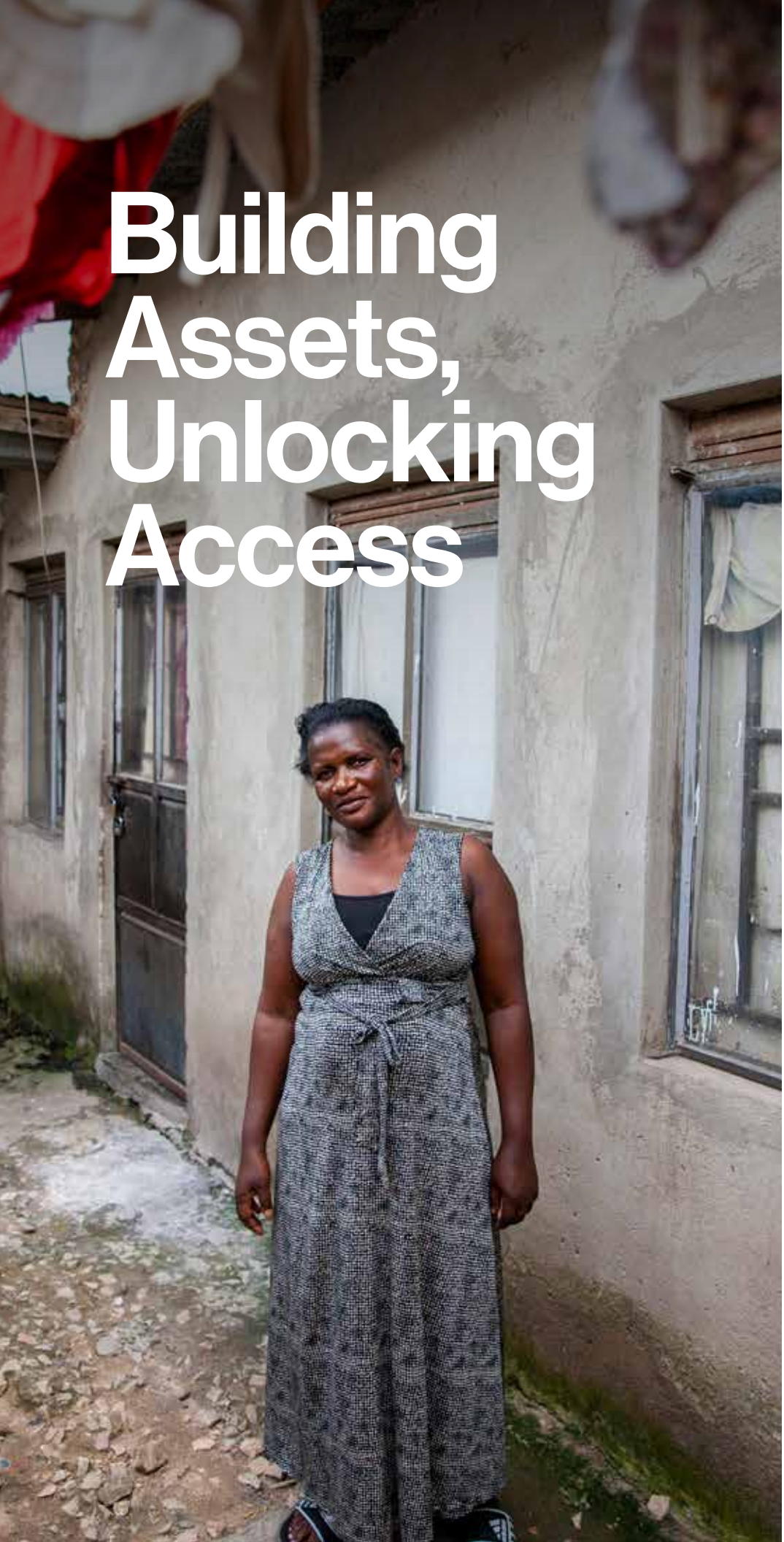

Building Assets, Unlocking Access

Centenary Bank Impact Evaluation Report

December 2018

Habitat for Humanity®

Terwilliger Center for Innovation in Shelter

mastercard foundation

Centenary Bank

Elaborated by:

G:ENESIS UNLOCKING VALUE

rwi

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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 US$5-10 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 was 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 to conduct an impact evaluation of the Building Assets, Unlocking Access project in Uganda.

Building Assets, Unlocking Access was 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 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 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 CenteHome Loan housing microfinance product as part of the Building Assets, Unlocking Access project, Centenary Bank partnered with Habitat's Terwilliger Center to conduct the impact evaluation with a sample of clients of the new product and a group of control branches. This impact evaluation assesses the attributable impact that Building Assets, Unlocking Access has had on improving a range of outcomes for clients of Centenary Bank who have accessed the CenteHome Loan.

To rigorously estimate the changes in the lives of Centenary Bank customers who have accessed the CenteHome Loan, the evaluation team 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. The evaluation team 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 CenteHome Loan clients, a baseline survey was conducted among the clients, along with a follow-up endline survey approximately one year later to establish levels of change in their housing conditions. The final sample size at baseline was 1,474 Centenary Bank members (673 from the control group and 801 from the treatment group), and the evaluation team was able to reach 1,112 Centenary 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 evaluation 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 statistical analysis found that the intervention had a positive impact on the number of households that had a separate kitchen. There was a statistically significant increase of 21.8 percentage points in the number of households with separate kitchens, and as a result, households are less exposed to indoor pollution.
- However, the study did not find significant impact on the reported main materials used for the roofs, walls or floors for the main dwelling of respondents.
- Access to water improved, as the number of CenteHome Loan beneficiary households with access to water from wells or boreholes increased 7.8 percentage points.

Housing satisfaction

- The statistical analysis shows a significant increase in satisfaction with the quality of their walls (26.2 percentage points), and overall housing satisfaction increased by 31.9 percentage points. This suggests that the CenteHome Loan is being used for purposes other than improving the building materials of dwellings, such as plastering or painting walls.

Health outcomes

- The CenteHome Loan did not have any attributable impact in the self-reported health of household members, specifically among children younger than 6 years old.
- There were no statistically significant findings on the impact of the CenteHome Loan on the stress level of beneficiaries.

Economic welfare

- 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 of the CenteHome Loan finds no evidence that this is true. Specifically, the statistical analysis investigated the impact of the CenteHome Loan on income, savings and expenditure. No statistically significant negative difference in savings was found. There was a significant increase in the number of respondents reporting experiencing an increased income and, congruent with these findings, an increase in the expenditure level as a result of the CenteHome Loan.
- There is no effect of the CenteHome Loan on asset ownership, but it is important to note that asset accumulation may change only in a longer period, likely after the CenteHome Loan has been paid back.
- The statistical analysis also investigated the impact of the CenteHome Loan on perceived financial well-being and found a statistically significant improvement in the respondents' perceived future financial well-being.
- No statistically significant results were found for security of tenure.

BUILDING ASSETS, UNLOCKING ACCESS CENTENARY BANK IMPACT EVALUATION REPORT

Educational outcomes

- The statistical analysis shows that the CenteHome 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, by using the CenteHome Loan to build rental properties, clients have been able to earn extra income for their family's needs, such as paying school fees for their children. However, with no quantitative data backing this, such testimonials should be interpreted with care.

Social power

- The statistical analysis does not show any statistically significant impact on the social power of CenteHome Loan customers. Nonetheless, qualitative interviews undertaken with clients revealed that improvements to their housing as a result of the loan have led them to feel prouder of their homes and more confident. Among users of the CenteHome Loan, the qualitative interviews also revealed increased recognition among members in their communities.

The evaluation findings suggest the CenteHome Loan developed by Centenary Bank has improved the lives of not only its customers, but also their families. We suggest that Centenary Bank 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.

To manage construction costs of the rental building she built with a CenteHome Loan, Claire burned her own bricks.

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. The project 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 for Innovation in Shelter, Centenary Bank developed a housing microfinance product called the CenteHome Loan.

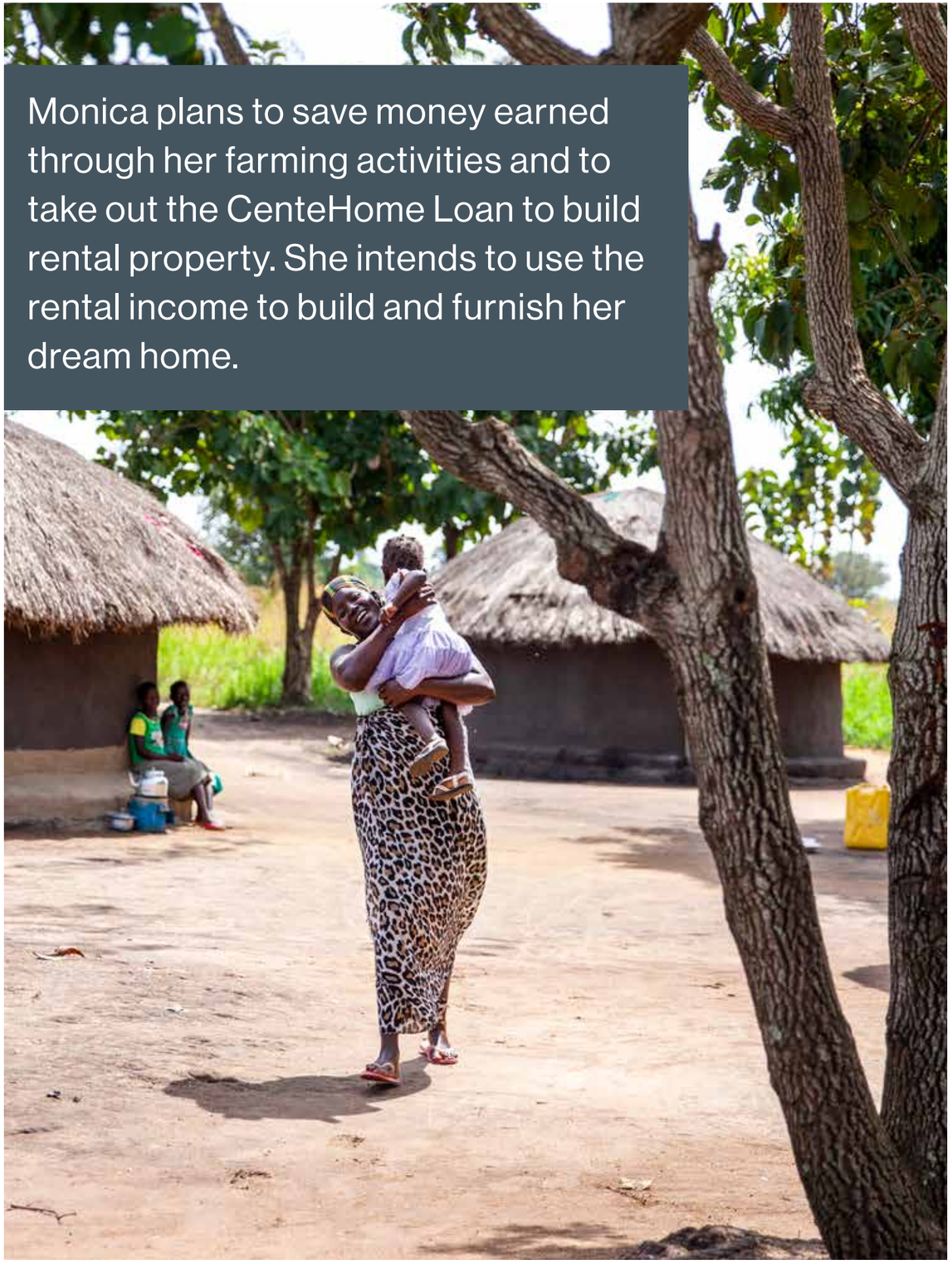
In 2016, Centenary Bank partnered with the Terwilliger Center to carry out an impact evaluation of the clients who have accessed the CenteHome Loan. This evaluation assessed the attributable impact that the housing microfinance product has had on improving the clients' quality of life.

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 Ugandan portion of this evaluation conducted with clients from Centenary 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 of the housing microfinance loans in the lives of CenteHome Loan customers.

1. The findings from the impact evaluation in Kenya have been shared in a separate report: Habitat for Humanity Terwilliger Center for Innovation in Shelter and Kenya Women Microfinance Bank — *Building Assets, Unlocking Access: KWFT Housing Microfinance Impact Evaluation Final Report.* June 2018.



Monica plans to save money earned through her farming activities and to take out the CenteHome Loan to build rental property. She intends to use the rental income to build and furnish her dream home.

2. Country context and background

2.1. The need for housing

Adequate shelter is one of the most basic human needs and is considered a right around the world. 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 and physical 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. Uganda

Despite having undergone rapid transformation and growth over the past decade, Uganda's housing finance sector remains small in comparison to the increasing housing needs of the country.[8][9] With a population growing at a rate of 3.3 percent per year, the sector is unable to meet the housing needs of its people, and its housing deficit has grown to 1.6 million houses.[10]

Although access to financing for housing has grown, it has met the financial needs of only a small percentage of Uganda's population, typically the middle-high income earners, in the form of formal mortgages. The lower income earners who constitute a large portion of the population have long been left out of this market and live in substandard homes. Over 70 percent of the population live in

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. Uganda Housing Market Mapping and Value Chain Analysis. Mastercard Foundation and Habitat for Humanity. https://www.sheltercluster.org/sites/default/files/docs/11_hfhi-uganda-housing-value-chain.pdf.
9. Overview of the housing finance sector in Uganda, commissioned by the FinMark Trust with support from Habitat for Humanity, 2013.
10. The National Population and Housing Census, 2014.

housing constructed of temporary materials such as wood and rammed earth.[11] [12] These poor housing structures pose a threat to the health and development opportunities of those living in them and contribute to the continuation of the poverty cycle.

Additionally, lack of formal land tenure documentation is a widespread issue in Uganda, as the country has multiple land governance systems in place, including customary land tenure. The Land Act seeks to balance these systems in a unified approach, but a lack of formal land tenure documentation excludes low-income households from accessing formal housing finance. Housing microfinance has demonstrated the opportunity to extend housing finance to households with informal or alternative proof of land tenure.

Given the above, an opportunity exists for alternative housing finance options that meet the needs of low-income groups in the country through the provision of small, affordable loans with favorable repayment terms.

2.3. The intervention: Building Assets, Unlocking Access

Habitat for Humanity began in 1976 with the vision that everyone deserves a decent place to live. Habitat established the Terwilliger Center for Innovation in Shelter to facilitate and accelerate better-functioning, more inclusive 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, better, affordable housing is possible for millions more. 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.

Habitat operates in 12 countries in Sub-Saharan Africa through a number of housing initiatives. In 2012, Habitat for Humanity Canada, Habitat for Humanity International and the Mastercard Foundation partnered to implement a six-year project in Sub-Saharan Africa, titled Building Assets, Unlocking Access. This project was carried out by the Terwilliger Center and aimed to provide technical assistance to leading financial institutions in Ghana, Kenya and Uganda. The 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 actors to develop sustainable and innovative housing solutions for the 1.6 billion people who lack adequate shelter globally.

11. Total and rammed earth is building material that is made by mixing selected aggregates such as gravel, sand, silt and clay.
12. Ministry of Lands, Housing and Urban Development. *The Uganda National Housing Policy*, 2016.

2.4. Centenary Bank's CenteHome Loan product

In February 2014, the Terwilliger Center entered into a partnership with Centenary Bank to support the development of viable housing products for low-income families. Centenary Bank is a leading microfinance commercial bank in Uganda serving over 1.4 million customers, whose services can be accessed through 72 branches across the country.

In order to meet the housing needs of the low-income earners who were not being served by Centenary Bank's existing loan products, which can be used to purchase land; to develop, construct or upgrade houses; or to purchase or upgrade household items such as furniture and appliances, Centenary Bank partnered with the Terwilliger Center.

As a result of this partnership, Centenary Bank developed a new product, called the CenteHome Loan, which includes a housing microfinance component and nonfinancial housing support services. The CenteHome Loan can be used to finance the construction of decent and affordable houses on an incremental basis; the improvement, renovations, repairs and extension of houses on an incremental basis; or the improvement of tenure.

Housing support services are nonfinancial services in the form of technical assistance or construction advice that are provided to clients as part of the housing loan package, which includes linking CenteHome Loan clients to selected masons, surveyors, engineers and suppliers of materials.

The pilot of the CenteHome Loan product was launched in August 2015, and ran for a period of nine months in a total of two branches across two regions in Uganda, namely the Eastern region (Iganga branch) and the Central region (Wakiso branch). During the pilot, Centenary Bank and Habitat's Terwilliger Center handled intensive monitoring and evaluation of the product implementation, which provided a remote indication of the impact of the product to increase the satisfaction levels of customers. As a result of this pilot, Centenary Bank rolled out the CenteHome Loan product to 15 branches across five regions of the country in August 2016 and partnered with Habitat to conduct an impact evaluation of the loan product by an independent consultant. Selected branches were excluded during the rollout phase to act as "control" branches.

Table 1: Centenary Bank housing microfinance loan characteristics — CenteHome Loan

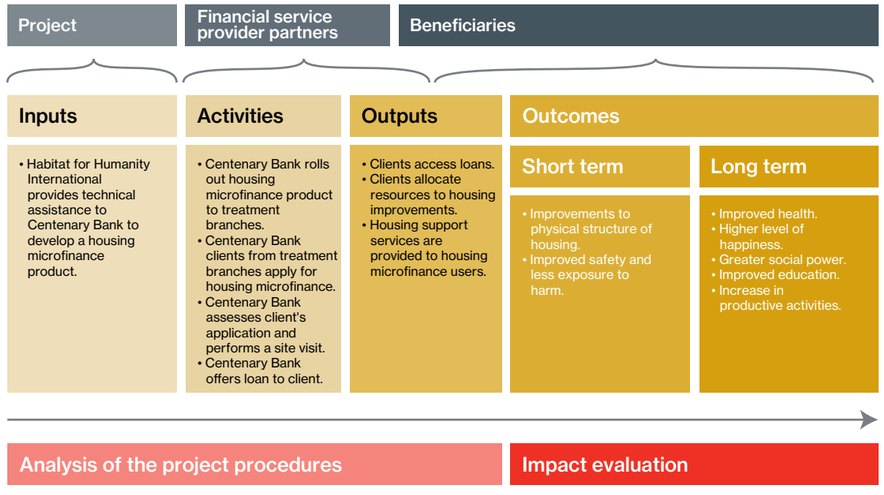
LOAN CHARACTERISTICS	CENTENARY BANK — CENTEHOME LOAN
Target markets	Existing and new clients engaged in microenterprises or agriculture, and salaried employees such as civil servants. Both rural and peri-urban residents.
Type of loan	Individual loan.
Loan sizes	110,300–30,400,000 Ugandan shillings (US$30–8,275) Average: UGX7,300,000 (US$2,000)
Loan terms	Up to 60 months Average: 24 months
Guarantees/security	Secured with the land on which housing is developed, with or without registered title. Also secured with personal guarantees.
Interest rate	25 percent APR plus UGX15,000 (US$4) application fee and 2 percent commitment fee (9 points below microenterprise loans).

2.5. Theory of change

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

A theory of change 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 product is allocated toward housing improvements. The outcomes that result through the housing improvements are expected to be realized at different periods after the clients 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 have 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 overall well-being from studies of households that have made incremental home improvements that 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.[13]
- Households with improved lighting have extended hours of productivity, and household members are more likely to continue these activities into the night.[14]
- 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.[15]
- 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.[16] 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.[17]
- As individuals upgrade their homes, they are more likely to expand the structure and earn a higher rental income if their homes are leased.[18]

13. 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
14. 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.
15. EHP, UNICEF/WES, USAID, World Bank/WSP and WSSCC. *The Hygiene Improvement Framework.* Available at ehproject.org/PDF/Joint_Publications/JP008-HIF.pdf.
16. 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.
17. 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.
18. Taylor, J. *Changes That Add Value.* Available at domain.com.au/news/changes-that-add-value-20100611-y2fe/.

Through these changes, 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 families will divert household resources away from other productive uses in the short run 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 is being offered to Centenary Bank members who belong to "treatment" branches on credit, which will have to be paid back with interest. Therefore, the "dosage" — the size of the CenteHome Loan and/or the intensity of the use of housing support services — is self-determined by the beneficiaries and their ability to pay back the CenteHome Loan.

In addition to this, individuals will have different needs and, ultimately, different uses for the CenteHome Loan. Therefore, while one person may prioritize using the CenteHome Loan to replace dirt floors with concrete, another may prioritize painting the exterior of their house. In other words, the intensity of the "treatment" will vary 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 is to improve the housing conditions of low-income groups in Uganda by providing them with tailored housing microfinance products, a broader goal is 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.[19] 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 aims to disseminate practical lessons on housing microfinance to other microfinance providers in Africa. There is 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 are to:

19. 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.

- 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.

Jackson would like to build a spacious brick house for his family. Living in a rental home does not provide them with security.

3. Evaluation method

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

3.1. Evaluation design

To identify the impact of the CenteHome 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 Centenary Bank, the evaluation team understood the pressure and need for the evaluation not to negatively impact on Centenary Bank'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 CenteHome 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 among senior management at Centenary Bank, the Terwilliger Center and the evaluation team, it became clear that Centenary Bank 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 a parametrised DID and 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.

The results presented in this paper are strongest when both the DID estimators and propensity score matching results are consistent. These findings are pointed out throughout the paper.

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

3.2. Sample selection

3.2.1. Sampling frame

After a successful pilot of the CenteHome Loan for nine months in two branches, Centenary Bank designed a phased rollout plan that would introduce the CenteHome Loan product to 15 branches every six months. In line with this, Centenary Bank began offering the CenteHome Loan to the first 15 branches in its network across the country. The clients from these 15 branches constitute the treatment group. Centenary Bank also identified the second group of 15 branches that would be next in the rollout. These 15 branches were excluded from the impact evaluation.

Centenary Bank provided the evaluation team with a list of a further 15 branches where the phased rollout of the CenteHome Loan would take place only after the follow-up survey in late 2018, and hence whose clients would serve as the control group for the impact evaluation. Centenary Bank asserts that the 15 branches were selected to serve as the control group on the basis that each of them had a comparable branch in the treatment group where the CenteHome Loan had been rolled out. Therefore, **treatment was not randomized but was withheld at the branch level.**

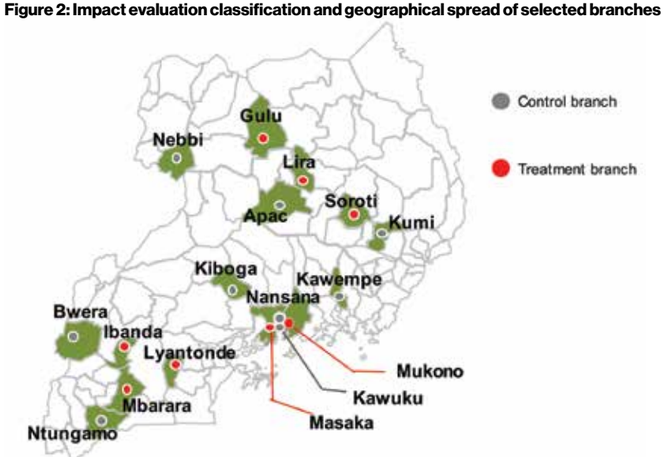
From the 30 branches, the evaluation team, together with Centenary Bank, further selected 16 branches (eight belonging to the treatment group and eight belonging to the control group). During implementation of the baseline survey, it was necessary to sample clients from an additional branch in order to meet the intended sample size as far as possible; consequently, nine treatment branches were included in the sampling frame.

Table 2 and Figure 2 on the facing page present a list and the geographical spread of the final 17 branches that were selected to be part of this study, along with the region in which they are located and their impact evaluation classification into treatment and control groups.

Table 2: Impact evaluation classification of selected branches

	BRANCH	IMPACT EVALUATION CLASSIFICATION
Central (A)	Masaka	Treatment
	Nansana	Control
	Kawempe	Control
	Kiboga	Control
Central (B)	Mukono	Treatment
	Kawuku	Control
Eastern	Soroti	Treatment
	Kumi	Control
Northern	Lira	Treatment
	Gulu	Treatment
	Apac	Control
	Nebbi	Control
Southwestern	Ibanda	Treatment
	Lyantonde	Treatment
	Mbarara	Treatment
	Ntungamo	Control
Western	Bwera	Control

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



The sampling frame consisted of a database of Centenary Bank clients from these 17 branches, provided by Centenary Bank.

3.2.2. Sample selection

At baseline, the evaluation team used a stratified random sampling strategy to ensure that a representative number of Centenary Bank clients from each branch were selected to be part of the study. Accordingly, the number of clients selected per branch was proportional to the total number of clients in that branch. 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 CenteHome Loan, the evaluation team randomly selected 75 percent of our sample out of those who had recently taken out the CenteHome Loan. This was essential to guarantee that meaningful analysis and statistical conclusions on the impact of the CenteHome Loan could take place upon collection of data at the endline. Given that the product had only recently been rolled out before the baseline survey, it is unlikely that the loan had yet impacted the outcomes of interest.

The selected clients from the control and treatment branches were revisited for a follow-up survey between October and November 2018.

3.2.3. Survey implementation

Baseline survey

With support from the branch officers and managers, the enumerator team was responsible for reaching out to the selected clients from each branch before the survey to inform them of their selection and participation in the survey on a particular date. Trained enumerators then administered the survey to participants at a central venue, such as a church or a school. Upon completion of their individual surveys, all respondents were compensated for their transportation to and from the survey venue. The baseline survey was completed in July 2017.

At baseline, whenever a Centenary Bank client from the original sample list was unavailable, enumerators were instructed to select another client from the same branch from a replacement list. However, there were several instances where clients from both the original sample list and the replacement sample lists were either not available, were deceased, were actively avoiding Centenary Bank because of loan defaults, or were no longer members of Centenary Bank. Therefore, an additional branch of Centenary Bank where the CenteHome Loan already had been offered, Masaka branch, had to be added to the sample in order to meet the intended sample size for the impact evaluation as well as possible.

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

Endline survey

The endline survey was conducted between October and November 2018, slightly more than a year after the rollout of the baseline survey.

Before the endline survey, the evaluation team worked closely with Centenary Bank and the respective branch officers from the 17 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 transportation to the survey venue.

3.2.4. Final impact evaluation sample

The baseline sample was made up of 1,474 Centenary Bank members, but the number of Centenary Bank members surveyed during both the baseline and the endline was 1,112. Figure 3 and Figure 4 provide the sample population by treatment and control branches, respectively, that was reached during both the baseline and the follow-up.

Figure 3: Sample population by treatment branch at baseline and endline

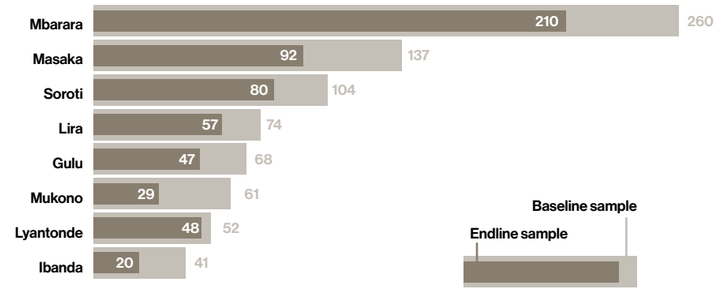
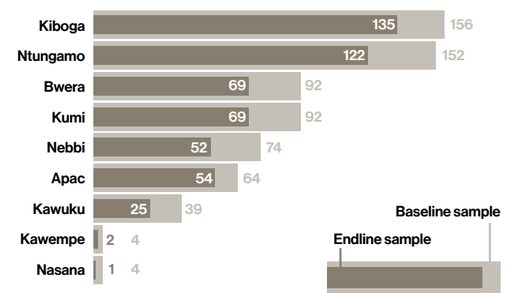


Figure 4: Sample population by control branch at baseline and endline



There was attrition of 362 survey respondents between the baseline and endline surveys (24.6 percent), largely because Centenary Bank members defaulted on their loans, exited from Centenary Bank, or were not reachable at the time of the endline survey. Figure 5 shows the final sample size by treatment and control groups at baseline and endline and also depicts the attrition rate between baseline and endline for both the treatment and control groups. Later in the report, we discuss whether any limitations resulted from the attrition in the sample.

Figure 5: Attrition rate between baseline and endline

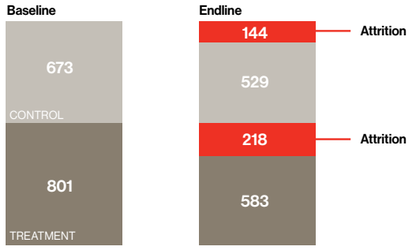


Table 3 presents survey respondents' basic sociodemographic and housing characteristics that are unlikely to be affected by the use of the CenteHome Loan. Specifically, it includes all households that were interviewed during baseline and compares households that were assigned to the treatment to those that belong to branches that were not offered the housing product (the control group). We report on the mean, standard deviation and number of observations and conduct t-tests on the differences in means across these outcomes. Standard errors are clustered at the branch level to control for intrabranch correlation. All variables are reported for the baseline period.

Comparing sociodemographic characteristics between the treatment and control groups, we find no substantial differences. We see that the majority of clients (between 70 and 75 percent) are male, that clients are on average 40 years old, and that approximately half of the survey respondents have attended some form of tertiary education. Approximately 85 percent of the survey respondents are married and live in a house with four to five other people.

With respect to housing characteristics, it becomes evident that households within treatment branches are generally different in two variables: They are more likely to own their houses, and their houses are more likely to be more than 10 years old. They have not lived in their houses significantly longer than households from the control branches.

As expected, the assignment between treatment and control branches was not random. In order to ensure statistical indistinguishability between the two groups, we therefore control for imbalances between the groups that occur at baseline.

Table 3: Descriptive statistics on sociodemographic and housing characteristics of respondents, by treatment and control group

	CONTROL MEAN	CONTROL STANDARD DEVIATION	CONTROL OBSERVATIONS	TREATMENT MEAN	TREATMENT STANDARD DEVIATION	TREATMENT OBSERVATIONS	REGRESSION DIFFERENCE	P-VALUE
Female	0.24	0.43	673	0.29	0.46	801	0.05	0.14
Female age	38.48	10.20	671	39.69	9.58	801	1.20	0.14
Female age squared	1,584.86	883.97	671	1,666.51	868.35	801	81.65	0.24
Female higher education (1/0)	0.55	0.50	673	0.64	0.48	801	0.09	0.20
Female married	0.84	0.37	671	0.80	0.40	800	-0.04	0.06
Female household size	5.45	2.75	673	4.98	2.59	801	-0.47	0.36
Female ownership of the house (0/1)	0.66	0.48	673	0.86	0.35	654	0.20	0.00
Female lived in the house for more than one year (0/1)	0.73	0.44	673	0.77	0.42	801	0.04	0.12
Household older than 10 years (0/1)	0.43	0.50	673	0.57	0.50	801	0.14	0.00

3.3. Survey instrument design

To rigorously assess the impact of the CenteHome Loan on various aspects of the livelihoods of individuals and households, a quantitative survey tool was designed. The survey was used to test a diverse range of indicators on the effect of the CenteHome Loan on health, wealth, financial access, income and expenditure, and housing 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 the Terwilliger Center. For this reason, all data collected are based on perception or self-reported values from survey respondents.

The survey is quantitative in that the questions were aggregated to draw general inferences about the respondents. To meet the aims of the survey, the 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 seven languages, including Luganda, then 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 45 minutes. During the endline survey, the average duration of the survey was 34 minutes.

The survey covered the following key areas of interest:

Household demographics: Understanding the survey respondents' individual and household characteristics provided valuable insight for evaluating and understanding any changes caused by the project.

Dwelling characteristics: The basic structure of the respondents' dwelling was assessed, including 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.

Tenure: As households invest in their homes, they are more likely to seek greater security of tenure for the land upon which the home rests. We expect therefore to see households motivated to seek higher levels of security of tenure whether the loan was explicitly intended for land (not common) or not. The impact of the CenteHome Loan on the respondent's tenure over their housing was therefore assessed. "Tenure" refers to the mode by which property is held or owned, or the set of relationships among people concerning the property.

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 catalogue 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 CenteHome Loan on perceived health and mental well-being, we expected that, as a result of the improved home environment, Centenary Bank members who accessed the CenteHome 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 CenteHome 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 4, with 0 corresponding to "never," 1 corresponding to "almost never," 2 corresponding to "sometimes," 3 corresponding to "fairly often," and 4 corresponding to "very often." Participants were asked to report how frequently they felt a certain way in the past six months.

Table 4: 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 4, 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, as appropriate lighting enables students to study in the evening. 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 on homework being completed in order to estimate the impact of the project on the children's educational performance.

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

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

Attrition is also a concern for any impact evaluation since it can influence the estimates. If the sample attrition appears to be random, then analyzing those who are observed at both baseline and endline will not skew the analysis but will reduce the sample size and associated power. However, if there is selective attrition, in that those who are lost are somehow different from those who remain in the sample, then there is a chance that the statistical results could be biased. To check whether there was selective attrition and examine potential biases, we regress an indicator of attrition (either not found or declined to complete survey during the endline survey) on treatment status. We do not find any evidence of differential attrition across treatment status of respondents. Analysis of the baseline data also shows that individuals who were found at the endline are not statistically different on a number of socioeconomic and housing characteristics from individuals who could not be found during the endline (these results are displayed in Appendix B: Attrition).

3.4.2. Selection bias

In an experimental setting, random assignment to treatment and control groups should, in expectation, ensure that individuals in both groups are statistically indistinguishable in terms of their observable and unobservable characteristics. In the context of the impact evaluation of the CenteHome Loan, the product was not rolled out randomly across branches, and therefore there is potential for selection bias between the treatment and control groups. This means that the treatment group (members of the Centenary Bank branches where the CenteHome Loan is offered) may be fundamentally different from the control group (members of the Centenary Bank branches where the CenteHome Loan is 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 are 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 groups 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. To control for imbalances between groups at baseline that occur by chance, and to ensure that the sample is balanced in terms of socioeconomic and housing characteristics of respondents, we include additional covariates into our regression analysis. Furthermore, standard errors are cluster-adjusted at the branch level to account for intra-branch correlation.

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 (in this case, taking out the CenteHome Loan), using observed characteristics captured at baseline. It does this using a discrete choice model and estimates the marginal probability of receiving treatment added by each selected observable characteristic. For example, being female increases the probability of taking out the loan by 10 percent.[24]

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 CenteHome Loan), which we then can use to match those who took out the loan with those who were just as likely to take out the loan.

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

- The client's household size.
- The age of the client.
- The gender 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 already have 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 C: Propensity score balancing for the results).

24. For illustrative purposes only. This is a simplified example, as determining the increase in the percentage probability requires further manipulation.

With the propensity scores generated, the outcomes of interest (such as the impact of the CenteHome Loan on physical characteristics of houses) between the treatment group (i.e., those who have taken out a CenteHome Loan) and the matched nontreatment group are compared to see whether the intervention affected the outcome of interest. Specifically, the average treatment effect of the intervention is 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. This risk, however, is not believed to be large enough to influence our findings substantially. 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 Centenary Bank's Wakiso 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.

Length of time to estimate impact

Given the nature of the CenteHome 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 Centenary Bank, the bank committed to withholding the CenteHome Loan product from being offered by the control branches for a limited period. Thus, it is likely that not all expected impacts are observed and captured by this evaluation.

Dan, a doctor, recently opened his own clinic and used a CenteHome Loan to construct a new house for his young family.

4. Findings

This section presents and discusses the results of the impact evaluation of the Building Assets, Unlocking Access project.

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

As discussed under the Evaluation design section, one concern with the DID method is that the treatment and control groups may differ in ways that would affect their trends over time, or their compositions may change over time. Although, we do not expect this to be the case in our context, we still use PSM to support the reliability of the DID results. Overall, the majority of results presented in the text that follows are consistent between both models, with only a few exceptions. In these cases, the direction of the coefficients remains the same with the significance level often higher in the PSM analysis than in the DID analysis.

At the bottom line, we expect the DID findings to be more robust because we are more confident that the underlying assumptions are met. In the PSM framework, inference about the impact of a treatment on the outcome of an individual involves speculation about how this individual would have performed had the person not received the treatment. In particular, the Conditional Independence Assumption, or CIA, should be met. That means that, given a set of observable covariates that are not affected by treatment, potential outcomes are independent of treatment assignment. Thus, the results hinge on a selection of observables that enter the matching estimations. Because we are not confident that we are able to observe all relevant covariates that should be included into the matching model, we choose to present both findings from the DID and PSM analysis throughout this report.

4.1. Impact on housing

4.1.1. Number of rooms and the quality of roofs, walls and floors

In Table 5 below, we begin by estimating whether the CenteHome Loan had an impact on the quality of housing that respondents live in. This tests the effect of the CenteHome Loan in terms of its primary objective: to enable households to improve their housing conditions.

To measure impact of the project on housing quality, respondents were asked what the main material of the roofs, walls and floors of their houses were at baseline and again at the endline survey.[25] Using the answers to these questions, we defined the following indicators:

- **Improved roofing:** An indicator equal to 1 if the respondent reports the main roofing material is bricks, concrete blocks, concrete, iron or tiles.
- **Improved walls:** An indicator equal to 1 if the respondent reports the main wall material is concrete blocks, concrete or bricks.
- **Improved floors:** An indicator equal to 1 if the respondent reports the main floor material is concrete, carpet over concrete, tiles or wood.

Table 5: Building quality — DID regression results

VARIABLES	NUMBER OF ROOMS IN THE HOUSE	ROOF COMPOSED OF IMPROVED MATERIALS	WALLS COMPOSED OF IMPROVED MATERIALS	FLOORS COMPOSED OF IMPROVED MATERIALS
Treated	0.372	0.038	0.059	0.026
	[0.143]**	[0.020]*	[0.032]*	[0.033]
Post	0.402	0.058	0.046	0.113
	[0.258]	[0.051]	[0.038]	[0.038]***
Impact (DID TOT)	0.014	-0.012	-0.011	0.015
	[0.259]	[0.027]	[0.036]	[0.032]
Observations	1,793	1,792	1,802	1,800
R-squared	0.211	0.033	0.037	0.062
Untreated Mean baseline	3.529	0.890	0.886	0.807
Untreated Mean endline	4.034	0.943	0.933	0.904
Treated Mean baseline	3.947	0.926	0.924	0.824
Treated Mean endline	4.426	0.972	0.962	0.945
Parallel Mean endline	4.451	0.979	0.972	0.921

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

25. This was an open question coded by the enumerator using a predetermined list of materials. If the respondent's answer did not fit the list, the enumerator specified "other" and filled in the answer.

There is no statistical evidence to suggest that the use of the CenteHome Loan has led to an improvement in the quality of building materials used for the roofs, walls or floors for respondents who took out the loan. The proportion of clients who have used the CenteHome Loan for building more rooms has not been impacted either. These findings are robust to using PSM.

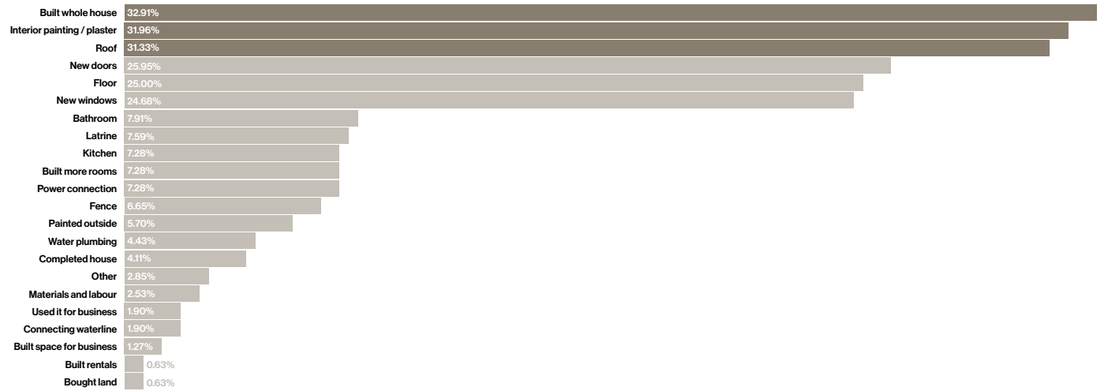
In Table 5, we also present the treatment and control group means of the building material at both baseline and endline, which reveal that at baseline the houses of members from both groups were already made up of "improved" materials. These findings suggest that the clients of Centenary Bank are generally already living in improved structures, and the CenteHome Loan may be intended for other purposes, such as building entirely new structures or "softer" improvements to existing structures, which include any changes that would not influence or change the main material of the housing structure (roofs, walls and floors), such as carpeting, plastering and painting, and better workmanship. Later in this paper we present the findings of dwellers' satisfaction with their house's physical characteristics and find significant impact, suggesting that people are making improvements but are not changing the fundamental building materials and rather improving on quality of workmanship or aesthetics.

The implication is that we are less likely to see the immediate improvements in self-reported health indicators than would be expected in a scenario in which more clients started from a lower standard of housing and used the CenteHome Loan to improve their houses at a more fundamental level. The reason is that the benefits of improving housing are not likely to be linear and are more dramatic when improving housing from a lower base.

Another explanation for the findings in Table 5 is a result of the use of the CenteHome Loan. Figure 6 shows that a third of clients at baseline claimed that they were going to use the loan to build a whole house, while a third said they were going to use the loan to plaster or paint the interior of their house.

Ocaka and his nine-member family currently live in a two-room house that is not big enough for them.

Figure 6: Reported use of CenteHome Loan at baseline
(note that respondents could select many answers)



The qualitative case studies during the follow-up wave provide additional evidence that loan takers have used the loan to build additional houses for the purposes of renting them out to earn additional income. The case studies also showed that although respondents are making building improvements, these improvements are not necessarily being made for their own houses[26], but to other structures, such as their rental property. This means the impact pathway in the case of many of the CenteHome Loan takers will be different from the way it was initially envisioned. We expect that, instead of seeing improvements directly to health outcomes, we will see improvements in income and financial well-being. Potential reasons for these hypotheses are discussed under the sections on health outcomes and economic welfare, respectively.

Case Study 1 presents how a member of the treatment group has used the CenteHome Loan to build additional rooms within her property for rental purposes. Case Study 2 illustrates the short time frame of the impact evaluation, where the respondent hasn't had time to move into his house yet.

26. Questions on the use of improved materials for housing components (walls, roofs and floors) asked specifically about the client's own house, but the question on what the loan was used for did not specify that the use had to be for the client's house. In other words, the loan could be used for improving a structure other than the client's house, which would not result directly in improved living conditions for the loan taker.

Case 1: ‘An investment for my children’s future’

Claire has constructed this building using the CenteHome Loan.

Claire Nanyondo 46 years old	**Divorced**	**6 children** 4-27 years old	**UGX550,000** Household income	**Treatment group**	**6 people** House occupants	**Mosquito net** Yes	**Land title or agreement** Yes	**Mukono** Kasowo	**Nov. 2, 2018** Interview date

Claire, a primary school teacher, lives in a small brick house with five of her six children. Although the house is very small and in need of renovation, she decided to use the CenteHome Loan to construct a rental building. She considers this new building an investment in her children’s future, and she spends the rental income that she earns to pay school fees for her children. She says the children’s education is a necessity, and having a big, well-furnished house is a luxury she cannot afford right now.

Claire burns her own bricks to cut down on construction costs.

Claire shares this house with five of her children.

I used the CenteHome Loan to construct a rental building comprising four apartments in front of my house. I have thought about building a property like this for a long time, because rentals are lucrative and I needed an extra source of income to pay school fees for my children. As a single mother of six, I am constantly trying to make ends meet to ensure my children’s health and education are well taken care of. I want them to have a better life than me, and as a teacher, I know how important education is to achieving a happy and prosperous life.

Financing

Initially, I tried to reduce the cost of building materials by producing bricks using the clay in my backyard, but I soon realized that I needed a more substantial cash injection to start construction. I thought about getting a bank loan, but somehow I could not summon the courage to ask the bank about my options and the specific terms of a bank loan. Luckily, Centenary was advertising a new type of loan, so when I heard about the CenteHome Loan, I immediately knew that this was the opportunity I had been waiting for. Without any hesitation, I applied for UGX6 million (US$1,620) for my building project. I was confident about my project, and I knew I was going to use the loan wisely, so I never feared that I would fail to repay it. Centenary Bank automatically deducts the monthly instalment, UGX220,000 (US$60) from my salary, which is a great relief because I do not even have to think about transferring money to the bank to pay off the loan.

Improved income

Although the building is not yet complete, I am already renting out two of the units for UGX75,000 each (US$20). The extra monthly income of UGX150,000 (US$40) has made my life easier. I worry less about my expenses, and the experience has taught me that it is possible to take control of your life and change it for the better. Despite this, the cost of living is still very high, and with a monthly disposable amount of less than UGX100,000 (US$27), there is no room for buying new assets like a TV or a radio or saving up money for emergencies and other unforeseen expenses. For instance, last month I had to sell a goat to pay for my father’s funeral.

Impact of the CenteHome Loan on the community

When the building was still under construction, most people in my community thought I would lose all of my money to the bank. After the success of my project, people now come to me for financial advice. I tell them that you commit yourself when you take out a loan, that the loan keeps you focused and helps you achieve your goals. Many people have started their own building projects using both the CenteHome Loan and other types of loans, but unfortunately, they are not performing as well as I am. There is a need for people to know how to administer a loan once they acquire it.

Case 2: ‘With the CenteHome Loan, you can finally get a loan big enough to build a house’

John Bosco says his new house will give him more space to invite visitors, helping him build relationships in the community.

John Bosco Okwii 54 years old	**Married** Since 2000	**7 children** 12-23 years old	**UGX1.7 million** Household income	**Treatment group**	**7 people** House occupants	**Mosquito net** Yes	**Land title or agreement** Yes	**Lira** Ayago	**Nov. 11, 2018** Interview date

John, a university teacher and regional Local Council 5 chairperson, used the CenteHome Loan to supplement his savings and build a new home. With large tiled rooms, installed water and electricity, the new house is a big improvement from his current residence, and he expects that he will benefit from the upgrade on both a personal and professional level. John is a public figure, and having a presentable house and being able to invite more visitors can help him build better relationships with the community and the people he serves.

John Bosco inspects the kitchen tap in his new home.

Building a house keeps you focused

Having a big project like building a house makes you work harder and keeps you focused. Your thoughts are always centered on how you can complete it in the best way possible and searching for new solutions to refine the end result. Our new house is everything I could ask for. It has three bedrooms and amenities such as a garage, an indoor kitchen, a bathroom, and a toilet with installed water. This house will provide a comfortable base for my wife and me. Our children are getting older, and those who have not already moved into their own homes are studying at boarding schools, so we do not need as many rooms as before. We have decided to keep the old house to accommodate the children during school holidays.

The impact of a loan

Thanks to the CenteHome Loan, we have managed to build the house in just three years, which is much sooner than we estimated. In Uganda, it can be very difficult to access a big bank loan, so when we laid the foundation in 2015, we used our savings to cover the preliminary expenses before we went to the bank to apply for a loan. I did not expect the bank to offer any substantial credit, so you can imagine my joy when the loan officer introduced me to the CenteHome Loan. Not only could I access the money I needed for the next phase of construction, but the loan also had a good interest rate and more flexible terms. If for some reason you are delayed with a monthly instalment, Centenary Bank does not put as much pressure on you as they would with other types of loans. During the past three years, I have taken out three CenteHome Loans with a total amount of UGX17 million (US$4,550), which is about half of the amount I have spent on the house in total (about UGX45 million or US$12,038).

Building a new house requires more than a bank loan

I think many people do not consider how complicated it is to build a new house. It is not just about getting a loan; you also need to plan the process carefully, including establishing the cost of materials and workers to avoid encountering any unforeseen expenses. It is unlikely that you will be able to borrow the total amount that a new house will cost, which means that you also need to save up money from your income before and during the construction process. I have not experienced any difficulties in repaying the loans, but I have had to cut down on some expenses, such as transportation. I expect that we will move into the new house within the next few months. We still have to finalize a few things and buy new assets such as a flat-screen television, a water heater and a fridge. I plan to take out a new CenteHome Loan to cover the expenses for this.

4.1.2. Kitchens

In Table 6, we study the impact of the CenteHome Loan on whether households have a separate kitchen[27]. When a household does not have a separate kitchen with proper ventilation and uses a substandard kitchen stove, serious negative effects on respiratory health may result. As women are primarily responsible for cooking, and children often spend time with their mothers, women and young children are often disproportionately affected by this indoor air pollution. A separate kitchen can help reduce indoor air pollution and thereby improve health.

Table 6: Separate kitchen — DID regression results

VARIABLES	SEPARATE KITCHEN
Treated	-0.010
	[0.054]
Post	-0.132
	[0.046]***
Impact (DID TOT)	0.218
	[0.074]***
Observations	1,808
R-squared	0.167
Untreated Mean baseline	0.714
Untreated Mean endline	0.693
Treated Mean baseline	0.708
Treated Mean endline	0.831
Parallel Mean endline	0.688

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Vincent's wife prepares a meal in their house.

Table 6 shows that the use of the CenteHome Loan has led to a statistically significant increase in the number of households that have a separate kitchen — 21.8 percentage points among the respondents who have taken out the loan. This finding is consistent using PSM and means that some clients are either using the loans to improve their kitchens or are reinvesting their incomes generated through other means to do so.

27. During the baseline and endline surveys, respondents were asked whether their houses have a separate room used as a kitchen or for cooking. Therefore, a separate kitchen is a binary variable corresponding to one if the survey respondent answered "yes" to this question.

4.1.3. Water and sanitation

In Table 7, we investigate whether access to the CenteHome Loan 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 7: Water connection — DID regression results

VARIABLES	PIPED WATER IN DWELLING	PIPED WATER IN YARD	PUBLIC/ COMMUNAL TAP	WATER CARRIER/ TANK	WELL/ BOREHOLE	SPRING	RIVER, LAKE OR OTHER NATURAL SOURCE
Treated	0.031	0.101	-0.011	-0.046	-0.057	0.004	-0.016
	[0.036]	[0.023]***	[0.025]	[0.026]*	[0.043]	[0.018]	[0.050]
Post	0.142	0.125	-0.012	-0.002	-0.181	-0.027	-0.058
	[0.049]**	[0.032]***	[0.042]	[0.029]	[0.085]**	[0.020]	[0.028]*
Impact (DID TOT)	-0.033	-0.076	-0.009	0.051	0.078	-0.008	0.010
	[0.072]	[0.058]	[0.040]	[0.036]	[0.040]*	[0.020]	[0.048]
Observations	1,806	1,806	1,806	1,806	1,806	1,806	1,806
R-squared	0.042	0.034	0.022	0.026	0.053	0.025	0.034
Untreated Mean baseline	0.0997	0.232	0.144	0.0541	0.356	0.0584	0.0484
Untreated Mean endline	0.251	0.330	0.111	0.0488	0.211	0.0310	0.00222
Treated Mean baseline	0.110	0.305	0.164	0.0266	0.284	0.0593	0.0511
Treated Mean endline	0.214	0.352	0.131	0.0828	0.190	0.0241	0.00690
Parallel Mean endline	0.261	0.403	0.131	0.0212	0.139	0.0319	0.00491

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

As illustrated in Table 7, we find that access to the CenteHome Loan was associated with a significant increase in the number of households that access water from a well or a borehole — 7.8 percentage points.

However, when using PSM, we find that the significance on accessing water from a well or a borehole falls away, and that the CenteHome Loan has led to a significant impact on the number of households that access water from a water carrier or tank — 8 percentage points, as shown in

Table 8. This positive finding suggests that respondents are using their CenteHome Loans for the purchase of assets such as water carriers or tanks.

Table 8: Water — Average treatment effect using nearest neighbor matching

	AVERAGE TREATMENT EFFECT	NUMBER OF OBSERVATIONS
Water carrier/tank	0.08	690

In Table 9, we investigate whether access to the CenteHome Loan resulted in any 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 9: Ablutions — DID regression results

VARIABLES	FLUSH TOILET	CHEMICAL TOILET	PIT LATRINE WITH SLAB	PIT LATRINE WITHOUT SLAB/ OPEN PIT	NO FACILITY/BUSH/ FIELD
Treated	0.039	-0.001	0.107	-0.145	0.001
	[0.024]	[0.001]	[0.044]**	[0.037]***	[0.001]
Post	0.060	-0.002	0.065	-0.127	0.003
	[0.028]**	[0.002]	[0.062]	[0.050]**	[0.003]
Impact (DID TOT)	0.041	0.005	-0.156	0.114	-0.003
	[0.051]	[0.003]	[0.080]*	[0.046]**	[0.003]
Observations	1,807	1,807	1,807	1,807	1,807
R-squared	0.041	0.004	0.017	0.046	0.007
Untreated Mean baseline	0.101	0.00142	0.674	0.222	0
Untreated Mean endline	0.201	0	0.692	0.102	0.00221
Treated Mean baseline	0.0982	0	0.791	0.110	0
Treated Mean endline	0.200	0.00345	0.697	0.100	0
Parallel Mean endline	0.198	-0.00142	0.810	-0.0100	0.00221

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

The intervention has resulted in a statistically significant increase in the number of households with pit latrines without slabs – 11.4 percentage points – and a statistically significant decrease of 15.6 percentage points in the number of households who have pit latrines with slabs. This was supported by the PSM findings. It is unclear how this downgrade occurred or what drove it. Through the qualitative engagements, some respondents reported moving into different accommodation, which could have had less-developed ablutions, but we do not have quantitative evidence for this.

Using PSM, we also find that the CenteHome Loan has resulted in a statistically significant increase in the number of households that have flush toilets – 12 percentage points – as presented in Table 10.

Table 10: Ablutions — Average treatment effect using nearest neighbor matching

	AVERAGE TREATMENT EFFECT	NUMBER OF OBSERVATIONS
Flush toilet	0.12	691

4.1.4. Housing satisfaction

In Tables 11 and 12, we investigate whether the use of the CenteHome Loan results in an improvement in housing satisfaction. 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. Survey respondents were asked about their satisfaction with floor quality, wall quality, roof quality and 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 11 presents the results of the TOT analysis on ordinal self-reported measures for satisfaction of housing.

Ocaka and his wife plan to take out a CenteHome Loan to build a three-bedroom house with an indoor kitchen and bathroom.

Table 11: Housing quality satisfaction — DID regression results

VARIABLES	HOW WOULD YOU RATE YOUR SATISFACTION WITH THE FLOOR QUALITY IN YOUR HOUSEHOLD?	HOW WOULD YOU RATE YOUR SATISFACTION WITH THE WALL QUALITY IN YOUR HOUSEHOLD?	HOW WOULD YOU RATE YOUR SATISFACTION WITH THE ROOF QUALITY IN YOUR HOUSEHOLD?	HOW WOULD YOU RATE YOUR SATISFACTION WITH THE OVERALL QUALITY OF YOUR HOUSEHOLD?
Treated	0.166	0.166	0.065	0.170
	[0.125]	[0.127]	[0.135]	[0.131]
Post	0.040	0.060	0.091	0.037
	[0.114]	[0.118]	[0.129]	[0.124]
Impact (DID TOT)	0.249	0.262	0.246	0.319
	[0.155]	[0.146]*	[0.157]	[0.161]*
Observations	1,804	1,805	1,805	1,806
R-squared	0.051	0.057	0.050	0.065
Untreated Mean baseline	2.024	2.021	2.162	2.033
Untreated Mean endline	2.104	2.116	2.307	2.124
Treated Mean baseline	2.204	2.202	2.247	2.209
Treated Mean endline	2.536	2.571	2.640	2.616
Parallel Mean endline	2.285	2.297	2.392	2.300

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

In line with the lack of significant findings on the quality of building materials for the floors and roofs of respondents' dwellings, as discussed above, the CenteHome Loan has not led to any improvement in the respondents' satisfaction regarding the floors or roofs in their dwellings.

However, despite there being no significant findings on the quality of building materials for the walls of respondents' dwellings, the project's effect on the clients' satisfaction levels with their wall quality, including their satisfaction with the overall quality of their housing, is positive and significant. Specifically, the CenteHome Loan has increased the number of those who report being satisfied with the quality of their walls by 26.2 percentage points. Similarly, it has increased the number of beneficiaries satisfied with their overall housing quality by 31.9 percentage points.

When using PSM, we find that the impact on the satisfaction of walls and the overall quality of housing are robust, and additionally, the findings on the impact of the CenteHome Loan on respondents' satisfaction with floors and roofs become significant too, as shown in Table 12.

Table 12: Housing quality satisfaction — Average treatment effect using nearest neighbor matching

	AVERAGE TREATMENT EFFECT	NUMBER OF OBSERVATIONS
How would you rate your satisfaction with the floor quality in your household?	0.53	690
How would you rate your satisfaction with the wall quality in your household?	0.48	690
How would you rate your satisfaction with the roof quality in your household?	0.37	690
How would you rate your satisfaction with the overall quality of your household?	0.47	690

4.2. Health outcomes

As discussed under the section 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 time for productive activities, 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 13 presents the analysis of the impact of the CenteHome Loan on the reported health outcomes of children younger than 6 years old in the households.

Monica hopes that one day she will save enough money to build a home with enough space for raising her children.

Table 13: Child health outcomes — DID regression results

VARIABLES	TOTAL REPORTED HEALTH PROBLEMS	BLOCKED NOSE	RUNNY NOSE	PERSISTENT SNEEZING	SORE THROAT	PAINFUL SWALLOWING	COUGH	FEVER	HEADACHE
Treated	-0.193	-0.015	-0.042	0.003	-0.018	-0.005	0.081	-0.080	-0.030
	[0.679]	[0.017]	[0.044]	[0.022]	[0.013]	[0.007]	[0.056]	[0.049]	[0.043]
Post	-0.677	-0.019	-0.005	-0.013	-0.020	-0.007	-0.044	-0.083	-0.065
	[0.724]	[0.020]	[0.033]	[0.019]	[0.016]	[0.010]	[0.035]	[0.061]	[0.050]
Impact (DID TOT)	0.735	0.013	0.066	0.033	0.030	0.014	0.050	0.036	0.045
	[0.820]	[0.021]	[0.061]	[0.027]	[0.019]	[0.010]	[0.067]	[0.060]	[0.055]
Observations	1,808	1,808	1,808	1,808	1,808	1,808	1,808	1,808	1,808
R-squared	0.121	0.022	0.020	0.012	0.025	0.019	0.028	0.030	0.023
Untreated Mean baseline	3.735	0.0620	0.171	0.0449	0.0309	0.0161	0.267	0.332	0.188
Untreated Mean endline	3.013	0.0535	0.178	0.0313	0.0121	0.00773	0.230	0.260	0.128
Treated Mean baseline	3.100	0.0418	0.140	0.0374	0.00799	0.00714	0.304	0.240	0.144
Treated Mean endline	2.903	0.0353	0.201	0.0543	0.0158	0.0124	0.307	0.191	0.119
Parallel Mean endline	2.378	0.0334	0.147	0.0238	-0.0107	-0.00128	0.267	0.167	0.0842

VARIABLES	SHORT BREATH	ITCHY EYES	NAUSEA	VOMITING	RASH	DIARRHEA	WORMS	TREAT WORMS	NO HEALTH PROBLEMS
Treated	-0.002	-0.000	-0.012	-0.013	-0.007	-0.000	-0.320	0.433	0.108
	[0.002]	[0.008]	[0.010]	[0.010]	[0.004]*	[0.015]	[0.281]	[0.558]	[0.072]
Post	-0.003	0.011	-0.006	-0.006	-0.010	-0.019	-0.265	0.649	-0.001
	[0.004]	[0.010]	[0.014]	[0.014]	[0.008]	[0.015]	[0.296]	[0.887]	[0.017]
Impact (DID TOT)	0.009	-0.009	0.011	0.004	0.013	0.008	0.584	-1.150	0.002
	[0.007]	[0.011]	[0.015]	[0.014]	[0.007]*	[0.023]	[0.420]	[1.066]	[0.061]
Observations	1,808	1,808	1,808	1,808	1,808	1,808	133	133	1,783
R-squared	0.011	0.026	0.026	0.014	0.018	0.018	0.130	0.124	0.051
Untreated Mean baseline	0.00736	0.0141	0.0233	0.0260	0.0177	0.0400	2.694	3.278	0.0368
Untreated Mean endline	0.00515	0.0224	0.0164	0.0215	0.00773	0.0239	2.507	2.964	0.0360
Treated Mean baseline	0.00357	0.0111	0.00391	0.0119	0.00680	0.0316	2.286	3.381	0.0868
Treated Mean endline	0.00891	0.0101	0.00632	0.00776	0.00776	0.0216	2.594	2.625	0.0866
Parallel Mean endline	0.00136	0.0194	-0.00298	0.00743	-0.00316	0.0155	2.099	3.067	0.0859

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

There is no evidence of the CenteHome Loan leading to any positive implication on household health. However, the findings demonstrate that there has been a 1.3 percentage point increase in the reported cases of rashes. We find that the impact on reported rash symptoms is not robust when looking at the results of the PSM model, but additional increases in the reported symptoms are found, as shown in Table 14:

Table 14: Child health outcomes — Average treatment effect using nearest neighbor matching

	AVERAGE TREATMENT EFFECT	NUMBER OF OBSERVATIONS
Sore throat	0.03	693
Runny noses	0.12	693

Specifically, when using PSM, we find that there have been additional increases in the reported number of children younger than 6 having runny noses and sore throats. These symptoms are associated with allergies and environmental factors such as indoor air pollution and inadequate heating.

However, these findings violate the parallel trend assumption as the counterfactual estimates a negative proportion of children experiencing these symptoms, which is impossible. With prevalence rates, it becomes increasingly less likely to see reductions the closer to zero one gets, thus making the trends impossible to be parallel, as illustrated by the assumption leading to a statement of prevalence rate being minus 1 percent of children in the counterfactual households having sore throats. Thus, we cannot conclude that the findings from the PSM analysis reported under Table 14 are reliable in this instance.

4.3. Mental health

Previous research has found mixed results on the impact of housing on mental health outcomes. Table 15 presents the effects of the intervention on mental health using the score from the PSS, along with the impact on the number of people who can be classified as having a low stress score, a moderate stress score and a high stress score.

Table 15: Mental health — DID regression results

VARIABLES	PSS SCORE	LOW STRESS LEVEL	MODERATE STRESS LEVEL	HIGH STRESS LEVEL
Treated	-0.324	-0.038	0.087	-0.054
	[0.659]	[0.023]	[0.038]**	[0.036]
Post	-1.036	0.032	-0.004	-0.031
	[0.619]	[0.029]	[0.045]	[0.034]
Impact (DID TOT)	0.525	0.014	-0.035	0.024
	[0.699]	[0.037]	[0.045]	[0.029]
Observations	1,806	1,808	1,808	1,750
R-squared	0.017	0.017	0.021	0.015
Untreated Mean baseline	20.25	0.0655	0.852	0.0868
Untreated Mean endline	19.39	0.0839	0.852	0.0655
Treated Mean baseline	20.13	0.0184	0.937	0.0459
Treated Mean endline	19.65	0.0621	0.900	0.0386
Parallel Mean endline	19.26	0.0367	0.937	0.0246

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

We find from both the simple DID estimation and from PSM that there are no statistically significant findings of the impact of the CenteHome Loan on the PSS score. These findings suggest that takers of the CenteHome Loan have been able to manage their finances without experiencing an increased burden of repaying the loan, which would cause them to experience a higher level of stress.

4.4. Impact on economic welfare

4.4.1. Wealth

The main measures for economic welfare are household income, expenditure and savings. In this section, we begin by investigating the degree to which the CenteHome Loan has had an impact on household income, specifically by looking at the reported value of monthly household income. Given that this is a noisy variable, respondents were also asked to report on whether their household income had increased, stayed the same, or decreased in the past nine months. We also investigate the impact of the CenteHome Loan on savings and weekly expenditure of respondents.

Table 16: Income, change in income expenditure and saving — DID regression results

VARIABLES	IN A TYPICAL MONTH, WHAT IS THE TOTAL MONTHLY INCOME COMING INTO YOUR HOUSEHOLD?	HOW HAS YOUR HOUSEHOLD INCOME CHANGED IN THE PAST NINE MONTHS?	IN THE PAST WEEK, HOW MUCH DID YOUR HOUSEHOLD SPEND ON FOOD AND DRINKS (EXCLUDING ALCOHOL)?	IN THE PAST 12 MONTHS, HAS YOUR HOUSEHOLD MADE ANY SAVINGS?
Treated	138,974.620	0.091	3,706.192	-0.070
	[137,037.496]	[0.130]	[5,753.311]	[0.060]
Post	473,243.776	-0.015	13,052.325	-0.007
	[98,467.617]***	[0.094]	[7,114.562]*	[0.033]
Impact (DID TOT)	-221,794.922	0.233	5,075.423	0.037
	[126,728.199]*	[0.129]*	[7,658.654]	[0.057]
Observations	1,722	1,805	1,742	1,799
R-squared	0.032	0.041	0.067	0.017
Untreated Mean baseline	849883	0.301	70600	0.727
Untreated Mean endline	1359000	0.343	89785	0.731
Treated Mean baseline	888774	0.363	63953	0.616
Treated Mean endline	1166000	0.619	81175	0.651
Parallel Mean endline	1398000	0.405	83138	0.620

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Using the unmatched DID estimate, we do not find that access to the CenteHome Loan has led to significant increases in reported value of household income of respondents, as demonstrated in Table 16. This finding becomes insignificant when the PSM model is used. This illustrates that taking out of the loan has not negatively impacted short-term income generation, which allays that fear.

In contrast to the significant negative DID finding on the reported household income, Table 16 shows that there is a significant number of respondents reporting experiencing an increase in income. This finding is robust using the PSM model.

Despite the reported increase in household income in the past month as a result of the loan, Table 16 shows that there has not been any impact on the reported weekly household expenditure of respondents who have taken out the CenteHome Loan. These findings are consistent using PSM. Lastly, Table 16 demonstrates that there has been no significant change in the number of respondents who report saving in the past 12 months as a result of the CenteHome Loan. This finding is robust when using PSM. This suggests that despite needing to pay back the CenteHome Loan, respondents have not had to decrease their savings, illustrating that the use of the loan has not harmed short-term income generation and has in fact increased it.

Case 3: ‘Diversifying our income through the CenteHome Loan’

Wilfred and his family have used the CenteHome Loan to expand their home and add units for rent.

Wilfred Juna 54 years old	**Married** since 2011	**3 children** 5 months - 5 years old	**UGX12 million** Household income	**Treatment group**	**7 people** House occupants	**Mosquito net** Yes	**Land title or agreement** Yes	**Mbarara** Katete	**Nov. 5, 2018** Interview date

Wilfred, a sales manager at a large construction material factory, used the CenteHome Loan to extend his home with four new self-contained apartments. As a result, he has been able to rent out two of the four apartments that he built, which has resulted in an extra income for his family and has allowed them to save money.

Wilfred observes the progress on the new apartment where he is going to live with his family.

Wilfred plans to take out a third loan to complete his building expansion and give his children more room to play and study.

Turning our home into a source of income

I used the CenteHome Loan to expand our apartment into multiple, small rental units. When we moved into this place five years ago, it was just a small apartment with barely enough room for my family, but because of the large compound and attractive location (near town and the police station), I knew it would be ideal to rent out.

Use of the CenteHome loan

To date, I have taken out two loans from Centenary Bank. The first loan was UGX8 million (US$2,136), which enabled me to start the construction of the new rooms. The cost of constructing these rooms was higher than the loan, so I paused all building activities until I repaid the loan and could apply for a second one. The second loan amounted to UGX10 million (US$2,670), and with this I managed to complete two apartments, which we are currently renting out to another family and a student. These apartments provide us with an extra income that makes it easier for us to save up money while we are repaying the loan.

Plans for the future

As soon as we repay our second loan, I plan to take out another CenteHome Loan. I wish I could have taken out all the loans at once to avoid delays in completing our building, but I hope that the third loan will be large enough to complete the expansion of the house and enable us to move into the largest of the new apartments. We already moved to a bigger apartment after the first construction phase, but the two-story apartment that we intend to build will be even larger. It will have four rooms, which will give our children the space they need to play and study. I also want my mother to move into our current apartment, as she is very old, and it’ll give me peace of mind knowing that I can take care of her.

4.4.2. Financial well-being

As a subcomponent of economic welfare, we investigate whether the CenteHome Loan has had any impact on perceived financial well-being. Specifically, survey respondents were asked how they would classify their household's current and future (in two years' time) financial situation compared with the financial situation of other households in their community. Respondents had the option of responding as "above average," "average," "below average" or "much below average." These findings are presented in Table 17.

Table 17: Perceptions of financial well-being – DID regression results

VARIABLES	PERCEPTION OF CURRENT FINANCIAL WELL-BEING	PERCEPTION OF FUTURE FINANCIAL WELL-BEING
Treated	0.099	-0.194
	[0.071]	[0.158]
Post	0.133	0.146
	[0.057]**	[0.102]
Impact (DID TOT)	0.110	0.459
	[0.081]	[0.147]***
Observations	1,797	1,760
R-squared	0.077	0.113
Untreated Mean baseline	-0.0984	0.670
Untreated Mean endline	0.116	0.865
Treated Mean baseline	-0.0928	0.333
Treated Mean endline	0.182	0.961
Parallel Mean endline	0.121	0.528

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

Using the simple DID estimation, we find that while the CenteHome Loan has had no impact on the current perceived financial well-being of respondents, it has had a significant positive impact on the future perceived financial well-being of respondents.

However, when using PSM, the CenteHome Loan has led to a significant positive impact on both the current and the future perceived financial well-being of respondents, as shown in Table 18.

Table 18: Perception of current financial well-being — Average treatment effect using nearest neighbor matching

	AVERAGE TREATMENT EFFECT	NUMBER OF OBSERVATIONS
Perception of current financial well-being	0.34	684

4.4.3. Asset index

We investigate the impact of the CenteHome Loan on the asset ownership of households. Housing conditions can influence asset ownership in different ways. 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 also can increase the value of some durable goods and, thus, stimulate their acquisition. However, as mentioned in the Theory of Change section, it is possible to experience a short-term decrease in asset accumulation in response to loan repayments. We test this latter hypothesis by looking at the asset accumulation.

The main measures for economic wealth are household income, expenditure and savings, which we presented above. However, these can be noisy measures for approximating one's economic status. Thus, we complement this measure of wealth with two asset indices. First, we construct an index of technological assets as a z-score by taking the first principle component of six measures, specifically whether the respondent reported owning a television, a radio, a mobile phone, a computer, a satellite dish, and a VCR/DVD. Secondly, an index of livestock assets is constructed as a z-score by taking the first principal component of four measures, specifically whether the respondent reported owning goats, cows, pigs or poultry.

We use Principle Component Analysis, or PCA, because we have multiple covariates that measure some dimension of wealth. In order to have a single continuous summary measure of these characteristics, we construct a standardized index that is a weighted average of the multiple variables measured in the survey. Rather than arbitrarily giving each variable equal weight, the PCA is a data reduction technique that extracts a set of uncorrelated components from a set of correlated variables. If we use 10 variables for PCA, we will get 10 principal components. These are ordered so that the first principal component explains the largest amount of variation for these variables. We assume this first principal component to approximate for wealth.

Table 19 depicts the estimation of the effect of the project on the technological asset index, on the livestock asset index, and on the possession of the following assets: equipment for business, land greater than one acre, a motorcycle, and a fridge.

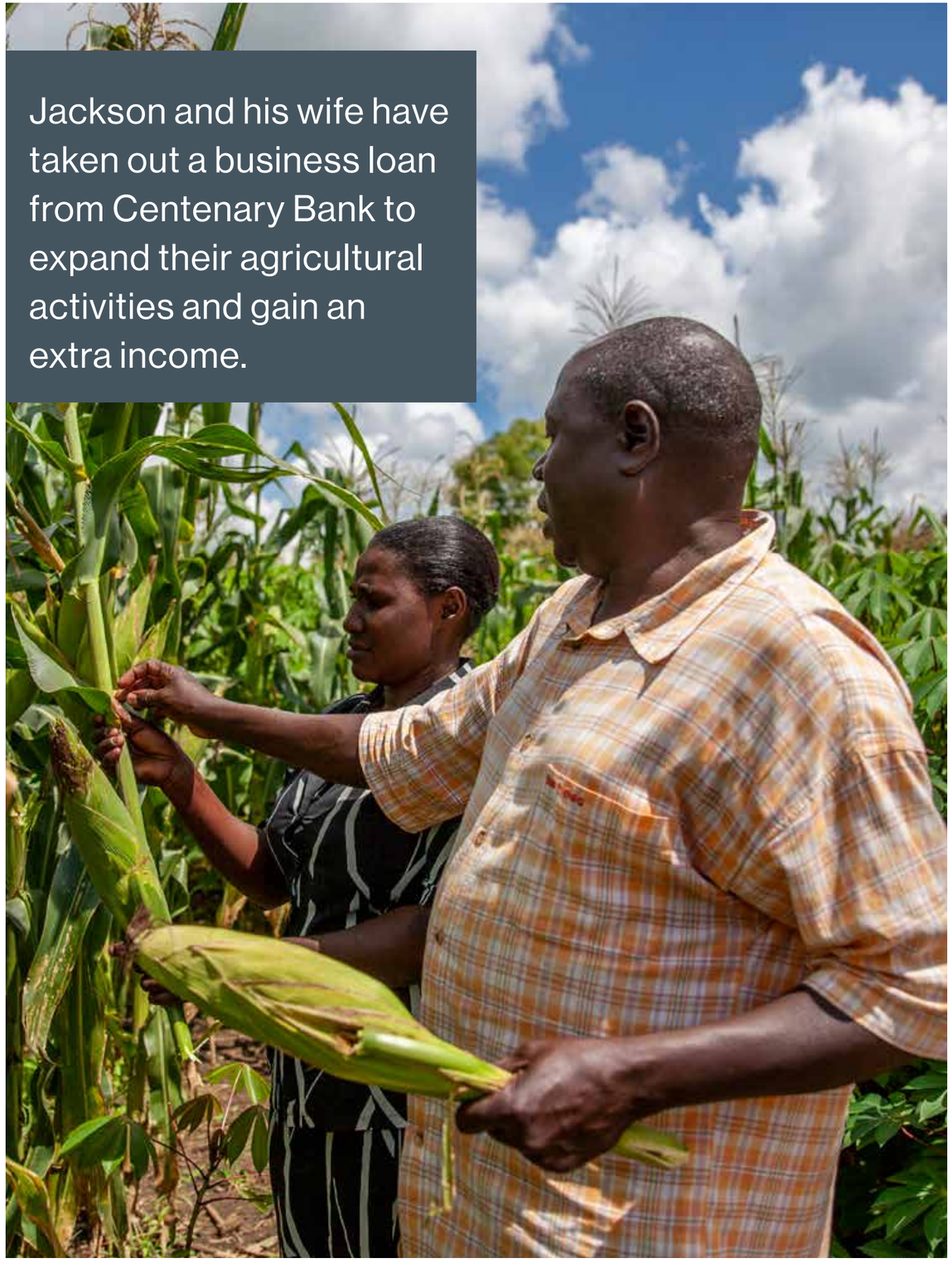
Table 19: Wealth and assets — DID regression results

VARIABLES	TECHNOLOGICAL ASSET INDEX	ANIMAL ASSET INDEX	OWN EQUIPMENT FOR BUSINESS	OWN LAND GREATER THAN AN ACRE	OWN A MOTORCYCLE	OWN A FRIDGE
Treated	0.290	-0.205	-0.066	-0.073	0.034	0.006
	[0.122]**	[0.098]*	[0.029]**	[0.066]	[0.056]	[0.022]
Post	0.930	-0.253	-0.018	-0.035	-0.095	0.158
	[0.158]***	[0.180]	[0.035]	[0.056]	[0.061]	[0.037]***
Impact (DID TOT)	-0.214	0.016	0.064	-0.033	0.014	-0.042
	[0.189]	[0.218]	[0.049]	[0.068]	[0.061]	[0.035]
Observations	1,808	1,808	1,808	1,808	1,808	1,808
R-squared	0.098	0.115	0.023	0.087	0.052	0.046
Untreated Mean baseline	-0.246	0.251	0.107	0.538	0.275	0.148
Untreated Mean endline	0.671	0.0904	0.0971	0.552	0.203	0.320
Treated Mean baseline	-0.257	-0.0249	0.0306	0.471	0.300	0.114
Treated Mean endline	0.437	-0.236	0.0724	0.424	0.221	0.228
Parallel Mean endline	0.660	-0.185	0.0209	0.485	0.228	0.286

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

The results show that the project has had no effect on the technological asset index or the livestock asset index. In other words, at least during the period studied, we do not find that the treated households have responded to increasing or decreasing their investments in the assets that make up these indexes. We find that these results are robust when looking at the results of the PSM model.

Therefore, the insignificant findings illustrate that there is no evidence to suggest that the housing loan has diverted investment away from assets. Given that the period between the baseline and endline surveys was just over one year, the changes in asset ownership and accumulation are unlikely to be experienced within that time, and it is important to note that these may change over a longer period.



Jackson and his wife have taken out a business loan from Centenary Bank to expand their agricultural activities and gain an extra income.

Case 4: Generating a much-needed income

Jane has built two new rooms to rent for extra income.

Jane Kaundar 45 years old	**Married** since 1992	**5 children** 1 - 25 years old	**UGX 600,000** Household income	**Treatment group**	**5 people** House occupants	**Mosquito net** Yes	**Land title or agreement** Yes	**Ntungamo** Ntungamo Town	**Nov. 6, 2018** Interview date

Jane, a businesswoman and beauty salon owner, lives in a tiny two-roomed apartment with barely enough space to accommodate her family. Given the opportunity, she would like to paint the walls and tile the floor, but she has used the CenteHome Loan to build two rental rooms in the backyard. Through the extra income from her rentals, Jane is able to pay the school fees for her children and purchase items such as clothing.

Jane generates most of her income from her beauty salon.

Use of the CenteHome Loan
I used the CenteHome Loan to construct two rental rooms in the backyard of our apartment. For me, the construction of the rental units was more important than making home improvements, because we desperately needed an extra income to pay school fees and buy clothing for the children.

Our apartment is part of a bigger building where each family has a shop facing the street and lives in the back. Each unit has three rooms, including the front shop room, and we all share the kitchen and toilet facilities. Being in a central location is great for attracting customers to my beauty salon, and the installed water and electricity make it easy to run my business. Even though our apartment is very small for five people and could use some renovation, I like living here, and I do not think that improving our housing conditions would have a significant impact in our lives.

Seize the opportunity
As a businesswoman, I am always looking for new opportunities to make an extra income, so when I heard about the CenteHome Loan from a friend, I understood that I could use the loan to create an additional income. I appreciate that the CenteHome Loan is slightly cheaper than other loans, as it has a low interest rate and a reasonable payment scheme.

Trusting the bank
Prior to getting the CenteHome Loan, I had experience with getting a number of loans over the years. I got my first business loan several years ago when I had a small retail shop; then we got a housing loan to top up our savings when we bought this place. Since then, I have regularly taken out business loans to buy supplies for the salon.

I remember the first time I went to Centenary Bank to apply for a loan. I was so stressed because someone had told me that the bank would take away my property if I could not pay off the loan in time. I think many people are misinformed about how banks (not just Centenary Bank) work, and the deceptive stories about how banks steal innocent families' money make people fear the bank instead of using them as a tool for development. I always tell people that I have never experienced anything but good and welcoming service from the bank. However, I think the bank could do a lot better when they inform their customers about their loan options.

Plans
I do not think we are going to make any house improvements while we are paying back the loan. We already have to be careful about how much we spend on clothing and other expenses. In time, I would like to buy some new furniture and tile the floor.

4.4.4. Tenure

It is expected that as respondents use the CenteHome Loan to improve their housing, households will be motivated to seek higher levels of tenure security. In Table 20, we estimate the impact of the CenteHome Loan on the respondents' tenure over their housing.

Table 20: Tenure — DID regression results

VARIABLES	OWN TITLE DEED
Treated	-0.032
	[0.054]
Post	0.116
	[0.054]**
Impact (DID TOT)	-0.048
	[0.065]
Observations	1,524
R-squared	0.041
Untreated Mean baseline	0.189
Untreated Mean endline	0.326
Treated Mean baseline	0.139
Treated Mean endline	0.224
Parallel Mean endline	0.275

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

The CenteHome Loan has shown no statistically significant impact on the form of tenure a respondent has over their house.

4.5. 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.

In Table 21, we look at the impact of the average expenditure on the education of survey respondents' children and on the average number of days spent absent from school by children in the household.

Table 21: Education — DID regression results

VARIABLES	DAYS SPENT ABSENT FROM SCHOOL IN THE PAST THREE MONTHS	AVERAGE EXPENDITURE ON EDUCATION
Treated	0.969	1296657.009
	[0.650]	[1052474.436]
Post	-0.653	940,286.528
	[0.382]	[551,568.704]
Impact (DID TOT)	0.060	-1924766.904
	[0.591]	[1255939.145]
Observations	1,125	1,259
R-squared	0.047	0.011
Untreated Mean baseline	1.933	309071
Untreated Mean endline	1.650	958641
Treated Mean baseline	2.565	1365000
Treated Mean endline	1.823	412262
Parallel Mean endline	2.282	2014000

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

The results show that the CenteHome Loan has not led to any statistically significant findings on the total number of days that children are absent from school or on the total education expenditure among households of respondents that have taken the loan. We find that these results are robust when looking at the results of the PSM model.

The impact of the CenteHome Loan on education is limited to these two variables, where the effects on such outcomes of interest are likely only to be experienced in the longer run. Given that the impact of the CenteHome Loan was measured over a period of just over one year, the evaluation is unable to explore whether the loan would have a longer-term impact on the average household expenditure on education, nor whether the project would impact the education attainment by children in the respondents' household as measured by, for example, the maximum years of schooling completed.

Despite this, the qualitative interviews undertaken with beneficiaries revealed that, by using the CenteHome Loan to build rental properties, they have been able to use this extra income for the benefit of their households and families, such as paying school fees for their children.

4.6. Social power

To understand the impact of the CenteHome Loan on the social power of its customers, survey respondents were asked whether they are proud of their houses and whether they would hold a social event at their house.

Table 22: Pride — DID regression results

VARIABLES	ARE YOU PROUD OF YOUR HOUSE? FOR EXAMPLE, WOULD YOU HOLD A SOCIAL EVENT AT YOUR HOUSE?
Treated	0.051
	[0.059]
Post	0.188
	[0.037]***
Impact (DID TOT)	-0.036
	[0.062]
Observations	1,797
R-squared	0.147
Untreated Mean baseline	0.529
Untreated Mean endline	0.753
Treated Mean baseline	0.619
Treated Mean endline	0.811
Parallel Mean endline	0.842

Standard errors in brackets
*** p<0.01, ** p<0.05, * p<0.1

We find from both the simple DID estimation and from PSM that there has been no statistically significant impact on the outcome of this binary variable.

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. Case Study 5, however, does present a story of how one loan taker reports a greater sense of pride and accomplishment because of his home. The qualitative case studies do suggest that there have been improvements in social power and confidence among those taking out the CenteHome Loan.

With the help of Centenary Bank's loans, Vincent and his wife can spend more time together in their family room.

Case 5: ‘This is what I call a home’

Dan saved money for many years to buy the land and lay the foundation for his home.

Dan Zaake
32 years old

Married
Since 2013

2 children
2 months and 3 years old

UGX2 million
Household income

Treatment group

4 people
House occupants

Mosquito net
Yes

Land title or agreement
Yes

Mpigi
Kikondo

Nov. 2, 2018
Interview date

Dan, a doctor with his own clinic, used the CenteHome Loan to build a new family home. Dan has always wanted to build his own house, and for many years he lived in a rented house while he was saving up money to purchase land and lay the foundation. But he did not go to the bank to negotiate for a loan, until he felt economically burdened by a sudden increase in his rent. For Dan, the process of building a house and becoming a homeowner has made him mature, and he feels more respected by his family and the local community.

Dan has invested in a small-scale piggery.

Financing a new house

I used the CenteHome Loan to build a new home for my family. It is a beautiful cemented house located in a green and lush area with plenty of space for other projects such as a piggery and a tree grove. Before we moved into the new house, we lived in a rented house in town, and even though the house was fairly spacious and in a good condition, I always wanted to build and own a house. So, when the landlord raised the rent without warning from UGX350,000 (US$94) to UGX600,000 (US$162), I went to Centenary Bank to inquire about my loan options.

I chose Centenary Bank to finance my house because I already had a good relationship with them. I previously obtained a business loan for my medical clinic. Many people perceive the bank as being an expensive option, but I think a bank loan is the safest way to borrow money because you sign a legally binding contract. After discussing my situation with the loan officer, I decided to apply for a CenteHome Loan worth UGX60 million (US$16,186). However, because I did not own a land title, I could not be approved for more than UGX30 million (US$8,930). Following the bank’s advice, I used my savings to procure a land title, and when it was settled, I was able to borrow another UGX30 million (US$8,930) with a reduced interest rate. The interest rate fell from 24 percent to 19 percent, but to be honest, I did not pay attention to the loan terms. I was just happy that I could finally get enough money to start building my own house. I was concerned about repaying the loan, as UGX60 million is a lot of money, and the fact that I had just quit my job and opened up my own clinic only made my economic situation more stressful. But sometimes you have to take a chance as it could be your only opportunity to progress in life.

A new life as a homeowner

Everything has worked out well, and so far, I have managed to pay the instalments on time without having to cut back on other household expenses like food and clothing. The only thing I have put on hold while repaying the loan is a post-graduate course that I was planning to take to increase my services at the clinic. Aside from that, we have not suffered any losses. I have even been able to save up money on the side and have used my savings to speed up the construction process.

Increased social status

Being a homeowner has helped me mature, and other people such as my family also look at me differently. In my culture, you are not considered a man till you own a house. I also feel much more confident and responsible compared with before, and am more positive about the future. When I look at my neighbors who live in houses like ours, I feel confident that we are on the right path. I would recommend that anyone take out a loan, because no matter how big your savings are, you will need a cash injection at some point to avoid costly standstills.

Case 6: ‘A good house makes you feel safe and confident’

Shalifa says her new house makes her feel more respected in the community.

Shalifa Namuddu 28 years old	**Single**	**2 children** 6 years old (twins)	**UGX3 million** Household income	**Treatment group**	**4 people** House occupants	**Mosquito net** Yes	**Land title or agreement** Yes	**Lyantonde** Lyantonde Town	**Nov. 5, 2018** Interview date

Shalifa is a young and independent shop owner. She used the CenteHome Loan to build a better and safer house for her daughters. As a seasoned businesswoman, Shalifa is familiar with managing a budget and borrowing money from the bank, and she says the experience has helped her manage the construction process and the repayment of the four CenteHome Loans that she has taken out so far. Becoming a homeowner has been a big achievement for Shalifa. She feels much more confident and respected in the community.

Shalifa owns a well- stocked shop in Lyantonde.

New house, new life

I used the CenteHome loan to build a safe home for my two girls and I. Previously we lived in a small, rented room with a shared kitchen, bathroom and toilet, but I always dreamed of something bigger and better for my girls.

As a single mother, you are the sole provider, and it can be challenging to make ends meet if you do not manage your money well. It has always been important for me to give my girls the best options in life, so I work hard to keep them in school. Their education is the first priority. Living in a good quality house with plenty of space keeps them healthy and focused on their schoolwork. I want my girls to be as focused as I am and always strive to do better.

Taking advantage of financial services

I learned about the CenteHome Loan at a meeting with the loan officer at Centenary Bank. I was concerned about my housing situation, because the girls were getting older and they needed better facilities than I could offer in our small apartment, where we shared the bathroom and the toilets with other tenants. The CenteHome Loan sounded perfect to me because the interest rate is slightly lower compared with business loans, and the bank puts less pressure on you if you for some reason are a couple of days behind with the monthly repayments. Furthermore, I appreciated that it could be used purely for construction purposes, because I knew that it would keep me focused. Since then, I have taken out three additional CenteHome loans, all of which I have managed to repay on time with the profit from my grocery shop.

As a businesswoman, I know that it can be necessary to use credit to accelerate results, and even though I have never doubted my ability to repay the loans, it still stresses me to owe money to the bank.

A house is more than a shelter

Owning a house makes me feel safe, because I know that no one can take my home away from me. Being a homeowner has also improved my life in other ways. I am more confident and have become a respected member of the local community. People admire me for what I have achieved, and it makes me very proud when they ask for my advice.

Plans

The new house is still not perfect. Many things still need to be done, such as tiling and installing a toilet. My plan is to take out a fifth CenteHome Loan next year, when I am done repaying my current loan, to make the final improvements.

Thanks to access to bank loans from Centenary Bank, Vincent and his family built the first brick house in Lira.

5. Conclusion

Uganda's housing market is characterized by low levels of affordable housing finance and the lack of access to secure tenure, which makes it difficult for the low-income population to secure formal housing finance from financial institutions, resulting in poor living conditions. Due to a lack of capital and financing options, households resort to incremental improvements to their physical houses; however, even these small incremental improvements can be unaffordable. The microfinance sector, which has grown over the years in response to the lack of access to formal financial services for low-income populations, has provided a solution to this constraint. Through the provision of small loans for incremental improvements, housing microfinance has a potential role to play in addressing this gap in the market, which satisfies the needs of low-income households and significantly impacts household welfare.

Through the Building Assets, Unlocking Access project, the Terwilliger Center provided technical assistance to Centenary Bank to develop a housing microfinance product and provide housing support services that enable households to incrementally improve their housing conditions in Uganda. 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 Centenary Bank's CenteHome Loan product across six regions in Uganda on a range of indicators, including physical building materials, self-reported health outcomes and possession of assets.

While it was predicted that the use of the CenteHome Loan would result in an improvement in housing quality, specifically through the improvement of the materials used for various structures of the home, no statistical evidence was found to suggest that this hypothesis materialized for the quality of building materials used for the roofs, walls or floors. The baseline data reveal that even before the use of the CenteHome Loan, the houses of members from both groups were already made up of "improved" quality materials, suggesting that the clients of Centenary Bank are generally already living in improved structures, and the CenteHome Loan may be being used for other purposes, such as building entirely new structures to rent out or making "softer improvements," a finding supported by the qualitative data collection and quantitative results on satisfaction. We did find that the CenteHome Loan led to a significant increase in the number of households that have a separate kitchen, which would mean less exposure to pollution and, in time, a reduction in the negative effects on respiratory health.

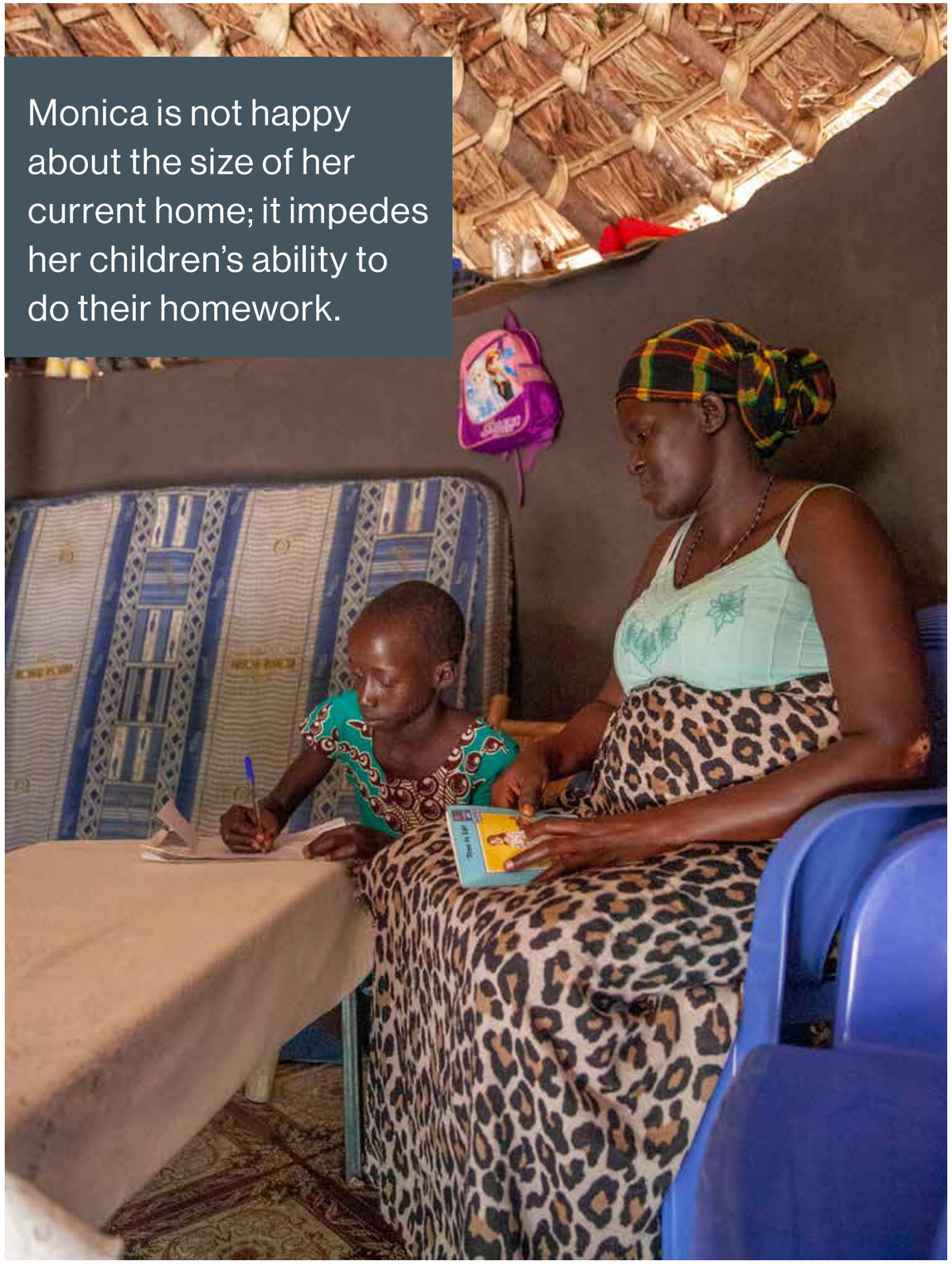
Despite the insignificant findings of impact on the types of building materials or limited physical changes in the structure of houses, CenteHome Loan users reported increased satisfaction with housing quality, including the satisfaction of the quality of their walls. The findings also revealed that the CenteHome Loan has resulted in an increase in the respondents' perceived future financial situation compared with the financial situation of other households in their communities.

These results on housing satisfaction, coupled with the findings on perceived well-being, indicate that the loan has had a significant effect on welfare, which would not be captured by standard monetary indicators such as income, consumption or assets, or by the types of health outcomes used in this study.

Although there is no evidence on the impact of the CenteHome Loan on households' asset ownership, there was a significant finding of households reporting increased income as a result of the loan. This is likely a result of the loan being used to build rental structures. It is expected that over time, these households will be in a better position to accumulate assets and wealth. At this point, there is no significant evidence to show an improvement in security of tenure as a result of this loan.

An implication of the nonsignificant findings on the quality of housing before the use of the CenteHome Loan is that we are less likely to see the immediate improvements in self-reported health indicators, as clients do not demonstrate a need for significant improvement in the quality of building materials between baseline and endline. Additionally, given the length of time available to observe impact of the CenteHome Loan, no statistically significant effects on education for children in the household were observed.

Together, the findings of the impact evaluation and the qualitative findings suggest that the CenteHome Loan has led to an improvement in the welfare of those who took out the product, and qualitative evidence exists to support this impact. Given the nature of the CenteHome 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 experienced, it will lead to further investment in housing quality and, thus, incremental gains in impact over time.

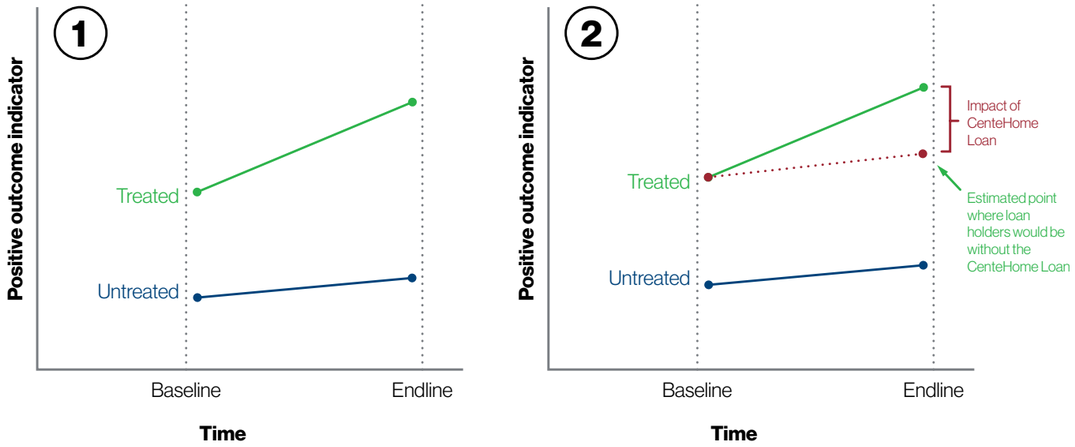


Appendix A: Statistical approach

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

Figure 7 illustrates how, in theory, the DID method will estimate the attributable impact of the CenteHome Loan, and uses annual household income as an example for an outcome of interest:

Figure 7: Graphical explanation of the difference-in-difference approach



Estimating the difference-in-difference

	Baseline	Endline	Difference
Annual income (treatment group)	US$1,000	US$1,500	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 CenteHome 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 characteristics 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, ð, the coefficient on the interaction term (Si×Tt), which represents the impact of the CenteHome 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, along with any changes in the outcomes that have occurred over time but not as a result of the CenteHome 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 CenteHome 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 7). 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 as those experienced by the "treatment branches," or that individuals at the control branches behave systematically differently from those in the treatment branches.

Appendix B: Attrition

Table 23: Selective attrition

	All	Control	Treatment	Regression	P-Value
Assignment	0.75	0.77	0.61	-0.01	0.66
Treated	0.75	0.73	0.76	0.03	0.25

Table 24: Balancing between surveyed and nonsurveyed (at endline) individuals

	Found mean	Found standard deviation	Found observations	Unfound mean	Unfound standard deviation	Unfound observations	Regression difference
Age	39.03	9.97	1,098.00	39.44	9.63	374.00	-0.41
Female	0.27	0.44	1,099.00	0.27	0.45	375.00	-0.00
Higher education (1/0)	0.59	0.49	1,099.00	0.63	0.48	375.00	-0.04
Mental well-being (0-40)	19.85	4.60	1,096.00	19.58	4.46	375.00	0.28
Expenditure percentiles	2.90	1.43	1,090.00	2.88	1.44	372.00	0.02
House older than 10 years (0/1)	0.51	0.50	1,099.00	0.50	0.50	375.00	0.01
Ownership of the house (0/1)	0.85	3.09	992.00	0.77	0.42	336.00	0.08
Satisfaction with housing (1-4)	2.05	0.95	1,095.00	2.07	0.92	374.00	-0.02

Appendix C: Propensity score balancing

```
**************************************************
Algorithm to estimate the propensity score
**************************************************

The treatment is treat
    Treat |      Freq.     Percent        Cum.
------------+-----------------------------------
        0 |        867       58.82       58.82
        1 |        607       41.18      100.00
------------+-----------------------------------
    Total |      1,474              100.00

Estimation of the propensity score
Iteration 0:   log likelihood = -985.53607
Iteration 1:   log likelihood = -874.71707
Iteration 2:   log likelihood = -873.66676
Iteration 3:   log likelihood = -873.66643
Probit regression                 Number of obs   =       1454
                                  LR chi2(7)      =     223.74
                                  Prob > chi2     =     0.0000
Log likelihood = -873.66643       Pseudo R2       =     0.1135

------------------------------------------------------------------------------
       treat |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
     hh_size |   -.0498248   .012378    -4.03   0.000    -.0740852   -.0255643
         age |    .0140495   .0038616    3.64   0.000     .0064808    .0216182
   build_age |    .4169683   .0741437    5.62   0.000     .2716494    .5622872
      stress |   -.0216513   .0070415   -3.07   0.002    -.0354525   -.0078502
         f15 |    .4512486   .0839981    5.37   0.000     .2866153    .6158819
         f14 |   -.1165629   .0412333   -2.83   0.005    -.1973787   -.0357472
      income |    .2310341   .0249551    9.26   0.000     .1821229    .2799452
       _cons |   -.9311922   .2637817   -3.53   0.000    -1.448195   -.4141896
------------------------------------------------------------------------------
```

Description of the estimated propensity score

Percentiles	**Smallest**			
1%	.0841808	.0424434		
5%	.1270681	.0567562		
10%	.1597171	.0642593	Obs	1,454
25%	.2583098	.0647112	Sum of Wgt.	1,454
50%	.404584		Mean	.4135232
	Largest			
75%	.5652137	.8153827	Std. Dev.	.1870228
90%	.6730965	.822062	Variance	.0349775
95%	.7164102	.8244492	Skewness	.1106978
99%	.7913399	.8763837	Kurtosis	2.013156

****

Step 1: Identification of the optimal number of blocks.
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	**Treat**		
	0	1	Total
.0	197	48	245
.2	182	52	234
.3	167	83	250
.4	142	95	237
.5	89	130	219
.6	69	124	193
.7	19	68	87
.8	2	7	19
Total	867	607	1,474

****

End of the algorithm to estimate the pscore

****

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