who have accessed the Nyumba Smart Loan, a housing microfinance product developed as part of the project.

To rigorously estimate the changes that have occurred as a result of the Building Assets, Unlocking Access project in the lives of customers who have accessed the Nyumba Smart Loan developed by KWFT, Genesis used a quasi-experimental method of comparing the changes experienced by those who have accessed the loan – the treatment group – with the counterfactual scenario, which uses a control group to estimate what would have happened in the absence of the housing microfinance product. The counterfactual scenario was predicted using a difference-in-differences, or DID, approach, which compared outcomes in the treatment group at baseline with outcomes in the treatment group at endline and then compared this difference in outcomes with the difference experienced over the same period by the control group. Genesis also used propensity score matching to strengthen the evaluation design to ensure that credible results of impact were still produced and that the parallel trend assumption was supported.

As part of the impact evaluation of the Building Assets, Unlocking Access project in the lives of clients who accessed the Nyumba Smart Loan, Genesis conducted a baseline survey and a follow-up endline survey approximately one year later to establish levels of change in the housing conditions among the loan's customers. The final sample size at baseline was 1,550 KWFT members (778 from the control group and 772 from the treatment group), and Genesis was able to reach 1,250 KWFT members who participated in the baseline survey upon the endline data collection. As part of the evaluation, Genesis also conducted a series of qualitative interviews with members from both the treatment and control groups.

The Genesis team used the Building Assets, Unlocking Access project's theory of change to identify the impact results that would be measured as part of the impact evaluation. These included the physical improvement of housing conditions, the satisfaction on quality of housing, health outcomes, changes in wealth, educational outcomes, and social power. The overall findings from the impact evaluation of the Building Assets, Unlocking Access project on each on these outcomes is described below:

Housing

- The Nyumba Smart Loan had a positive impact on the overall housing conditions of its beneficiaries. Specifically, as a result of taking out the Nyumba Smart Loan, beneficiaries have added more rooms to their house, live under improved roofing, have improved walls, and have a separate room used as a kitchen.
- The statistical analysis found that the intervention also had a positive impact on the sanitation of households. There was a statistically significant increase of 2.1 percentage points in the number of households with flush toilets and a 2.6-percentage-point decrease in the number of households with no facility or using a bush or field.
- Access to water also improved, as the number of Nyumba Smart Loan beneficiary households with a connection to piped water increased 3.5 percentage points, those with access to water from tanks increased 5.2 percentage points, and the use of water from communal taps, rivers or boreholes decreased by 6.1 percentage points.

Housing satisfaction

- The positive and significant effects of the project on the physical housing structure also resulted in an improvement in housing satisfaction among users of the Nyumba Smart Loan. The statistical analysis shows a significant increase in satisfaction with the quality of floors (19.4 percentage points), with the quality of walls (21.5 percentage points), and with the quality of roofing (19.7 percentage points). Overall housing satisfaction increased by 14.9 percentage points.

Health outcomes

- Building Assets, Unlocking Access has achieved attributable impact in the self-reported health of household members, specifically among children younger than 6. As a result of housing improvement, there were fewer reports of symptoms such as sore throats, shortness of breath, itchy eyes, blocked noses, vomiting and rashes.
- There were no statistically significant findings on the impact of the Nyumba Smart Loan on the stress level of beneficiaries.

Income generation and wealth

- A key concern with housing microfinance is that it will divert funds and resources away from income-generating activities in the short run, but the evaluation finds no evidence that this is true. No statistically significant negative difference in income or investment in income-generating assets has been found.

- The statistical analysis found the Nyumba Smart Loan's effects on asset ownership to be ambiguous, but it is important to note that asset accumulation may change only in a longer period, after the Nyumba Smart Loan has been paid back.
- The statistical analysis also investigated the impact of the Nyumba Smart Loan on income, expenditure, financial behavior and perceived financial well-being. The Nyumba Smart Loan had no significant impact on the household's income and expenditure; such an impact is likely to be observed only after a long period. There was, however, a statistically significant improvement in the overall perception of the household's financial well-being and a reduction in reported cash savings. This latter reduction in cash savings is likely a result of the prioritization of the repayment of the loan, which translates to an investment in the physical asset of the house.

Educational outcomes

- The statistical analysis shows that the Nyumba Smart Loan has not led to any statistically significant impact on the total number of days that children are absent from school, or on the total educational expenditure among households. Despite this, the qualitative interviews undertaken with beneficiaries revealed that improvements made to their physical housing structure, such as adding rooms, have made the households more conducive for homework.

Social power

- The statistical analysis does not show any statistically significant impact on the social power of Nyumba Smart Loan customers. Nonetheless, qualitative interviews undertaken with beneficiaries revealed that improvements to their housing as a result of the loan have led them to feel prouder of their homes and have increased the number of social events held in their houses. The qualitative interviews also revealed increased participation in community events among Nyumba Smart Loan customers.

The evaluation findings suggest the Nyumba Smart Loan, developed by KWFT, has improved the lives of its customers and their families. We suggest that KWFT continue to monitor a cohort of individuals to assess how the impact progresses over time, since the full impact of the housing microfinance product is likely to be observable only over a longer period.

Millicent and her family have more space in the new house they were able to finish with help from a Nyumba Smart Loan.

1. Introduction

Building Assets, Unlocking Access is a six-year project in Africa, implemented in partnership by Habitat for Humanity Canada, Habitat for Humanity International and the Mastercard Foundation. It provided technical assistance to six leading financial institutions in Uganda and Kenya as they developed housing microfinance products and nonfinancial support services for people living on US$5-10 per day. The aim was to enable these people to access small, short-term loans with affordable payment schedules in order to improve their housing conditions progressively.

In 2014, with the technical support of Habitat's Terwilliger Center, Kenya Women Microfinance Bank, formerly known as Kenya Women Financial Trust, or KWFT, developed a housing microfinance product called the Nyumba Smart Loan.

In 2015, KWFT partnered with the Terwilliger Center to carry out an impact evaluation of the clients who have accessed the Nyumba Smart Loan. This evaluation assessed the attributable impact that the housing microfinance product has had on improving the clients' quality of life and to further support the social performance strategy of KWFT.

In 2013, Habitat for Humanity's Terwilliger Center for Innovation in Shelter contracted Genesis Analytics and the Leibniz Institute for Economic Research, or RWI, to conduct an impact evaluation of the Building Assets, Unlocking Access project in Kenya and Uganda. This report presents the key findings and conclusions of the Kenyan portion of this evaluation conducted with clients from Kenya Women Microfinance Bank.[1]

This report includes the following:

- An overview of the implementing context and an outline of the project's theory of change.
- A description of the sampling frame, sample size and methodology used to conduct the impact evaluation.
- An analysis of the project's results, focusing on the impact achieved on the project's indicators.
- Overall conclusions on the impact of the housing microfinance loans in the lives of Nyumba Smart Loan customers.

1. The findings from the impact evaluation in Uganda will be shared in a separate, subsequent report.

Grace is happy that the Nyumba Smart Loan helped her build a new home with her own private living space.

2. Country context and project background

2.1. The need for housing

Adequate shelter is one of the most basic human rights. The term "adequate shelter" refers to more than the basic infrastructure; it includes the availability of land and services, such as water and appropriate sewage facilities, that make it possible for people to survive, eat, sleep, raise families and enjoy relaxing in their homes.

A lack of adequate housing exposes people to a range of social ills that compromise their quality of life and hinder their progress toward building sustainable livelihoods. On a microeconomic level, adequate housing has been shown to have a significant impact on health and educational outcomes, feelings of security, social cohesion, family well-being and productivity. Housing also has the potential to be a tool for poverty eradication and socioeconomic mobility.[2][3][4][5][6]

In addition to being an important social good that addresses a basic need, adequate housing can result in innumerable indirect benefits for a country as a result of the provision of better living conditions, including economic growth and job creation.[7]

2.2. Kenya

Access to adequate housing for low-income earners is a critical development issue facing most countries around the globe. Kenya, where housing is recognized as a basic right by the constitution,[8] is no exception. Many people in Kenya reside in inadequate and substandard shelter. Approximately 61 percent of the population live in temporary shelters or extremely low-quality housing, affecting the overall well-being of household members.[9]

In rural Kenya, much of the population is unable to improve their housing conditions, largely because of the lack of access to affordable credit. Access to finance for housing in Kenya is predominantly provided by commercial institutions such as banks, in the form of formal mortgages. This means that the poor and those with alternative forms of land tenure have limited access to long-term financing

2. *Impact of Habitat for Humanity Homeownership*, Habitat for Humanity, 2015.
3. Thomson, H.; Thoms, S.; Sellstrom, E.; and Petticrew, M. (2009) "The Health Impacts of Housing Improvements: A Systematic Review of Intervention Studies From 1887 to 2007." *American Journal of Public Health*. 99(53). pp. S681 – S692.
4. Wolitski, R.; Kidder, D.; Pals, S.; Royal, S.; Aidala, A.; Stall, R.; Holtgrave, D.; Harre, D.; and Courtenay-Quirk, C. (2009) "Randomized Trial of the Effects of Housing Assistance on the Health and Risk Behaviors of Homeless and Unstably Housed People Living with HIV." *AIDS and Behavior*. 14. pp. 493 – 503.
5. Leaver, C.; Bargh, G.; Dunn, J.; and Hwang, Stephen. (2007). "The Effects of Housing Status on Health-Related Outcomes in People living with HIV: A Systematic Review of the Literature." *AIDS and Behavior*. 11. pp. S85 – S100.
6. *Measuring Success in Human Settlements Development: An Impact Evaluation Study of the Upgrading of Informal Settlements Programme in Selected Projects in South Africa*, The Department of Human Settlements, South Africa.
7. The World Bank. (2018). *Housing Finance*. Available at worldbank.org/en/topic/financialsector/brief/housing-finance.
8. Available at kenyalaw.org/lex/actview.xql?actid=Const2010.
9. The World Bank. (2017). *Kenya Economic Update: Housing – Unavailable and Unaffordable*. Available at documents.worldbank.org/curated/en/988191491576935397/Kenya-economic-update-housing-unavailable-and-unaffordable.

and face unaffordable interest rates. Only 2.4 percent of the total population can afford the typical loan rates[10] offered by commercial institutions, and as a result, there is no viable market for low-income earners in rural areas.[11]

Given the above, an opportunity exists for alternative housing finance options that meet the needs of low-income groups.

2.3. The intervention: Building Assets, Unlocking Access

Habitat for Humanity (hereafter "Habitat") began in 1976 with the vision that everyone needs a decent place to live. Habitat operates in 12 countries in Sub-Saharan Africa through a number of housing initiatives. Habitat established the Terwilliger Center for Innovation in Shelter (hereafter "the Terwilliger Center") to work with housing market systems. The Terwilliger Center does this by helping local firms expand innovative and client-responsive services, products and financing to ensure that more households can improve their own shelters effectively, efficiently and sustainably. In this way, Habitat can have greater impact through improving systems that make better housing possible for millions. The role of the Terwilliger Center stays true to Habitat's original principles of self-help and sustainability by focusing on improving systems that enable families to achieve affordable shelter without needing ongoing direct support.

In 2012, Habitat for Humanity Canada, Habitat for Humanity International and the Mastercard Foundation partnered to implement a six-year project in Africa, titled Building Assets, Unlocking Access. This project was carried out by the Terwilliger Center and provided technical assistance to leading financial institutions in Uganda and Kenya. That support helped the institutions develop housing microfinance products and provide nonfinancial support services for people living on US$5-10 per day. The aim was to enable these people to secure adequate and affordable housing and improve their living conditions. The rationale for the project was driven by the need to achieve greater impact on the poor's access to affordable housing solutions by facilitating collaboration among public-, private- and third-sector partners to develop sustainable and innovative housing solutions for the 1.6 billion people who lack adequate shelter globally.

10. According to The World Bank Group, the average lending rate (%) in Kenya was 13.7 percent in 2017. Available at data.worldbank.org/indicator/FR.INR.LEND?end=2017&start=1960&view=map.
11. The World Bank. (2017). *Kenya Needs 2 Million More Low-Income Homes.* Available at worldbank.org/en/country/kenya/publication/kenya-needs-2-million-more-low-income-homes-building-them-would-boost-its-economic-growth.

2.4. KWFT's Nyumba Smart Loan product

In February 2014, the Terwilliger Center entered into a partnership with KWFT to support the development of viable housing products to low-income families. KWFT is the largest microfinance bank in Kenya in terms of market share, number of branches and size of loan portfolio. KWFT serves the majority of its customers using the group lending model of microcredit, in which women form groups that meet on a monthly basis to mobilize savings and are able to access credit by members co-guaranteeing one another.

The bank's vision is "To be the women's financial solution provider with a difference." Its mission is to partner with women in their creation of wealth. In pursuit of this mission and vision, KWFT offers savings, loans and microinsurance products to its target market, with the desire to create sustainable financial, social and environmental impact on the customers, their families, and communities at large.

KWFT developed a housing microfinance product called the Nyumba Smart Loan, which includes a housing microfinance component with nonfinancial housing support services. "Housing support services" refers to the provision of nonfinancial technical assistance or construction advice to clients as part of the housing loan package. The pilot of the Nyumba Smart Loan product was launched Nov. 10, 2014, for a period of six months in a total of four branches across two regions in Kenya, namely the Central Eastern region (Matuu branch and Machakos branch) and the South Nyanza region (Awendo branch and Ndhiwa branch). During the pilot, KWFT and Habitat's Terwilliger Center handled intensive monitoring and evaluation of the product implementation; it provided a remote indication of the impact of the product to increase the satisfaction levels of customers. As a result of this pilot, KWFT rolled out the Nyumba Smart Loan product across the country in June 2015 and partnered with Habitat to conduct an impact evaluation of the Nyumba Smart Loan by an independent consultant. Selected branches were excluded during rollout phase to act as "control" branches.

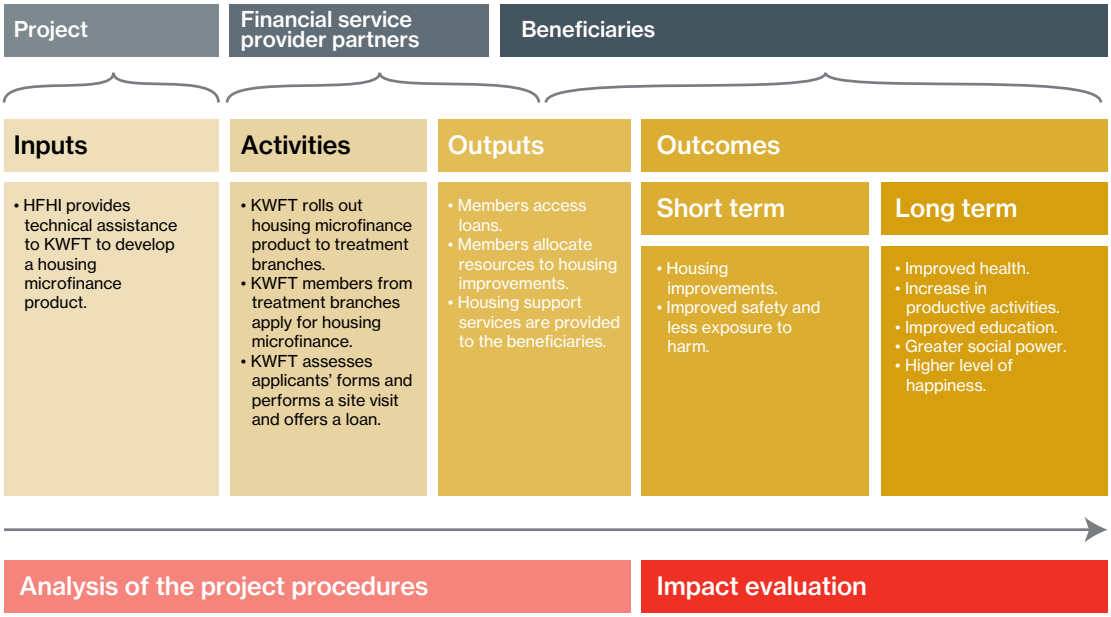
LOAN CHARACTERISTICS	KWFT — NYUMBA SMART
Target markets	Women entrepreneurs, primarily living in rural and peri-urban areas.
Type of loan	Primarily issued to members of a group who mutually guarantee one another's loans. Also individual loans (less than 10 percent of total loans).
Purpose	Construct new houses at once; expand or build houses incrementally; improve, renovate or repair houses; and construct or improve sanitation facilities.
Loan sizes	$50-$10,000
	Average: $700
Loan terms	Up to 60 months
	Average: 18 months
Guarantees/security	Personal and group guarantees for loans under $5,000. Loans above this are secured with "tangible assets": collateral, registered land.
Interest rate	24 percent flat (36.8-41.7 percent APR) plus 2 percent application fee and 2.25 percent insurance, on par with other microfinance products.

2.5. Theory of change

The theory of change underpinning the Building Assets, Unlocking Access project is graphically depicted in the results chain presented in Figure 1 below.

A results chain depicts a "story" about how change happens and shows the progress from inputs leading to outputs when activities are completed, which in turn leads to outcomes and, lastly, to impact.

Figure 1: Building Assets, Unlocking Access project theory of change



Source: Genesis Analytics, Evaluation Inception Report, 2013

It is expected that the finance taken up from the targeted housing microfinance is allocated toward housing improvements. The outcomes that result through the housing improvements are expected to be realized at different periods after the beneficiaries have received the housing microfinance product with housing support services.

The theory of change underpinning Building Assets, Unlocking Access is supported by numerous studies that show that improving housing and living conditions has had significant health and economic outcomes, such as improved health of household members, asset accumulation, social interaction, satisfaction levels, and employment outcomes. The following are examples of observed changes in the overall well-being of vulnerable households from studies of households that have made incremental home improvements but are not related to the Building Assets, Unlocking Access project:

- Households with improved heating, lighting and cooking facilities have lower risks of serious health hazards such as indoor air pollution and the probability of fires.[12]
- Households with improved lighting have extended hours of productivity, and household members are more likely to continue these activities into the night.[13]
- Improved sanitation arising from the installation of latrines and running water in households reduces the prevalence of morbidity and mortality from diarrheal diseases caused by open defecation and exposure to pathogenic organisms such as mosquitoes and parasitic worms, resulting in better health security for the inhabitants of the household.[14]
- Improved health among household members has further benefits. For example, the healthier they are, the more energy and time they have to engage in productive activities, such as attending school, seeking a job, working or developing a business.[15] As the economic activity and productivity of household members increase, the household will be able to earn a better income.
- The change in the household environment has a greater impact on children, as both their health and general well-being are improved. These benefits include having an environment that enables children to spend more time engaging in homework. In addition, the healthier they are, the less likely they are to be absent from school regularly.[16]
- As individuals upgrade their homes, they are more likely to expand the structure and earn a higher rental income if their homes are leased.[17]

Through the above, it is hypothesized that the improved quality of life associated with better housing may induce a greater sense of well-being, happiness and optimism for the future.

Although the long-term impact of a housing microfinance product is expected to be positive, there is concern that in the short run families will divert household resources away from other productive uses to repay the housing improvement loan. This could manifest in a reduction in investment in other productive assets and a short-term decrease in income.

It is important to note that unlike interventions that offer housing upgrades, in which a particular improvement is made to the houses of program beneficiaries, or housing vouchers and housing lotteries, in which lottery winners are provided the opportunity to move into improved housing, the Building Assets, Unlocking Access intervention was offered to KWFT members who belong to "treatment" branches on credit, which has to be paid back with interest. Therefore, the "dosage"

12. Martin, J.W.; Hollingsworth, J.; and Ramanathan, V. *Household Air Pollution from Cookstoves: Impacts on Health and Climate*. Available at: http://www-ramanathan.ucsd.edu/files/brt41.pdf
13. Rom, A.; Gunther, I.; and Harrison, K. *The Economic Impact of Solar Lighting: Results from a Randomized Field Experiment in Rural Kenya*. Available at ethz.ch/content/dam/ethz/special-interest/gess/nadel-dam/documents/research/Solar%20Lighting/17.02.24_ETH%20report%20on%20economic%20impact%20of%20solar_summary_FINAL.pdf.
14. EHP, UNICEF/WES, USAID, World Bank/WSP and WSSCC. *The Hygiene Improvement Framework*. Available at ehproject.org/PDF/Joint_Publications/JP008-HIF.pdf.
15. The Pew Charitable Trusts (n.d.). *Sector Study: Good Housing and Good Health? A Review and Recommendations for Housing and Health Practitioners*. Available at pewtrusts.org/en/~/media/assets/external-sites/health-impact-project/good_housing_and_good_health.pdf.
16. Solari, CD; Mare, RD. "Housing Crowding Effects on Children's Wellbeing." *Social Science Research*. 2012;41(2):464-476. doi:10.1016/j.ssresearch.2011.09.012.
17. Taylor, J. *Changes That Add Value*. Available at domain.com.au/news/changes-that-add-value-20100611-y2fe/.

– the size of the Nyumba Smart Loan taken out and/or the intensity of the use of housing support services – was self-determined by the beneficiaries in relation with the type of home improvement and their ability to pay back the Nyumba Smart Loan.

In addition to this, individuals had different needs and, ultimately, different uses for the Nyumba Smart Loan. Therefore, while one person may have prioritized using the Nyumba Smart Loan to replace dirt floors with concrete, another may have prioritized painting the exterior of their house. In other words, the intensity of the "treatment" varied from one user to another, which may lead to underestimating the impact of the project on a particular outcome of interest.

2.6. Objectives of the evaluation

While the specific goal of the project was to improve the housing conditions of low-income groups in Kenya by providing them with tailored housing microfinance products, a broader goal was to develop, validate and pilot scalable housing microfinance products with housing support services. Although official development assistance in the form of funding and technical assistance has been fairly consistent toward housing developments, this portfolio has decreased over time, and the implemented programs did not have a rural focus, instead aiming to provide housing and basic services to urban settlers.[18] If positive impact is detected under the Buildings Assets, Unlocking Access project regardless of the business case, additional investments in such products in other contexts may be warranted, thus contributing to the development of a housing microfinance market. To this end, the project aimed to disseminate practical lessons on housing microfinance to other microfinance providers in Africa. There was a great emphasis on measuring the impact of Building Assets, Unlocking Access, and the Terwilliger Center included a robust impact evaluation in the design of the project. The objectives of this impact evaluation were to:

- Estimate the impact that providing access to microfinance for housing has on households. Specifically, to determine whether access to housing microfinance and housing support services improves:
  - » Specific indicators of families' self-perceived health.
  - » The education performance of children, specifically in terms of the number of days absent from school and the number of hours spent performing homework.
  - » Economic power, specifically in terms of families' income and the number of assets they own.
  - » Social power, specifically in terms of families' willingness to host a social gathering at their homes.
- Add to the limited existing literature on housing microfinance in order to provide practitioners, policymakers and the broader community with evidence of its impacts and thus encourage the development and expansion of similar projects.

For KWFT, the main objective was to evaluate the impact of its Nyumba Smart products in the lives of its customers, their families, and their communities.

18. International Housing Coalition. (2008). *Multilateral and Bilateral Funding of Housing and Slum Upgrading Development in Developing Countries.* Available at ihcglobal.org/wp-content/uploads/2017/06/Multilateral-and-Bilateral-Funding-of-Housing.pdf.

Vera has taken out a business loan from KWFT but would consider taking out a loan for housing improvements only if her income increases.

3. Evaluation method

This section discusses the approach used to undertake the impact evaluation.

3.1. Evaluation design

To identify the impact of the Nyumba Smart Loan on households, we need to assess a counterfactual. In other words, we need to examine what would have happened to the households in the treatment group had they not received treatment.

Given the commercial nature of KWFT, the evaluation team understood the pressure and need for the evaluation not to negatively impact on KWFT's bottom line and that the evaluation needed to fit into "business as usual" as far as possible. Thus, the evaluation was designed to be as unobtrusive as possible without compromising its credibility and statistical validity. The specifics of the approach are described below.

Initially, it was believed that the evaluation design could make use of a randomized control trial whereby the control group would consist of randomly selected applicants of the Nyumba Smart Loan who would be denied the product for a period. This approach was based on the assumption that microfinance institutions limit rollout of their products because of capital rationing. However, after meetings between senior management at KWFT, the Terwilliger Center and the evaluation team, it became clear that KWFT does not practice capital rationing, and therefore would not randomly deny clients any loan product.

As a result, a quasi-experimental method called "difference-in-differences," or DID, was selected for the impact evaluation. The DID approach compares outcomes in the treatment group at baseline with outcomes in the treatment group at endline and then compares this difference in outcomes with the difference experienced over the same period by the control group.

Some concerns were raised at the baseline, as there were statistically significant differences between certain indicators — optimism, increases in income, stress, and household ownership — in the control and treatment groups. Thus, we use propensity score matching to strengthen our evaluation design and try to ensure that credible results of impact can still be produced while the parallel trend assumption is supported. Propensity score matching improves the evaluation design, as it ensures that we compare individuals in the treatment group with those in the control group with similar characteristics. This approach did not require any changes to be made to the survey or data collection.

More details on the statistical approach can be found in Appendix A.

3.2. Sample selection

3.2.1. Sampling frame

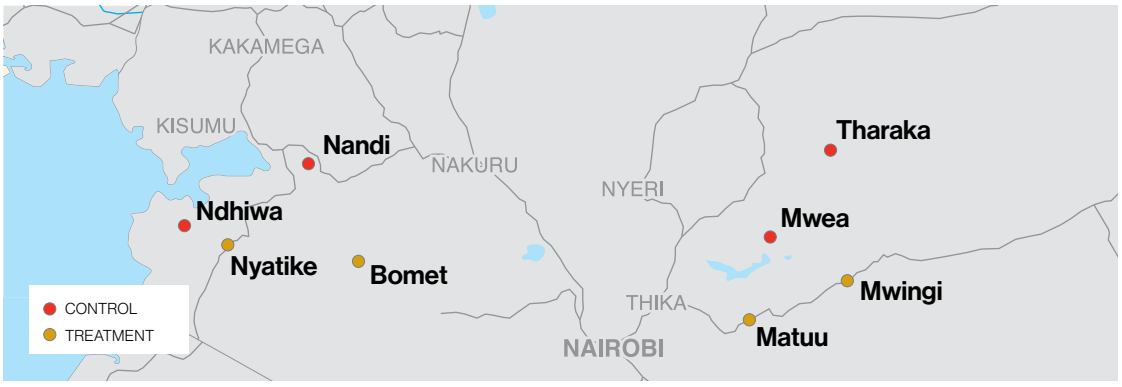
After a successful pilot of the Nyumba Smart Loan for six months in four branches, KWFT rolled out the product in all but four of its 222 branches across Kenya.[19] KWFT selected eight branches to be part of the evaluation: four treatment and four control branches. KWFT asserts that it selected these branches because of their comparability with one another. Therefore, it must be noted that treatment was not randomized, which is the reason for using the method of analysis discussed in Section 3.1.

Table 1 and Figure 2 below present a list of the final eight branches that were selected to be part of this evaluation, the region they are located, their impact evaluation classification into treatment and control groups, and their geographical spread.

Table 1: Impact evaluation classification of selected branches

REGION	BRANCH	IMPACT EVALUATION CLASSIFICATION
South Rift Valley	Bomet	Treatment
North Rift Valley	Nandi	Control
South Nyanza	Ndhiwa	Treatment
	Nyatike	Control
Eastern Machakos	Matuu	Treatment
	Mwingi	Treatment
Mount Kenya East	Mwea	Control
	Tharaka	Control

Figure 2: Impact evaluation classification and geographical spread of selected branches



The sampling frame consisted of a database of KWFT clients from these eight branches, provided by the bank.

19. At the start of the impact evaluation, in 2014, KWFT had a total of 222 branches across Kenya, with an additional 10 "desks" in smaller communities.

3.2.2. Sample selection

For the control group, a simple random sample was selected out of the control branches at baseline. However, to ensure that a large enough number of those in the treatment branches would be beneficiaries of the Nyumba Smart Loan, the evaluation team randomly selected 75 percent of our sample out of those who had recently taken out the Nyumba Smart Loan. This was essential to ensure that meaningful analysis and statistical conclusions on the impact of the Nyumba Smart Loan could take place upon collection of data at the endline. There was an 8.07 percent increase in the takeup of the Nyumba Smart Loan between the baseline and endline survey, and given this relatively small increase, the evaluation team's decision to randomly select 75 percent of those who had already taken out the Nyumba Smart Loan as part of the treatment group was validated further.

The selected clients from the control and treatment branches were then revisited for the endline. Additional replacement clients were randomly selected to make up for attrition.

3.2.3. Survey implementation

Baseline

During the baseline, surveys were administered to participants during group meetings with KWFT business development officers. These meetings occurred during the second and third weeks of every month to allow the officers to collect loan repayments from their clients. However, conducting interviews with clients only during the second and third weeks of the month meant that there was not sufficient time to collect data from the desired sample size.

To overcome this challenge, respondents were called by the respective KWFT branch that they belong to in advance and asked to attend the survey, which was held at a central community venue, such as a church or a school. These respondents were compensated for the transport used to travel to the survey venue upon completion of their individual surveys.

Whenever a KWFT member from the original sample list was unavailable, enumerators were instructed to first interview the KWFT members who were on the list of sampled members and were present, to allow for other bystanders to find and call the others on the list. A member from the replacement sample list could be interviewed only if the sampled members were unavailable for the whole day. In the cases where the sampled clients were unavailable or could not be located, or were no longer clients of KWFT, the enumerators were allowed to select KWFT members for the survey at their own discretion, and these respondents are flagged in the dataset. However, because the survey was administered during group meetings with KWFT business development officers, if a member who was sampled from the group was not present, a member of the same group was selected by the enumerators. This made it likely that those selected would be similar to the original sampled member, as KWFT groups were formed among people who live in the same neighborhood or village and are of the same social standing.

During the baseline survey, a primary contact number was gathered from the participants, along with an additional phone number of the participant's neighbor, relative or friend. These details were used at the endline to ensure that the attrition rate between the surveys was low.

Endline

The endline survey was conducted between September and November 2017, slightly more than a year after the rollout of the baseline survey.

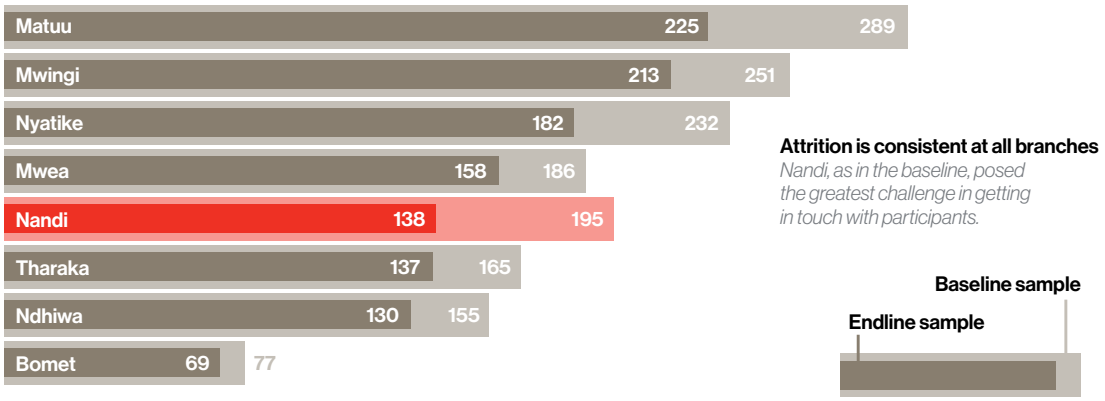
Before the endline survey, the evaluation team worked closely with KWFT and the respective branch officers from the eight sample branches to contact the participants from the baseline survey. The primary contact and additional phone numbers gathered from the participants during the baseline survey were used to reach out to the sampled clients.

As with the baseline process, the endline survey respondents were invited to a central venue for the survey, such as a church or school. Upon completion of their individual surveys, respondents were again reimbursed for the transport to the survey venue. For a small number of beneficiaries who were unavailable to complete the survey in person, the evaluation team conducted the surveys via phone.

3.2.4. Final impact evaluation sample

The baseline sample was made up of a total of 1,550 KWFT members, but the number of KWFT members surveyed during both the baseline and the endline was 1,252. Figure 3 provides the sample population by branch that was reached during both the baseline and endline.

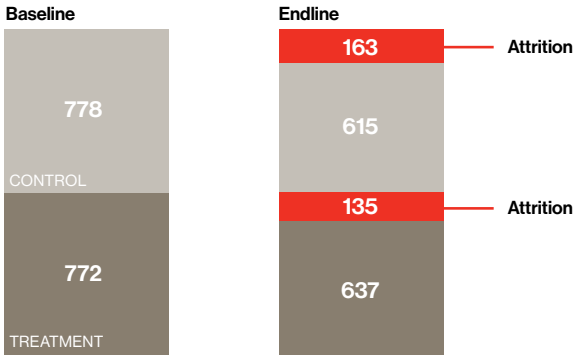
Figure 3: Sample population by branch at baseline and endline



There was attrition of 298 survey respondents between the baseline and endline survey (19.2 percent), largely because KWFT members defaulted on their loans, exited from KWFT, or were not reachable at the time of the endline survey. Specifically, 33 percent of survey respondents who were part of the attrition group defaulted from their loans, all of whom belonged to the treatment group, and 21 percent of survey respondents who were part of the attrition group were from both the treatment and control groups and could not be reached during the data collection phase. Figure 4 shows the final sample size by treatment and control group at baseline and endline and also depicts the attrition rate between baseline and endline for both the treatment and control groups.

Figure 4: Attrition rate between baseline and endline

Attrition between the two surveys is 19.2 percent. Attrition was similar between the two groups.



3.3. Survey instrument design

To rigorously assess the impact of the Nyumba Smart Loan on various aspects of the livelihoods of the individual and household level, a quantitative survey tool was designed. The survey was used to test a diverse range of indicators on the effect of the Nyumba Smart Loan on health, wealth, financial access, income and expenditure, and house outcomes. The same survey instrument was used during the baseline and endline.

It is worth noting that all indicators collected as part of the impact evaluation surveys were designed to reduce the level of intrusion on the clients caused by concerns from both the Terwilliger Center and KWFT. For this reason, all data collected are based on perception or self-reported values from survey respondents.

The survey was quantitative in that the questions that respondents were asked in the survey were aggregated to draw general inferences about the respondents. To meet the aims of the survey, the survey questionnaire took on a structured design that provided a script for presenting a standard set of questions and response options. For example, respondents were asked to respond to questions in a standard format, select an answer out of a predetermined list of potential answers, or use a numerical scale to rate their feelings for or understanding of a certain concept.

The survey instrument was translated into Kiswahili, piloted, refined and loaded on an electronic web-based application that allowed for an electronic data collection process using tablets. The use of an electronic system, as opposed to a paper form-based system, limited the potential for incorrect data format entry and ensured that respondents were limited to answering questions in a standard way, therefore allowing for a better interview experience and higher data quality. The survey was designed to take between 45 minutes and one hour. During the endline survey, the average duration of the survey was 37 minutes.

The survey covered the following key areas of interest:

Household demographics: Understanding the survey respondents' individual and household characteristics provided valuable insight to evaluate and understand any changes caused by the project.

Tenure: The impact of the Nyumba Smart Loan on the respondent's tenure over their housing was assessed. "Tenure" refers to the mode by which property is held or owned, or the set of relationships among people concerning the property.

Dwelling characteristics: The basic structure of the respondents' dwelling was assessed, such as the materials used for construction, the environment of the household, and available services. This allowed for the measurement of any household improvements made between the baseline and endline, along with the impact of these household improvements on other household outcomes.

Assets and expenditure: The baseline and endline surveys explored income and expenditure patterns, thereby allowing the evaluation to measure how these shifted as a result of the intervention. The asset catalog was an additional, complementary measure of understanding how household income was affected by the project because households might spend increased income not only on daily needs, but also on assets such as motorbikes and land.

Household health and mental well-being: Implementing interventions that influence people's feelings about the areas they live in can be a critical feature of bringing stability in a person's life. It was therefore of value to understand if this project has had an impact on the perceived health and mental well-being of its beneficiaries. In addition to analyzing the impact of the Nyumba Smart Loan on perceived health and mental well-being, we expected that, as a result of the improved home environment, KWFT members who accessed the Nyumba Smart Loan might enjoy spending time in their homes once they made improvements. We also hypothesized that one would be happier living in a cleaner, warmer, more aesthetically pleasing environment.

To measure the impact of the Nyumba Smart Loan on mental health, the evaluation team implemented the Perceived Stress Scale, or PSS, developed by Sheldon Cohen, Tom Kamarck and Robin Mermelstein (1983).[20] The evaluation used a 10-item version of the PSS designed to capture the degree to which members found their lives to be unpredictable, uncontrollable and overloaded during the month before the interview. Answers were given on a scale of 0 to 5. Participants were asked to report how frequently they felt a certain way in the past six months, on the following questions:

20. Cohen, S.; Kamarck, T.; and Mermelstein, R. *A Global Measure of Perceived Stress.* Available at: https://pdfs.semanticscholar.org/bed9/2e978f5bca851a79b16d8499b8ca21eeb3d6.pdf.

Table 2: Perceived Stress Scale questions

POSITIVELY WORDED QUESTIONS	NEGATIVELY WORDED QUESTIONS
• How often have you felt that you were on top of things? • How often have you felt confident about your ability to handle your personal problems? • How often have you felt that things were going your way? • How often have you been able to control irritations in your life?	• How often have you been upset because of something that happened unexpectedly? • How often have you felt that you were unable to control the important things in your life? • How often have you felt nervous and "stressed"? • How often have you felt difficulties were piling up so high that you could not overcome them? • How often have you found that you could not cope with all the things that you had to do? • How often have you been angered because of things that were outside of your control?

As can be seen in Table 2, four of the questions were positively worded, and the other six were negatively worded. The PSS score is obtained by reversing the scores for the answers to the positively worded items and then summing up the scores across the answers of the 10 items. Therefore, individual scores on the PSS can range from 0 to 40, with higher scores indicating higher perceived stress. Scores ranging from 0 to 13 would be considered low stress; scores ranging from 14 to 26 would be considered moderate stress; and scores ranging from 27 to 40 would be considered high perceived stress.

Educational factors: Previous literature suggests a relationship between the amount of time spent on homework and whether or not a household has electricity, since students are able to study in the evening with appropriate lighting. However, there is no consensus in the empirical literature on the impact of access to electricity on educational attainment. While some papers do find a positive effect, many find no effect. Barron and Torero (2014)[21] and Khandker et al. (2012)[22] find an increase in hours spent studying, but Bensch et al. (2011)[23] finds no effect. Thus, the evaluation team included questions on time spent working at home and homework being completed in order to estimate the impact of the project on the children's educational performance.

3.4. Limitations, risks and mitigation strategies

This section outlines the challenges, limitations and risks associated with the impact evaluation study.

3.4.1. Attrition

Attrition is the loss of the sample population between baseline and endline surveys. Attrition is a first-order concern for any evaluation, as it can create a bias in estimates.

Attrition is inevitable during an impact evaluation, as participants may have moved away (permanently or temporarily), refused to answer or died. The evaluation team's primary approach

21. Barron, M., and Torero, M. (2014). *Short Term Effects of Rural Electrification: Experimental Evidence from Northern El Salvador*. Job Market Paper.
22. Khandker, R.; Barnes, D.; and Samad, H. (2009). *The Welfare Effects of Rural Electrification: A Case Study from Bangladesh.* Policy Research working paper series 4859, The World Bank.
23. Bensch, G.; Kluve, J.; and Peters, J. 2011. *Impacts of Rural Electrification in Rwanda*. Institute for the Study of Labor.

to limit this problem was to intensively track and re-survey all baseline respondents by collecting a primary contact number and an additional phone number for the participant's neighbor, relative or friend to ensure that participants could be contacted during the endline survey.

To check whether there was selective attrition, we regress an indicator of attrition (either not found or declined to complete survey) on treatment status. The results are displayed in Appendix C. We do not find any evidence of differential attrition across treatment and control groups.

3.4.2. Selection bias

There is a potential for selection bias between the treatment and control groups, because the treatment was not randomized and KWFT selected the branches that formed the control group during sample selection. This means that the treatment group (members of the KWFT branches where the Nyumba Smart Loan was offered) may be fundamentally different from the control group (members of the KWFT group where the Nyumba Smart Loan was not offered).

Despite this limitation, it is standard in a quasi-experimental approach for the treatment group to be somewhat different from the control group, as they were not randomly allocated. Therefore, a valid comparison group can still be attained if the parallel trend assumption holds. This means that even if the treatment and control group do not match at baseline, it is reasonable to assume that the control group will experience changes across the key outcome variables at the same rate as the treatment group were it not for the intervention.

Because of possible selection bias, our analysis was further strengthened using propensity score matching, or PSM. PSM constructs a statistical comparison group that is based on a model of the probability of participating in the treatment, using observed characteristics captured at baseline. Adding up all the "probability coefficients" of the observable characteristics provides us with a total propensity score (how likely the participant is to take out a Nyumba Smart Loan).

On the basis of this probability, or propensity score, clients who have taken out a Nyumba Smart Loan are matched to those who have not taken out a Nyumba Smart Loan or belonged to the control group. Through iteration and logic, we use the following data on the following variables to estimate the probability of taking out a Nyumba Smart Loan:

- The client's household size.
- The age of the client.
- Whether the client has received some form of higher education.
- The age of the client's dwelling.
- Whether the client owns the dwelling in which they live.
- Whether their floor or walls have already been classified as "improved" at baseline.
- A measure of their household asset wealth (approximated by ownership of a radio, bicycle, motor vehicle, motorcycle, television).
- Whether the household owns productive assets for either farming or a business.
- The client's monthly expenditure.
- The client's perception of their overall financial well-being.

Using the variables presented above, we find that the balancing property of PSM is satisfied and this model allows us to use PSM to strengthen this evaluation (see Appendix B for the results).

With the propensity scores generated, the outcomes of interest (such as the impact of the Nyumba Smart Loan on physical characteristics of houses) between the treatment group (i.e., those who have taken out a Nyumba Smart Loan) and the matched nontreatment group were compared to see whether the intervention affected the outcome of interest. Specifically, the average treatment effect of the intervention was then calculated as the mean difference in outcomes between these two groups.

Potential question misunderstanding

With any survey, there is the potential that a question will be misunderstood or that it will not measure what it is intended to measure. During the development of the baseline survey, the evaluation team tried to avoid such measurement issues by compiling the survey modules from other validated survey instruments. Additionally, before the rollout of the baseline survey, enumerators pilot-tested the survey instruments on clients of KWFT's Limuru branch who were not members of either the control or treatment branch. This allowed the evaluation team to test whether the questions were easy to understand and if response choices made sense, thereby reducing the potential for misunderstanding.

For the endline survey, the same survey tool was used. This survey was adjusted and improved according to the feedback received from the enumerators who collected the baseline data. Again, before the rollout of the endline survey, enumerators were retrained on the survey tool, mitigating any potential risks of respondents not understanding the questions or of any response bias. Despite the above, it is still possible that a respondent could have misunderstood the survey questions or interpreted them in a different way. This risk, however, was not believed to be large enough to influence our findings substantially.

Length of time to estimate impact

Given the nature of the Nyumba Smart Loan product, it is likely that any impact resulting from an intervention of this sort will take time to be experienced by users. It is further expected that when the impact is eventually experienced, it will lead to further investment in housing quality and, thus, incremental gains in impact over time.

Because the evaluation needed to avoid negatively affecting the project for KWFT, KWFT committed to withholding the Nyumba Smart Loan product from being offered by the control branches for a limited period. Thus, it is likely that not all expected impacts have been observed and captured by this evaluation.

Jericah wants to further improve her house but is not sure how to raise capital. She is reluctant to apply for a new loan.

4. Findings

This section presents and discusses the results of the impact evaluation of the Building Assets, Unlocking Access project in Kenya with clients of KWFT.

In estimating the effects of being a member of a KWFT branch where the Nyumba Smart Loan was offered, it is important to take into account that some members of the treatment group did not take out a Nyumba Smart Loan. Therefore, the findings present impact estimates in terms of treatment-on-treated, or TOT, estimates, which present the impact of the Nyumba Smart Loan on those who actually took one out. TOT estimates control for treatment group nonparticipation (those who did not take out a Nyumba Smart Loan despite being in the treatment branches).

The variable of interest when estimating the impact of the intervention for each of the outcomes presented in this section is labeled "impact," which is the DID estimator, where both:

- Time is a binary variable indicating the endline or not.
- Treated is a binary variable indicating whether the Nyumba Smart Loan was taken out.

The DID estimator controls for changes in time (differences in pre- and post-) and group changes (differences between treated and nontreated). As discussed above, to control for selection biases in the estimated impacts caused by unobservable differences between treated and nontreated project participants, we strengthened our analysis using PSM. Only where there is a difference in the magnitude or significance of the impact, both positive and negative, on outcomes of interest between the TOT DID indicator and the average treatment effects from PSM do we present the findings of the PSM analysis.

4.1. Impact on housing

We begin by estimating whether the Nyumba Smart Loan had an impact on the quality of housing. This tests the effect of the Nyumba Smart Loan in terms of its primary objective: to enable households to improve their housing conditions. The use of the Nyumba Smart Loan is also a necessary condition for this intervention to have any impact on the other outcomes.

4.1.1. Walls, floors, roofs, kitchens and number of rooms

In Table 3, we present two specifications of the DID estimation. Model I presents the results for the effects of the DID estimation without controlling for any other differences between the treated and control clients. Model II uses the same DID estimation in Model I but also controls for additional differences, including:

- Housing satisfaction, to control for the fact that the more satisfied one is with one's housing, the less likely one is to make any changes or improvements to the physical characteristics of the house.
- The age of the dwelling, to control for the fact that those who own newer houses are less likely to make any changes or improvements to the physical characteristics of their houses.
- Variables relating to demographic controls, which include the age of the survey respondent and whether they have received some form of higher education.

The findings show that the Nyumba Smart Loan has generally had a positive effect on overall housing conditions.

Table 3: Difference-in-difference estimation for impact on physical housing characteristics

	Model I	Model II	Model I	Model II	Model I	Model II	Model I	Model II	Model I	Model II
	Number of rooms	Number of rooms	Improved roofing	Improved roofing	Improved walls	Improved walls	Improved floors	Improved floors	Separate kitchen	Separate kitchen
TREATMENT EFFECT VARIABLES										
Impact	0.285 ([0.120]**)	0.239 [0.124]*	0.044 [0.011]***	0.046 [0.012]***	0.153 [0.025]***	0.067 [0.038]*	-0.036 [0.019]*	-0.022 [0.020]	0.093 [0.033]***	0.108 [0.033]***
Endline	-0.040 [0.076]	-0.117 [0.081]	0.002 [0.007]	0.000 [0.008]	-0.005 [0.024]	-0.013 [0.025]	-0.001 [0.012]	0.004 [0.013]	0.067 [0.021]***	0.040 [0.022]*
Had received the loan	-0.003 [0.081]	-0.079 [0.083]	-0.048 [0.007]***	-0.048 [0.008]***	0.086 [0.038]**	0.173 [0.025]***	0.033 [0.013]**	0.032 [0.013]**	0.028 [0.022]	0.007 [0.022]
EXPLANATORY CONTROL VARIABLES										
Dwelling age		0.009 [0.003]***		0.000 [0.000]		0.004 [0.001]***		0.001 [0.001]		0.005 [0.001]***
Housing satisfaction		0.584 [0.069]***		0.021 [0.007]***		0.201 [0.021]***		-0.105 [0.011]***		0.010 [0.018]
Age of survey respondent		0.017 [0.003]***		0.000 [0.000]		0.004 [0.001]***		-0.000 [0.000]		0.002 [0.001]*
Higher education		0.032 [0.085]		0.008 [0.008]		0.049 [0.026]*		-0.021 [0.013]		0.005 [0.023]
CONSTANT										
Constant	3.144 [0.050]***	2.297 [0.127]***	0.990 [0.004]***	0.969 [0.012]***	0.536 [0.015]***	0.268 [0.039]***	0.931 [0.008]***	0.959 [0.020]***	0.699 [0.014]***	0.604 [0.034]***
REGRESSION STATISTICS										
n =	2 779	2 521	2 775	2 518	2 746	2 495	2 781	2 523	2 781	2 523

Impact legend

*** Significantly different from 0 at the 1 percent level.
** Significantly different from 0 at the 5 percent level.
* Significantly different from 0 at the 10 percent level.

As shown in Table 3, as a result of taking out a Nyumba Smart Loan, more beneficiaries[24]:

- Have added more rooms to their houses.
- Now live under improved roofing (an additional ~4.5 percent of beneficiaries).
- Now have improved walls (an additional ~7 to 15 percent of beneficiaries).
- Have a separate kitchen (an additional ~10 percent of beneficiaries).

24. Survey respondents were asked to provide details on the main materials used for their roofs, walls and floors. Using the answers to these questions, we defined variables for improved roofing, improved walls and improved floors. Roofing was defined as improved if it was made of bricks, iron or concrete; walls were defined as "improved" if they were made of bricks or concrete; and flooring was defined as improved if it was made of concrete, bricks or wood, or was tiled.

Interestingly, the treatment group shows a small and vaguely significant decrease in the quality of flooring; however, once controlled for other explanatory variables, this significance disappears. It is also important to note that ~96 percent of respondents had improved floors to begin with (i.e., at baseline), which would explain why there hasn't been an improvement in the quality of floors as a result of the Nyumba Smart Loan.
We conclude that a significant proportion of loan clients used their loans to improve the quality of the houses.

4.1.2. Water and sanitation

In Table 4, we investigate whether the intervention had an impact on the type of ablution facilities in households. Improved ablution facilities are associated with improved health outcomes and an improved sense of dignity.

Table 4: Difference-in-difference estimation for impact on ablution facilities

	Flush toilet	Pit latrine with slab	Pit latrine without slab	No facility/bush/field
TREATMENT EFFECT VARIABLES				
Impact	0.021 [0.013]*	0.046 [0.038]	-0.037 [0.038]	-0.026 [0.013]**
Endline	0.002 [0.008]	0.208 [0.024]***	-0.201 [0.024]***	-0.008 [0.008]
Had received the loan	-0.015 [0.009]*	-0.003 [0.025]	-0.019 [0.026]	0.033 [0.008]***
CONSTANT				
Constant	0.029 [0.005]***	0.372 [0.016]***	0.576 [0.016]***	0.022 [0.005]***
REGRESSION STATISTICS				
n =	2 781	2 781	2 781	2 781

Impact legend

*** Significantly different from 0 at the 1 percent level.
** Significantly different from 0 at the 5 percent level.
* Significantly different from 0 at the 10 percent level.

The intervention has resulted in a statistically significant increase in the number of households with a flush toilet of 2.1 percentage points, and a statistically significant decrease of 2.6 percentage points in the number of households that have no facility or make use of a bush or field. Therefore, the Nyumba Smart Loan has had positive effects on the sanitation of households. Although these impacts may seem small in magnitude, compared with the low percentage of those in the baseline who had a flush toilet – 3 percent in the control group and 2 percent in the treatment group – this is relatively large.

Next, we look at whether the intervention resulted in improved access to water for households. Ease of access to water for households improves the physical health of the dwellers. Yet, over and beyond its direct effect on physical health, improved water access could have important effects on household well-being. Reducing the time burden of water collection not only frees up time that could be spent on additional leisure or production, but also removes an important source of stress and tension, usually faced by women and girls.

Table 5: Difference-in-difference estimation for impact on access to water

	Piped water in dwelling	Piped water in yard	Public/ communal tap	Water carrier/ tank	Well/borehole	Spring	River, lake or other natural source
TREATMENT EFFECT VARIABLES							
Impact	-0.018 [0.012]	0.035 [0.021]*	-0.061 [0.021]***	0.052 [0.024]**	-0.019 [0.033]	-0.016 [0.013]	-0.004 [0.026]
Endline	0.021 [0.008]***	-0.042 [0.013]***	0.046 [0.014]***	-0.008 [0.015]	0.024 [0.021]	-0.036 [0.009]***	-0.021 [0.024]
Had received the loan	-0.019 [0.008]**	-0.090 [0.014]***	0.012 [0.014]	0.000 [0.016]	0.082 [0.023]***	0.022 [0.009]**	-0.024 [0.038]
CONSTANT							
Constant	0.028 [0.005]***	0.125 [0.008]***	0.069 [0.009]***	0.099 [0.010]***	0.207 [0.014]***	0.042 [0.006]***	0.412 [0.016]***
REGRESSION STATISTICS							
n =	2 781	2 781	2 781	2 781	2 781	2 781	2 781

Impact legend

*** Significantly different from 0 at the 1 percent level.
** Significantly different from 0 at the 5 percent level.
* Significantly different from 0 at the 10 percent level.

We find that the project was associated with a 3.5 percentage point increase in the connection of piped water in the yard, and a 5.2 percentage point increase in access to water from a water carrier/ tank among households of Nyumba Smart Loan takers, as illustrated in Table 5. The Nyumba Smart Loan was also associated with a decrease in the use of water from public or communal taps, rivers and boreholes of 6.1 percentage points.

The analysis above shows that a proportion of Nyumba Smart Loan clients used their loans for improvements in their households' access to water and improved their sanitation.

4.1.3. Housing satisfaction

Below, we investigate whether the improvement in the physical structure of houses due to the intervention results in an improvement in housing satisfaction among users of the Nyumba Smart Loan. These measures are important, as the quality of a physical characteristic is determined not only by the building materials used, but also by the craftsmanship and other perceived factors.

All survey respondents were asked about their satisfaction with the quality of the floors, walls and roofs of their households, and of their satisfaction with overall housing quality. The possible answers were: a) Very satisfied, b) Satisfied, c) Neutral, d) Unsatisfied. We converted these responses into a binary variable that equals 1 if the answer was in categories a) or b) and 0 otherwise. Table 6 presents the results of the analysis on ordinal self-reported measures for satisfaction of housing:

Table 6: Difference-in-difference estimation for impact on housing satisfaction

	Satisfaction with floor quality	Satisfaction with wall quality	Satisfaction with roof quality	Satisfaction with overall house quality
TREATMENT EFFECT VARIABLES				
Impact	0.194 [0.033]***	0.215 [0.034]***	0.197 [0.036]***	0.149 [0.034]***
Endline	-0.008 [0.021]	0.012 [0.022]	0.025 [0.023]	0.023 [0.022]
Had received the loan	-0.082 [0.022]***	-0.061 [0.023]***	-0.053 [0.024]**	-0.040 [0.023]*
CONSTANT				
Constant	0.249 [0.014]***	0.252 [0.014]***	0.299 [0.015]***	0.250 [0.014]***
REGRESSION STATISTICS				
n =	2 781	2 781	2 781	2 781

Impact legend

*** Significantly different from 0 at the 1 percent level.
** Significantly different from 0 at the 5 percent level.
* Significantly different from 0 at the 10 percent level.

The project effects are all positive and significant, and the physical improvements to houses that have been discussed above are matched by the impact that the Nyumba Smart Loan has had on beneficiaries' satisfaction levels with their housing quality, including their floor, wall and roof quality.

Specifically, the Nyumba Smart Loan has increased the number of those who report being satisfied with the quality of the floors by 19.4 percentage points. Similarly, the Nyumba Smart Loan has increased the number of those satisfied with the quality of walls and roofing by 21.5 and 19.7 percentage points, respectively. Lastly, it has increased the number of beneficiaries satisfied with their overall housing quality by 14.9 percentage points.

The case study below presents a story of how one loan taker was able to change the physical characteristics of her house, and how this resulted in additional benefits beyond the "brick and mortar."

Case 1: Janet – more than bricks and stone

Janet and her husband work in the garden behind their house.

Janet Maritim 32 years old	**Married** Since 2005	**6 children** 6 months-13 years old	**KES 15,000 (US$145)** Household income	**Treatment group** Loan taker	**8 people** House occupants	**Bomet** Kapsimotwo	**Sept. 29, 2017** Interview date

The Nyumba Smart Loan has enabled Janet and her husband to finalise the house of their dreams. When Janet was introduced to the loan by KWFT, the couple had already spent all of their savings on building materials for the foundation of their new house, and they desperately needed capital to complete the construction. With the credit, they managed to get the house ready for occupancy within a year. They plan to take out a new loan to make further improvements. The accomplishment has made Janet more confident, and she feels much more respected in her community.

Janet, a Nyumba Smart Loan taker, and her baby.

Janet prepares a meal in the kitchen.

Janet plans to take out another Nyumba Smart Loan to further improve her house.

The joy of a good house

Everything about this house makes me happy! We wanted a house like this for a long time, but it was not until we heard about the Nyumba Smart Loan from KWFT that we realized that we could make it happen. We have lived here for nine months, and so far, I have enjoyed every single day. The house has three bedrooms and a big living room. For hygienic reasons, we have constructed the kitchen and the toilet separately from the house. We are still finalizing the last details, such as the veranda and the ceiling, but it will soon be done. We have bought new furniture, and I am absolutely thrilled about the result.

Before we moved here, we lived in a small wooden house with barely enough space for all of us to sleep. The weather in Bomet is often cold, and we get a lot of rain. The wind swept through the thin walls, and even though we have insulated the house with newspapers and sheets of cardboard, we could never heat it up properly.

Seizing the opportunity

We could not have completed the house without the Nyumba Smart Loan. I am a farmer; I cultivate cabbage, potatoes and beans and sell the produce in town. My husband is a *fundi* (handyman), and together we make KES 15,000 (US$145) in a month. We had saved up for a new house for many years, and we even managed to lay the foundation for the house on our own, but we ran out of funds. For a long period we were stuck. When I learned about the Nyumba Smart Loan from KWFT, I discussed the terms with my husband, and we agreed that this was the opportunity we had been waiting for. I borrowed KES 100,000 (US$968) and made arrangements to repay the loan over a two-year period. I did not have any particular concerns about repaying the loan, because I am familiar with the process from a number of business and school fee loans. We have already agreed to take out a new Nyumba Smart Loan to make further house improvements when the first loan is repaid. The loan enables you to reach your goals faster.

More than bricks and stones

Moving to a better house not only has been a tangible change; it also has changed our attitude toward other aspects of life. I have much more confidence, and people have started to treat me respectfully. We get a lot of visitors, and they all want to know how we have managed to create such a nice home. I am always happy to show them around the house and explain what we have done. Furthermore, it has been a huge relief not to worry about the health of our children. When we lived in the old house, the cold air that ran through the rooms always made me fear that a flu would turn into a serious illness like pneumonia. It makes me happy to see the children thrive. They have also gained more respect, and their friends often come over to see the house.

4.2. Health outcomes

As discussed in Section 2.5 on the theory of change, physical improvements to shelter are expected to result in improvements in the health outcomes of household members. These improvements in turn cascade into other benefits, such as improved productivity, better educational outcomes for children, and a better quality of life. It is important to note, however, that it takes time for many health indicators to improve.

Table 7 presents the analysis of the impact of the Nyumba Smart Loan on the reported health outcomes of children younger than 6 in the households.

Table 7: Difference-in-difference estimation for impact on household health

A	Total health problems	Blocked nose	Runny nose	Persistent sneezing
TREATMENT EFFECT VARIABLES				
Impact	-0.566 [0.375]	-0.039 [0.062]	-0.095 [0.072]	-0.057 [0.052]
Endline	-0.102 [0.237]	0.050 [0.039]	0.040 [0.046]	0.073 [0.033]**
Had received the loan	0.451 [0.252]*	0.065 [0.042]	0.080 [0.048]*	0.038 [0.035]
CONSTANT				
Constant	0.249 [0.014]***	0.252 [0.014]***	0.299 [0.015]***	0.250 [0.014]***
REGRESSION STATISTICS				
n =	2 781	2 781	2 781	2 781

B	Sore throat	Painful swallowing	Cough	Fever
TREATMENT EFFECT VARIABLES				
Impact	-0.137 [0.035]***	-0.004 [0.028]	-0.032 [0.073]	0.065 [0.075]
Endline	0.078 [0.022]***	0.016 [0.018]	-0.018 [0.046]	-0.128 [0.048]***
Had received the loan	0.075 [0.023]***	0.037 [0.019]*	0.001 [0.049]	0.028 [0.051]
CONSTANT				
Constant	0.249 [0.014]***	0.252 [0.014]***	0.299 [0.015]***	0.250 [0.014]***
REGRESSION STATISTICS				
n =	2 781	2 781	2 781	2 781

C	Headache	Short breath	Itchy eyes	Nausea
TREATMENT EFFECT VARIABLES				
Impact	-0.082 [0.083]	-0.031 [0.027]	-0.026 [0.027]	-0.036 [0.034]
Endline	-0.112 [0.052]**	0.002 [0.017]	0.019 [0.017]	-0.056 [0.021]***
Had received the loan	0.127 [0.056]**	0.006 [0.018]	0.024 [0.018]	0.032 [0.023]
CONSTANT				
Constant	0.249 [0.014]***	0.252 [0.014]***	0.299 [0.015]***	0.250 [0.014]***
REGRESSION STATISTICS				
n =	2 781	2 781	2 781	2 781

Impact legend

*** Significantly different from 0 at the 1 percent level.
** Significantly different from 0 at the 5 percent level.
* Significantly different from 0 at the 10 percent level.

D	Vomiting	Rash	Diarrhea	Worms
TREATMENT EFFECT VARIABLES				
Impact	-0.069 [0.036]*	-0.067 [0.025]***	-0.000 [0.028]	0.043 [0.062]
Endline	-0.024 [0.023]	0.041 [0.016]***	-0.011 [0.018]	-0.073 [0.040]*
Had received the loan	0.027 [0.024]	0.040 [0.017]**	-0.002 [0.019]	-0.126 [0.042]***
CONSTANT				
Constant	0.249 [0.014]***	0.252 [0.014]***	0.299 [0.015]***	0.250 [0.014]***
REGRESSION STATISTICS				
n =	2 781	2 781	2 781	2 781

Impact legend

*** Significantly different from 0 at the 1 percent level.
** Significantly different from 0 at the 5 percent level.
* Significantly different from 0 at the 10 percent level.

We find that the Nyumba Smart Loan has had positive implications on household health. Specifically, the following effects were observed in the health of children younger than 6:

- A 13.7 percentage point decrease in sore throats.
- A 6.9 percentage point reduction in the occurrence of vomiting.
- A 6.7 percentage point decrease in reported rashes.

We find that these results are robust when looking at the results of the PSM model, except for the impact on reported vomiting, and that additional impacts are found:

Table 8: Average treatment effect on household health using nearest neighbor matching

	Average treatment effect	Number of treated	Number of control
Blocked nose	-0.161	481	289
Vomiting	0	481	289
Fever	0.173	481	289
Short breath	-0.131	481	289
Itchy eyes	-0.064	481	289
Rash	-0.081	481	289
Sore throat	-0.183	481	289

Average treatment effect legend

Significantly different from 0 at the 1 percent level.
Significantly different from 0 at the 5 percent level.
Significantly different from 0 at the 10 percent level.

When using PSM, we find that there have been additional reductions in the reported number of children younger than 6 having blocked noses, shortness of breath, and itchy eyes. These symptoms are associated with allergies; poor ventilation; and environmental factors such as indoor air pollution, inadequate heating and sanitation, and exposure to hazardous waste. Thus, the improvement is logically supported by the improvements in housing structures. This is confirmed by the case studies, where dust is brought up as a problem affecting health outcomes.

The impact on vomiting becomes insignificant using PSM. Interestingly, there was an increase in the number of fevers reported as a result of the Nyumba Smart Loan. This finding is significant only at the 10 percent level, and we cannot conclude why; it would need to be interrogated with further research.

Table 9 presents the effects of the intervention on mental health:

Table 9: Difference-in-difference estimation for impact on mental health

	Overall PSS	Low stress	Moderate stress	High stress
TREATMENT EFFECT VARIABLES				
Impact	1.159 [0.383]***	-0.043 [0.027]	0.047 [0.032]	0.008 [0.019]
Endline	0.064 [0.242]	0.026 [0.017]	-0.055 [0.020]***	0.024 [0.012]**
Had received the loan	-0.947 [0.257]***	0.021 [0.018]	-0.001 [0.021]	-0.025 [0.013]*
CONSTANT				
Constant	18.863 [0.158]***	0.128 [0.011]***	0.808 [0.013]***	0.062 [0.008]***
REGRESSION STATISTICS				
n =	2 781	2 781	2 781	2 781

Impact legend

*** Significantly different from 0 at the 1 percent level.
** Significantly different from 0 at the 5 percent level.
* Significantly different from 0 at the 10 percent level.

We find that the overall scores of the PSS are significantly higher among those treated, and therefore this may suggest that the use of the Nyumba Smart Loan has resulted in a greater level of stress among its takers. However, when using the PSM model, we find that this significant difference disappears, suggesting that the Nyumba Smart Loan has had no impact on the stress level of the beneficiaries.

Case 2: Elizabeth's family and health

Elizabeth built her house with the help of a Nyumba Smart Loan from KWFT.

Elizabeth Auma Seko	**Married**	**4 children**	**KES 10,000 (US$97)**	**Treatment group**	**8 people**	**Ndhiwa**	**Sept. 26, 2017**
About 50 years old	Since 1982	11-20 years old	Household income	Loan taker	House occupants	Dhuono	Interview date

Elizabeth is thrilled about the changes in her life. She feels that the new house has positively influenced almost all aspects of her life, including her children's health and education. Elizabeth has taken out several KWFT business loans over the years, so she knows that she is able to manage a bank loan, which is why she did not hesitate to take advantage of the Nyumba Smart Loan when it was introduced by KWFT. The improvements in the lives of Elizabeth and her family have reaffirmed her belief in using financial services to obtain otherwise unreachable goals.

Elizabeth's son has space to do homework in the living room.

A new beginning

I would highly recommend the Nyumba Smart Loan to everybody who wants to improve their house! House renovations and construction are expensive, and it is difficult to save up such a large amount of money on your own. But with a loan, you get the capital you need. The loan keeps you focused and enables you to realize your dreams.

We built this house two years ago with money from a KWFT Nyumba Smart Loan. It is a beautiful house with cemented floor, iron sheets and a steel door. Our old house was too small for eight people, and since it was not cemented, it was impossible to keep it tidy. The dust was everywhere, and the children were chronically with a cold. I used to turn from one side to the other at night trying to figure out where to get enough money to build a new house. But now that I can properly clean the floor and the walls, we all feel better. It has been a huge relief for me not to worry about my children's health.

The house has changed the way we live. We spent much more time inside, and I have bought tables, mattresses, chairs and beds. I never had the money to buy things like that before, and even if I did, I would never have prioritized it because the old house was too small. The kids have space for their homework now, and their performance in school has improved considerably. They are also very fond of the smart house, and they gain more respect from their peers.

I am so proud of our house and our new furniture. People come from afar to look at it, and when they ask me how I have managed to build a beautiful house like this, I tell them about KWFT and the Nyumba Smart Loan. It makes me very happy to be in a position where I can advise other people and help them to improve their lives.

Taking advantage of financial services

We could have built the house without the loan, but it would have taken us years to complete it! My husband and I earn about KES 10,000 (US$97) in a month from the produce we sell at the market and my used clothing business. We spend about half of our income on school fees for our children (about KES 61,500 (US$596) in a year), so we do not have much money left for savings. Even if we put aside all of our money, we would never have been able to save up an amount large enough to build a new house. That is why I immediately knew that I was going to apply for a Nyumba Smart Loan when I first heard about it from KWFT.

I cannot express how happy I was when I realized that I was going to be the owner of a smart house! It did not scare me to take out a big loan, because I already had very positive experiences with KWFT's business loans. We still have plans with the house; I would like to repair and improve the walls. We have just finished repaying the loan, and I would like to focus on my business for a while before we apply for a new Nyumba Smart Loan.

4.3. Wealth and income generation

We investigated the impact of the Nyumba Smart Loan on the wealth and income generation in households. There are different ways in which housing conditions can influence the wealth of a household. On one hand, if a better house provides security to those who live in it, then it also will provide more security for the assets inside it. Thus, dwellers can invest more in buying durable goods. On the other hand, having an improved house can also increase the value of some durable goods and, thus, stimulate their acquisition. However, as mentioned in the Theory of Change section, it is possible that there is a short-term decrease in asset accumulation and a diversion of resources away from income generation. We test this latter hypothesis by looking at the asset accumulation and the incomes within the household.

Table 10 and Table 12 depict the performance of different variables corresponding to the possession of assets. We estimate the effect of the Nyumba Smart Loan on the possession of assets such as furniture, electric appliances, vehicles, agricultural and business-related equipment, and livestock.

The results from the DID analysis show that the project has led to a significant decrease in the possession of certain assets, including a satellite dish, VCR/DVD, fridge or freezer, geyser, equipment for agriculture, carts, trees, and modes of transport. However, using the PSM model, the average treatment effects from a more rigorous estimation shows mixed results, with positive impacts on radio, pig and bicycle ownership, and negative impacts on cart and fridge ownership.

Therefore, we concluded that there have been ambiguous effects on asset ownership as a result of the Nyumba Smart Loan, but it is important to note that asset accumulation may change only in a longer time, after the loan has been paid back. This illustrates that there is only weak evidence to suggest that the housing loan has diverted investment away from income-generating assets, and this becomes insignificant when using the more rigorous model.

Table 10: Difference-in-difference estimation for impact on assets (A)

Asset	Radio	Television	Satellite dish	VCR/DVD	Computer/ laptop/ tablet	Camera	Electric stove	Gas stove	Paraffin stove	Fridge/ freezer	Geyser
TREATMENT EFFECT VARIABLES											
Impact	0.032 [0.032]	-0.036 [0.037]	-0.045 [0.022]**	-0.060 [0.031]*	0.005 [0.016]	0.004 [0.016]	-0.010 [0.007]	-0.020 [0.031]	-0.047 [0.037]	-0.022 [0.013]*	-0.010 [0.004]**
Endline	0.009 [0.020]	0.081 [0.024]***	0.035 [0.014]**	0.050 [0.020]**	0.021 [0.010]**	-0.021 [0.010]**	0.003 [0.005]	0.081 [0.020]***	0.021 [0.023]	0.009 [0.008]	0.009 [0.003]***
Had received the loan	0.017 [0.022]	-0.012 [0.025]	-0.021 [0.015]	0.029 [0.021]	0.006 [0.011]	0.018 [0.011]	0.006 [0.005]	0.022 [0.021]	0.219 [0.025]***	0.001 [0.009]	0.001 [0.003]
CONSTANT											
Constant	0.767 [0.013]***	0.328 [0.015]***	0.089 [0.009]***	0.174 [0.013]***	0.046 [0.007]***	0.033 [0.007]***	0.943 [0.007]***	0.007 [0.003]**	0.166 [0.013]***	0.289 [0.015]***	0.010 [0.004]***
REGRESSION STATISTICS											
n =	2 781	2 781	2 781	2 781	2 781	2 781	2 781	2 781	2 781	2 781	2 781

Table 11: Average treatment effect on assets using nearest neighbor matching [25]

	Average treatment effect	Number of treated	Number of control
Radio	0.065	481	289
Fridge/freezer	-0.027	481	289

Impact legend

*** Significantly different from 0 at the 1 percent level.
** Significantly different from 0 at the 5 percent level.
* Significantly different from 0 at the 10 percent level.

25. Only showing significant results (A).

Table 12: Difference-in-difference estimation for impact on assets (B)

Asset	Equipment for business	Equipment for agriculture	Bicycle	Motorcycle	Cart	Other transport	Trees	Cows	Goats	Pigs	Poultry
TREATMENT EFFECT VARIABLES											
Impact	-0.038 [0.036]	-0.114 [0.037]***	0.033 [0.037]	-0.023 [0.018]	-0.093 [0.026]***	-0.013 [0.006]**	-0.079 [0.038]**	-0.038 [0.036]	-0.021 [0.038]	0.014 [0.009]	-0.029 [0.027]
Endline	0.069 [0.023]***	0.173 [0.024]***	-0.027 [0.024]	0.034 [0.011]***	0.039 [0.016]**	-0.002 [0.004]	0.070 [0.024]***	-0.002 [0.023]	0.055 [0.024]**	0.002 [0.006]	0.029 [0.017]*
Had received the loan	0.034 [0.024]	0.137 [0.025]***	0.148 [0.025]***	0.014 [0.012]	0.132 [0.017]***	0.012 [0.004]***	0.117 [0.026]***	0.098 [0.024]***	0.222 [0.025]***	-0.011 [0.006]*	0.101 [0.018]***
CONSTANT											
Constant	0.260 [0.015]***	0.513 [0.015]***	0.327 [0.015]***	0.211 [0.014]***	0.077 [0.011]***	0.005 [0.003]**	0.512 [0.016]***	0.654 [0.015]***	0.452 [0.016]***	0.015 [0.004]***	0.813 [0.011]***
REGRESSION STATISTICS											
n =	2 781	2 781	2 781	2 781	2 781	2 781	2 781	2 781	2 781	2 781	2 781

Table 13: Average treatment effect on assets using nearest neighbor matching [26]

	Average treatment effect	Number of treated	Number of control
Bicycle	0.083	481	289
Cart	-0.067	481	289
Pigs	0.021	481	289

Impact legend

*** Significantly different from 0 at the 1 percent level.
** Significantly different from 0 at the 5 percent level.
* Significantly different from 0 at the 10 percent level.

26. Only showing significant results (B).

Case 3: Annah's wealth

Annah was able to hire a handyman and complete work on her house through the Nyumba Smart Loan.

Annah Ndinda	**Married**	**4 children**	**Not available**	**Treatment group**	**5 people**	**Mwingi**	**Oct. 2, 2017**
53 years old	Since 1980	20-32 years old	Household income	Loan taker	House occupants	Tia Kamunthale	Interview date

Annah feels well-informed about KWFT's financial services and products, and she trusts the bank. So when she heard about the Nyumba Smart Loan, she decided to take out a loan to complete the house that she and her husband had been working on for more than 15 years while living in a smaller, crowded house nearby. The loan has enabled Annah to transform the house into a modern home with plenty of space for her and her family. The expanded house has greatly improved Annah's living standard, and the experience has made her realise that she has the power to be the change-maker in her life.

Annah relaxes in the living room of her now finished house.

The Nyumba Smart Loan helped Annah and her husband complete their house, including installing a decorative steel door.

A long renovation

When we moved into the house, it only had two rooms and it was in a horrible condition, with no windows and partly demolished walls. We soon realized that this house was not fit to live in, so we constructed a small house for us to stay in while we were doing the renovation. We began working on the house in 2000, but because of financial constraints we had to stop after two years. A few years later, my son supported us with some money, but when that was spent, we had to halt the project once again. We continued like that for almost 15 years without even getting close to completing the house. Meanwhile, I was stranded in a way-too-small house with my children and my parents-in-law. The whole situation was wearing me out, so I guess you can imagine how excited I was when I heard about the Nyumba Smart Loan from KWFT.

The KWFT Nyumba Smart Loan experience

I borrowed KES 70,000 (US$678) from KWFT and immediately hired a *fundi* (handyman) to complete the walls. Then I bought red paint for the iron sheets and finally a steel door to complete the house. I love my house! It is a three-room L-shaped house with green and blue walls, and the decorative steel door is painted in different shades of green and blue. I feel completely satisfied with my home. My experience with the loan has been very positive. When I applied for the loan, I already had a KWFT business loan, and I was worried about repaying two loans at the same time. But with guidance from KWFT, everything worked out just fine. Of course, I had to watch my spending, but I managed with help from my husband and my son. The loan kept me focused – I knew I had to meet the monthly installments, and that made me work harder. Without the Nyumba Smart Loan, the house would still be under construction.

Life today and in the future

It has been almost two years since we completed the house renovation, and people still congratulate me. Many ask how I did it. I am finally content with my housing conditions. My husband works in Nairobi, and I only see him a few days in a month. I live here with my daughter and her baby girl and my daughter-in-law and her toddler. It makes me happy to see my two grandchildren thrive as a result of better housing with less dust, no inside fireplace, proper beds, and space enough to play around and be loud without disturbing the adults. We all benefit from the house. I mean look at me; I have gained a lot of weight! I am still planning to buy a new sofa set and a TV, and when my grandchildren grow up, I will expand the house with two additional rooms so that they can come and visit me. I can easily buy the furniture and the TV with the income from my mini-market, but for the house extension, I will definitely take out a new Nyumba Smart Loan from KWFT.

4.3.1. Financial well-being

As a subcomponent of wealth, we investigate the degree to which the Nyumba Smart Loan has affected incomes, expenditure, financial behavior and perceived financial well-being.

Table 14: Difference-in-difference estimates for impact on financial well-being

	Perception of current financial well-being	Perception of future financial well-being	Have saved in the past 12 months	Monthly household income
TREATMENT EFFECT VARIABLES				
Impact	0.145 [0.058]**	0.067 [0.064]	-0.084 [0.032]***	-1,758.382 [3,174.418]
Endline	0.002 [0.037]	0.229 [0.041]***	0.002 [0.020]	1,379.585 [2,011.092]
Had received the loan	-0.224 [0.039]***	-0.170 [0.043]***	0.090 [0.022]***	-661.552 [2,163.378]
CONSTANT				
Constant	2.910 [0.024]***	2.044 [0.026]***	0.763 [0.013]***	20,524.661 [1,334.671]***
REGRESSION STATISTICS				
n =	2 760	2 551	2 778	2 581

Impact legend

*** Significantly different from 0 at the 1 percent level.
** Significantly different from 0 at the 5 percent level.
* Significantly different from 0 at the 10 percent level.

We find no significant impact at this time on income or expenditure, which, as noted earlier, is likely to take longer to become positive. This further illustrates how the taking out of the loan has not negatively impacted short-term income generation, which allays that fear.

However, we do find increases in the overall perception of financial well-being now. There was limited impact on financial inclusion indicators. There has been a statistically significant reduction of those who report saving in the past 12 months because of the Nyumba Smart Loan. This may be a result of the household prioritizing paying back its loans, as opposed to saving money. Nevertheless, those who did save in the past 12 months were more likely to save at KWFT now as a result of taking out the Nyumba Smart Loan.

4.3.2. Security of tenure

The Nyumba Smart Loan has shown no statistically significant impact on the form of tenure a household has over its house or whether the household feels more confident in its tenure over its residence as a result of having accessed the loan.

4.4. Educational outcomes

Housing characteristics such as tenure and living conditions can affect how children perform at school and develop. For example, unstable housing with no electricity may result in negative educational outcomes for children, whereas improved housing can have a positive effect on educational outcomes, such as increased years of schooling. Children in unsuitable and overcrowded housing are more likely to miss school more often for health-related reasons, and often lack suitable conditions for studying, in turn influencing their educational achievement.

We look at the impact on the average expenditure on the education of survey respondents' children and the average number of days spent absent from school by children in the household. Table 15 looks at whether the intervention has had an impact on educational factors of children in the household.

Table 15: Difference-in-difference estimation for impact on educational factors

	Number of days absent from school	Educational expenditure
TREATMENT EFFECT VARIABLES		
Impact	-0.189 [0.479]	-1,889.579 [1,580]
Endline	0.397 [0.303]	-1,563.378 [1,000]
Had received the loan	0.244 [0.322]	3,477.918 [1,062]***
CONSTANT		
Constant	2.459 [0.198]***	8,832.625 [653.009]***
REGRESSION STATISTICS		
n =	2 781	2 781

The results in Table 15 show that the Nyumba Smart Loan has not led to any statistically significant findings on the total number of days that children are absent from school or the total education expenditure among households that have taken the loan.

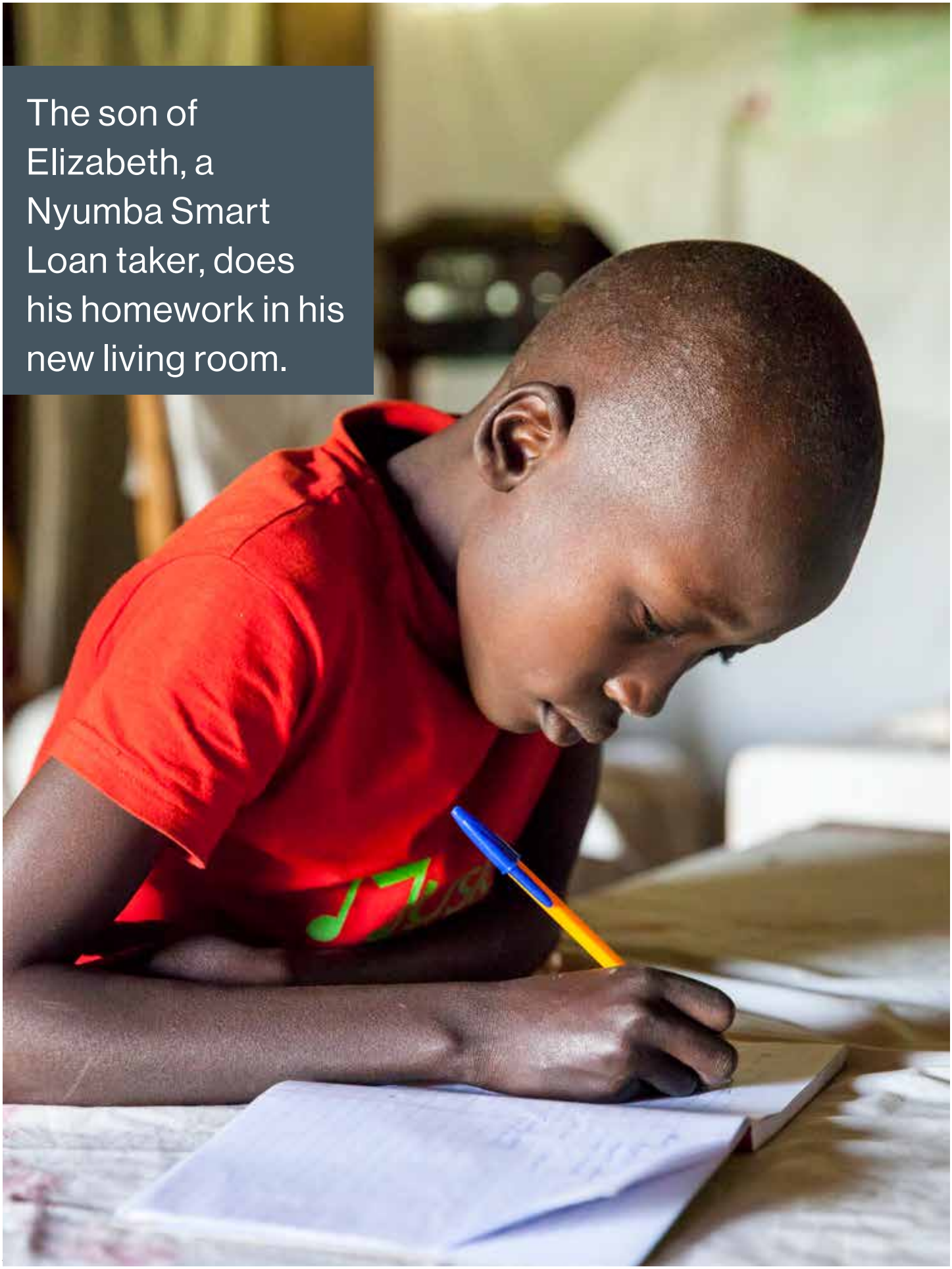
These indicators are potentially limited, however. As shown in Case 2, there are other ways in which educational outcomes can be improved, such as improved health, improved home conditions and feelings of being settled.

Thus, although we cannot make conclusive statements on the two indicators presented in Table 15, we can extrapolate from the other impacts that children will be better off and, thus, better able to put their time toward their education. This is supported by the qualitative data.

4.5. Social power

In this section, we present findings on the impact of the Nyumba Smart Loan on the social power of those who take out the loan. In particular, survey respondents were asked whether they are proud of their houses – i.e., whether they would hold a social event at their house.

We find from both the simple DID estimation and from PSM that there has been no statistically significant impact on the outcome of this question. It is important to note that almost all respondents answered positively for this question at the baseline. This suggests that perhaps the question does not delve deeply enough to unpack social power. The qualitative case studies do suggest, however, that there have been improvements in social power and confidence among those taking out Nyumba Smart Loans.



The son of Elizabeth, a Nyumba Smart Loan taker, does his homework in his new living room.

5. Conclusion

Kenya's housing market is characterized by low levels of affordable housing finance and insufficient housing delivery programs for low-income households, resulting in poor living conditions. The microfinance sector has grown over the years in response to the lack of access to formal financial services for low-income populations. These loans provide households with the opportunity to undertake incremental housing improvements at favorable interest rates and repayment periods. Literature shows that the scale and nature of housing microfinance has evolved from serving households excluded by the formal banking sector to improving living conditions by allowing low-income and poor households to access finances through small, incremental loans tailored to their needs, incremental building practices, and repayment capacity. Housing microfinance has a potential role to satisfy the needs of a gap in the market and make significant impacts on household welfare.

Through the Building Assets, Unlocking Access project, the Terwilliger Center provided technical assistance to KWFT to develop a housing microfinance product and provide housing support services to women from low-income households in Kenya. The impact evaluation of Building Assets, Unlocking Access sought to estimate the causal effects of the provision of housing microfinance and housing support services, delivered through KWFT's Nyumba Smart Loan across four counties in Kenya, on a range of indicators, including physical living conditions, self-reported health outcomes and possession of assets.

Findings from the evaluation reveal a significant increase in the overall quality of housing conditions, specifically the quality of the walls and roofs, the number of rooms, and the quality of building materials used to construct the houses. Secondly, households that undertook the Nyumba Smart Loan reported further benefits of investing in water and sanitation, such as increased use of flushing toilets, decrease in use of bushes or fields, installation of safe water sources, and a decrease in the use of public taps. This resulted in improved health outcomes, a greater sense of dignity and easier access to water. Based on this, women are saving time on water collection and instead engaging in economic activities. Additionally, improvements in water and sanitation have led to better health outcomes in families, particularly reductions in reported illnesses associated with allergies and poor environmental factors. Lastly, loan beneficiaries reported increased satisfaction with their new housing quality. Individuals who had taken out the Nyumba Smart Loan view their houses as assets that contribute to the household's economic welfare and personal development. The access to the Nyumba Smart Loan also has increased community status, as the state of housing is a status symbol at the community level, and has made Nyumba Smart Loan customers more confident in participating in their communities.

Contrary to theories on the impact of housing microfinance on welfare outcomes, the effect of the Nyumba Smart Loan on indicators such as health, wealth (financial and assets) and educational outcomes was ambiguous based on beneficiary feedback. Although the increase in wealth emerged for ownership of assets such as radios, animals and bicycles, there was a decrease in the possession of larger assets such as a fridge, and modes of transportation (other than bicycles). It is important to note that some changes in possession of assets should be considered according to

the context. In rural Kenya, for instance, small holder farmers may not need to invest in agricultural equipment because of low farm mechanization; they may not need fridges since fresh food is available, daily, for consumption.

It is also important to note that improvements in financial well-being, such as increased income and expenditure or asset accumulation, may change and be observed only after a long period after the Nyumba Smart Loan has been repaid. The lack of negative findings allays the fear that a loan for housing may lead to a diversion of resources away from other income-generating assets.

The findings that the Nyumba Smart Loan has reduced households' abilities to save liquid assets in financial institutions or at home suggest that households are likely prioritizing paying back the loan. However, it is expected that over time these households will be in a better position to accumulate assets and wealth, as their improved living spaces will allow them to be more productive. This movement of liquid savings to repaying the loan is a movement of investment into the house, a physical asset.

We found that at the time of undertaking the impact evaluation, the Nyumba Smart Loan had no other statistically significant effects to report, with no quantitative evidence to suggest improvements in education for children. However, there is qualitative evidence to suggest the beginnings of more impact. For example, some of the cases showcased within the report described better environments for their children to do homework.

The findings suggest that the Nyumba Smart Loan has generally improved the lives of those who have taken it out, along with the lives of their families. However, the full impact of a product such as the Nyumba Smart Loan is likely to be observed only over a longer period. Thus, we suggest that KWFT and Habitat for Humanity's Terwilliger Center continue to monitor a cohort of individuals to assess how the impacts progress over time.

The results of this evaluation affirm that the Nyumba Smart Loan is supporting the social performance strategy as part of KWFT's triple bottom-line business approach of pursuing financial, social and environmental impact, and the opportunity to keep expanding the product in the rural and peri-urban contexts. It yields important insights for various stakeholders, such as policymakers, financial service providers and donors, to alleviate the supply-side challenges that restrict access to housing microfinance. This has the potential to affect social and developmental goals, as housing appears to be a critical component to anti-poverty interventions. The results of the Building Assets, Unlocking Access project show improvements in economic welfare and personal development, presenting an opportunity to advance the conversation around financial service providers investing, scaling and replicating housing microfinance products in other contexts.

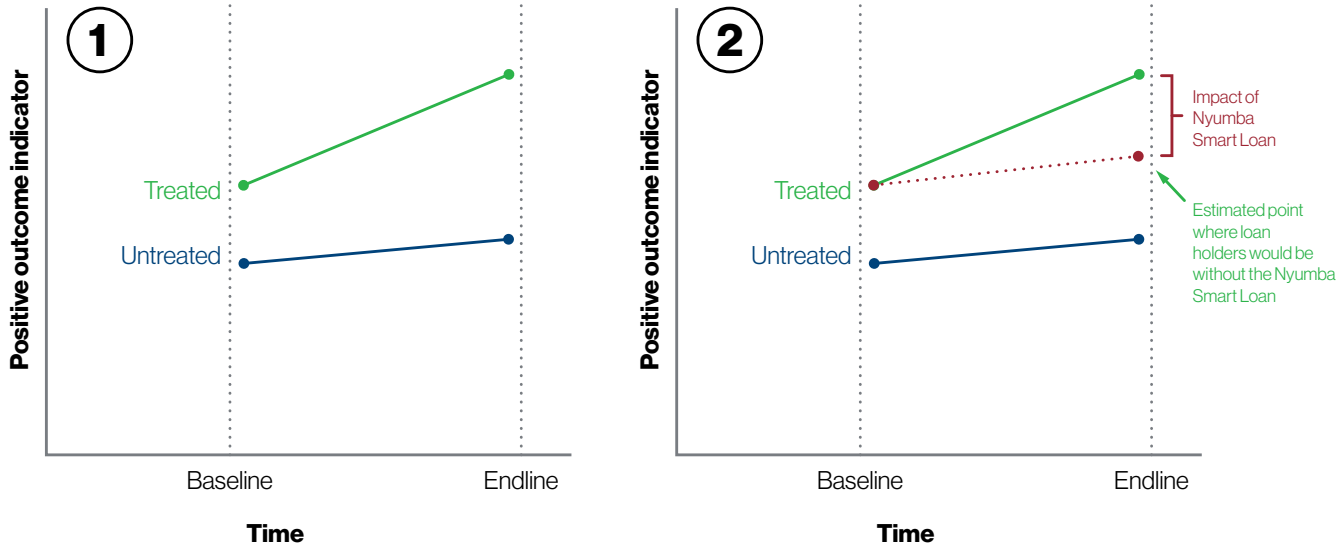
Sarah has taken out business and school fee loans from KWFT but has not shown interest in taking out a housing loan.

Appendix A

Below, we discuss the selection of the treatment and control groups for this impact evaluation.

Figure 5 illustrates how, in theory, the DID method will estimate the attributable impact of the Nyumba Smart Loan, and uses annual household income as an example for an outcome of interest:

Figure 5: Graphical explanation of the difference-in-difference approach



Estimating the difference-in-difference

	Baseline	Endline	Difference
Annual income (treatment group)	US$1,000	US$1,000	US$500
Annual income (control group)	US$800	US$1,100	US$300
Difference	US$200	US$400	US$200

Difference-in-difference

Parallel trend assumption

Annual income (treatment group) without treatment	US$1,000	US$1,300	US$300
Annual income (control group)	US$800	US$1,100	US$300

Same difference in absence of treatment

The treatment effect is estimated using a regression model with the following equation:

$$y_{it}=\beta_0+\beta_1 S_i+\beta_2 T_t+\delta(S_i \times T_t)+\beta_3 \boldsymbol{X}_{it}+\varepsilon_{it}$$

Where:

- y_{it} is the measurement of the outcome indicator for individual "i" at time "t."
- S_i is a binary indicator for whether individual "i" was in the treatment or control group (S_i = 1 if in treatment group, and S_i = 0 if in control group). This is used to account for the initial difference between the treatment and control groups.
- T_t is a binary indicator for baseline or endline (T_t = 0 if at baseline, T_t = 1 if at endline). This is used to account for the changes in outcomes over time that are not a result of the Nyumba Smart Loan.
- The betas represent the coefficient, (the magnitude and sign of the relationship between the indicators and the outcomes).
- ($S_i \times T_t$) represents the interaction between the time period and treatment status of the individual, and this interaction will take on the value 1 only when in the treatment group and in the endline, and will be 0 otherwise.
- X_{it} is a matrix of explanatory characteristic of individual "i" at time "t," such as age and household size.
- ε_{it} is merely the error term that captures all unobserved effects.

Thus, in estimating this equation, one is able to estimate delta, δ, the coefficient on the interaction term ($S_i \times T_t$), which represents the impact of the Nyumba Smart Loan on the outcome indicators of interest. All other terms in the equation are used to account for any of the initial discrepancies between the control and treatment groups, as well as any changes in the outcomes that have occurred over time but not as a result of the Nyumba Smart Loan, thus allowing for the isolation of the causal effect of the linkages on the outcome indicators.

The impact estimates obtained from this approach are valid as long as the parallel trend assumption holds true; that is, in the absence of the Nyumba Smart Loan (the intervention), the outcomes in the two groups (treatment and control groups) would have followed parallel trends (as illustrated in the second table of Figure 5). Therefore, this approach is valid as long as the selection of "control branches" was not biased toward areas where individuals are unlikely to experience similar environmental, political, social and economic influences to those experienced by the "treatment branches," or that individuals at the control branches behave systematically differently from those in the treatment branches.

Appendix B

Estimation of the propensity score

note: build_own dropped because of collinearity
Iteration 0: log likelihood = -1020.1279
Iteration 1: log likelihood = -933.94447
Iteration 2: log likelihood = -933.2366
Iteration 3: log likelihood = -933.2364

Probit regression — Number of obs = 1538
LR chi2(13) = 173.78
Prob > chi2 = 0.0000
Log likelihood = -933.2364 — Pseudo R2 = 0.0852

b0	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
a0	.0682212	.0179891	3.79	0.000	.0329631	.1034793
a5_1	.0152317	.0033073	4.61	0.000	.0087494	.021714
higher_educ	.0488059	.095628	0.51	0.610	-.1386215	.2362333
build_age	.5423738	.0720552	7.53	0.000	.4011483	.6835994
improved_w~s	.4658069	.0745333	6.25	0.000	.3197243	.6118894
improved_f~r	.4777536	.1583433	3.02	0.003	.1674064	.7881007
c1_20	.2314054	.0810984	2.85	0.004	.0724555	.3903553
c1_18	.2291253	.0724427	3.16	0.002	.0871401	.3711104
c1_1	-.0001133	.0842206	-0.00	0.999	-.1651826	.164956
c1_2	-.1541246	.0784171	-1.97	0.049	-.3078193	-.0004298
c1_29	-.0124578	.0796073	-0.16	0.876	-.1684851	.1435695
c1_30	.2449644	.0739639	3.31	0.001	.0999979	.3899309
expense	-.0016223	.0241753	-0.07	0.946	-.0490051	.0457605
_cons	-2.463505	.2659225	-9.26	0.000	-2.984703	-1.942306

Note: The common support option has been selected

The region of common support is [.04720791, .81334547].

Description of the estimated propensity score in region of common support:

Estimated propensity score

	Percentiles	Smallest		
1%	.096143	.0472079		
5%	.1389446	.0679573		
10%	.1687517	.0713716	Obs	1,533
25%	.2542459	.0726931	Sum of Wgt.	1,533
50%	.3743851		Mean	.3779583
		Largest	Std. Dev.	.1575082
75%	.4816904	.7931557		
90%	.6012687	.7949405	Variance	.0248088
95%	.6555184	.7963098	Skewness	.2710637
99%	.7379895	.8133455	Kurtosis	2.44292

Step 1: Identification of the optimal number of block

Use option detail if you want more detailed output. The final number of blocks is 8. This number of blocks ensures that the mean propensity score is not different for treated and controls in each block.

Step 2: Test of balancing property of the propensity score

Use option detail if you want more detailed output. The balancing property is satisfied. This table shows the inferior bound, the number of treated and the number of controls for each block.

Inferior of block of pscore	Have you taken out a Nyumba Smart Loan with KWFT?		
	No	Yes	Total
.0472079	194	30	224
.2	121	25	146
.25	100	47	147
.3	113	50	163
.35	112	77	189
.4	251	255	506
.6	59	97	156
.8	0	1	1
Total	950	582	1,532

Note: The common support option has been selected.
End of the algorithm to estimate the pscore.

Appendix C

(.) reg unavailable treatment

Source	SS	df	MS	Number of obs = 285
				F(1, 283) = 0.10
Model Residual	103.86207	1	103.86207	Prob > F = 0.7486
	285582.187	283	1009.12434	R-squared = 0.0004
				Adj R-squared = -0.0032
Total	285686.049	284	1005.93679	Root MSE = 31.767

unavailable	Coef.	Std. Err.	t	P>t	[95% Conf. Interval]	
treatment	-1.551561	4.836296	-0.32	0.749	-11.07124	7.968115
_cons	16.85345	2.085587	8.08	0.000	12.74822	20.95868

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