MWANGAZA MASHINANI PILOT PROJECT MIDLINE EVALUATION REPORT

Evaluation of the Mwangaza Mashinani pilot project in Kilifi and Garissa counties, Kenya

Volume I: Midline report

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All opinions expressed, and any mistakes, remain the responsibility of the authors.

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ACRONYMS

ARI	Acute respiratory infections
ATT	Average treatment effect on the treated
BCC	Behaviour change communication
BWC	Beneficiary Welfare Committee
CC	Community Champion
CT-OVC	Cash Transfer for Orphans and Vulnerable Children
E4I	Energy4Impact
FCDO	UK Foreign, Commonwealth and Development Office
GoK	Government of Kenya
ITT	Average treatment effect on those intended to be treated
KEQ	Key evaluation question
KOSAP	Kenya Off-grid Solar Access Project
KSH	Kenyan shilling
MLSP	Ministry of Labour and Social Protection
MoE	Ministry of Energy
MVP	Millennium Village Project
OECD-DAC	Organisation for Economic Co-operation and Development's Development Assistance Committee
OP-CT	Older Persons' Cash Transfer
OPM	Oxford Policy Management
POC	Point of contact
PWSD-CT	Cash Transfer for Persons with Severe Disabilities
QA	Quality Assurance
SAU	Social Assistance Unit
Sida	Swedish International Development Agency
SPS	Social Protection Secretariat
TA	Technical assistance
ToC	Theory of change
UNICEF	United Nations Children's Fund
VfM	Value for money

EXECUTIVE SUMMARY

Intervention context

In December 2018, the GoK launched its National Electrification Strategy to achieve its goal of universal energy access by 2022. Kenya has seen rapid increases in electrification over the past few years, increasing grid access for Kenyan households from a rate of 25% in 2011 to 64.5% in 2018, according to Power Africa (2018). Despite this, there remain large inequities in electricity provision, with close to 95% of the population not having access to electricity in rural parts of the country (Willcox *et al.*, 2015). While Kenya has a rapidly growing and innovative solar market, most of the large solar suppliers are concentrated in the western and central parts of Kenya, with limited supply networks in rural areas (Energy4Impact *et al*., 2018). Further, solar devices are relatively expensive products and even when products are available, the poorest households will remain excluded due to the issue of product affordability. The Mwanganza Mashinani pilot project was designed and implemented within this context, with the aim to generate evidence on the impact of solar devices on households' well-being, as well as understand how a market for solar devices can be developed in underserved regions.

The Mwangaza Mashinani pilot project

Oxford Policy Management (OPM) has been contracted by the United Nations Children's Fund (UNICEF) to conduct an independent evaluation of the Government of Kenya's (GoK's) Mwangaza Mashinani pilot project. The Mwangaza Mashinani is an innovative pilot project that is designed to enhance energy access for the most vulnerable segment of the Kenyan population, in order to increase their well-being in terms of health, education, and livelihoods, with a particular focus on women and children. This is expected to be achieved by:

- Households reducing the use of kerosene and/or candles for lighting resulting in a reduction of indoor air pollution and fire hazards and, ultimately, a reduction in the prevalence of acute respiratory infections (ARI), burns and eye irritation.
- Children increasing the number of hours that they spend studying at night by using solar lighting, resulting in improved educational outcomes.
- Households using the solar device to increase productive activity, diversify livelihoods and reduce net energy expenditure, resulting in an increase in household income.

Additionally, the pilot project seeks to develop markets for solar energy by increasing the penetration of solar products to previously underserved communities. This will be achieved by providing incentives to participating solar suppliers to extend their networks into hard-to-reach areas by incorporating a de-risking mechanism into the project. The project is offering a guarantee to suppliers that will pay 80% of the value of the device in the event that a household defaults on their re-payments.

The pilot project is designed to address the issue of affordability of solar products for the poorest segment of the population. The first phase of the pilot project targeted 2,000 vulnerable households in selected sub-counties in Kilifi and Garissa. The pilot project provides subsidies, through a bi-monthly cash top-up, to households enrolled in the Inua Jamii[1] who wish to purchase a small solar device for lighting. The purpose of providing cash top-ups (subsidies) to purchase the device, rather than distributing free solar devices, is to foster a sense of ownership of the device among beneficiary households, as well as to avoid introducing distortions into the market for solar devices.

Evaluation design and methods

The evaluation takes a theory-based approach, which methodologically guides the evaluation by drawing on the pilot project's theory of change (ToC) to identify the key issues the evaluation should address (for full details, see Annex B – Evaluation matrix, in Volume II of this midline report). The evaluation draws on multiple research methods, which have been sequentially implemented, to achieve completeness of findings in order to bring together a more comprehensive account of the pilot project. A mixed methods research framework, combining four methodologies was designed to answer the questions in the evaluation matrix:

- **A quantitative research study** – to respond to questions of effectiveness and impact, and to support answers on relevance. This study is based on a quasi-experimental design and a quantitative household survey, which was implemented through an in-person survey at baseline and remotely through a mobile phone survey at midline.
- **A qualitative research study** – to respond to questions of relevance and effectiveness, and to provide initial indications on sustainability. This study is based on interviews with community leaders, community-based project support structures, and beneficiary households.
- **An implementation review** – to respond to questions regarding the relevance and effectiveness of the pilot project. This study is based on interviews with national-level stakeholders, including the GoK, UNICEF, and the project implementing consortium.
- **A value for money (VfM) study** – to respond to questions of efficiency. This study relies on data from UNICEF and the implementing consortium.

Due to the outbreak of the COVID-19 global pandemic, the original evaluation plan articulated in the inception report was adapted. A remote, midline survey took place in July/August 2020, with the originally planned in-person endline survey postponed until early 2021. The mobile phone survey allowed us to gather valuable information in a timely manner on evaluation indicators and, importantly, COVID-19 indicators, such as COVID-19 knowledge and behaviour, children's learning during the pandemic, and health outcomes.[2]

[1] The Inua Jamii is the GoK's flagship social assistance programme and comprises beneficiaries of the Cash Transfer for Orphans and Vulnerable Children; the Older Persons Cash Transfer; the Persons with Severe Disabilities Cash Transfer; the Hunger Safety Net Programme. The objective of the Inua Jamii is to uplift the lives of poor and vulnerable citizens of Kenya through regular and reliable bi-monthly cash transfers.
[2] For full results, see UNICEF (2020) 'COVID-19 Brief: Evidence from Kilifi and Garissa', Oxford Policy Management, Oxford, UK.

This report presents the midline evaluation findings, including an assessment of impact on a sub-set of indicators and initial indications of sustainability. A full assessment of impact and sustainability will be conducted as part of the endline evaluation.

Main findings and conclusions

Relevance

Overall, our findings suggest that the Mwangaza Mashinani pilot project's objectives are relevant for the targeted households, solar suppliers, and the GoK. Specifically, the project's aim to improve the affordability of small solar devices is relevant for the targeted households, who are found to lack access to modern energy sources for lighting and mobile phone charging. Our findings confirm that affordability is the key constraint faced by these households. The project also aims to develop markets for solar energy by increasing the penetration of solar products in previously underserved communities. We find that the de-risking mechanism offered to the solar energy suppliers provides them with a sufficient incentive to explore new remote markets and expand into underserved regions. Finally, we find that the project is aligned with the priorities of both the social protection and energy sectors in terms of supporting all Kenyans to live in dignity and achieving universal electrification, respectively.

Effectiveness of project operations

The pilot project was able to successfully register, target, and enrol over 2,000 vulnerable households in its first phase, although 33% of households in our evaluation sample intended to be treated (and therefore eligible and registered) did not enrol. The project was also able to distribute solar devices and deliver all six cash top-ups to beneficiaries, including the final payment during the pandemic. However, along the delivery chain, the project has faced a number of challenges, many of which are due to weaknesses in outreach and communication, and, in particular, limited implementation of the behaviour chance campaign (BCC) component. The evaluation findings suggest that while households were aware that there were two devices offered through the project, it is not clear that households made an informed selection. Further, we find that households struggled with the repayment process due to a lack of financial literacy or due to challenges using M-Pesa, in many cases requiring support from the village Chiefs and community champions (CCs) to facilitate repayments. As part of the enrolment process, we also find that almost half the households that enrolled in the project paid the commitment fee using money provided by project staff or family/friends.

In addition, the pilot project relies heavily on the Inua Jamii's delivery systems. While we find that targeting for the project was successful, with most households meeting the eligibility criteria, there was also the perception that not all vulnerable and most needy households had been included. By targeting beneficiaries of the Inua Jamii, the pilot project targets only vulnerable households that meet the Inua Jamii's categorical targeting criteria, while also inheriting the Inua Jamii's exclusion errors.

The Mwangaza Mashinani pilot project also piggybacks on the Inua Jamii payment systems, including in terms of timing. This means that challenges faced by Inua Jamii beneficiaries in

accessing their regular payments are inherited by the project. In particular, payment delays are problematic for the pilot project, as households are not able to make timely repayments to the solar providers, resulting in their lights being switched off.

Awareness and use of devices

Our findings suggest that the pilot project's objectives related to improved awareness of solar devices and their benefits, and the use of the solar devices for lighting and charging mobile phones, have been largely achieved. Specifically, awareness of the benefits of solar energy among beneficiary households at midline is high and has improved over time compared to baseline. The usage of solar sources for lighting has significantly increased since baseline, to cover the majority of beneficiary households, while the use of some other sources of lighting has declined. The main uses of the solar devices reflect the pilot's ToC's indications and include charging mobile phones, providing light for the family, using them for productive purposes, and supporting children's study time.

Additionally, the use of the solar devices has also produced unintended positive effects for beneficiary households, including a better sense of security provided by light at night, staying connected by having charged mobile phones and radios, and improved social capital within communities.

Impact

This report presents the midline findings, which provide preliminary indications of the project's impact, shortly after the project finished (i.e. all payment cycles had concluded), in terms of livelihoods and health. Due to limitations associated with a remote survey, the midline survey could not cover all modules related to project outcomes and impact that were included in the baseline survey, such as women and children's time use. In addition, it was not possible to measure impact on education as part of the midline evaluation, due to the closure of schools in Kenya during the COVID-19 pandemic. A more detailed, comprehensive – and thus conclusive – impact analysis, including on education and children's and women's time use, will take place at endline.

At midline, our findings suggest that the pilot project has had no impacts on the health of beneficiary households, and a modest impact on their livelihoods. While the prevalence of respiratory conditions among household members has decreased over time, to reach very low levels at midline, there is no evidence that this improvement in health outcomes can be attributed to the Mwangaza Mashinani pilot project. There is, however, evidence that the pilot project has had a positive impact on some livelihood outcomes, such as the number of working household members and the diversity of activities by households. However, this has not translated into additional income for households. There is therefore no conclusive evidence at midline on the impact of the project on livelihoods. The broader and more comprehensive impact analysis that will be undertaken at endline will help shed light on the pilot project's impact on this and other domains. Table 1, in Section 1.2 of the report, summarises the different areas that the pilot project is expected to affect, as well as when this impact is going to be measured as part of the evaluation, whether at midline or, more fully, at endline.

Efficiency

In terms of coordination, our findings suggest that the pilot project is well coordinated at the county level, through the county technical working groups, but that national-level coordination could be strengthened. The pilot project has been implemented using local structures that are also part of the Inua Jamii, and has set up its own structures to embed the project in the communities, although awareness of these structures is limited.

Findings from the VfM analysis indicate that the pilot project meets the definition of providing 'average' VfM. The pilot project has managed to minimise the transaction costs attached to delivering the cash top-ups, as well as operational and staff costs. However, contractual services for the implementation and evaluation of the pilot project cost more than expected. Some reasons for this relate to delays and challenges emerging from contextual factors, some unforeseeable at the planning stage. While the pilot project followed sound procurement practices for the selection of the solar suppliers, the final cost of the solar devices was above the budgeted amount.

We also find that the majority of activities have been implemented within budget, although the pilot project allocated significantly larger resources to set-up and inception activities, as well as implementation, compared to the budget. This was due to delays in the procurement practices and due to challenges emerging from contextual factors, some of which were unforeseeable. Despite the initial delays, by June 2020, the pilot achieved most logframe targets. Nonetheless, 22% of enrolled households decided not to purchase the solar devices, and 30% of beneficiaries do not regularly make repayments for the devices. With a unit cost per beneficiary of US$ 296[3] compared to an average transfer of US$ 151 per beneficiary to pay for the solar device, the pilot shows a modest level of efficiency in the use of resources, owing in part to the innovative approach tested by the project and learning and start-up costs associated with a pilot phase.

Sustainability

The preliminary assessment of sustainability suggests there is a high degree of commitment to scaling up the pilot project by the national government. However, solar devices are expensive products for the target market and are highly subsidised by the project in order to 'seed' the market. The issue of financial sustainability will need to be addressed in any scale-up scenario.

While at midline it is too early to assess sustainability at the household level, as a majority of beneficiary households still have a fully functioning device, early indications suggest that households might struggle with the costs (replacement parts and repair services) of maintaining the devices. This will be explored fully at endline.

[3] This excludes the costs for the external independent evaluation and costs associated to UNICEF's technical assistance and quality assurance.

Recommendations

Relevance: to ensure that the project remains relevant for both users and suppliers of solar devices a number of elements should be considered:

- The design of the second phase of the pilot project should consider whether and how affordability can be further addressed, with particular consideration given to setting the value of the commitment fee and the type of solar products offered for purchase to beneficiaries. For example, the pilot project could consider removing the commitment fee altogether as we find that the majority of households did not pay the fee themselves, but, at the time of the midline, had working devices and continued to use their device frequently.
- The second phase of the pilot project should be used to 'sell' the project to additional solar suppliers. To this end, the project should raise awareness among solar suppliers, drawing on the successes and lessons learned during Phase 1, including the findings from the evaluation to date, and the potential for involvement in the scale-up, to attract further suppliers to sign memoranda of understanding with the project in Phase 2.
- A de-risking mechanism, such as the 85% guarantee offered to suppliers, should be retained in the second phase of the project to leverage private sector financing and to support considerably de-risked opportunities for the private sector in a traditionally commercially unattractive sector.

Effectiveness: to improve the effectiveness of implementation, there is an opportunity to refine the existing pilot project operations or to test alternative models for implementation during Phase 2 of the pilot before a full project scale-up, including considering which aspects of the Inua Jamii's delivery systems to piggyback on.

- It is imperative that a strong communication and engagement strategy is developed in order to strengthen the processes of sensitisation.
- Gender should be explicitly incorporated into the pilot project's design and implementation: for example, tailored communications around promoting the benefits of solar energy (which might be different for men and women), ownership and usage of the product (which may have unintended impacts on women's time poverty), maintenance of the product, and capacity building (e.g. focusing on training female agents and CCs while taking their needs into account, such as security concerns, means of travel etc.)
- The pilot project should consider whether all the categorical targeting criteria are required for the expansion phase, or whether different categorical criteria might be more appropriate to improve inclusion. Further, the pilot project's focus on enhancing access to modern energy for vulnerable households in underserved communities suggests that a more inclusive approach to targeting, that covers both Inua Jamii and non-Inua Jamii households, could be better suited to achieving this objective.
- The repayment model should be reviewed to ensure that payment delays are properly accounted for, and protocols for extending light to households during payment delays should be agreed with suppliers in advance.

- The grievance and case management procedures should be reviewed, consolidated, and documented. To simplify the process for households and improve service delivery, these procedures should allow households to lodge any type of grievance with any of the grievance channels. Project points of contact (POCs) should be properly trained to deal with any grievance or case management issue related to the project.
- The project management information system should link to the Social Protection Secretariat's (SPS's) Single Registry, and, once it is rolled out, the Enhanced Single Registry, either directly (preferable) or using the complementary module.

Impact: to ensure that a comprehensive assessment of impact is undertaken it is recommended that a full endline evaluation take place in order to measure the full set of impact indicators related to health (e.g. experience of eye irritation and burns), livelihoods (including women's time use), and, crucially, children's education (including study hours).

Efficiency: to improve project coordination and to embed it in local systems, the structures set up to coordinate and facilitate project implementation in the communities, the counties, and at national level should be consolidated and strengthened.

- The role of the national technical working group and national steering committee should be clarified among key stakeholders.
- At the community level, greater awareness raising around the role of CCs should take place to ensure that they are able to provide support to households.

In addition, **to enhance the economy of procurement and efficiency in the use of project resources**, we propose the following:

- The pilot project should intensify its efforts around better budgeting and forecasting of expenses, to minimise overspending. The project should improve its documentation of unexpected expenses, and the risk mitigation strategy that is in place. Budgets could be combined with sensitivity analysis based on risks, to estimate the financial implications of potential risks.
- The accuracy of the management information system should be enhanced to better track the pilot project's performance and the beneficiaries' accounts. This would improve the ability to identify beneficiaries, and to track payments to suppliers and transfers to the banks. A standardised system should be in place, and should be agreed and used across stakeholders, to consistently report project information.
- The pilot project should consider updating targets in light of the evolving circumstances, as well as clearly outlining data sources and how indicators are derived.
- Using the existing government system is likely to enhance harmonisation of service delivery and to be a sustainable solution if the GoK is willing to take ownership and scale-up the project. However, the pilot project could have considered the implications of running on existing systems, and what the implication might be for control and reporting, and ensuring payments are made on time. In particular, given the crucial importance of regular repayments to use the solar devices, a mitigation strategy should be in place as part of the project planning to prevent deactivation of the devices due to delayed repayment caused by

delayed disbursement of the Inua Jamii transfers. The project could explore ways to better integrate and track data and better handle information management across the different parties involved in the project implementation and the government systems. This would improve tracking of beneficiaries and payments.

Sustainability: to support households' maintenance of the devices and support the scale-up of the project, the second phase of the pilot project should have an explicit focus on sustainability, with an eye to scaling up.

- Engagement with key stakeholders at the national level should be deepened to ensure that there is sufficient buy-in for scale-up. In particular, the implementing consortium should consider more intense engagement with the Ministry of Energy (MoE) and Kenya Off-grid Solar Access Project (KOSAP) on the design of the pilot for Phase 2, to enable the presentation of a viable and tested model that could be considered for scale-up by KOSAP.
- In addition, it is important that the pilot project expand and strengthen the formal role of CCs, so that they are able to continue to provide support to households as they begin to experience maintenance issues beyond the project cycle.

Finally, we recommend that during the inception and preparatory activities of Phase 2 of the pilot project's implementation the ToC is revised to update the impact pathways and underlying assumptions based on learnings to date. For example, unintended outcomes/impacts, such as improved security and social capital, could be included in the ToC for Phase 2. In addition, assumptions, such as that regarding households' willingness to pay the commitment fee, should be revised.

1 INTRODUCTION

UNICEF has contracted OPM to conduct an independent evaluation of the GoK's Mwangaza Mashinani pilot project, which is being implemented in partnership with UNICEF.[4] The pilot project is providing cash top-ups for purchasing solar devices[5] to selected households residing in off-grid communities with school-going children and who are currently enrolled in the Cash Transfer for Orphans and Vulnerable Children (CT-OVC), Older Persons' Cash Transfer (OP-CT), or Cash Transfer for Persons with Severe Disabilities (PWSD-CT) in Garissa and Kilifi counties.[6] The purpose of the pilot project is to generate evidence on the impact of solar devices on households' (particularly women and children's) well-being in terms of education, health, and livelihoods, as well as to understand how a market for solar devices can be developed in underserved regions.

1.1 The intervention context

In December 2018, the GoK launched its National Electrification Strategy to achieve its goal of universal energy access by 2022. Achievement of this goal will require densification of the national grid services, expansion of grid services where economically possible, and provision of off-grid energy solutions (such as solar devices and mini-grids) in areas where grid provision is not viable.

Kenya has seen rapid increases in electrification over the past few years, increasing grid access for Kenyan households from a rate of 25% in 2011 to 64.5% in 2018, according to Power Africa (2018). Despite this, there remain large inequities in electricity provision, with close to 95% of the population not having access to electricity in rural parts of the country (Willcox *et al.*, 2015). These households typically use kerosene lighting, which comes with high operational costs, provides low-quality light, and can have adverse effects on household members' health and the environment (Rom *et al*., 2017). The UNICEF proposal for the Mwangaza Mashinani pilot project suggests that these areas of the country, representing about 2 million households, could be served by off-grid energy solutions, as extending grid access to remote regions is very costly.

Kenya has a rapidly growing and innovative solar market. However, most of the large solar suppliers are concentrated in the western and central parts of Kenya (Energy4Impact *et al*., 2018). Since the national grid does not fully extend into the northern and the eastern parts of the country, they remain underserved in terms of energy access. While solar suppliers exist in larger towns, including Garissa Town and Kilifi Town, their networks rarely extend into more rural parts of the counties. Although the GoK's KOSAP,[7] supported by the World Bank,

[4] Phase 1 was implemented between December 2018 and June 2020 while Phase 2 will be implemented from April 2020.
[5] The pilot project was designed to have a strong BCC component. However, this was limited in implementation and did not form a core part of the project.
[6] The evaluation focuses only on households enrolled in the CT-OVC or OP-CT, as households enrolled in the PWSD-CT were included in the eligible population as an addition during sensitisation and enrolment, after the baseline had concluded.
[7] The purpose of KOSAP, which targets underserved counties, is to increase access to modern energy services through four components. The second component, which is of relevance to this project, is to increase access and ownership of standalone solar devices and clean cooking solutions for households in underserved counties by facilitating and incentivising entry of the private sector into underserved regions. The project does not specifically address issues of consumer affordability.

will create incentives for suppliers to move into remote regions, which will help to increase the availability of solar products in general, the poorest households will remain excluded due to the issue of product affordability.

The GoK has made significant progress in building the National Safety Net Programme, which has expanded cash transfers to the most vulnerable segments of the population. In 2020, the CT-OVC, OP-CT, and PWSD-CT programmes, collectively known as the Inua Jamii, transferred Kenya shillings (KSH) 4,000 (approximately US$ 37) to over 1 million households on a bi-monthly basis. Over the next five years, the GoK has prioritised the 'cash plus' agenda, based on the assumption that the impacts on households' well-being are greater if cash transfers are complemented and linked with other interventions and programmes. The cash plus agenda hopes to help households to diversify their incomes as well as to access essential services, such as energy services.

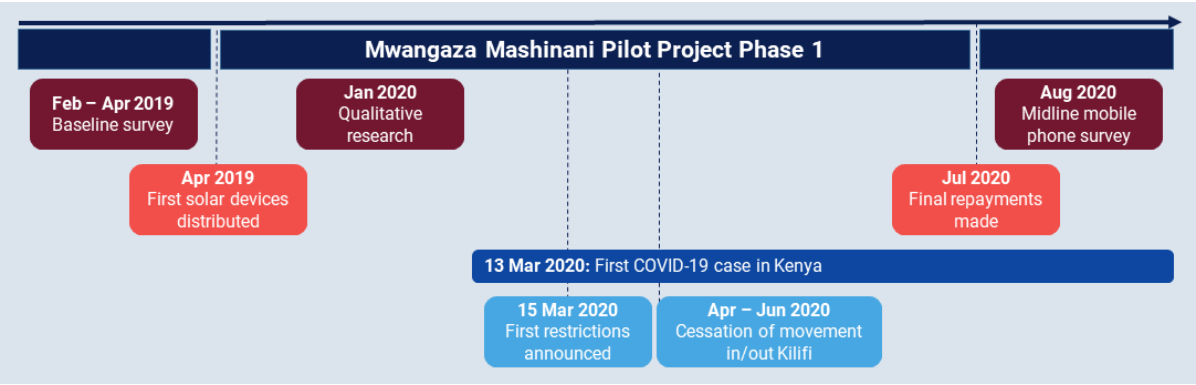
1.2 The Mwangaza Mashinani pilot project

The Mwangaza Mashinani pilot project is an innovative pilot project that is designed to enhance energy access for the most vulnerable segment of the Kenyan population in order to increase their well-being in terms of health, education, and livelihoods, with a particular focus on women and children. This is expected to be achieved by:

- Households reducing the use of kerosene and/or candles for lighting resulting in a reduction of indoor air pollution and fire hazards and, ultimately, a reduction in the prevalence of acute respiratory infections (ARI), burns and eye irritation.
- Children increasing the number of hours that they spend studying at night by using solar lighting, resulting in improved educational outcomes.
- Households using the solar device to increase productive activity, diversify livelihoods and reduce net energy expenditure, resulting in an increase in household income.

Additionally, the project seeks to develop markets for solar energy by increasing the penetration of solar products in previously underserved communities. This will be achieved by providing incentives to participating solar suppliers to extend their networks into hard-to-reach areas by incorporating a de-risking mechanism into the project. The project is offering a guarantee to suppliers that will pay 80% of the value of the device in the event that a household defaults on their re-payments.

Figure 1: Timeline of implementation and research



UNICEF, with funding from the Swedish International Development Agency (Sida), is supporting the GoK in implementing the pilot project. The first phase was implemented over

a one-year period by a consortium led by Energy4Impact (E4I), with the Busara Centre for Behavioural Economics and Somali Aid. The implementation timeline and timing of research activities is shown in Figure 1.

The project is expected to improve the well-being of beneficiary households in terms of household members' health, children's education, and household livelihoods by enhancing access to and use of energy for the most vulnerable segment of the population, developing markets for solar energy, and increasing penetration of solar energy solutions in targeted communities. The solar energy solutions promoted by the pilot project are small solar devices. Table 1 summarises the key expected outcomes of the project based on the ToC. For a full presentation of the ToC, see Figure 32 and Annex A in Volume II.

Table 1: Key expected outcomes based on the ToC

Outcomes based on ToC	Impact expected based on baseline findings	Timing of measurement
Household members' health:		
Reduced prevalence of ARI	**No impact expected:** Very low prevalence of ARI, in the first place, and continued use of firewood for cooking.	Midline and endline
Reduced prevalence of eye irritation	**Small, positive impact expected:** Shift to solar devices for lighting, but continued use of firewood for cooking.	Endline only
Reduced prevalence of burns from lighting	**Small, positive impact expected:** Shift to solar devices for lighting, but continued use of firewood for cooking.	Endline only
Children's education:		
Increased children's study hours	**Positive impact expected:** Majority of time spent studying outside the school is in the dark hours, and there is widespread acknowledgement of the benefit of solar lighting for studying.	Endline only
Household livelihoods		
Increased livelihood activities	**Small, positive impact expected:** Potential for increase in livelihood activities, but limited scope for achieving this increase given low power output of solar devices. The time use analysis at baseline also shows that around one-third of adult female household members can be considered as time poor. Hence, the potentially negative impact on time poverty will also be assessed at endline.	Midline and endline
Reduced expenditure on energy	**Small, positive impact expected:** Potential for reduction of expenditure on energy, but continued use of firewood for cooking may limit this reduction.	Endline only

The Mwangaza Mashinani pilot project is designed to address the issue of affordability of solar products for the poorest segment of the population. The project provides subsidies, through a bi-monthly cash top-up, to households enrolled in the Inua Jamii who wish to purchase a small solar device for lighting. The purpose of providing cash top-ups (subsidies) for purchasing the devices, rather than distributing free solar devices, is to foster a sense of ownership of the devices among beneficiary households, as well as to avoid introducing distortions into the market for solar devices. In addition, the pilot project is designed to piggyback on the Inua Jamii's delivery systems in order to embed the project in the GoK and to improve the efficiency of delivery. This is further discussed in Box 1.

Box 1: Designed to piggyback on the Inua Jamii

The Mwangaza Mashinani pilot project was designed to piggyback on the Inua Jamii cash transfer system. The purpose of piggybacking on the existing cash transfer system is to support strengthening government systems and to ensure that the project is integrated into the system to enhance sustainability. The piggybacking occurs in a number of ways:

First, the pilot project is targeting vulnerable households, which is achieved by targeting only beneficiaries of the Inua Jamii. The Inua Jamii is categorically and poverty targeted, using a proxy means test, with the objective of reaching the most vulnerable households meeting the categorical criteria. The Mwangaza Mashinani pilot project chose to piggyback on the targeting on the assumption that the Inua Jamii already reaches the most vulnerable households.

Second, the pilot project is piggybacking on the GoK's payment systems by using the same partner banks and transferring the top-ups into beneficiaries' bank accounts. This payment mechanism was selected to reduce the time and money spent by beneficiaries in accessing their money and to minimise the risk that top-up funds are used for consumption.

Third, the pilot project planned to integrate the Inua Jamii's grievance mechanism into the project's operations such that beneficiaries could use the hotline (or other channels of communication) to raise grievances with the project.

Fourth, the pilot project is working with the same outreach structures as the Inua Jamii, including Chiefs and Beneficiary Welfare Committees (BWCs).

Finally, the pilot project planned to feed into the Ministry of Labour and Social Protection's (MLSP's) information systems by feeding data from the project into the Single Registry using the complementary module.

During this first phase of the pilot project, the implementing consortium signed a memorandum of understanding with two solar device suppliers, d.light and Bright Sky Solar Solution (distributors of the BioLite solar device).[8] In order to incentivise their expansion into underserved and hard-to-reach areas in Kilifi and Garissa, the project provides a guarantee mechanism to the suppliers to ensure that they receive 85% of the value of the solar device in the case of default on the repayments by households.

The first phase of the pilot project targeted 2,000 vulnerable households in selected sub-counties in Kilifi and Garissa.[9] The sub-counties and locations were selected through a

[8] Initially, a third supplier, Green Light Planet, was also part of the pilot project, offering households Sun King solar lanterns. While a small number of households selected this product, Green Light Planet withdrew from the project shortly after it began.

[9] In Kilifi, seven locations in Ganze and Magarini sub-counties were identified as most vulnerable. In Garissa, nine locations across Dadaab, Fafi, and Ijara sub-counties were selected.

vulnerability assessment,[10] which concluded in December 2018, which ranked sub-counties and locations in each county based on a number of selection criteria.[11] In each location, eligible households were identified for participation in the project through a verification exercise, which sought to register all households that are part of the Inua Jamii[12] and that had at least one school-going child, were willing to pay a small commitment fee (KSH 250),[13] and did not already have a solar device. Eligible households were then invited to a *baraza*,[14] where they were given information about the project and provided with information on the solar devices that they could choose to purchase through the pilot project. This *baraza* was also attended by households who were not registered during the verification exercise but who met the eligibility criteria. After this, interested households were asked to pay the commitment fee, using their own funds, and were enrolled in the project.

Once enrolled, households were part of the Mwangaza Mashinani pilot project for six payment cycles (totalling 12 months in all). During this time, households were required to repay the solar suppliers on a pay-as-you-go basis. Every two months, households received their Inua Jamii transfer and, at the same time, the cash top-up to be used for the solar device. In each payment cycle, households were asked to withdraw their cash top-up, or transfer it to their M-Pesa[15] account, and purchase a token from the solar supplier, which activates the solar device for 60 days.[16] The bi-monthly payment schedule is shown in Table 2. Once the number of days for which the light had been paid had passed, the device was switched off and households needed to purchase another token to turn the device back on. This process was repeated for six payment cycles and once all six repayments were made, households owned their device and no longer needed to pay the suppliers to keep it activated.

Table 2: Repayment amounts, by funding source

Solar device	Source of funds	Cycle 1 (KSH)	Cycles 2–6 (KSH)
d.light	Cash top-up	3,050	2,100
	Household's contribution	250	-
	Total	3,300	2,100
BioLite	Cash top-up	2,850	2,100
	Household's contribution	250	-
	Total	**3,100**	**2,100**

[10] For details on the methodology and recommendations, see (2018) 'Energy and cash plus pilot project in Kilifi & Garissa counties. Vulnerability assessment report', E4I, Kenya.
[11] In Kilifi, these were: 1) off-grid; 2) geographically remote from infrastructure and services; 3) school performance is poor; 4) sufficient numbers of households enrolled in the CT-OVC programme; 5) high levels of insecurity; 6) high rates of early pregnancy and rape; 7) areas prone to floods; and 8) no livelihoods. In Garissa, the criteria were the same as those applied in Kilifi with the addition of the prevailing security situation.
[12] The Inua Jamii is the GoK's flagship National Safety Net Programme, covering the beneficiaries of the CT-OVC, OP-CT, PWSD-CT, and Hunger Safety Net Programme. The objective of the Inua Jamii is to lift up the lives of poor and vulnerable citizens of Kenya through regular and reliable bi-monthly cash transfers.
[13] Initially, the commitment fee was KSH 500 but this was lowered to encourage more households to enrol.
[14] *Baraza* refers to a place where public meetings are held.
[15] M-Pesa is a mobile banking service that allows users to store and transfer money through their mobile phones.
[16] In the original design, households also needed to pay a small amount (KSH 200) from their own funds, in addition to the cash top-up, in order to purchase the token. This was later removed on affordability grounds.

Note: In the first payment cycle, the cash top-up was higher, to cover the KSH 1,000 deposit for the solar devices (UNICEF paid KSH 750, in addition to the KSH 250 commitment fee). The payment amounts were subsequently aligned for both products. In practice, payments in Cycles 2 and 3 and Cycles 5 and 6 were paid as a lump sum of KSH 4,200.

The first phase of the pilot project ended in June 2020. At the time of writing, UNICEF is preparing to support implementation of a second phase of the pilot project, targeting a second cohort of households in Kilifi and Garissa.

1.3 The evaluation

The primary purpose of this evaluation is to render a summative assessment of the impact of the pilot project, and to generate scientifically robust evidence on whether and how the project has impact on the quality of life of children and their families in terms of education, health, and livelihoods. The final evaluation findings aim to assess a proof of concept that project stakeholders can use to advocate for and facilitate government decision-making around the scale-up of the intervention.

The evaluation also has a formative purpose, to improve the processes of the pilot project. The evaluation evidence needs to facilitate decision-making regarding project implementation and eventual modification of the project's operations for Phase 2, as well as for scale-up, by looking in particular at the project's coordination and delivery systems.

The primary objectives of the evaluation can be summarised as follows:

1. An assessment of the **relevance** of the pilot project with respect to the needs of vulnerable households in Garissa and Kilifi.
2. An assessment of the **impact** on beneficiary households attributable to the pilot project, with a focus on women and children.[17]
3. An assessment of the **effectiveness** and **efficiency** of the project implementation process, with a focus on operational lessons and recommendations for Phase 2, scale-up, and **sustainability**.

1.3.1 COVID-19 evaluation redesign

Due to the outbreak of the COVID-19 global pandemic, the original evaluation plan articulated in the inception report became unviable. As the full implications of the pandemic emerged, it became clear that in-person fieldwork for the endline survey would not be possible in the form originally envisaged. OPM therefore submitted a proposal to UNICEF to revise the evaluation design. The evaluation was subsequently adjusted in order to achieve two objectives: 1) to ensure that crucial learning that will be useful for the pilot project's expansion and eventual scale-up is not lost; and 2) to gather timely evidence on COVID-19 to inform UNICEF's, as well as the GoK's and local county governments', response to the epidemic.[18]

In light of public health advice, we adjusted the survey modality and implemented a remote midline survey based on mobile phone interviews. This replaced the originally planned in-person endline survey and took place in July–August 2020. The mobile phone survey

[17] A full assessment of impact will be conducted as part of the endline evaluation. We present only a sub-set of impact indicators in this report.
[18] Further details can be found in the Evaluation Adjustment and Redesign Note (April 2020).

allowed us to gather valuable information in a timely manner on evaluation indicators (including exposure to the Mwangaza Mashinani pilot project, access to energy, and household livelihoods – see Volume II, Annex B) and, importantly, COVID-19 indicators (including COVID-19 knowledge and behaviour, and education activities during school closure). A full list of survey modules can be found in Volume II, Annex C. This survey did not represent a simple replacement of the original endline survey: it also fulfilled the additional research purposes. Due to time limitations associated with a remote survey, the midline survey could not cover all of the modules related to project outcomes and impact that were included in the baseline survey, such as women and children's time use and children's education. It is therefore recommended that a full endline survey takes place in order to comprehensively assess the impact of the pilot project.

1.4 Structure of the report

The midline evaluation report is presented in two volumes. The present Volume I sets out the midline evaluation findings, conclusions, and implications for policy, drawing on all research activities conducted to date. The report is structured around the Organisation for Economic Co-operation and Development's Development Assistance Committee (OECD-DAC) evaluation criteria and the evaluation questions articulated in the evaluation matrix (see Volume II, Annex B). Volume II contains the technical annexes to the midline report.

The remainder of Volume I is structured as follows: Chapter 2 describes the evaluation methodology and approach to each research activity. Chapter 3 presents the findings on the relevance of the pilot project for households, solar suppliers, and the GoK. Chapter 4 presents the findings on the effectiveness of the project's operations and includes a case study on the November 2019 switch-off. Chapter 5 presents the findings on the outcomes of the pilot project, focusing on awareness and use of the solar devices. Chapter 6 presents the findings on the impact of the project in relation to health and livelihoods, as well as a discussion of children's engagement in learning activities during the pandemic. Chapter 7 presents the findings on efficiency, including on coordination, engagement with community structures, and the results of the VfM analysis. The final results chapter, Chapter 8, presents preliminary findings related to the sustainability of the pilot project, focusing on stakeholder commitment to scale-up and early indications of households' sense of ownership and willingness to maintain the devices. Chapter 9 draws on the findings presented in this report and presents a midline assessment of the ToC. Chapter 10 provides conclusions and presents a set of recommendations for the project to consider in its second phase, and eventually in scale-up.

2 METHODOLOGY

This chapter sets out the evaluation methodology, with more technical details included in Volume II of the report. In this chapter, we present the mixed methods framework used for the beneficiary level analysis (Section 2.1), the quantitative research component (Section 2.2), and the qualitative component (Section 2.3). The chapter then proceeds, in Section 2.4, with the implementation review, and, in Section 2.5, with the VfM analysis. The methodology chapter concludes with Section 2.6 on risks and limitations.

2.1 Mixed methods evaluation framework

This evaluation has been designed in line with the 2016 United Nations Evaluation Group Norms and Standards and is guided by a theory-based approach, which draws on the project's ToC (see Chapter 9 and Volume II, Annex A) to identify the issues the evaluation should address. Through this theory-based approach, the evaluation aims to unpack the ToC causal chain leading from assumptions to impact (or lack thereof), to provide a better understanding of why change happens (or not).

The ToC was designed during the evaluation inception phase, in consultation with key stakeholders, including the evaluation team, the pilot project implementation team, and UNICEF, in order to provide the foundation for our theory-based evaluation. From the ToC, we also formulated key evaluation questions (KEQs). The KEQs were organised together with detailed sub-questions and indicators in an evaluation matrix according to the five overarching OECD-DAC criteria of relevance, effectiveness, impact, efficiency and sustainability (see Volume II, Annex B – Evaluation matrix)..

A mixed methods research framework was designed to answer the questions articulated in the evaluation matrix. Broadly, this framework combines four methodologies:

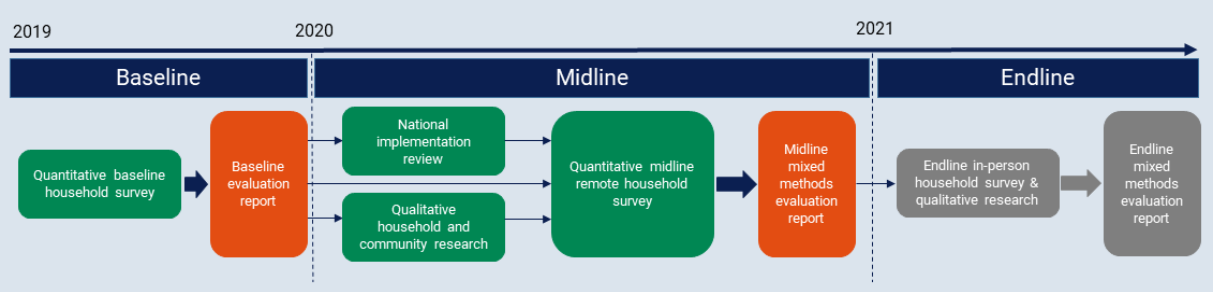
- **A quantitative research study** – to respond to questions of effectiveness and impact, and to support answers on relevance. This study is based on a quasi-experimental design and a quantitative household survey, which was implemented through an in-person survey at baseline and remotely through a mobile phone survey at midline (see Section 2.2).[19]
- **A qualitative research study** – to respond to questions of relevance and effectiveness, and to provide initial indications of sustainability.[20] This study is based on interviews with community leaders, community-based project support structures, and male and female household members (see Section 2.3).
- **An implementation review** – to respond to questions regarding the relevance and effectiveness of the project. This study is based on interviews with national-level stakeholders, including the GoK, UNICEF, and the implementing consortium (see Section 2.4).

[19] See Section 1.3.1 for details on how the quantitative evaluation was adjusted due to the COVID-19 pandemic.
[20] While the qualitative study was originally planned to respond to questions related to impact, due to the timing of the qualitative research, and the fact that the second payment cycle was delayed, we could not elicit qualitative findings on impact. We will seek to explore this at endline.

- **A VfM study**: The objective of this research study is to respond to questions of efficiency. It relies on data from UNICEF and the implementing consortium (see Section 2.5).

Figure 2 presents an overview of how the different research methods are sequenced as part of the evaluation timeline, which was revised and adjusted in response to the challenges posed by COVID-19 (see Section 1.3.1). At the beneficiary level, the initial findings emerging from the quantitative baseline survey were used to inform the sampling approach and research focus of the qualitative study at the household and community levels, which in turn fed into the design of the quantitative midline survey. This meant that the midline survey included indicators that we aimed to integrate with qualitative evidence, especially in terms of the effectiveness of the project's operations and the efficiency of its engagement with the local community.

Figure 2: Sequencing of quantitative and qualitative research methods



Mixing data in practice

Evidence from the four studies were first analysed by methods and sector specialists. Draft findings from each of these studies were drawn by each specialist team and shared with the wider evaluation team as they emerged. Given that each round of data collection and analysis was staggered from January to August 2020, the team met several times to keep abreast of the evidence as it developed. In order to write this report, research teams worked together to share findings and then proceeded to write up answers against each evaluation question. Each chapter has a lead author and a supporting author, based on the relevant methods used to answer the evaluation questions, but the findings are mixed in each chapter and overall conclusions have been drawn based on this mixed methods analysis.

Way forward

The impact of the pilot project was not investigated by qualitative research and was only partially covered by the quantitative midline survey, due to limitations of the remote survey mode and the consequences of the COVID-19 pandemic. The endline stage of the evaluation, which is currently planned to take place in early 2021, will provide a more detailed and comprehensive analysis of the overall impact of the pilot project, as well as of its scalability and sustainability over time. This comprehensive endline evaluation will thus represent a summative assessment of the pilot project and will benefit from a mixed methods framework whereby the quantitative impact estimation provides an exact measure of impact attributable to the pilot across a large range of indicators, while qualitative insights provide an explanation of the determinants of impact (or lack thereof).

2.2 Quantitative component

The objective of the quantitative impact evaluation is to determine whether the Mwangaza Mashinani pilot project has had an impact on its beneficiaries, and to quantify the scale of any impact detected. This estimation of impact is carried out within the context of a quasi-experimental design. The impact estimates produced at midline and discussed in this report are based on quantitative data collected via a remote mobile phone survey, which replaced the originally planned in-person endline survey (see Section 1.3.1).

The remote survey mode led to a reduction in the number and type of questions asked (see Volume II, Annex C for more details on the remote survey modality adopted). This also entailed a reduced number of impact areas and outcome indicators that could be covered at midline. While the final follow-up and new endline stage of the evaluation, which is currently planned to take place in-person, will investigate a larger range of potential effects of the pilot project, this midline is nonetheless a key stage of the evaluation. From a quantitative perspective, the midline evaluation analysis has the following three objectives:

1. To provide **descriptive trends** of changes in indicators of interest for the pilot project target population, between baseline and midline.
2. To provide a **descriptive picture** of the pilot project's implementation achievements in terms of beneficiaries' exposure to and engagement with the intervention.
3. To provide a **measure of impact** on a sub-set of indicators at the beneficiary level that is directly attributable to the Mwangaza Mashinani pilot project.

Specifically, impact is measured through propensity score matching on a reduced set of outcome indicators related to the following two impact areas covered by the midline survey:

- **Health:** The proportion of household members with ARI; the proportion of household members with a cough; the proportion of household members with a cough and a fever; and the proportion of household members with a cough and breathing difficulties.
- **Livelihoods:** The number of household members who are working; the number of productive activities per household; and the total monthly income per household.

Details on the impact analysis, including the propensity score matching approach, the results of the balancing tests, and the impact estimates for each impact indicator, are provided in Volume II, Annex E.

2.2.1 How to read the quantitative results in this report

Descriptive findings

Descriptive trends are presented in this report for a range of indicators of interest pertaining to the outcome and impact areas identified using the pilot project's ToC, and on which evidence could be gathered through the mobile phone survey. This pre/post trend analysis looks at the evolution between baseline and midline of key outcomes of treatment households. In addition, a cross-sectional analysis focusing on the description of indicators at midline provides a general idea of the intervention implementation features of the pilot project, as well as its reach among the target population.

Descriptive midline findings are presented for the 501 treatment households interviewed at midline in Kilifi and Garissa,[21] and, where relevant, the corresponding estimates at baseline are presented to assess the trends over time. Throughout the report, descriptive findings are presented for the treatment sample as a whole and also disaggregated across categories of interest, such as the location of the household (i.e. county), the gender of the household head or household member, and the cash transfer programme in which the household is enrolled. This disaggregation analysis is informed by the way in which the sample is structured across strata (see Annex C in Volume II of the baseline report).

These quantitative descriptive findings are presented graphically. The sample size for different indicators varies depending on the analysis target sub-sample, which is specified in the subtitle of each graph. The size of the sample upon which the analysis is conducted is reported in the notes at the bottom of each graph. For some of the outcome and impact indicators, the graphs display disaggregated results over time, with 95% confidence intervals showing where differences between baseline and midline estimates for each group are significant (e.g. Figure 13 in Chapter 5). Differences are considered statistically significant when the confidence intervals are not overlapping.

Detailed statistical tables for the treatment group are presented in Volume II, Annex I.

Impact estimates

For each impact area, two sets of results are presented in this report: the average treatment effect on the intent-to-treat (ITT), and the average treatment effect on the treated (ATT):

- **ITT**

  Impact is measured across all households that were originally registered for the pilot project and included in the treatment group at baseline, regardless of whether or not they actually received the solar devices.

  In more technical terms, the ITT covers every household that is surveyed in areas defined as treatment areas (according to the implementation plan) and ignores non-compliance or other factors that may prevent households from being treated. In the ITT analysis the impact estimates provide a measure of the effect of being offered, rather than actually receiving, the treatment, and is generally more conservative compared to the analysis of impact on observations that are all equally treated.

- **ATT**

  Impact is measured only for those households that were actually enrolled in the pilot project and that received the solar devices.

  In more technical terms, the ATT is indicative of the expected causal effect of the pilot when its constituent parts reach its intended beneficiaries. The ATT impact estimates are thus biased towards a sub-set of the population that may have been better placed to receive the intervention, and cannot be seen as representative of the overall impact of

[21] In total, 943 households were interviewed in the treatment and comparison groups at midline. However, similar to what was done in the evaluation baseline report, the midline descriptive findings are only presented for the treatment group (n=501). This is because a straight comparison of treatment and comparison descriptive statistics is not robust and can be misleading. By design, the two groups are not expected to be comparable, simply as a consequence of the sampling strategy adopted. In a quasi-experimental design, the comparison group only plays the role of constructing a counterfactual to the treatment group in order to determine whether any impact detected on outcome indicators is directly attributable to the treatment under evaluation.

the pilot. Our investigation of this bias suggests that the primary factors influencing the enrolment are location, gender, and type of cash transfer received. Specifically, more eligible and registered households in Kilifi were enrolled in the pilot than in Garissa, and more female-headed households and CT-OVC beneficiaries were enrolled (see Volume II, Annex D for more details).

Impact estimates are also presented graphically, with one graph per impact area for the ITT estimates and another graph per impact area for the ATT estimates (e.g. Figure 21 and Figure 22 in Chapter 6). Each graph shows point estimates for the average treatment effect on outcome indicators and 95% confidence intervals. This means that the probability that the true treatment estimate will fall within this area is 95%. When the confidence intervals of such estimates do not overlap with zero, this is an indication that this treatment effect is truly different from zero. A zero value is indicated using a red line in the graphs.

The impact indicators for household health used in this evaluation are proportions and estimates of treatment effects are given as percentage point changes. The impact indicators for household livelihoods are not proportions and estimates of treatment effects are given in units, as per the unit the indicator is defined in relation to (e.g. in KSH for household income and in number of household members for the indicator on working members per household).

Impact estimates are found in Chapter 6 of the present Volume I. Further details on ITT, ATT, and the results of the impact estimation are presented in Volume II, Annex E.

2.2.2 Sample achievement of the midline survey

Given the longitudinal nature of the evaluation, the same baseline households were tracked and re-interviewed at midline to create a panel of surveyed households. At midline, the quantitative survey respondents are members of the households that were successfully interviewed for the baseline survey and then again successfully traced and interviewed for the midline survey. The final quantitative survey sample achievement at midline is shown in Table 3, including the distribution by evaluation group and county. As can be seen, 943 households were successfully reached at midline, representing 80% of the households interviewed at baseline.

Table 3: Final midline sample (target and actual)

County	Target	Complete at midline	Completion rate (%)
Treatment	**600**	**501**	**83.5**
Kilifi	387	321	82.9
Garissa	213	180	84.5
Comparison	**586**	**442**	**75.4**
Kilifi	373	268	71.8
Garissa	213	174	81.7
Total	**1,186**	**943**	**79.5**

Volume II, Annex C provides further detail on the sample achievement of the midline survey, as well as the attrition analysis conducted to assess whether there is bias in the sample resulting from the attrition of households. Additionally, the sampling strategy adopted to select the sample at baseline, as well as the full technical details concerning the sampling

frame, sampling weights, and baseline sample distribution, are presented in detail in the evaluation baseline report.[22]

2.3 Qualitative component

The key focus of the qualitative component is the relevance, effectiveness, and sustainability of the Mwangaza Mashinani pilot project.[23] For further details on the focus of the qualitative study, including the specific KEQs answered by this component, see Volume II, Annex F.

- As part of the assessment of **relevance**, we assess the extent to which the objectives of the Mwangaza Mashinani pilot project respond to the needs of the target population and the communities it is serving. Crucially, we focus on the population of interest, which is 'the most vulnerable segment'. A key assumption of the qualitative component is that the needs of this particular population are greater than those of the 'poor', and that members of households and communities not only have varying needs but also varying power in accessing and using energy.[24]
- The **effectiveness** assessment focuses on the way in which the pilot project operations are functioning, in order to identify ways in which implementation can be improved. In addition, this assessment considers whether or not the project is improving access to and use of energy among the most vulnerable population, and how women in different households, as well as their communities, are benefitting (or not) from the project. In this regard, we explore whether and how the solar devices are being used, by whom, and in what ways. We also try to understand how and to what extent (if at all) the target population has improved their understanding of, and their ownership over, the solar devices.
- The **sustainability** assessment focuses on identifying factors that enable and hinder the likelihood that the targeted population will maintain their solar devices beyond the project cycle. Given that the pilot project seeks to reach the most vulnerable households, the qualitative research collected information early on in the life of the project on the affordability of the solar devices and their maintenance, and the extent to which the sampled households make an informed choice about whether to use solar devices, and to maintain them in the long run, taking into account other available sources of energy.

Qualitative sampling and tools

The qualitative research was conducted in January 2020 (eight months into implementation and prior to the onset of the COVID-19 pandemic). In total, we visited four villages: two in Garissa and two in Kilifi. The main qualitative tools used to collect data were semi-structured key informant interviews and community mapping with village leaders, CCs, and members of

[22] See Section 4.3 of Volume I of the evaluation baseline report and Annex C in Volume II.
[23] The main focus of the qualitative research that has been carried out was relevance and effectiveness. The qualitative design included preliminary indications on sustainability. However, data on this were limited as communities had only received the first cash top-up at the time of the research and still had to make several more repayments before fully owning their devices. Data collected in relation to sustainability have provided an early indication of the challenges related to sustaining the use of the devices, and have been included in this report.
[24] The qualitative study also considers aspects of the project and its assumptions that are not relevant to the target population, if any.

the BWCs; as well as in-depth interviews with households who are enrolled in the Mwangaza Mashinani pilot project.

- Key informant interviews were conducted with the village leader and a member of the BWC and/or CC in each village.
- Community mapping was conducted with the village leader and CC/BWC member to identify the physical, social, or economic landscape of the community. These maps provided a useful way to understand vulnerability, energy access, sources of conflict, or underlying challenges in the community.
- In each village, three households were selected and in-depth interviews were conducted separately with a man and a woman from the same household.

Further details about the qualitative approach can be found in Volume II, Annex F.

2.4 Implementation review

As part of the implementation review, we conduced qualitative interviews with stakeholders at the national level.[25] The purpose of this data collection was to generate evidence to address evaluation questions related to the relevance, effectiveness, efficiency, and sustainability of the project.[26] The interviews took place after six months of implementation and were timed such that the findings could be taken into account during the design of the second phase of the pilot. The findings and recommendations from the research were presented in a policy note and discussed during national- and county-level workshops held in Nairobi and Kilifi in February 2020.

Stakeholders for the implementation review were selected in consultation with UNICEF and covered funding agencies, development partners, the implementing consortium, and stakeholders from the energy sector and the social protection sector. Data collection took the form of semi-structured, qualitative individual or group interviews with project stakeholders, with most of the 15 interviews conducted face-to-face in Nairobi in November 2019. The same topics were discussed with different stakeholders to allow for triangulation and different perspectives to inform the evidence base. However, not all topics were part of the interview with each stakeholder and interview topics varied depending on the stakeholder's potential knowledge of the topic. Because of the large number of evaluation questions and topics to cover, the interviews could not explore each topic in-depth.

Further details can be found in Volume II, Annex G.

2.5 VfM analysis

The objectives of the VfM analysis are to review how much the Mwangaza Mashinani pilot project, as managed by UNICEF and implemented by a consortium led by E4I, has spent, and to assess whether the project has provided VfM, being '*the optimal use of resources to achieve intended outcomes*' (UK Department for International Development (DFID), 2011). Based on discussions with UNICEF, for the purpose of this midline analysis, we focused on

[25] County-level data collection with stakeholders in Kilifi and Garissa, which will complement the national level findings, is planned to take place at the same time as the endline survey.
[26] The evaluation matrix in Volume II, Annex B, indicates the different stakeholder interviews our answers to each of the evaluation questions will draw on.

two areas of VfM: economy and efficiency. By looking at these areas, we have attempted to answer the following research questions:

- **Economy:** Is the pilot project buying inputs of the appropriate quality at the right price? Inputs include staff, contractual services from external providers, and other goods and services that are used to produce outputs.
- **Efficiency:** How well does the pilot project convert inputs into outputs? Outputs are results delivered by the project, as measured by the project logframe. In this case, the cost efficiency analysis looks at the cost of delivering cash top-ups to beneficiaries, and the cost incurred by the project per beneficiary household.

Using the UK Foreign, Commonwealth and Development Office (FCDO) guidelines on VfM (DFID, 2011) and OPM's VfM approach (King and OPM, 2018), an assessment framework has been applied that sets out a transparent basis for making evidence-based judgements on VfM. Clarity is achieved by using explicit criteria (aspects of performance) and standards (levels of performance) for each of the VfM dimensions. The criteria and standards are specific to the Mwangaza Mashinani pilot project and aligned with the project's design and ToC. The VfM assessment is based on a comparison between the identified standards and project-level indicators for each criterion.

The core evidence base for this VfM assessment includes data that are routinely collected as part of the pilot project's monitoring system, UNICEF annual reports to Sida, E4I quarterly reports to UNICEF, the project implementation plan, contracts and memoranda of understanding with key input providers, and budget and expenditure data as recorded by UNICEF and E4I. The analysis also draws on a validation interview with UNICEF and E4I. This includes a mix of quantitative indicator-based measurement and qualitative contextual evidence.[27]

Volume II, Annex H provides further technical detail, including the VfM assessment.

2.6 Risks and limitations

An overarching limitation of the midline stage of the evaluation is related to the adjustments made in response to the COVID-19 crisis (see Section 1.3.1 and the evaluation adjustment and redesign note). Originally, the quantitative endline survey was expected to take place shortly after the completion of the qualitative research, and exactly one year after the quantitative baseline survey. However, due to the COVID-19 pandemic, the endline survey was postponed and redesigned as a midline survey, and was implemented six months after the completion of the qualitative fieldwork. Therefore, the quantitative and qualitative research activities took place at different points in time in the implementation of the pilot project, and in different contexts, due to the implications of the COVID-19 mitigation measures.

The rest of this section discusses specific limitations of each research study.

The main limitation affecting the **midline quantitative analysis** concerns the remote nature of the quantitative household survey. Although the midline survey was implemented robustly using computer-assisted telephone interviewing software and a data monitoring system that

[27] In this report, costs are reported in US$ and KSH. For reference, at present, the exchange rate applied is KSH 1 = US$ 0.0092.

ensured the quality of the data (see Volume II, Annex C, for more details), the number and type of questions through which data could be collected had to be curtailed due to the more stringent time requirements of the remote survey mode. As a consequence, the quantitative midline analysis is limited to a restricted number of indicators and, specifically, only covers a sub-set of health and livelihood indicators (see Section 6). An impact analysis on the full range of impact areas and indicators detailed in the evaluation matrix will only be possible at endline, if and when in-person data collection can take place.

Another risk with respect to the quantitative household survey data concerns a potential seasonality effect between the baseline and midline survey rounds. Whereas baseline data were collected between February and April 2019, midline data were collected in July and August 2020. The two periods represent pre- and post-rainy season periods, respectively, which means that a substantial seasonal difference was avoided by not collecting data for either survey round during the rainy season. In other words, it is reasonable to assume that seasonality would have been a stronger concern if the midline research had been conducted during the rainy season. However, it is still possible to expect some seasonal differences between the two rounds of data collection, compounded by the contextual differences due to COVID-19. These potential differences are mitigated in the impact analysis by the use of a counterfactual-based design in which both treatment and comparison groups were equally affected by the two different seasons/contexts. As a result, any seasonality effect is cancelled out in the estimation of impact, though not in the descriptive trend analysis.

Finally, the quasi-experimental impact estimates are characterised by limited external validity, since the treatment effect is defined only in respect to households eligible for (ITT estimates) or actually enrolled into (ATT estimates) the pilot project, which may be systematically different on average to households that were not targeted by the Mwangaza Mashinani pilot project. The propensity score matching approach only measures impact for the treatment households that were successfully matched to the corresponding comparison households, and its results are thus not generalisable to all vulnerable households in Kilifi and Garissa.

The qualitative component was originally designed as part of the endline evaluation activities. Therefore, the research questions and framework were developed to respond to the endline evaluation questions that would aim to provide a summative assessment of the Mwangaza Mashinani project. Owing to changes in the design as a result of COVID-19 (see Section 1.3.1), OPM had to make changes to the design and presentation of the evaluation. As qualitative data collection was completed, the analysis and findings presented in this report were adapted to provide a midline assessment of the pilot project.

The implementation review was designed to take place at both the national level and the county level. The county-level interviews were planned to take place at the same time as the originally planned endline survey, in June 2020. However, due to the COVID-19 pandemic, it has not yet been possible to conduct these interviews as they require travel to the counties. This is an important research gap that will need to be filled during the endline research.

There exist some limitations to the **VfM assessment** analysis. First, some inconsistencies in the data limit our ability to assess comprehensively all areas of VfM. There are some discrepancies on the spending and results as reported by different data sources, which have not been fully clarified. Budget data and actual spending are not reported based on a standardised coding approach: the budget is disaggregated by activity, while spending is coded according to the cost centre money was spent on (e.g. personnel, travel, contractual

services, etc.). This makes comparability of budget and spending data difficult and this has required the team to make a set of assumptions in order to analyse the efficiency of the project.[28] Second, the evaluation team was not able to access some data disaggregated at the appropriate level for the spending incurred by the consortium led by E4I, which limited the extent to which certain aspects of the VfM assessment could be explored and expanded upon.

[28] These assumptions are outlined in the VfM Technical Note.

3 RELEVANCE

Box 2: Summary of findings related to relevance

The pilot project's objectives seem to be relevant for both the targeted beneficiary households (given their lack of access to modern energy sources) and the solar energy suppliers that are interested in exploring new remote markets. The project is also relevant and aligned to the GoK's agenda.

- **Energy access:** The majority of households enrolled in the pilot project do not have access to modern energy sources for lighting and mobile phone charging, and affordability is cited as a key constraint on accessing solar energy.
- **Energy market:** Both solar suppliers were interested in continuing to be involved in the pilot project. Both noted that the guarantee is an important feature of the project, which incentivises and de-risks their expansion into underserved areas and markets.
- **Policy context:** The pilot project is aligned with the GoK's social protection and energy objectives, although the level of lighting provided is low.

In this chapter, we explore the relevance of the project for households and their communities (Section 3.1), the solar suppliers (Section 3.2), and the GoK in relation to its priorities for social protection and electrification (Section 3.3).

3.1 Relevance to the needs and priorities of the target population and their communities

The findings from the baseline survey indicated that almost all households enrolled in the Mwangaza Mashinani pilot project have limited access to modern energy sources for lighting and mobile phone charging, with only a small minority owning a solar device or solar lantern (3% of households for both) prior to implementation. The baseline survey also found that half of respondents would be interested in buying a solar device. However, among those who did not want to purchase a solar device, affordability was seen as a key constraint.[29]

Qualitative research confirms that financial constraints are the key reason households choose not to buy solar devices. This is especially evident in a community sampled by the qualitative study in Garissa that had previously been selected to participate in the Millennium Village Project (MVP).[30] Several households enrolled in the Mwangaza Mashinani pilot project had previously received a solar device as part of the MVP. Their original solar devices had since stopped working and, despite the benefits that they had offered, households had not bought another device because they could not afford to.

> *'There is a very big problem about power. All government activities work under solar. Several schools are operated with solar and people progress economically through solar. When [you] need power, you purchase your own generator or equip yourself*

[29] A full discussion of relevance can be found in the baseline evaluation report.
[30] The MVP was a 10-year, multisector, rural development project, operating in 10 sites in 10 African countries. The project implemented integrated interventions, with solar devices distributed as part of the infrastructure strengthening initiative. For further details, see here.

with a solar device. The common person has no power and he/she stays in a blackout. Wake up in a blackout and sleep in the blackout.'

Chief, Garissa

Across the board, national stakeholders interviewed as part of the implementation review felt that the pilot project was relevant for households. Specifically, they noted that 78% of households that enrolled in the project actually purchased the solar device, which was deemed a success given that households had to pay a commitment fee to enrol in the project and were initially expected to fund part (~10%) of the two-monthly repayment themselves. Further, the solar suppliers reported that a few households had selected more powerful (and more expensive) solar devices than those offered through the project.

Stakeholders noted that some households that did not meet the pilot project's eligibility criteria were also interested in the solar devices, with a small number of these households purchasing the devices themselves on similar pay-as-you-go repayment terms. The midline survey findings corroborate this, as 22% of households that were not enrolled in the project[31] were found to have used a solar device for lighting in the 30 days prior to the survey.

3.2 Relevance for suppliers

Initially, the Mwangaza Mashinani pilot project signed memoranda of understanding with three solar suppliers. However, shortly after the project began, Green Light Planet pulled out of the project, citing challenges in reaching remote areas and the inability to modify its business model to fit the project's design. In addition, stakeholders interviewed as part of the implementation review speculated that its withdrawal was either due to low demand for solar lanterns, in comparison to solar devices, or the relatively small size of the project in relation to Green Light Planet's regular sales volumes.

From the remaining solar suppliers' perspective, the pilot project is seen to be relevant and interesting as both d.light and Bright Sky Solar Solution have a social impact motive alongside operating as for-profit companies. Both suppliers mentioned the guarantee mechanism as an important part of the project, which de-risks the expansion of their businesses and increases their willingness to venture into new markets.[32] As part of the implementation review, both suppliers noted that they would be interested in expanding the project within Kilifi and Garissa or to new counties, caveating that they would need a similar de-risking arrangement to be in place for expansion into similar markets to be feasible.

3.3 Alignment with government policies

The pilot project is aligned with the social protection sector's priorities to support households to live a life of dignity and to enhance the capacity and opportunities for the poor and vulnerable to improve and sustain their livelihoods and welfare. The GoK has implemented a number of 'cash plus' projects in pursuit of these objectives. Stakeholders in the Social Assistance Unit (SAU) and SPS noted that spending on energy was a priority for them given that the provision of access to clean energy helps to achieve their objective of reducing

[31] This refers to non-compliant treatment group households and comparison group households.
[32] At this stage, data are not available on how many times the guarantee has been used. This will be explored at endline.

poverty and enabling households to live a decent life. Promoting linkages between the social and non-social sectors was also part of Sida's strategy.

In addition, the project is aligned with the MoE's priority of achieving universal electrification by 2022, which requires provision of energy solutions to the poorest households. The MoE's approach, including under KOSAP, is to facilitate entry of the private sector into underserved regions by de-risking their expansion. However, the Mwangaza Mashinani pilot project's approach is complementary to the efforts of KOSAP, which does not have a subsidy focus and hence does not address the affordability constraint on the demand side. If the MoE is to reach the most vulnerable segment of the population, who are most financially constrained, a focus on affordability will be crucial.

It is worth nothing that, while aligned with the MoE's priorities for lighting, the Mwangaza Mashinani pilot project only provides a low level of energy access for lighting, and does not address the issue of clean cooking solutions for households. The implementing consortium and stakeholders in the energy sector acknowledged the project as a starting point in terms of trying to reach the most vulnerable households with clean energy solutions.

4 EFFECTIVENESS OF PROJECT OPERATIONS

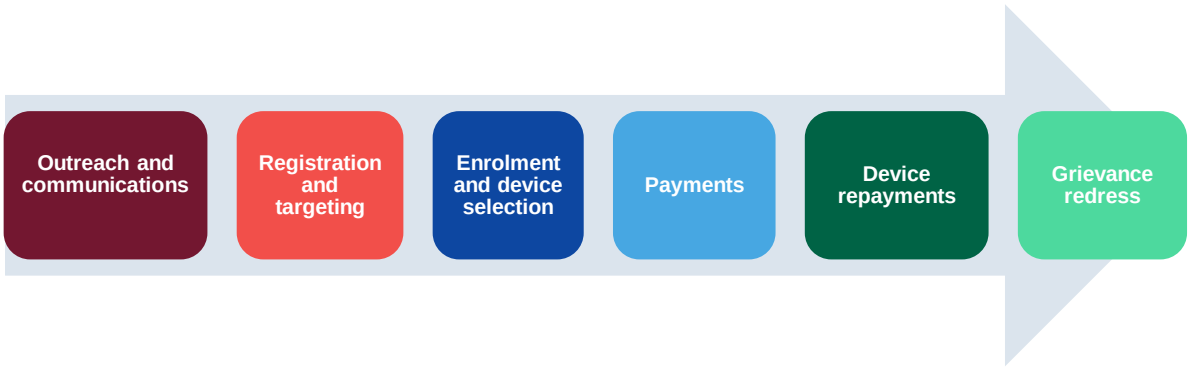
Box 3: Summary of findings related to effectiveness of project operations

Overall, the pilot project was able to successfully register, target, and enrol over 2,000 vulnerable households in the first phase of the project. The project was also able to distribute solar devices and deliver six cash top-ups to beneficiaries (with the final payment successfully disbursed during the COVID-19 pandemic). However, along the delivery chain, a number of challenges have been faced, many of which are due to weaknesses in outreach and communications due to limited implementation of the BCC component. In addition, the project relies heavily on the Inua Jamii's delivery systems, especially for targeting and payments, and therefore weaknesses in the Inua Jamii's service delivery are inherited by the project.

- **Outreach and communications:** Weakness in outreach and communications has undermined other aspects of the pilot project's service delivery.
- **Targeting and registration:** Targeting was successful, with most households meeting the eligibility criteria. However, there was also the perception from some village leaders that not all vulnerable households had been included.
- **Enrolment:** The project was able to meet and exceed its enrolment target in the first phase of implementation, although 33% of households in our evaluation sample that were intended to be treated did not enrol. The process of enrolment differed by community, which undermined the original intended registration and targeting process.
- **Commitment fee:** Almost half the households that enrolled in the pilot project paid the commitment fee using money provided by project staff or family/friends.
- **Device selection:** While households were aware that two devices were offered through the project, it is not clear that households made an informed selection.
- **Cash top-up payments:** Challenges faced by Inua Jamii beneficiaries in accessing their regular payments were inherited by the project. Payment delays are problematic as this undermines households' ability to make timely repayments to solar suppliers.
- **Repayment process:** Households struggled with the repayment process due to a lack of financial literacy or challenges in using M-Pesa, in many cases requiring support from the Chiefs and CCs to facilitate repayments.
- **Grievance mechanisms**: The majority of households are not relying on the appropriate contact person for problems related to the devices or cash top-ups.

In this chapter, we explore the effectiveness of the Mwangaza Mashinani pilot project's operations, as depicted in Figure 3, including outreach and communications (Section 4.1), registration and targeting of beneficiaries (Section 4.2), enrolment of beneficiaries and device selection (Section 4.3), payment and repayment mechanisms (Section 4.4), and grievances redress (Section 4.5). The chapter concludes with a case study on the mass switch-off of devices in November 2019 caused by payments delays in the Inua Jamii (Section 0).

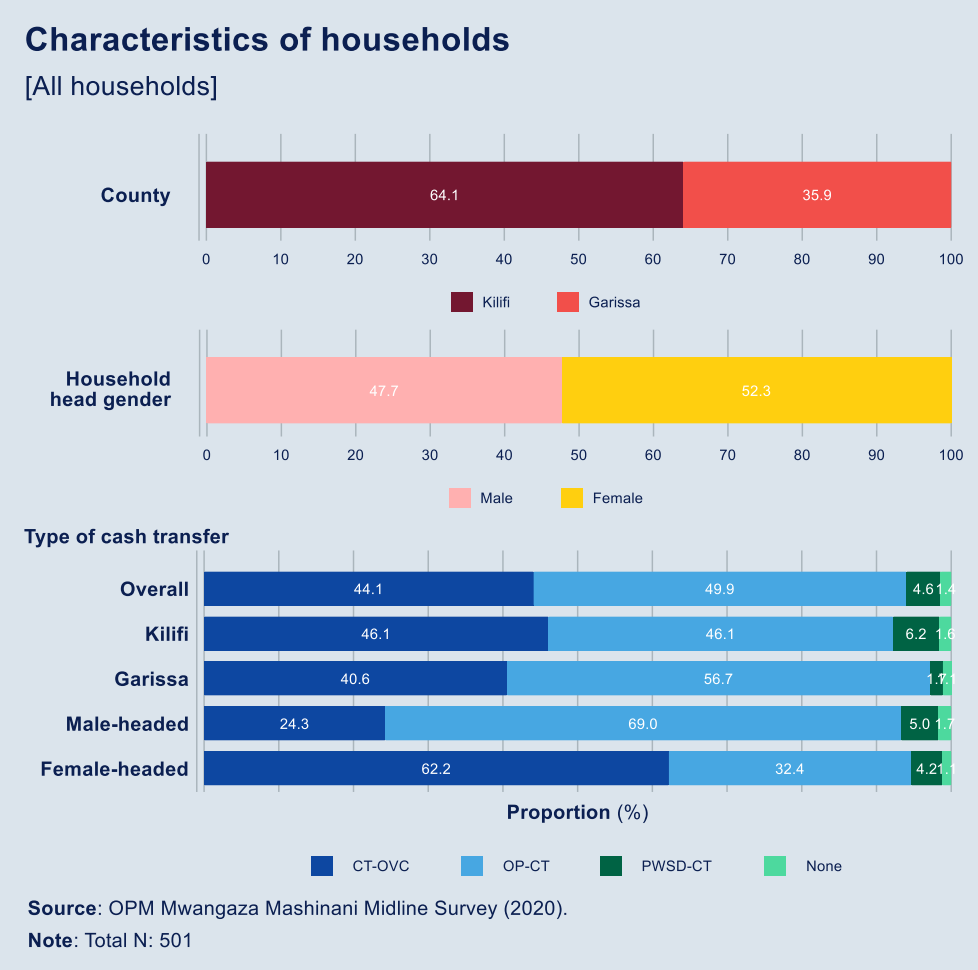
Figure 3: Mwangaza Mashinani pilot project service delivery system



Population characteristics

To situate the findings from the qualitative research and midline survey, we first describe the characteristics of the households in the evaluation sample. As shown in Figure 4 about two-thirds of sampled households reside in Kilifi and about one-third in Garissa. Overall, there are slightly more female-headed households (52%) than male-headed households (48%), though Kilifi has significantly more female-headed households than Garissa.

Figure 4: Characteristics of households



Source: OPM Mwangaza Mashinani Midline Survey (2020).
Note: Total N: 501

Among our sample, 50% of households are recipients of the OP-CT, while 44% are recipients of the CT-OVC. A very small percentage (5%) are recipients of the PWSD-CT.

Figure 4 shows marked gender differences in terms of types of cash transfer, where female-headed households are more likely to be enrolled in the CT-OVC (by 38 percentage points) while male-headed households are more likely to be enrolled in the OP-CT (by 37 percentage points). We also see differences across counties, with significantly more households in Garissa being recipients of the OP-CT (by 10 percentage points).

The average household size is eight, with slightly larger households found in Kilifi compared to Garissa. On average, just over half of household members are female, with slightly more female members per household in Kilifi than Garissa.

4.1 Outreach and communication

The evidence presented in this section is based on the qualitative research study.

4.1.1 Outreach

Outreach by the Mwangaza Mashinani pilot project was targeted at households and other relevant stakeholders, including local community leaders. Planned activities included conducting sensitisation meetings, mini-road shows, and *barazas* on the benefits of solar energy, and trainings on equipment use and ensuring sustainable and regular repayment.

Awareness was raised by project stakeholders, including solar companies, government departmental representatives, and Chiefs, as well as BWC members and CCs, who mobilised the community via *barazas* with the implementing consortium and solar suppliers, or via BWCs canvassing homesteads prior to hosting *barazas* for sensitisation purposes. In some villages, beneficiaries reported that the benefits of the solar devices were also conveyed through a media campaign. Aside from formal awareness raising, we find that awareness of the use of the solar device was also created by households observing their neighbours benefitting from solar devices, and through other projects that have also distributed solar devices (e.g. MVP – see Section 3.1).

Qualitative findings suggest that the project indeed conducted sensitisation meetings about the solar devices and engaged the support of leaders and CCs. However, the effectiveness of outreach was variable: not all members of the community were informed in time about the meeting or its purpose. In some cases, meetings took place quickly, without adequately assessing participants' understanding of the topics discussed.

In some villages, households that received information during a BWC member's home visit felt they had a better opportunity to ask questions and receive information. In other cases, it was felt that the awareness-raising campaign was most successfully implemented in conjunction with in-person meetings with the community when these were also convened with village leaders, BWC members, and CCs. Both villages in Garissa felt that the effectiveness of the awareness-raising campaign was limited by the restricted signal for radio or television transmission.

4.1.2 Ongoing communication

The pilot project was designed to include ongoing communication with the project's stakeholders, including updating community leaders about the project, with messages to be cascaded to beneficiary households. Throughout implementation, regular messaging to

households was required to provide information on processes across the delivery chain, including the registration and enrolment processes, the cash transfer payments (and delays), repayment mechanisms, and grievance redress.

Our findings show that appropriate communication systems were not adequately set up at the start of the project, leading to challenges in beneficiary selection. The village Chief – often the first point of contact for new initiatives being introduced in the community – was expected to mobilise people and serve as a 'witness' that solar devices had been received by households. However, Chiefs reported that they received limited information about the project enrolment process, including on how beneficiary lists were generated. Furthermore, Chiefs received information in a non-uniform way, sometimes through government sources, and other times through the project itself. While the rationale for not consulting Chiefs on beneficiary selection was to ensure free and fair targeting and enrolment, clearer communication about generating beneficiary lists would have engendered stronger buy-in, especially as Chiefs are often the main point of contact when households have queries. Some Chiefs received a letter ahead of a visit from programme staff, explaining the programme, and solar providers presented pamphlets that explained the difference between the two solar devices during outreach meetings. However, most of the communication was through word of mouth.

Lack of clarity around eligibility and enrolment filtered down to the CCs, BWCs, and households themselves. Discussions with households revealed confusion around enrolment, including why some households that were eligible had not received the solar device. In Kilifi, one possible explanation is that training was provided to *all* households that attended the sensitisation meeting, but not all households would be enrolled (although they could purchase the solar devices themselves). However, we find that this process unduly raised households' expectations, the negative effects of which are likely to have offset the benefits of creating future demand for the solar device product.

Several households interviewed in the qualitative research had retained high-level information about the project, but could not provide specific details about the process.

> *'I don't know it as Mwangaza Mashinani… We were told that old people were getting the money, and there is a lady that came to me, she wrote my name and my phone number and left. When the solar was ready I was called and was told to come to town, and they wrote things about us. They came again and told us that we will be getting money for the solar. They told us it would come with the money for the elderly people. I then took KSH 2,850. I don't know anything about this programme. I think it is an NGO, but I don't know the name.'*
>
> Male beneficiary, Garissa

Inefficiencies in communication also affect the payment and repayment processes. For example, at the start of the pilot project, some households did not receive the money and therefore did not go to pick up their device. In Kilifi, others received the top-up prior to receiving the device, and used it for other purposes and so did not pick up their device. BWCs interviewed felt that more sensitisation was needed to ensure that when the top-up came into bank accounts, beneficiaries would be instructed to start paying from the very start, rather than repurposing the top-up. The perception is that the responsibility for this sensitisation lies with UNICEF, the Chief, the BWC members, and other community leaders.

There is substantial reliance on BWC members in Kilifi and in Garissa, by both the Chiefs and beneficiaries, in regard to understanding how the Inua Jamii and solar device payment systems interact with each other.[33] Responses from the BWCs, CCs, and Chiefs suggest that they do not fully comprehend the repayment system, including details on the commitment fee and managing subsequent payments. This is compounded when the Inua Jamii payments are delayed. The lack of BWCs' awareness creates greater confusion among beneficiaries, especially when beneficiaries (in Kilifi in particular) rely on the BWC to provide payment-related information and support their solar device repayments. One of the Chiefs at the same location in Kilifi reported relying on the BWC member to brief him on the breakdown and duration of the cash transfer when it is released.

The implementing consortium also used interactive voice response calls and text messages to communicate with households about repayment, and also distributed brochures and FAQs. However, concerns about this communications approach included whether interactive voice response calls or text messages reached the relevant household member, and how to communicate technical issues to people with low levels of technology literacy.

Finally, it is also worth noting that while the pilot project was conceptualised as having an explicit gender focus, it was clear during the implementation review and the qualitative research that gender was not considered in the design of the communications strategy. Findings from the implementation review suggest that the difference in access or needs for women and men was not considered when designing the communication. Qualitative research finds that the household head was invited to the *barazas*, and usually the oldest male member attended the meeting.

4.2 Registration and targeting

4.2.1 Registration

The qualitative research finds that the pilot project did not follow a systematic process for registration. Households were registered in different ways, depending on their location. In Kilifi, some households were not aware of the project or the registration process, but were asked by village elders to go to the Chief's house and register their names. Solar devices were then distributed according to this register. In Garissa, and from the perspective of the BWCs, not all households who registered on the first day of the project received a solar device, though some received the solar cash transfers nonetheless. This has led to speculation and mistrust about why some people have been registered and received the solar devices, whereas other who may have registered or attended meetings have not received the devices.

In all four communities, BWCs, CCs, and households felt that the process of registering and enrolling households and distributing the solar devices could have been streamlined further. They suggested presenting clear information on what the process ought to be, and who to contact to ask questions or redress grievances if the BWC or CC were unavailable or unaware of what to do to improve their enrolment experience. BWCs and CCs reported a lack of training provided to them by the pilot project.

[33] The baseline survey found that only 23% and 11% of households in Kilifi and Garissa, respectively, were aware of the BWC in their community. The qualitative research was conducted six months after baseline.

'There are people who the first day, were told about the solar and their names written but have not been given solar yet and they are receiving the solar money…I don't know how it happens but I hear so… but I don't know who...they are. I will find out soon.'

BWC member, Garissa

4.2.2 Targeting

Overall, the pilot project has been effective in targeting communities and households that would otherwise not have been able to afford the solar devices. Findings from the baseline survey indicated that households in the evaluation sample targeted by the project[34] (although not necessarily enrolled) largely met the project's eligibility criteria.[35]

The pilot project also sought to target the most vulnerable households in Kilifi and Garissa. This was achieved by piggybacking on the Inua Jamii's poverty-based approach and only selecting households enrolled in the Inua Jamii for the Mwangaza Mashinani pilot project. While we did not assess quantitatively whether beneficiary households are indeed the *most* vulnerable, our qualitative research suggests that the project was appropriately targeted:

'To speak the truth, the programme has really helped because most of them had no lights, they slept like that. They used tin lamp, and the smoke enters the nose, they were suffering. But when the programme came, people now are happy. Children now study well as she has said. It is like a gift from the organisation without them giving money.'

BWC member, Kilifi

Elsewhere, a BWC member in Garissa perceived the targeting process to have been conducted systematically. Despite this, there was also a feeling that the eligibility criteria excluded some vulnerable households from being part of the project in Garissa and Kilifi. Village leaders suggest that, going forward, the project could also target vulnerable households outside of the Inua Jamii. Stakeholders interviewed as part of the implementation review echoed this sentiment, recognising that the Inua Jamii does miss some vulnerable households, due to exclusion errors and categorical targeting. While there are merits to piggybacking on the existing cash transfer system (see Box 1), the project's decision to piggyback on the Inua Jamii's targeting approach means that, by design, only a sub-set of vulnerable households are eligible to enrol in the pilot project, and vulnerable households not covered by the Inua Jamii will be missed.

4.3 Enrolment and selection of a device

4.3.1 Enrolment

The project successfully enrolled 2,134 beneficiaries in its first phase of implementation, of which 63% were female. While the pilot project design documents emphasise the

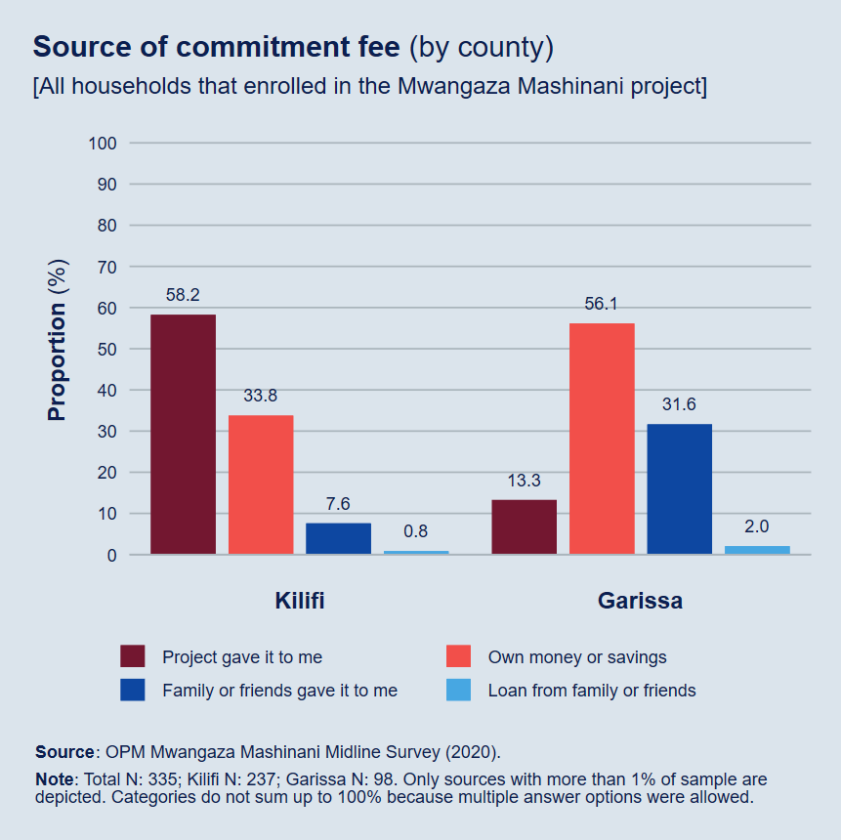
[34] Some households that were enrolled in the pilot project were not listed as part of the verification exercise, and therefore were not included in the baseline survey's sample frame. For this reason, we cannot assess the extent to which these households meet the project's eligibility criteria.

[35] The final project eligibility criteria differed from those presented in the project's operations manual as some criteria were altered after the verification exercise indicated that fewer households were eligible for the project than had been anticipated.

importance of targeting women as part of the project, during the implementation review it was clear that there was no explicit gender focus in terms of targeting female beneficiaries (either as the household head or households with female children).

The qualitative findings suggest the enrolment did not follow through as per the plan. Not only were processes different in each county, they also differed across villages within counties. Deviations were often to the detriment of the project's design and undermined the sense of ownership of the solar devices that the project sought to achieve. One such deviation was where the solar devices were provided without requiring beneficiaries to pay the commitment fee. Another deviation, notably in Kilifi, occurred where a project representative paid the commitment fee on behalf of the beneficiaries. Both examples are likely to have undermined the sense of ownership of the device and process, and to have created a false demand for the products. These findings are corroborated by both the BWCs and households in Kilifi, who stated that the initial KSH 250 was provided by a project representative to register.

Figure 5: Source of commitment fee (by county)

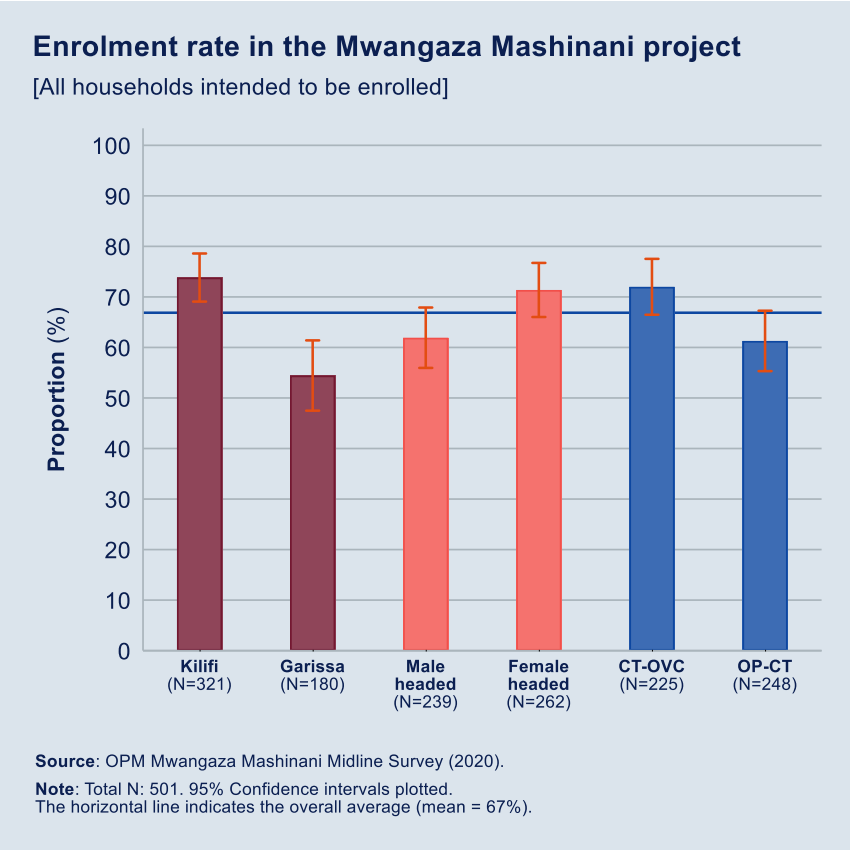


The midline survey confirms that this problem was widespread (Figure 5): slightly less than half (45%) of beneficiaries reported that they received the money for the commitment fee from the project. In Kilifi, the majority of households (58%) relied on project money to pay for the commitment fee. However, only 13% of households in Garissa reported this having happened. Indeed, more households in Garissa cited using their own money or savings and family networks as sources for the payment of the commitment fee.

The qualitative research found additional disparities in the subsequent enrolment processes. In one Garissa community, the enrolment process was described as systematic: social services, child welfare, and solar suppliers informed the BWC about the project; engaged

them in a sensitisation process; and distributed solar devices in a *baraza*. In another Garissa community, a team of implementers delivered the message to the BWC about the benefits and affordability of solar, before proceeding to visit potential beneficiary houses one by one.

Figure 6: Households intended to be treated that enrolled in the pilot



The *ad hoc* enrolment processes followed in each community resulted in households not originally listed during the verification exercise enrolling in the pilot project, as well as, conversely, households identified during this exercise not enrolling in the project. The midline survey shows that only 67% of the households that were intended to be enrolled in the pilot project at baseline (that is, the sample of households that formed our treatment group at baseline) actually ended up enrolling in the pilot project and receiving the solar device (Figure 6). The enrolment was more successful in Kilifi, although still below the initial target: 74% of targeted households actually enrolled, compared to only 54% of targeted households in Garissa. We also find significant differences in the enrolment rate by gender of the household head and type of cash transfer the household receives. More female-headed households enrolled (71%) than male-headed households (62%), while more CT-OVC recipients (72%) enrolled than OP-CT recipients (61%).[36]

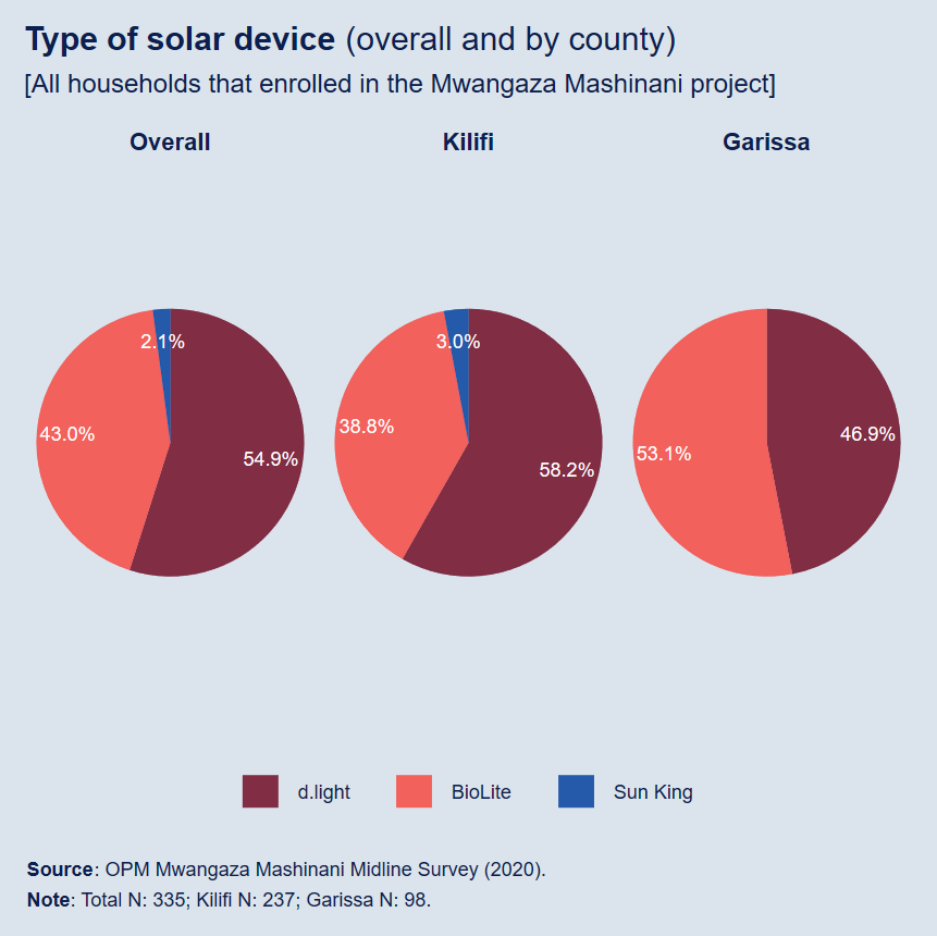
4.3.2 Selection of the devices

The qualitative research finds that households were aware of there being two solar devices offered through the Mwangaza Mashinani pilot project: the device manufactured by d.light

[36] It is important to note that household head gender is correlated with cash transfer type, and both are correlated with county (as shown in **Error! Reference source not found.**). In order to isolate their correlations with enrolment in the project, we conducted a simple regression analysis. We find that all three factors are independently correlated with the probability of enrolment in the project (see Volume II, Annex D).

and the device manufactured by BioLite. Households were asked to choose their preferred device. Midline survey results showing that 55% of beneficiaries selected the d.light device while 43% selected the BioLite device (Figure 7). Significantly more households in Garissa selected the BioLite device (by 14 percentage points).

Figure 7: Type of solar device selected by households



The qualitative findings suggest that respondents' familiarity with using non-project solar devices, and awareness of the cost of the devices, were contributing factors in the selection of the device. Some households in Garissa perceived that most beneficiaries chose the d.light solar device due to familiarity with the product (e.g. from purchasing d.light devices independently), or from receiving the d.light device through other programmes, such as the MVP.

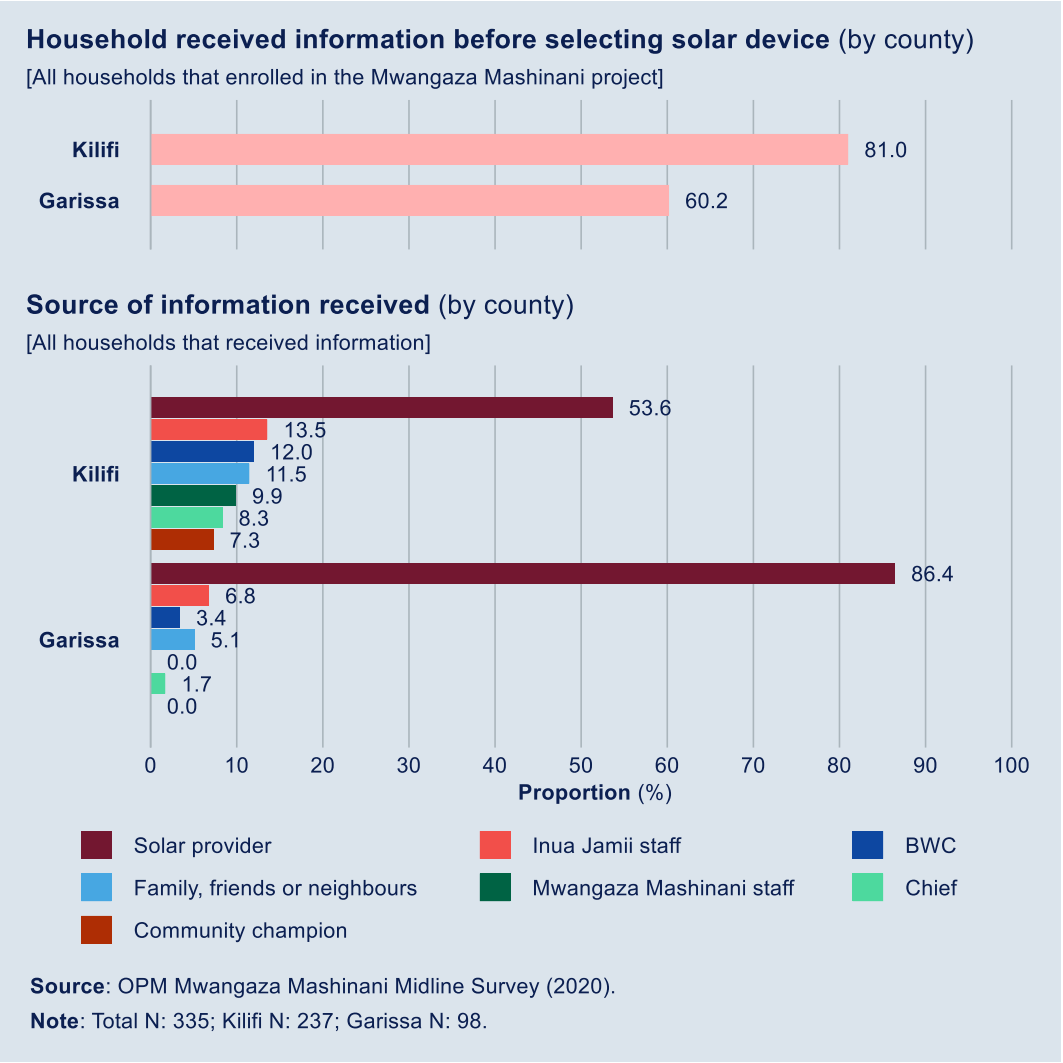
Beneficiaries were aware of the difference in cost between the d.light and BioLite solar device kits. In several household qualitative interviews, it was explained that the first repayment for the BioLite device was KSH 2,850, compared to a first payment of KSH 3,150 for the d.light device. Further, interviews with households demonstrated an awareness that repayments were later adjusted to align the repayment amounts for both devices.

Knowledge about the difference between these two devices is variable, which can partially be explained by differences in processes for informing communities about the devices, and the extent of household-level engagement by the BWCs, CCs, and solar providers. The level of literacy and numeracy of beneficiaries appeared to impact households' capacity to make an informed choice between the two devices. This may have been an issue for many

households, given the low levels of literacy found in the baseline survey: 83% of heads in beneficiary households had never attended school. In some communities, solar suppliers brought sample devices to demonstrate the benefits of each device and to inform beneficiaries' choice. In other communities, households were provided with a leaflet and asked to select their device. Some households chose the particular device simply because they were being asked to make a choice between different images on a card. It is therefore unclear whether a real 'choice' was made between the two devices. The following excerpt relays a male household member's account of how his mother (the beneficiary) chose the BioLite device:

> *'Actually on that I don't know, because when she came to explain it to me, she said they were shown about it from a picture and my mum is illiterate. From the first explanation they got they were given and shown from a picture to choose from with her other counterparts. So, she pointed out and chose from the number of pictures that were shown there, so when she pointed it, it was the BioLite solar.'*
>
> Male household member, Kilifi

Figure 8: Information received by beneficiaries prior to device selection (by county)



Source: OPM Mwangaza Mashinani Midline Survey (2020).
Note: Total N: 335; Kilifi N: 237; Garissa N: 98.

The midline survey corroborates these findings, showing that provision of information about the solar devices before selection varied across counties. A sizeable minority did not receive any information at all. Specifically, three-quarters of beneficiaries reported receiving information about the device before they selected it. Figure 8 shows that this proportion was significantly higher in Kilifi than in Garissa (by 21 percentage points). The main source of information about the device prior to selection was from solar providers (cited by 61% of households), followed by Inua Jamii programme staff (12%), BWC (10%), and family, friends, or neighbours (10%). There are county-level differences as well, with significantly more households in Garissa receiving the information from solar providers while households in Kilifi relied more on the BWC, Mwangaza Mashinani project staff, and CCs.

Finally, the qualitative research demonstrates a potential lack of understanding about the level of service and features of the solar devices provided by the pilot project. Greater sensitisation around the differences between the two devices (beyond cost), and around the range of different devices available for purchase locally by each manufacturer, will serve to quell any unrealistic expectations or impressions of being short-changed by the solar devices available for purchase through the project.

4.3.3 Distribution and take-up of the devices

As part of the implementation review, both suppliers felt they were sufficiently well-established in the counties to distribute the devices. Bright Sky Solar Solution has staff in the counties who carry out sales and provide after sales service, while d.light uses an agent model, which it believes is an attractive model for local young people, who become last-mile distributors who receive a commission once a household signs up for a device.

There were some initial issues in terms of distributing the devices at the same time as the first top-up payment, which resulted in some households not taking up the devices as they had used the funds by the time the devices were available. However, stakeholders felt this was likely to be a one-off issue. Despite this, take-up during the first round of payments was close to 70% and was judged to be a success.

4.3.4 Installing and operating the devices

The qualitative research finds that households in both Kilifi and Garissa were able to install and use the solar devices effectively, with the support of CCs and non-project community members. Household interviews suggest that some training was provided to them, with fairly detailed instructions provided in an accompanying manual, which covers, for example, how the power flows towards the panel, how to connect lights, how to fix the device to any walls, and where to fix the phone charger. However, the BWC members feel that more ongoing sensitisation is needed (e.g. every three months) to enable households and the community to maintain their devices in the long run (see Section 8.2).

We find that selection and installation of the devices is usually entrusted to elder sons by older beneficiaries (OP-CT beneficiaries, aged 65+ years) and those who are illiterate. While the device is registered in their name, elderly beneficiaries rely on their children to provide their contact details at registration at sensitisation meetings, to decide whether the device should be acquired, to install and operate the device, and, in some cases, to assist with repayments once Inua Jamii payments and cash top-ups are received. There is a hesitance among elderly female beneficiaries, in particular, to operate the device, for fear of damaging

the apparatus, and elder children teach them how to switch the device on and off, but nothing more complex beyond that. This means women do not use the devices to their full potential: for example, for powering a radio or charging their phones.

4.4 Cash transfer payments and device repayments

4.4.1 Cash transfer and related challenges

The payment and repayment structure of the Mwangaza Mashinani pilot project is designed to align with the schedule of payments under the Inua Jamii. Cash top-ups are supposed to be disbursed to households on a bi-monthly basis, at the same time and to the same bank account as the regular Inua Jamii cash transfer payments. This alignment is crucial to reduce transaction costs for households (e.g. transport costs and withdrawal fees) and to reduce the risk that the top-up is spent on immediate other needs, including consumption, education, and health.

It is worth noting that, during Phase 1 of the pilot project, payments of the cash top-up were made to the banks in parallel by UNICEF, rather than through the government's systems. Stakeholders did not think it would be efficient for the payments to be fully integrated with the government payments at this stage, as this would be time-consuming and burdensome. This does mean, however, that the implementing consortium is needed to do the reconciliation and update the payroll. It is still to be determined who would take this on when scaling up the project.

The biggest challenge faced by the project has been the unpredictability of the timing of the Inua Jamii payments, and by implication cash top-ups, which has affected the timing of the repayments. Delays to the Inua Jamii resulted in two combined 'double' payments taking place as part of the Mwangaza Mashinani pilot project: cycles 2 and 3, and cycles 5 and 6 were combined. The implementing consortium did not have a protocol in place for managing these delays, despite stakeholders being aware that delays occurred frequently. In both Kilifi and Garissa, households appear to be accustomed to – though nonetheless frustrated by – delays to their Inua Jamii payments that sometimes last four to six months and result in households receiving a lump sum payment to cover the missed period.

In Kilifi and Garissa, beneficiaries have not been forewarned about delays. They either contact the Chief when the cash transfer is delayed, or, in some cases, the Chief proactively informs them when he receives news of a delay. In Kilifi, delayed Inua Jamii disbursements are communicated to the Chief and the household waits to collect their payment. When the cash transfer arrives in bank accounts, bank agents come to the nearest town to disburse the cash, but in some cases, elderly, infirm beneficiaries need assistance with collection. In most cases, male household members – either the owner of the solar device or the son of the owner – is informed that the Inua Jamii cash transfer has arrived. This household member also helps make the payment for the solar device to the solar provider. Alternatively, in some communities, BWCs and CCs are relied upon to help make the payment for the solar device. The evidence from Garissa is mixed: some households reported receiving text messages alerting them to upcoming payment delays, while others reported no such forewarning – in several cases, households chose simply to wait until the payment eventually arrived.

Inua Jamii payment delays create incentives for beneficiaries to re-purpose the top-up funds they receive from the Mwangaza Mashinani pilot project, as they would have reverted to other forms of energy use when the lights were switched off and may not necessarily feel compelled to go back. Community leaders and CCs interviewed as part of the qualitative research highlighted that delays in cash transfers in some cases have knock-on effects on households' likelihood of making solar device payments on time. In most cases, households wait for the Inua Jamii transfer to arrive and rarely report paying from their own money when there are delays.

The process of collecting payments is difficult for old and vulnerable recipients, and the focus of the Mwangaza Mashinani pilot project on targeting remote locations presents additional challenges. For beneficiaries residing in these areas, the transaction and personal costs incurred to withdraw the Inua Jamii cash transfer from the bank, even before any solar device repayment is made, can be high. Oftentimes, unverified news is shared in the community that the Inua Jamii money has reached their banks and beneficiaries incur unnecessary travel costs only to discover the funds are not available. On these occasions, households either have to make the journey home without the money or stay overnight in town (incurring a cost) and try again the next day. These challenges are exacerbated in one location in Garissa, which does not have bank agents who are willing to travel to their community for small transactions.

4.4.2 Repayment to solar providers

The midline survey finds that most beneficiaries (92%) used their last cash top-up to pay for their solar device. However, qualitative interviews suggest variable levels of understanding of the solar device repayment process, which can be attributed to a lack of financial literacy; a lack of knowledge about what they are entitled to as part of the Inua Jamii cash transfer; a misalignment of payments between the Inua Jamii and the Mwangaza Mashinani pilot project; and challenges using M-Pesa. As a result, several stop-gap arrangements have emerged.

In Kilifi, difficulties were experienced with the mobile top-up process and, as a result, in-person payments are preferred, particularly among some of the elderly beneficiaries. To this end, the solar supplier meets beneficiaries at the Chief's office to receive repayments. In some cases, the solar device is brought in by older children of beneficiaries to solar providers' offices to make payments. Other beneficiaries emphasise a reliance on CCs to help enter token numbers, in order to make repayments, onto the solar device.

Households also make repayments by bringing the money to the BWC member, who then makes payments through M-Pesa so that tokens are released to switch on the device. In Garissa, some beneficiaries wait for bank agents to come to the community to withdraw their cash transfer, and make the solar device payment with the help of the BWC member.

One of the BWCs in Garissa had the perception that households do not fully understand the repayments which they are being asked to make. Illiterate beneficiaries struggle with the process and need support to make the repayments. It becomes even more difficult to manage repayments when the Inua Jamii and top-ups are received at different times. Some beneficiaries are said to not understand the concept of an account number, and even when they withdraw the money, they do not understand the transfer value of the Inua Jamii vis-à-vis the Mwangaza Mashinani pilot project, or know how to make the repayment:

'They don't understand the time the tokens get finished, it remains 10 days, seven days, they don't know until solar is switched off. Again, they don't understand the money for the old people and money for the solar, they see all the money belongs to them and they squander all the money saying it belongs to them… they see it as that of the old people. So, it is difficult even if you explain to them, they don't understand.'

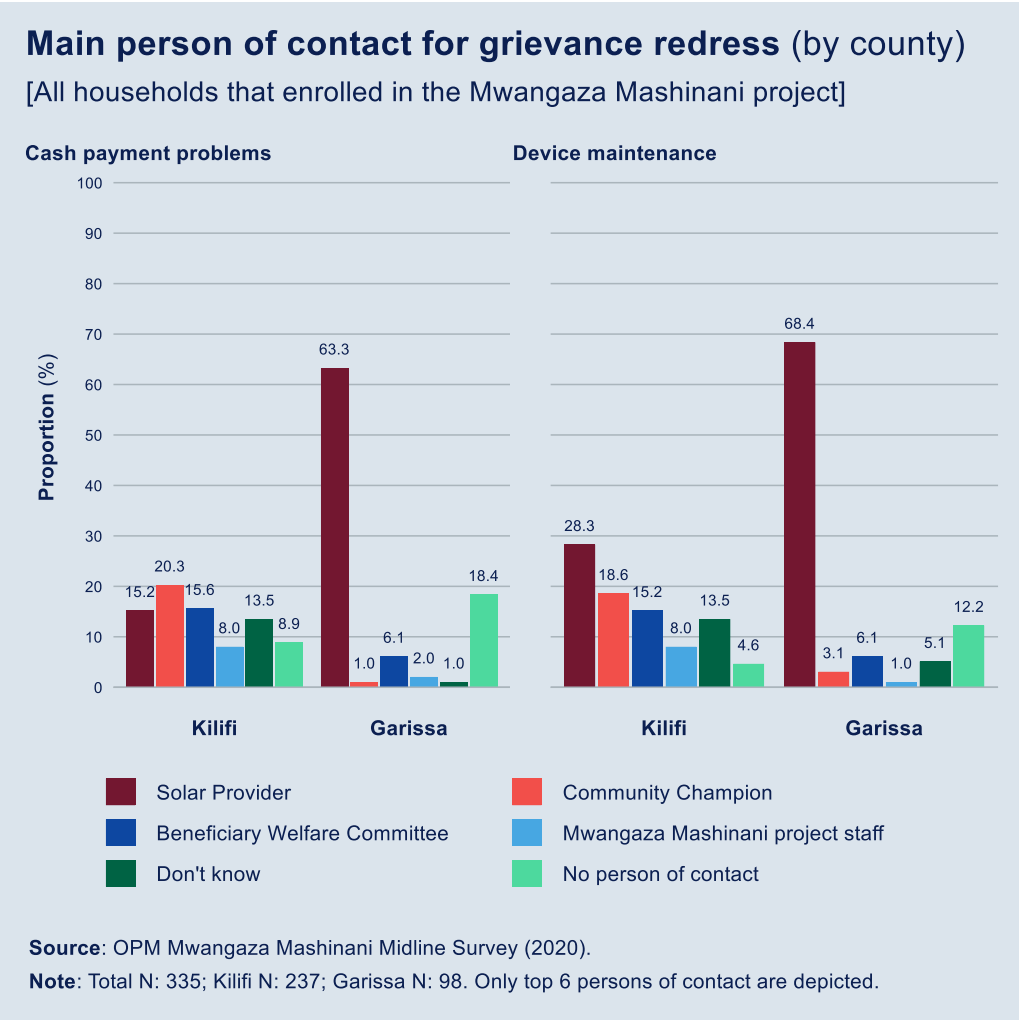
CC, Garissa

That said, a few beneficiaries in Garissa said that they did not experience problems with making device repayments, receiving the token and entering it into the device. However, these individuals either have previous experience with solar devices, or make regular M-Pesa transactions. In sum, we infer that further training of beneficiaries is needed across the board to enable a more standardised repayment system using tokens and M-Pesa.

4.5 Grievance redress

The results of the midline survey show that the majority of households are not relying on the appropriate channel or POC for reporting grievances. The survey did not explore why that is the case; however, the finding that many households do not contact the appropriate POC implies reduced effectiveness of the grievance mechanism, and reduced likelihood of households receiving the support they need.

Figure 9: Main POC for grievance redress (by county)



Source: OPM Mwangaza Mashinani Midline Survey (2020).

Note: Total N: 335; Kilifi N: 237; Garissa N: 98. Only top 6 persons of contact are depicted.

For issues related to receipt of the Mwangaza Mashinani top-up, households are expected to contact the BWC or CC. Evidence from the midline survey implies this is not taking place. Only a minority of households reported the BWC (13%) or CC (15%) as being the main POC for issues related to the top-up, while 29% of households reported the solar provider as the main POC, and 20% reported other actors, such as Inua Jamii staff, Mwangaza Mashinani project staff, and the Chief. A sizeable proportion (22%) reported that they do not have a POC, or do not know who their main POC is. Households in Kilifi were significantly more likely to contact the BWC (by 10 percentage points) or CC (by 19 percentage points) for cash-related problems, as shown in Figure 9, while the overwhelming majority of households in Garissa (63%) considered the solar provider to be the main POC.

Regarding problems related to the maintenance of the device, the expectation is that beneficiary households will contact the solar providers. However, again, the midline survey finds that a minority of households (40%) consider the solar provider as the main POC for maintenance issues. There are also stark differences across counties (see Figure 9), where about two-thirds of households in Garissa consider the solar providers to be the main POC while less than a third of households in Kilifi do, more commonly reporting the BWC or CC as the POC.

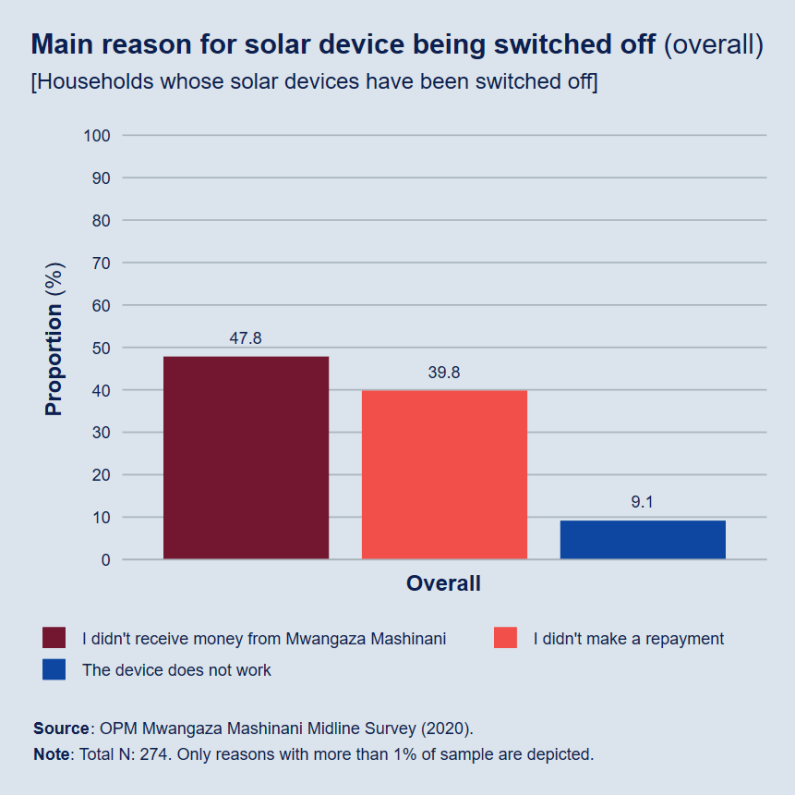
When households have contacted their reported POC for cash- and device-related issues, the POC has not always been helpful. This may be because households are not contacting the appropriate POC for the issue faced. Among beneficiaries who have a contact for reporting cash related problems, 56% said that they reported problems with receiving the top-up to their POC. While the majority of these households (66%) considered the POC to be always helpful, 16% said they were sometimes helpful and 8% said they were never helpful. Similarly, in contacting the POC for problems related to maintenance, among the 39% of households who contacted the POC, slightly more than half (56%) found the POC to be always helpful.

4.6 The November 2019 switch-off

As discussed in Section 4.4, one of the biggest challenges faced by the pilot project has been delays to the Inua Jamii payments, which have affected the timing of the top-up payments. One such incident occurred in September 2019, and resulted in the second payment cycle being skipped. This required the project to simultaneously disburse the second and third top-ups, and for households to make a double repayment at the end of November 2019 (henceforth referred to as the November switch-off). In order to fill the gap, suppliers extended additional light to households, though not for the entire duration of the delay, and, ultimately, almost all beneficiaries' devices were switched off for some time (from one week to two months).

The midline survey finds that the majority of beneficiaries (82%) have experienced a switch-off since receiving the solar device, with no significant difference across counties. The main reasons provided by households for this switch-off are related to the payment for the device (Figure 10), with 48% reporting that it was because they did not receive money from the project, and 40% reporting that it was because they did not make the solar device repayment. A small proportion (9%) reported the lack of functioning of the solar device as the main reason for being without light.

Figure 10: Main reason for solar device being switched off since receiving it



While the quantitative impact of these delays is not currently known, qualitative findings suggest that delays affect beneficiaries' sense of ownership. In particular, the lack of communication about the payment delays and subsequent switch-off led to confusion and, in some cases, a breakdown in trust between the solar providers, community support structures, and beneficiaries. This incident also serves to highlight the challenges inherited by the project due to piggybacking on the Inua Jamii's delivery systems, which have served to distort the use of, and sense of ownership over, the solar devices.

4.6.1 Lack of communication with community leaders

In both Kilifi and Garissa, the BWCs in both Kilifi and Garissa felt that they did not receive clear communication as to why the lights were switched off, and they were neither trained nor supported to advise beneficiaries on what to do. The result was that BWC members and Chiefs had insufficient information to forewarn beneficiaries of Inua Jamii delays or support beneficiaries throughout the November switch-off. In some cases, beneficiaries blamed the BWC members for the devices not working. A frustrated BWC member in one of the Garissa locations reported that households were plunged into darkness once the tokens ran out, and that no warning or support was given to them.

> *'We asked ourselves why they were wasting our time because they are the ones who told us they will give us solar and that the money would be paid.'*
>
> BWC member, Garissa

4.6.2 Incorrect communication with households

At the time of the switch-off, officials from Nairobi were in the villages, holding a sensitisation meeting about the project with the BWC. According to the BWC, the officials present at the training meetings assured households that raised grievances about the switch-off that this would be reported back to the solar suppliers and that the issue would be settled in two months (it is unclear why this time period was mentioned), and that the issue was due to delays in Inua Jamii payments. When they did not hear back from the officials, BWC members had to act independently and proactively to get in touch with the solar suppliers.

4.6.3 Varied communication and response at household level

There was little or no specific communication ahead of time to warn beneficiaries about a switch-off and the reason for it, and households responded to the switch-off in varying ways. In most cases, beneficiaries did nothing, waiting for the devices to be switched on. That some beneficiaries did not inquire about why the switch-off occurred suggests a lack of agency and ability to hold suppliers and/or the project to account.

Some beneficiaries responded proactively by contacting solar providers to make a payment so that the lights would be switched back on. In some cases, solar suppliers provided an additional token so that the lights would remain on for an additional two weeks, but, after that, some households were not able to fund another token and the lights were switched off. The very few beneficiaries who had village elders in their family found out through them that the switch-off would happen in November, and mobilised money to pay the solar providers to release the tokens. It is unclear how these elders got this information before the BWCs or CCs.

Although a message was sent to phones, including on the use of tokens to keep the lights switched on, not everyone understood how to interpret the message, or the process to be applied. Where there was insufficient sensitisation of BWCs, CCs, and Chiefs, they were less able to support households. The tokens that were sent were a bonus, to be used to keep the lights on for longer, even though the Inua Jamii money had not come through. Some households would not have known or understood that this was a bonus and thereby not utilised it. The BWC in Kilifi reflected that, in some cases, beneficiaries may have deleted the messages. In most cases, the sons of beneficiaries dealt with responding to the switch-off and were aware of the CC's role in finding solutions. In several cases, the CC was the main contact for beneficiaries, assisting them in reading the messages received from the solar provider, reactivating the solar device, and inputting token numbers into the solar device.

Some beneficiaries could afford to pay to switch the lights back on. However, this was not the norm. Given that relatively few could afford the device even prior to the pilot project, the likelihood of them choosing to make solar payments from their own resources when the lights switched off (thereby imposing trade-offs in regard to other household purchases), was low. Those who could afford to make the solar device payment during the switch-off incurred the additional cost of having to visit the solar device provider to make the payment in cash to switch the lights back on. This was in addition to the inconvenience already experienced from the unexpected switch-off.

During the switch-off, in both counties, most households reverted to using torches and kerosene lamps for lighting, and to paying neighbours or vendors in nearby towns to charge their phones. Children could no longer easily study at night time as they had been doing since purchasing the devices (see Chapter 5).[37]

[37] This evidence was collected before the COVID-19 pandemic and related school closures.

5 AWARENESS AND USE OF SOLAR DEVICES

Box 4: Summary of findings related to awareness and use of devices

The pilot project's objectives related to improved awareness of solar energy solutions and the use of the solar devices for lighting and charging mobile phones have largely been achieved. Additionally, the project has had unintended positive effects on beneficiary households.

- **Awareness of solar energy:** Awareness of the benefits of solar energy among beneficiary households at midline is high and has improved over time.
- **Use of solar devices:** The usage of solar sources for lighting has significantly increased since baseline, while the use of some other sources of lighting has decline. The main uses of the solar devices include charging mobile phones, providing light for the family, using them for productive purposes, and supporting children's study time.
- **Additional unintended positive effects:** The use of the solar devices has had unintended positive effects on beneficiary households, including a better sense of security provided by light at night, staying connected by having charged mobile phones and radios, and improved social capital within communities.

In this chapter, we explore beneficiaries' awareness (Section 5.1) and use (Section 5.2) of the solar devices.

The quantitative results discussed in this chapter are broadly the same across households in the original evaluation treatment group (that is, all households intended to be treated) and the sub-sample of households that were actually treated. Therefore, in what follows, we present the estimates for the former group (intended beneficiaries) only. Where findings differ for the sub-sample of households that were enrolled in the project, this is discussed.

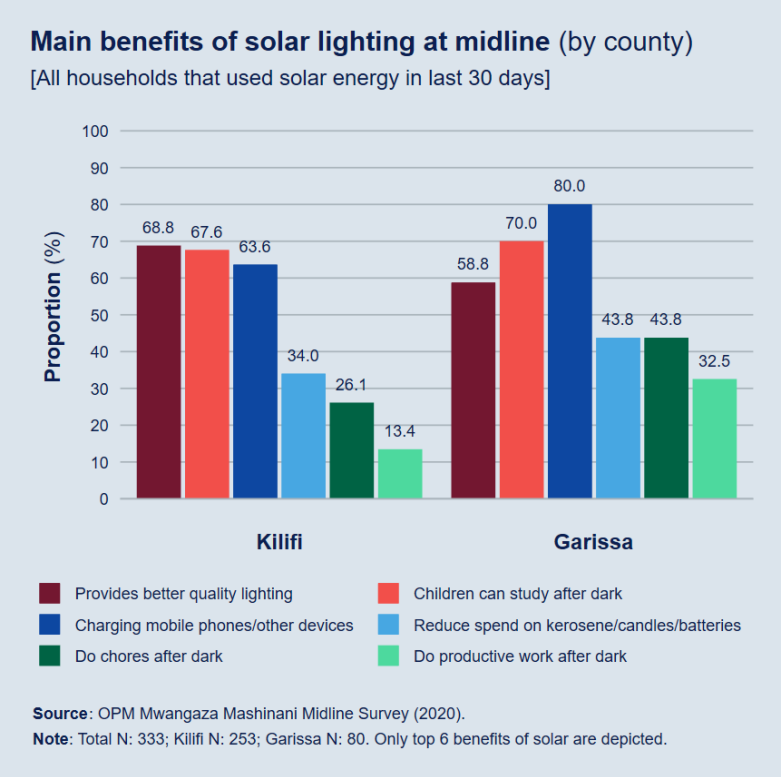
5.1 Awareness about the benefits of solar power

At midline, it is clear that there is a high level of awareness of the benefits of solar energy solutions among households that use solar energy, and an improvement over time compared to baseline. The midline survey finds that households that used solar energy for lighting in the 30 days prior to the survey reported extremely high awareness of the benefits of solar lighting sources. Specifically, 99% of these households stated that they were aware of at least one benefit, while 96% reported awareness of more than one benefit. On average, households are aware of three to four benefits of solar lighting. Compared to baseline, we see an improvement in already high levels of awareness, whereby 84% of households using solar energy at baseline reported more than one benefit, and households cited on average two to three benefits.

Across counties at midline, households in Garissa are aware of a greater number of benefits (four to five) compared to those in Kilifi (three to four), although the difference is small. There is no significant difference in the number of benefits reported by gender of the household head or type of cash transfer.

The most commonly reported benefits of solar lighting sources among households that used solar energy include: allowing children to study when it is dark (68%); charging mobile phones, radios, or other devices (68%); providing brighter, better, or more reliable quality lighting (66%); reducing spend on kerosene, candles, or batteries (36%); and allowing household members to do household chores after dark (30%). Few households reported that the benefits of solar lighting sources are linked to improved health outcomes. Across counties, we see some differences in the stated benefits of solar lighting, as shown in Figure 11.

Figure 11: Main benefits of solar lighting among users of solar energy (by county)



Compared to baseline, significantly more households at midline stated that solar lighting provides better-quality lighting, allows charging of mobile phones and other devices, and allows household members to continue working during dark hours.

The midline survey finds that the awareness of the benefits of solar energy is also high among households that did not use solar lighting in the 30 days prior to the survey (the majority of which comprise the households that did not end up enrolling in the project). This awareness has also increased since baseline.

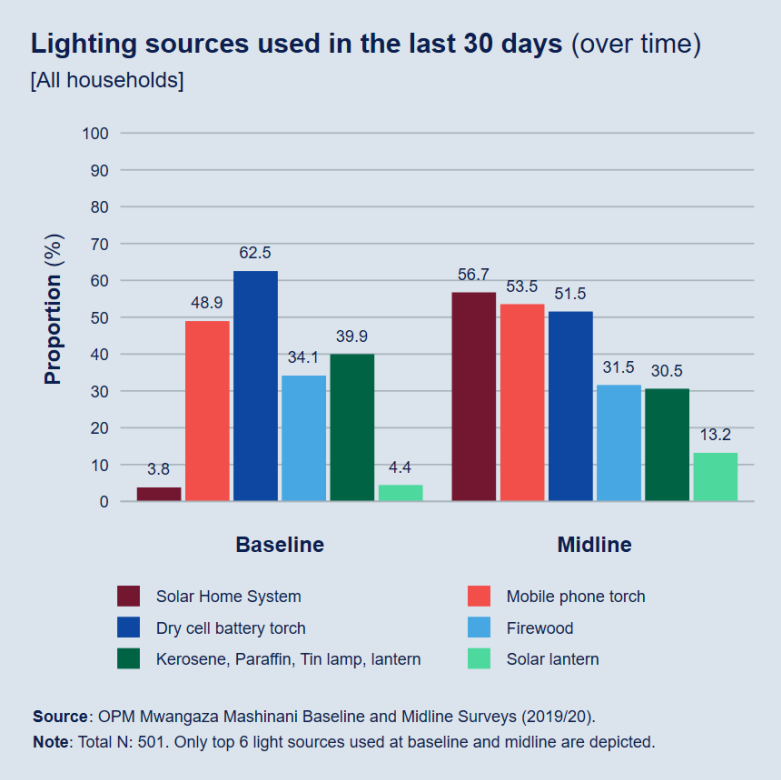
In conclusion, the target population has good awareness of the benefits of solar energy, even when they do not own solar devices, and the increased presence of solar energy in their communities increases this awareness. This further confirms the finding in Section 3.1 that the main reason why beneficiaries had not acquired a solar device prior to the project is not being able to afford the payments, rather than a lack of knowledge about the benefits of solar energy or where to acquire solar devices.

5.2 Use of solar devices

5.2.1 Use of solar versus other sources of energy

The top five reported sources of energy used for lighting in the 30 days preceding the midline survey include solar device (57%), mobile phone torch (54%), dry cell battery torch (52%), firewood (32%), and kerosene, paraffin, tin lamp, or lanterns (31%) (Figure 12). Overall, two-thirds of households used solar energy in the last 30 days, which primarily includes the solar devices but also solar lanterns (13%) and solar torches (7%).

Figure 12: Lighting sources used in the 30 days preceding the survey (over time)



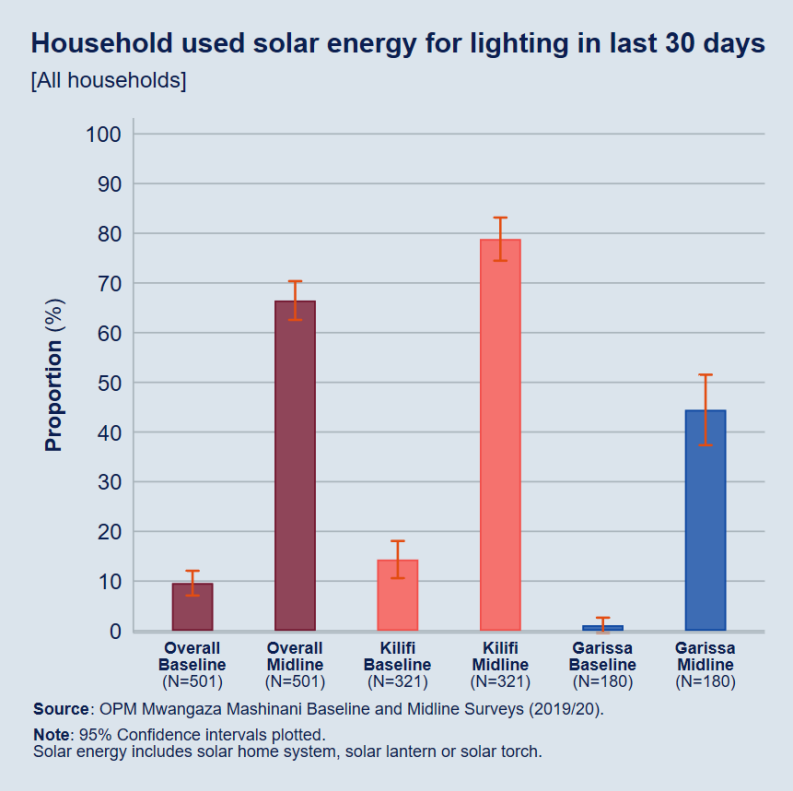
Since baseline, there has been a significant increase in the usage of solar sources (by 57 percentage points; see Figure 13), as would be expected following the Mwangaza Mashinani intervention. Specifically, at midline, significantly more households cited usage of solar devices (by 53 percentage points) and solar lanterns (by 9 percentage points) for lighting, while there has been a decrease in the use of other sources of lighting, particularly dry cell battery torch, and kerosene, paraffin, tin lamp, or lanterns (Figure 12).

As expected, these trends are stronger among households that actually received a solar device: 85% of these used solar sources for lighting in the 30 days preceding the midline survey. While this high prevalence constitutes a marked increase of 75 percentage points since baseline, 15% of households with a solar device had not used it in the last 30 days. These are primarily households who no longer have the solar device provided by the project or whose device is not fully functioning (see Section 8.2). These findings suggest that when households have the solar device, they are using it and they are reducing their use of other lighting sources.

There are significant differences between counties regarding the use of some sources of energy for lighting at midline. The use of solar lighting is much more prevalent among

households in Kilifi compared to those in Garissa (by 34 percentage points; Figure 13); this result is driven by the usage of solar devices. Significantly more households in Kilifi also reported using other energy sources for lighting, including mobile phone torches, kerosene, paraffin, tin lamp, or lanterns, firewood, and candles. This shows that, on average, households in Kilifi are relying on more sources of lighting than households in Garissa. On the other hand, 64% of households in Garissa cited the use of dry cell battery torches, which is significantly higher than in Kilifi – one reason for this is that firewood poses a risk to wooden houses, which are more common in Garissa. CT-OVC beneficiaries are also more likely to use solar devices than OP-CT beneficiaries (by 14 percentage points), which points to the challenges faced by older beneficiaries in using the solar devices. We find no significant differences by gender of the household head.

Figure 13: Solar lighting used in the 30 days preceding the survey (by county and over time)



5.2.2 Use of the solar devices

The qualitative research found that the most important benefit of the solar device is providing light to the family. Households reported sacrificing other uses of the solar device so that the device is sufficiently charged for use at night.

The midline survey finds that the top five reported uses of solar devices among households that use solar lighting include: charging mobile phones of household members (86%); lighting for children's study purposes (83%); lighting for productive purposes, including paid or unpaid work (83%); lighting the surrounding of households (72%); and lighting the house so that children can play (61%) (Figure 14). Less than half of households reported using solar energy to charge other households' mobile phones. There are significant and marked differences in how the devices are used across the two counties, as shown in Figure 15.

Figure 14: Main uses of solar devices at midline (overall)

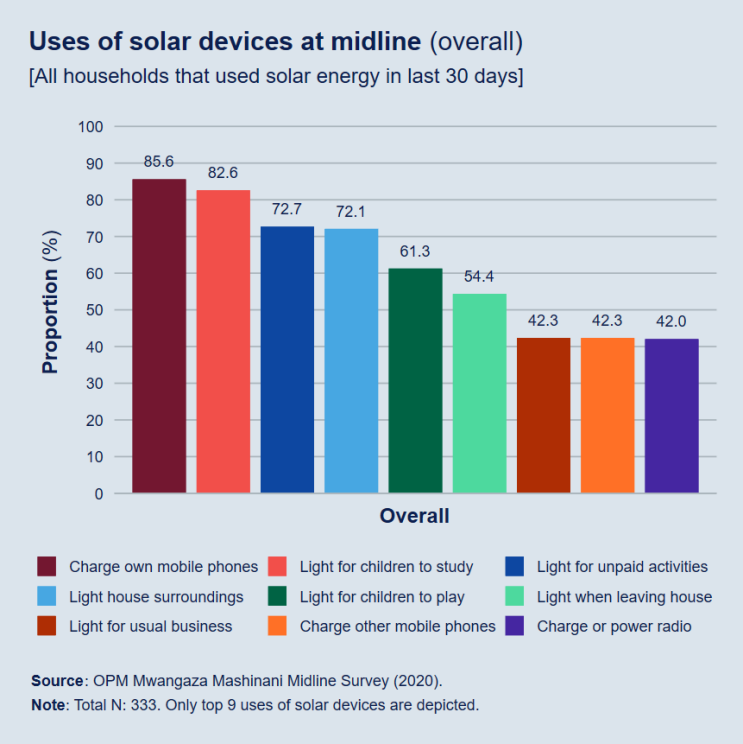
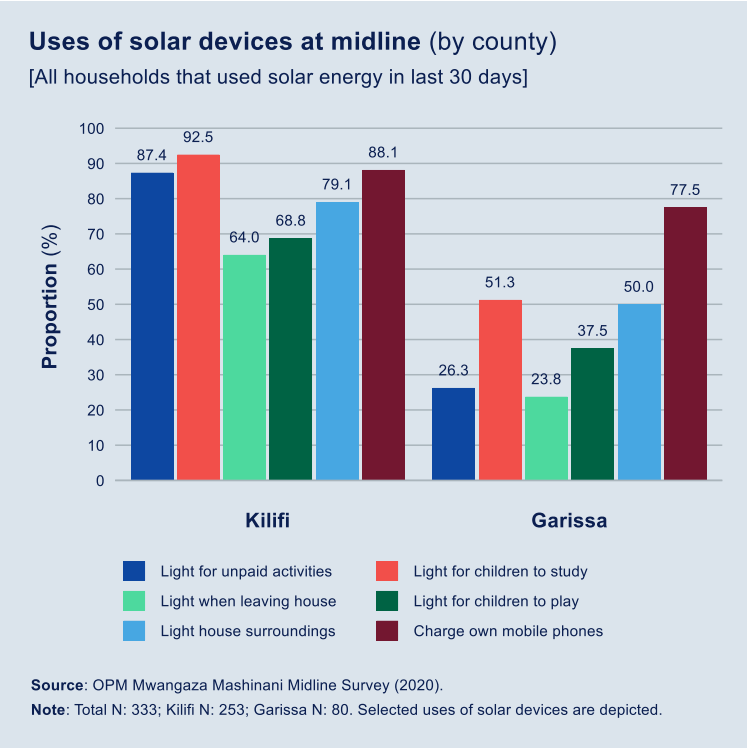


Figure 15: Main uses of solar devices at midline (by county)



5.2.3 Children and women's use of the devices

The qualitative research found that it is often the beneficiary enrolled in the Inua Jamii (the owner of the device) who determines when and by whom in the household the device should be used.

Further, we find that most households deem that, despite its various uses, the greatest benefit of solar device use is for their children, especially in terms of increasing study hours. Households reported that children have more time, and better-quality time, to study as they are not disturbed by low light or smoke caused by alternative lighting sources, such as torches and kerosene. Respondents reported no differences in the way girls or boys used the solar devices at midline, rather that now all children could study together due to the light, or could get ready for school together.

> *'When the child used the tin lamp, they had a problem with the smoke. The paraffin [takes time to turn on and goes off] in only half an hour. He/she has less time to study. Right now, there is solar light, which make them study from 8pm up to 10pm. He/she sleeps and wake up at night and study again like 3am up to 5am.'*
>
> BWC member, Kilifi

If a household has more than one child going to school, the likelihood of them all being able to study at the same time is lower with a torch or kerosene lamp as the light is not strong enough to share. These households say they now prioritise use of the solar device for children, in order to increase their hours of study during the hours of darkness. In one interview, the household said that their neighbour's children visit the house in the evenings to study with their own children using the solar light. In addition, the solar device is used to provide light for children to study early in the morning before going to school, as well as aiding them to get ready to go to school. Households also reported that the solar device helps to extend children's play time, as they have the light to play once they have completed their chores or studies.

In addition, qualitative findings indicate that the solar device better enables women to cook at night, as well as to bathe children in the morning and to prepare their meals before they go to school.

5.2.4 Facilitating communication

Qualitative findings suggest that a second and competing use of the devices is to stay connected. By charging phones and using the radio, community members can stay connected with each other and with what is happening in other parts of the country and the world. Charging one's phone costs both money (between KSH 50 and KSH 100) and time. Previously, a member of the household would use a neighbour's solar device or go into town to get their phone charged. As a result, their phone would remain switched off until they had the opportunity to charge the device. The solar device has allowed households to use their phone more frequently, and to save on recurring costs of charging their phone.

5.2.5 Social activities and security

In Garissa, the devices are used to extend study hours (pre-COVID-19) and prayer time. There is also a sense that households with a solar device have a greater social standing as a result of increased time spent socialising and relaxing outside their homes:

> '*There are changes. For example, people feel relaxed in their homestead, especially at night when seated around with family, with their chairs well arranged. You're then seen as an upper social class person. Unlike before when they used to sit in a dark place, which represents poverty and seen to be lower class. You are seated on chair*

but no light but now because of the light, you sit decently which brings respect in the community… If someone enters the homestead, they can see you better because of the light. But before, when you get in someone's homestead, you have to ask where someone is, because it was darkness everywhere. For example, someone looking for the old man ask where the old man is? The old man who is just near him but cannot see him because of darkness say "It's me, just here!" (Laughs.) It is a very big change.'

BWC member, Garissa

In both counties, households say that the solar device provides security against theft of belongings and livestock, and safety against snakes or other wild animals that are put off by the light:

'*It's very dark at night so we put the solar on and it lights up the area, not even a donkey can stand at our doorstep at night*.'

Beneficiary, Garissa

'*For example, when the kids come out at night for a call of nature we can use it to see, we use it to see dangerous creatures that may be in the compound also.'*

Beneficiary, Garissa

5.2.6 Savings and income

The qualitative research found that mobile phones tend to be charged between morning and afternoon, and the solar devices can generate a small amount of income for beneficiaries through charging other people's phones. Households that have a solar device often let their neighbours charge their phones using their device. As reported in Figure 14, 42% of households at midline used the solar device to charge other households' mobile phones. The qualitative interviews found that beneficiaries charge KSH 10 to 20 per phone, though they may occasionally charge a phone for free. In most cases—our qualitative interviews suggest not all—it is a woman who collects the money and decides what to do with it. The reason provided by men for not collecting or using this money is that it is considered 'small change', and it would be unnecessary or shameful to collect such a small sum for themselves. Moreover, phones are charged during the day, because the device is used for lighting at night, and men are usually not home at this time.

Households reported that the money they save from not buying kerosene or batteries, and from being able to charge their own phone, supplements spending on food and school supplies. Alongside the savings afforded by the solar devices, households also reported saving time as a result of not needing to visit other households or travel to vendors in nearby towns to charge their phones. Beneficiaries in Garissa noted that they no longer need to travel a significant distance into the nearby town to charge their phone, which suggests that the more remote the location of the village from a town, the more substantial the saving for the beneficiary.

These qualitative findings are corroborated by the midline survey, where 28% of beneficiaries reported that they have earned additional income using the solar device provided by the project. This is more prevalent in Kilifi, with a 25 percentage point difference between the two counties. In line with the qualitative findings, the most common reported

use of the additional income earned from the solar device is food (77%), followed by school fees or materials (18%), house materials (15%), and payment for the solar device (15%).

It is noteworthy that the Mwangaza Mashinani pilot project included an income-generating training component led by CCs and the BWC. Perspectives on this from some of the community-level facilitators are that income generation from mobile phone charging is only feasible when there are few solar devices in the community. Once the majority of a community owns a solar device with the capacity to charge phones, there is little opportunity to make money from this service.

> *'We were taught the importance of the light and we were told, regarding this programme, now that the organisation wanted the community get income through the solar device. But we see now, there a lot of solars around here. So, no one charges for the other to get money like KSH 10 …. It is difficult. But if they are those charging for others, then they are few. Solar helps the people to get light but not income-generating. Everyone has solar.'*
>
> BWC member, Kilifi

6 IMPACT

Box 5: Summary of findings related to impact

We find that the pilot project has had no impact on the health of beneficiary households, and a modest impact on their livelihoods. The impact on education could not be measured at midline.

- **Health:** While the prevalence of respiratory conditions among household members has decreased over time, to reach very low levels at midline, there is no evidence that this improvement in health outcomes can be attributed to the Mwangaza Mashinani pilot project.
- **Livelihoods:** There is evidence that the pilot project has had a positive impact on some livelihood outcomes (e.g. the number of working household members). However, this has not translated into additional income for households, and therefore there is no conclusive evidence on the impact of the project on the livelihoods of households.
- **Education:** The majority of households have at least some of their children engaged in educational learning activities at home since the schools closed in March, though not for all children in the house. The impact of the project on education outcomes was not estimated at midline due to COVID-19 and the resulting school closures.

This chapter provides key findings on the mid-term impacts of the Mwangaza Mashinani pilot project, following the conclusion of its first phase. We present results related to households' health (Section 6.1) and livelihoods (Section 6.2), and the education of children (Section 6.3), as per the impact areas defined in the project's ToC (see Figure 32 in Section 9). Specifically, for each impact area, we present the following:

- **Health and livelihoods:** Descriptive trends over time and impact estimates. We investigate the change in selected health and livelihoods outcomes between baseline and midline, and how much of these changes can be attributed to the pilot project. The evidence presented in this chapter covers a sub-set of the impact indicators that will be measured at endline, and provides a preliminary indication of the project's impact in terms of livelihoods and health at midline (see Table 1).
- **Education:** Descriptive results at midline. As mentioned in Section 2.2, the impact of the pilot project on children's education outcomes (e.g. study hours and school attendance) cannot be measured at midline, given that schools have been closed since March 2020 due to COVID-19. However, the midline survey collected information on the engagement of school-age children in learning activities at home and these findings are presented in this chapter descriptively. Understanding whether and how children were able to engage in learning at home during the COVID-19 pandemic will be important to understand any impacts (or lack thereof) on education at endline.

This chapter draws on quantitative data from the baseline and midline surveys only. This is because, as mentioned in Section 2.3, the qualitative research was conducted before midline and therefore does not explore the impact of the project.

Both ITT and ATT impact estimates will be presented in this chapter, as defined in Section 2.2.1. However, the descriptive trends will only be reported for the sample of households

intended to be treated, as the descriptive results are broadly the same across households intended to be treated and the sub-sample of households that were actually treated.

6.1 Health

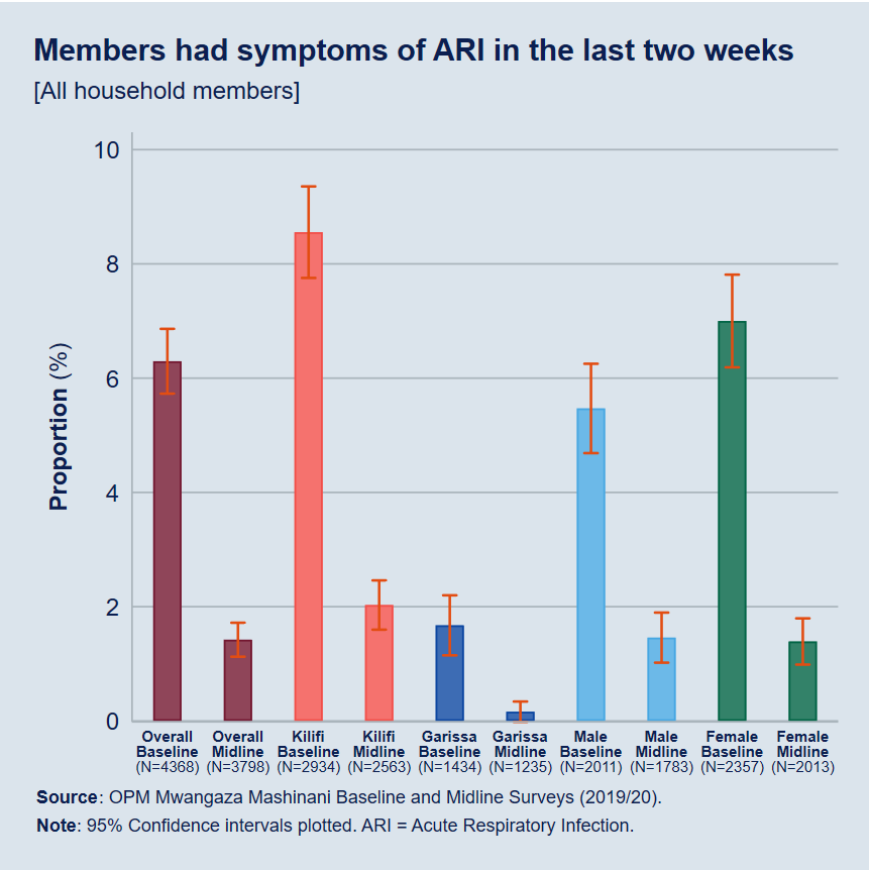
The midline survey measures household members' respiratory conditions in the two weeks preceding the survey, including experiencing a cough, a cough with fever, and a cough with rapid breathing or shortness of breath. These are used to determine the prevalence of ARI (see Box 6 on measurement) among beneficiary household members.[38]

Box 6: Measuring symptoms of ARI

ARI is a leading cause of childhood morbidity and mortality throughout the world. Following the 2014 Kenya Demographic and Health Survey methodology, the prevalence of ARI symptoms was estimated by asking the respondent whether, in the two weeks preceding the survey, any household member had been ill with a cough accompanied by short, rapid breathing and difficulty breathing as a result of a problem in the chest. These symptoms are consistent with pneumonia.

It is worth noting that the data collected on ARI symptoms are subjective and based on the respondent's perception of the illness, without validation by a medical professional.

Figure 16: Prevalence of ARI symptoms (by county and gender, and over time)



Prevalence of respiratory conditions among household members was low at baseline (c. 6%) and is even lower at midline (Figure 16). A negligible proportion (1%) of household members

[38] Unlike at baseline, at midline we did not collect information on whether members experienced eye irritation or burns whilst using lighting fuel. This will be collected during a potential endline survey.

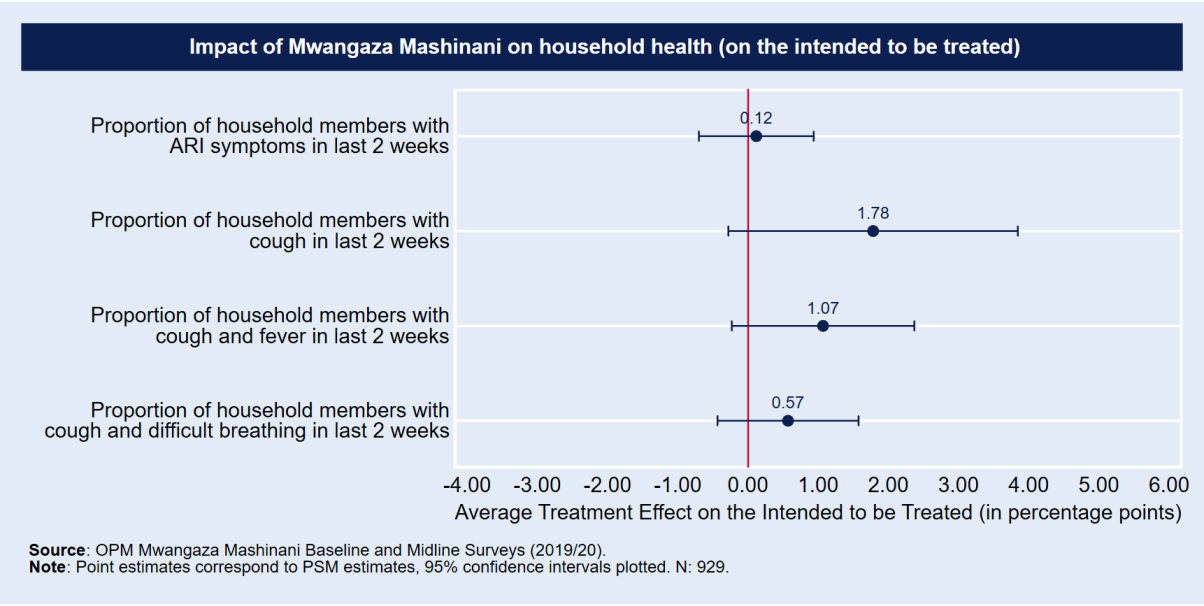
experienced symptoms of ARI in the two weeks preceding the midline survey. Similarly, low prevalence rates are observed for the individual respiratory symptoms, with 7% of household members reporting having a cough, 3% having a cough with a fever, and 2% having a cough with rapid or difficult breathing, in the two weeks prior to the survey. The prevalence of respiratory conditions has decreased significantly over time. Between baseline and midline, we observe a reduction of 5 percentage points in ARI symptoms, 11 percentage points for a cough, 8 percentage points for a cough with a fever, and 7 percentage points for a cough with rapid or difficult breathing.

Across counties, we find significant differences in health outcomes at midline, though the gap is smaller than at baseline. At baseline, there was a significantly higher prevalence of respiratory conditions in Kilifi than in Garissa. Over time, health outcomes have improved in both counties and while Kilifi saw a much starker improvement, it was not enough to close the gap between the two counties, with reporting of respiratory symptoms still higher in Kilifi than in Garissa at midline (Figure 16).

At baseline, there were also significant differences in respiratory conditions between male and female household members. Over time, health outcomes have improved for both groups but more so for female household members, such that by midline there are no significant differences in respiratory health outcomes between the two groups (Figure 16).

There are some differences based on the age of household members, albeit small. Elderly household members over the age of 60 are more likely to report a cough and a cough with a fever compared to younger household members, while household members aged six to 60 are less likely to report ARI symptoms compared to children under five or members over 60.

Figure 17: Impact of the pilot project on household members' health (ITT)



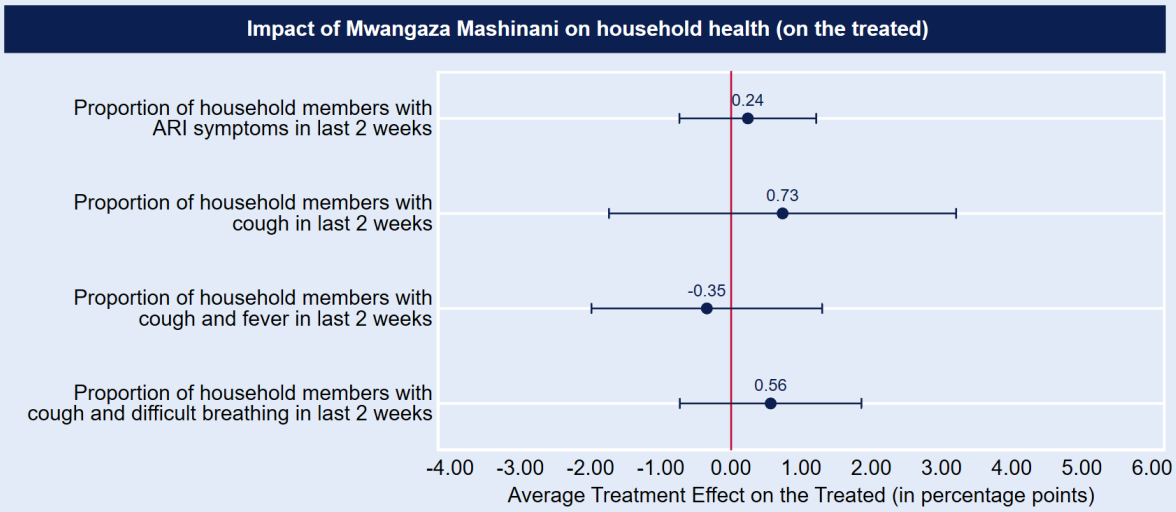
Source: OPM Mwangaza Mashinani Baseline and Midline Surveys (2019/20).
Note: Point estimates correspond to PSM estimates, 95% confidence intervals plotted. N: 929.

While this improvement in health outcomes is positive, there is no evidence that it can be attributed to the Mwangaza Mashinani pilot project. Results from the impact analysis do not show an impact across any of the indicators in this domain, or across either sample of households that were intended to be treated or actually treated. This is shown in Figure 17 and Figure 18, where the 95% confidence intervals associated with the point estimates overlap with zero. The positive trend could be due to the COVID-19 lockdown and social

distancing measures that have likely created environments where individuals are less likely to be exposed to viruses, as well as individuals perhaps being more hesitant to report COVID-19-related symptoms, given the social distancing measures they would be subjected to if found to be displaying symptoms. Seasonality effects may also be a factor as the baseline and midline surveys were conducted at different times of the year, though both took place during dry months.

The lack of impact of the pilot project on household members' respiratory conditions at midline is unsurprising and was expected at baseline given that the predominant cooking fuel used by households, firewood, is a far greater contributor to indoor air pollution than lighting fuel. The baseline survey found that 99% of households used firewood for cooking, and 47% of households cooked indoors.[39,40] In light of these results, substituting solar energy for lighting alone will have limited impact on health.

Figure 18: Impact of the pilot project on household members' health (ATT)



Source: OPM Mwangaza Mashinani Baseline and Midline Surveys (2019/20).
Note: Point estimates correspond to PSM estimates, 95% confidence intervals plotted. N: 929.

6.2 Livelihoods and remittances

6.2.1 Number and type of livelihood opportunities

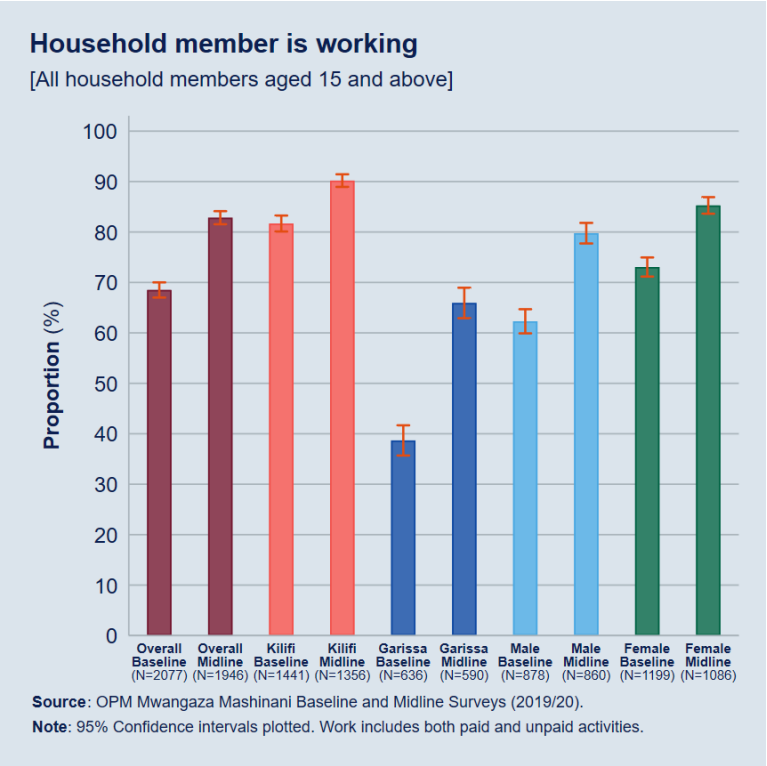
Our analysis of trends over time shows that more household members are engaged in productive activities at midline than were at baseline. The proportion of household members aged 15 and above that are engaged in work has significantly increased over time, from 69% at baseline to 83% at midline (Figure 19). This includes both paid and unpaid work either inside or outside the household.[41]

[39] Indoors refers to inside the main house (with or without a partition), in an attached but separate room, or in an outhouse.
[40] We did not measure the use of firewood for cooking at midline given time constraints due to the remote survey modality. This will be investigated at endline.
[41] This definition for livelihoods was agreed with UNICEF at baseline. The livelihoods module used in the baseline and midline surveys relied on survey modules from the OPM evaluation of the Hunger Safety Net Programme and Kenya Integrated Household Budget Survey. Distinguishing between income-generating and non-income-generating activities could be explored at endline.

The main reasons for not working among household members aged 15 and above include being too old to work (45%), being unable to work (25%), still being in education (18%), and being unemployed (9%). Only 1% of household members not working reported COVID-19 as the reason. Compared to baseline, significantly more household members are not working at midline because of old age and inability to work, while fewer household members are not working because they are unemployed or still in education.

The main types of activities household members are engaged in are domestic work or unpaid subsistence agricultural work. The top six activities among household members in the treatment sub-counties are farming for own consumption (47%), unpaid domestic work (43%), collecting water (23%), collecting firewood or other fuel materials (16%),[42] unpaid herding or livestock production (13%), and being self-employed in a small-scale business (9%). Between baseline and midline, the only increase in activity types has been in farming for own consumption (increase of 10 percentage points), while for all other work activities, either there has been a decrease over time (including in collecting firewood and other fuel materials, and being self-employed in a small-scale business) or no change (Figure 20).

Figure 19: Household member is working (by county and gender, and over time)



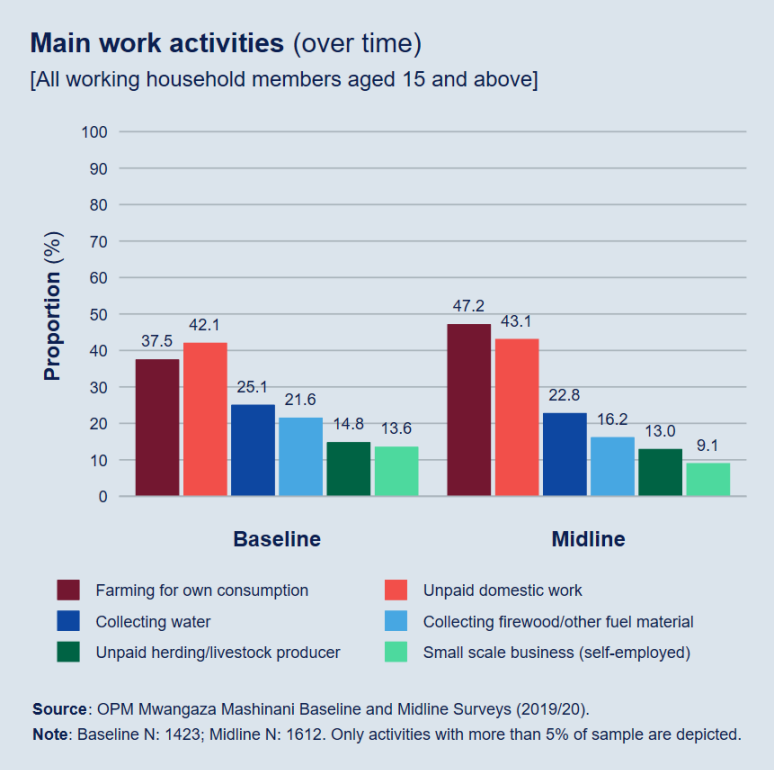
These trends could be driven by seasonality effects – given that the baseline survey was conducted during the dry months of the year, when minimal crop farming activities take place, while the midline survey was conducted after the rainy season – or they could be driven by COVID-19 lockdown measures, which would have limited household members' engagement in productive activities outside the household. In fact, when asked whether the activities household members engage in have changed since schools closed in March 2020, 38% of household members reported that they had. The main reason reported for the change was that their previous activities were no longer possible because of COVID-19.

[42] Activities such as collecting water and collecting firewood are often simultaneously paid and unpaid as household members collect water or firewood both for their own household and for other households for a fee.

For those household members who do paid or unpaid work, on average, each household member is engaged in 1.7 activities. This is very slightly lower than the 1.8 activities at baseline, although the difference is significant.

At the household level, the number of household members aged 15 and above that are engaged in work has significantly increased over time, from an average of 2.4 at baseline to 3.2 at midline. This is likely in part due to the ageing panel of the household sample. This has also led to an increase in the average number of activities that households are engaged in, from 5 at baseline to 5.8 at midline, suggesting that households have increased their diversification of activities over time. Furthermore, households are increasingly willing to engage in new productive activities as half of all activities that households engage in at midline were started in the year prior to the survey. This is double the number of activities that the average household started within the year prior to the baseline survey, and the difference is highly significant. This may be a result of the COVID-19 lockdown measures that necessitated changes in the activities that household members engage in.

Figure 20: Main work activities (over time)

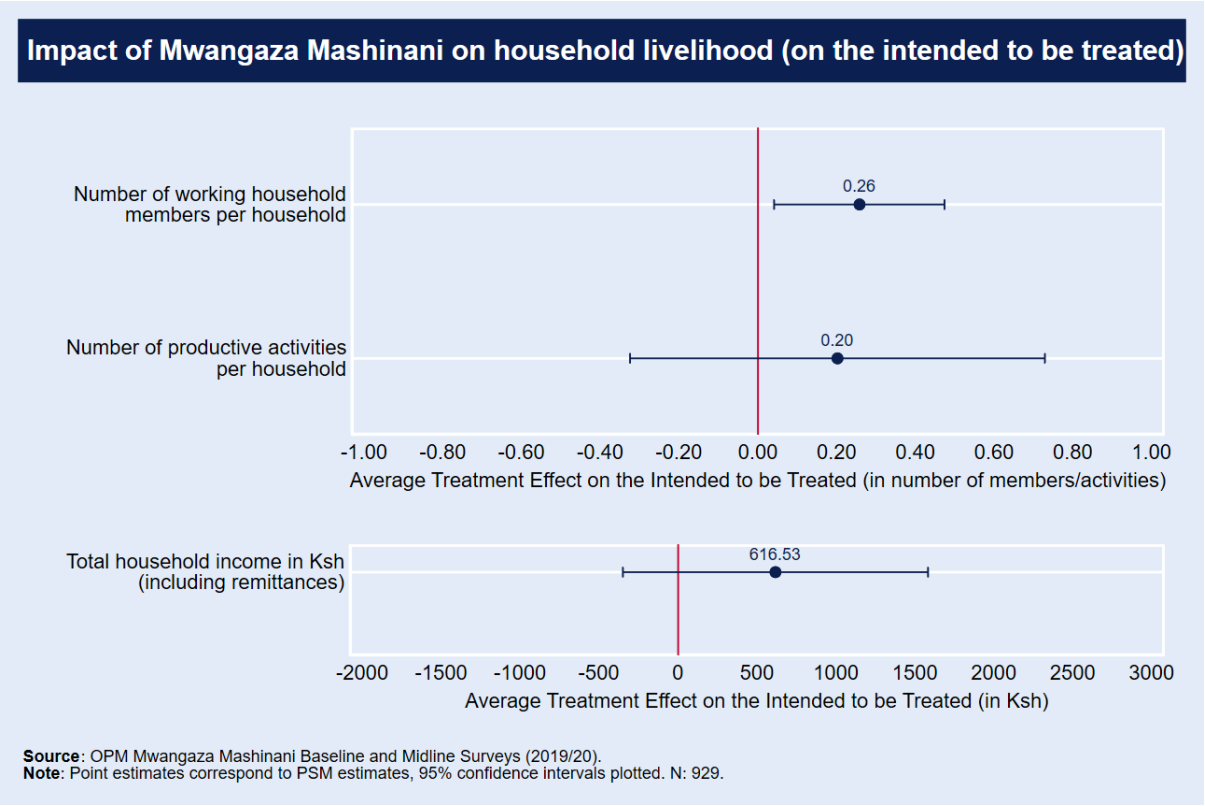


Across counties, we find stark differences in the number and types of productive activities that households engage in. While 90% of household members in Kilifi are engaged in work, only 66% of household members in Garissa are, although this gap has decreased since baseline (Figure 19). The average household in Kilifi is also engaged in more than double the number of activities (7) that an average household in Garissa is engaged in (2.6). There are also significant differences in the types of activities households engage in across counties. At both baseline and midline, while the majority of household members in Kilifi work in farming for own consumption, almost none of the household members in Garissa do. Collecting water, firewood, and other fuel materials is also more common in Kilifi. On the other hand, more household members in Garissa are engaged in unpaid domestic work and in unpaid herding and livestock production.

We find striking differences between men and women, with more women engaged in work (85%) than men (80%), as shown in Figure 19. Women, on average, are also engaged in a higher number of activities. While women are most commonly engaged in unpaid domestic work (66%), farming for own consumption (48%), collecting water (33%), and collecting firewood and other fuel material (24%), men are engaged in farming for own consumption (46%), unpaid herding or livestock activities (24%), unpaid domestic work (12%), and manual labour (10%).

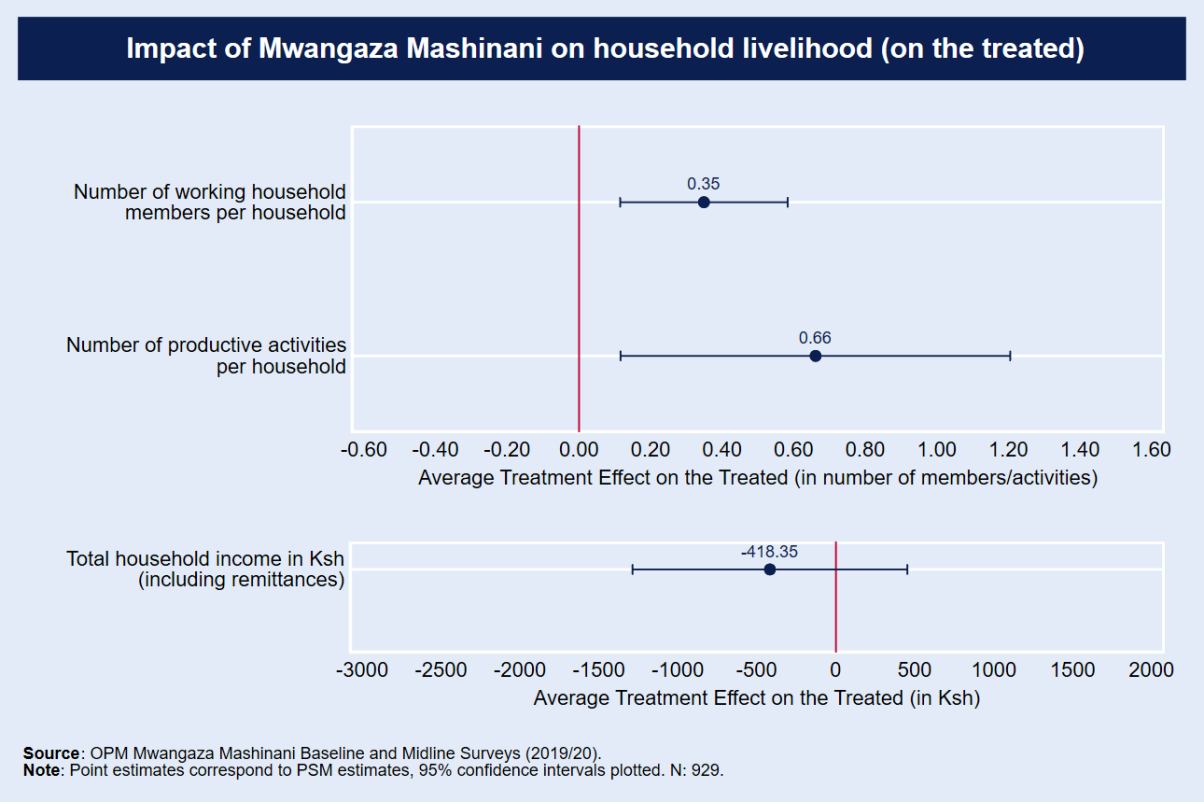
This improvement in trends over time regarding the number of working household members and the number of productive activities per household is partly attributed to the Mwangaza Mashinani pilot project (see Figure 21 and Figure 22). Among the ITT sample, the impact analysis finds a positive impact of the project on the number of working household members per household (point estimate=0.26), which, although modest in magnitude, is statistically significant at the 5% level. The impact is stronger on the sub-sample of households that were actually treated, with a higher point estimate of 0.35, and is highly significant at the 1% level. Furthermore, we find that, among the actually treated sample, the project has increased the number of productive activities per household by 0.66. However, among the ITT sample, we find no impact of the pilot project on the number of productive activities per household, suggesting that the project's inability to reach all intended beneficiaries has diluted its potential impact on the diversification of productive activities.

Figure 21: Impact of the pilot project on household livelihoods (ITT)



Source: OPM Mwangaza Mashinani Baseline and Midline Surveys (2019/20).
Note: Point estimates correspond to PSM estimates, 95% confidence intervals plotted. N: 929.

Figure 22: Impact of the pilot project on household livelihoods (ATT)



Source: OPM Mwangaza Mashinani Baseline and Midline Surveys (2019/20).
Note: Point estimates correspond to PSM estimates, 95% confidence intervals plotted. N: 929.

6.2.2 Income and savings

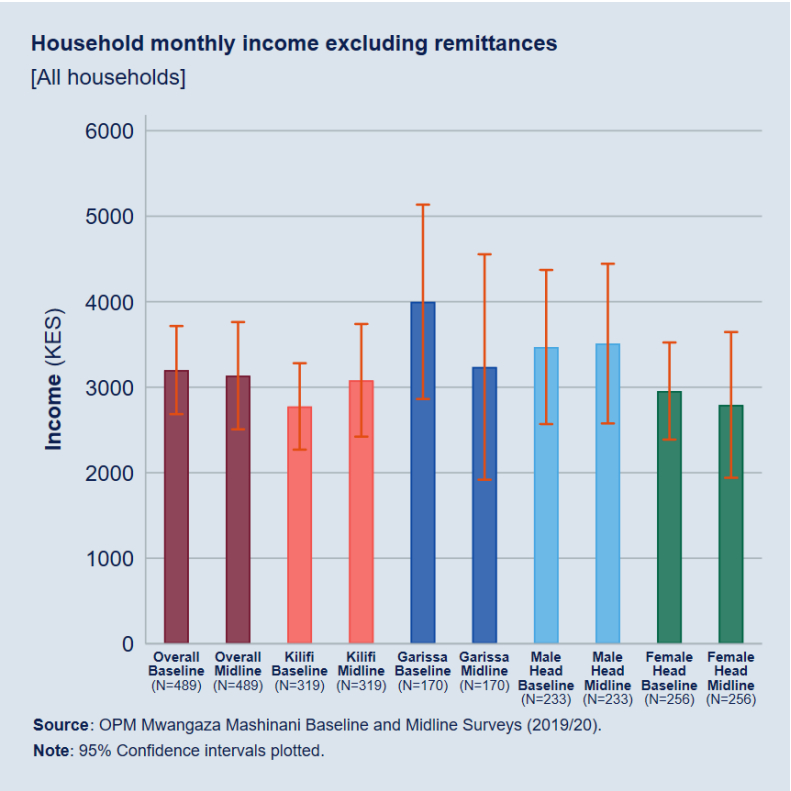
Households were asked how much income they earned from each activity in the month prior to the survey. At midline, household income from all household activities (but excluding income from remittances) in the month prior to the survey was on average KSH 3,135. This has not significantly changed since baseline (

Figure 23).

Households were also asked about income from remittances, as a large proportion of treatment households receive remittances (almost one-third at baseline) and it is an important source of household income (accounting for around 20% of household income at baseline overall, and over 40% in Garissa). Income from remittances has significantly decreased over time, from a monthly average of KSH 875 at baseline to a monthly average of KSH 379 at midline (Figure 24). This decrease is most likely associated with the COVID-19 outbreak. Indeed, the majority of households that received remittances in the year prior to the midline survey reported that there was a change in their income from remittances since schools closed in March 2020, with a third receiving remittances less frequently, another third receiving smaller amounts from remittances, and a fifth receiving both lower and less frequent remittances.

When including income from remittances, we find that total household income in the month prior to the survey has decreased over time. While this difference of KSH 650 is weakly significant for the ITT sample, it is highly significant for the actually treated households, with a reduction of KSH 782 between baseline and midline.

Figure 23: Household monthly income excluding remittances (by county and gender of household head, and over time)



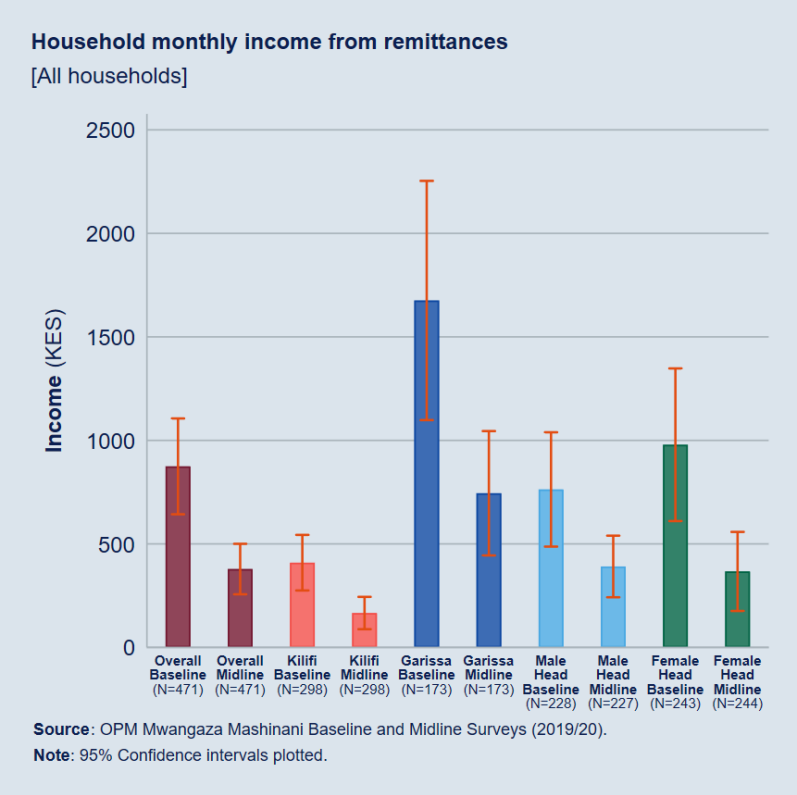
When it comes to differences in household income across counties, at baseline, households in Garissa had a significantly higher income than households in Kilifi, when including income from remittances. Over time, there has been no change in the monthly income of households in Kilifi, while Garissa saw a marked reduction of 30% – driven by a fall in income from remittances – such that by midline the difference in total household monthly income between the two counties is not statistically significant. However, income from remittances is still significantly higher in Garissa than in Kilifi at midline. As for differences in monthly income by gender of the household head, we see none at midline. However, we do find that the total monthly income (including remittances) for female-headed households has decreased over time, while the total monthly income for male-headed households has not changed significantly.

This reduction in household monthly income over time in the treatment sub-counties is mirrored among households in the comparison sub-counties. We thus find no evidence of a significant impact of the pilot project on household monthly income. While the impact coefficient is positive (as expected) for the ITT sample, it is negative for the actually treated households. However, in both cases the difference is statistically indistinguishable from zero, as can be seen from Figure 21 and Figure 22 above. It is worth noting that reported income should be interpreted cautiously as it is difficult to collect reliable self-reported income data, and data of this kind are usually considered unreliable in the literature.

Finally, we find that at midline a minority of household members aged 15 and above (13%) are part of a savings scheme, though this increased by 2 percentage points since baseline. There is a significant difference between counties regarding this indicator, with 17% of household members aged 15 and above belonging to a savings scheme in Kilifi, compared

to 4% of members in Garissa. This gap has widened since baseline. Results also differ by gender, with more women belonging to a savings scheme than men (17% compared to 9%).

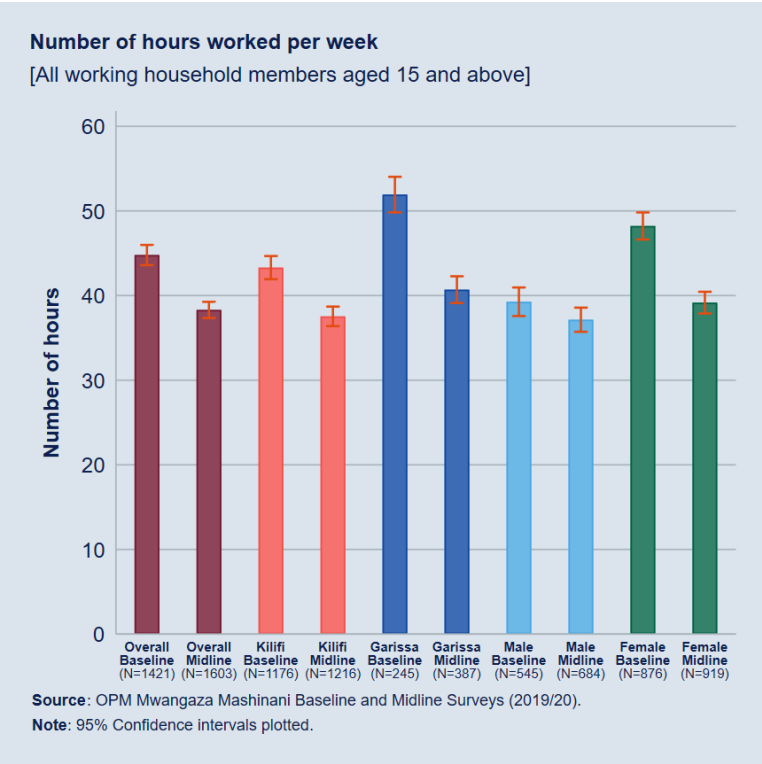
Figure 24: Household monthly income from remittances (by county and gender of household head, and over time)



6.2.3 Working hours

Figure 25 shows the number of hours worked per week over time, and by county and gender of household member. Working household members spend on average 38 hours working per week at midline, which represents a reduction from an average of 45 hours at baseline. Although it seems reasonable to presume that the COVID-19 pandemic may have contributed to this reduction, we do not have firm evidence to confidently make this claim. At baseline, household members in Garissa worked on average nine more hours per week than members in Kilifi. Working hours have decreased in both counties since baseline, but more so in Garissa, such that by midline the gap in working hours between the two counties has narrowed, although it is still significant, with members in Garissa working on average three additional hours per week. A similar pattern can be seen by gender, where at baseline women worked an additional nine hours per week when compared to men. Between baseline and midline, the number of working hours decreased for both women and men, but more so for women, such that the gap between the two groups has also decreased at midline (though it is still significant), with women working an additional two hours on average compared men.

Figure 25: Number of hours worked per week (by county and gender, and over time)



At midline, in an average household, just under half of activities (47%) are conducted inside the home. This is a slight increase from the mean proportion (41%) at baseline. Almost one-third of all working household members at midline conduct some of their work at home during darkness hours and using artificial light.[43] These household members work on average 10 hours per week using artificial light. While the proportion of household members who work at home using artificial light has increased since baseline – driven by increases in Garissa – the number of weekly working hours using artificial light has decreased over time, albeit both differences are modest in magnitude (Figure 26). Analysis across counties at midline reveals that more household members in Garissa work at home using artificial light (by 20 percentage points), and they work double the number of weekly hours using artificial light, when compared to household members in Kilifi. Furthermore, within households, it is mainly women who are using artificial light to conduct activities at home during darkness hours. More than half of working female household members (58%) conduct activities at home using artificial light, compared to only 8% of working male household members.

The main type of artificial light used by household members to conduct their activities at home during darkness hours is solar devices (42%), followed by a dry cell battery torch (27%), kerosene, paraffin, tin lamp, or lanterns (14%), and solar lanterns (7%). As expected, the proportion of household members using solar devices as the primary source of lighting is higher (at 58%) when looking at the sample of households who were actually treated by the project. Similar to the findings on the general use of lighting sources presented in Section 5.2, we find that for the household members who work at night, solar device use is more

[43] It is assumed that household members would only use artificial light to work at home during darkness hours.

prevalent in Kilifi (48%) than in Garissa (30%) (Figure 27). We find no differences in solar device use for work at night by gender.

Figure 26: Number of hours worked per week using light (by county and gender, and over time)

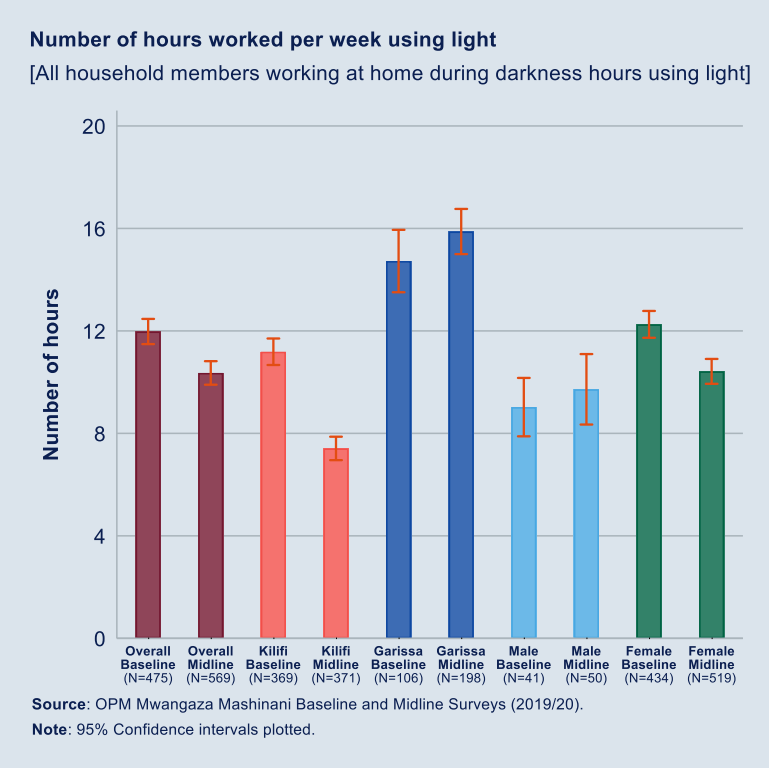
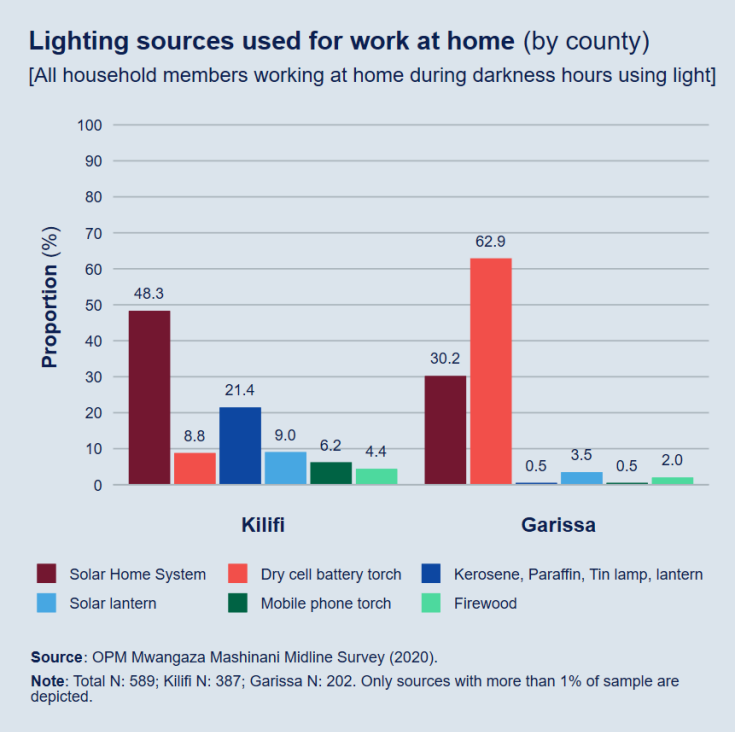


Figure 27: Lighting sources used for work at home during darkness hours (by county)



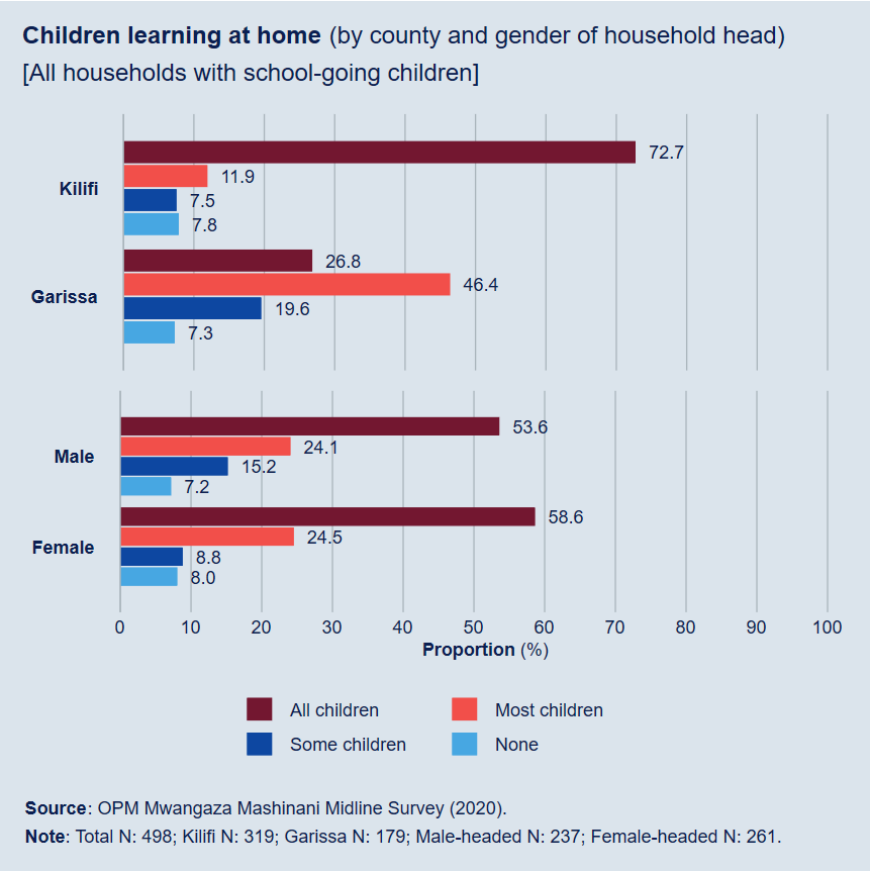
An estimation of the impact of the pilot project on weekly working hours will be conducted at the endline stage, when data on other time use indicators for children and women in the household will be collected and explored.

6.3 Education

As mentioned in the introduction to this chapter, the midline survey did not collect information related to children's school attendance or study hours at home, as was done at baseline, due to the fact that schools had been closed since March 2020 as a result of COVID-19. For this reason, we do not discuss the impact of the pilot project on the education of children in beneficiary households in this report. We will explore this at endline if schools are open at that time.

The midline phone survey did, however, collect information about the educational activities children of beneficiary households had engaged in at home since schools closed.[44] These findings will provide important context for any measurement of impact that takes place at endline.

Figure 28: Children engaged in learning at home (by county and gender of household head)



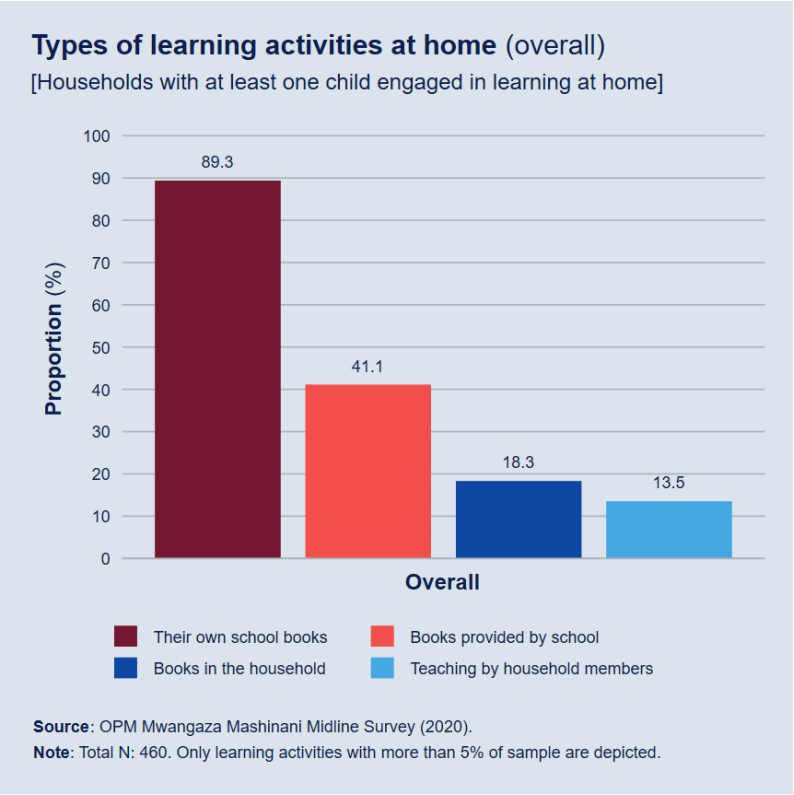
The survey findings indicate that 92% of households have had at least some of their children engaged in educational learning activities at home since the schools closed in March. For more than half of the households (56%), all of the school-going children in the household

[44] At the time of the midline survey, schools remained closed across the country.

have been engaged in learning activities at home. Only a small proportion of households with school-going children (8%) do not have any child engaged in learning at home. As shown in Figure 28, we find no marked differences in educational engagement on the basis of the gender of the household head, but we do see differences across counties. Significantly more households in Kilifi compared to those in Garissa stated that all their school-going children were engaged in learning (by 46 percentage points).

In relation to the learning activities that children engage in at home, the most commonly reported activities include using children's own school books and notes (89%), followed by using books provided by the school (41%), using other books the household has at home (18%), and teaching by household members (14%) (Figure 29). We find no differences in the types of learning activities reported based on the gender of the household head. However, there are differences across counties, with more households in Kilifi compared to those in Garissa citing using books provided by schools, and children's own school books and notes, as the main learning activities (by 26 percentage points and 8 percentage points, respectively).

Figure 29: Main types of learning activities children are engaged in at home



Among the minority of households where none of the school-going children are learning at home, the most commonly cited reasons are the need for children to be engaged in other things (29%), lack of access to educational programmes (24%), and lack of access to textbooks or learning materials (18%).

7 EFFICIENCY

Box 7: Summary of findings related to efficiency

In terms of coordination, we find that the pilot project is well coordinated at the county level but that national-level coordination could be strengthened. The VfM analysis indicates that the project meets the definition of 'average', in regard to both the standards for economy and for efficiency.

- **Coordination:** Most national project stakeholders felt they had been informed of the project design and implementation but that they could be more closely involved in the project going forward. The county technical working groups are considered to be well attended and the county governments have generally been supportive of the project.
- **Community structures:** The pilot project has been implemented using local structures that are also part of the Inua Jamii, including Chiefs, children's officers and BWCs. The project has also set up its own structures, including CCs, to embed the project in the communities. However, the majority of households are not aware of the CC in their area.
- **Economy:** The pilot project has managed to minimise the transaction costs of the cash transfers, as well as operational and staff costs related to UNICEF's activities. However, contractual services cost more than expected. While the project followed sound procurement practices in selecting the solar suppliers, the final cost of the solar products was above the budgeted amount.
- **Cost efficiency:** The majority of activities have been implemented within budget, although the pilot project allocated more resources to set up and inception activities, as well as implementation, compared to the budget. This was due to delays in the procurement practices and challenges emerging from contextual factors, some unforeseeable. Despite the initial delays, by June 2020 most logframe targets had been achieved. Nonetheless, 22% of enrolled households decided not to purchase the solar device and 30% of beneficiaries do not regularly make repayments for the device. Learning and start-up activities, key to the pilot project's objectives, as well as ancillary services provided to beneficiaries (such as skills training and behavioural change communication) increase the cost of the project, compared to other cash transfer programmes in Kenya. While higher costs are expected in a pilot project, the combination of high unit cost (US$ 296[45] compared to an average transfer of US$ 151 per beneficiary to pay for the solar device) and a quite high attrition rate presents the project with some lessons for subsequent phases.

In this chapter we discuss the efficiency of the pilot project's implementation, with a focus on coordination among stakeholders (Section 7.1) and the project's engagement with community structures (Section 7.2). We also present the findings from our VfM analysis in Section 7.3, which focuses on issues of economy and efficiency.

7.1 Coordination among stakeholders

During the conceptualisation and design phase, most stakeholders (in particular, the MoE and KOSAP) felt that they were informed about the pilot project but were not actively involved in the design. Similarly, the solar suppliers stated that they were only involved in the

[45] This excludes the costs for the external independent evaluation and costs associated with UNICEF's TA and Quality Assurance (QA).

project after the project had been designed and once they were selected, after responding to the request for proposals. The suppliers offered products that suited the project's specifications and explained the repayment mechanism to the project. Their business model/repayment terms were adapted for the project but the price remained the same as the market rate. Similarly, during the implementation phase, most stakeholders (besides Sida, UNICEF, and the implementing consortium) felt that they were only informed about the implementation, rather than actively involved in it. While the MoE felt that it could be more involved, the SPS and SAU felt they were involved on the ground through their officers (i.e. children's officers, etc.).

Across the board, stakeholders agreed that the county technical working groups are well attended and active. There is a general feeling that the county governments have been very supportive of the pilot project and that there is good political buy-in, which increased once the devices were distributed.

However, stakeholders felt that the national technical working group has been less active and engaged. One stakeholder felt that there was a tension between the national technical working group, which received a lot of pressure to implement quickly, and the county technical working groups, which were more detail-oriented and hence wanted to move slowly, to avoid implementation errors, the consequences of which would be felt in the counties. In addition, during the implementation review, there was found to be some confusion between the national technical working group and steering committee, and whether or not a steering committee had been established, or indeed whether this would be necessary at this stage.

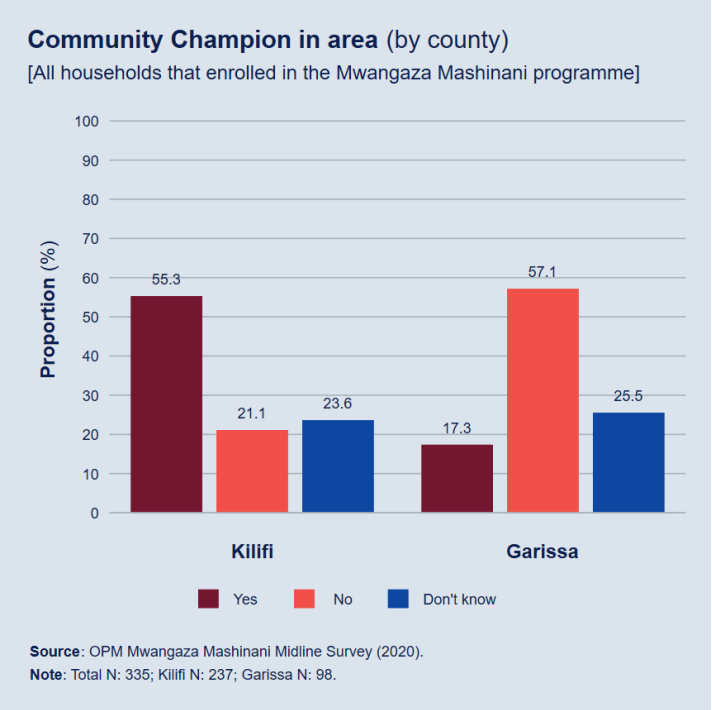
7.2 Engagement with community structures

The pilot project has been implemented using local structures that are also part of the Inua Jamii. These include government structures, such as Chiefs and children's officers, and structures of the Inua Jamii, including BWCs. While stakeholders interviewed as part of the implementation review were generally positive about the role of the BWCs in implementing the project and supporting beneficiary households, there are some concerns that the BWCs might not have the capacity (in terms of time availability and training) to fully take over the project were the implementing consortium to withdraw. If the project is going to continue working through the BWCs, the SAU noted that the BWCs will be reconstituted and retrained, and that the project could feed into this process.[46]

The project has also set up their own structures including solar peer associations and CCs with the aim to embed the project in the communities. The CCs receive a small stipend and are able to earn a small income through maintenance of devices or becoming agents for the solar suppliers. The midline survey finds that the majority of households are not aware of the CC in their area. Among the households that received the solar device, less than half (44.2%) reported that there was a CC in their area, while 32% said there was no CC in the area and 24% did not know whether there was a CC in the area. There are county-level differences in the awareness of the CC. More households in Kilifi cited that there was a CC in their area compared to households in Garissa (38 percentage points), as shown in Figure 30. There are no differences by gender or cash transfer type.

[46] This was planned to take place in the first quarter of 2020 but, due to the COVID-19 pandemic, the reconstitution process has been delayed.

Figure 30: CC in area (by county)



When households do know the CC, they frequently contact them and raise issues with them. Among those who said there was a CC, the majority either contacted the CC once per month (28%) or more frequently, once every two weeks (23%) or even once every week (23%). A very small proportion (4%) reported not having contacted a CC at all.

Overall, the CCs' role was most commonly known for the provision of information to beneficiaries (55%), support on technical issues related to the solar device (47%), and representation of beneficiaries collectively (33%). A large proportion of households aware of the CC (87%) cited having raised an issue with CC. In this regard, CCs were considered to be very helpful (74%) while only a small proportion of households did not consider this interaction helpful (9%).

Households were asked who they consider the main organisation leading the Mwangaza Mashinani pilot project to be. Almost half of all households (48%) reported that they do not know who is leading the project. A fifth reported the GoK as the main organisation behind the project, while 12% reported the solar providers (d.light or BioLite). 8% reported UNICEF and another 8% reported the Inua Jamii. There are significant differences across counties. While 53% of households in Kilifi do not know who the main organisation is, this is markedly lower in Garissa (37%), where more households reported the GoK (by 33 percentage points) and UNICEF (by 13 percentage points). On the other hand, more households in Kilifi reported the solar providers (by 16 percentage points) and Inua Jamii (by 10 percentage points). There were no significant differences across gender of household head or type of cash transfer.

7.3 VfM analysis

This section presents the main findings from the economy and efficiency analysis, covering the 36 months from October 2017 to September 2020. In the period under review, the

project performance was consistent with the agreed standards for 'good' economy and 'average' efficiency. Volume II, Annex H, includes the VfM assessment framework, performance standards for the VfM analysis, and the breakdown of how each indicator scored, to support our overall assessment. The remainder of this chapter presents the key findings from the economy and efficiency analysis.

7.3.1 Economy analysis

The VfM analysis evaluated whether the pilot project has used resources economically: buying inputs of the appropriate quality at the right price, and following good procurement and project management practices. According to the FCDO's VfM framework, economy is concerned with the cost and value of inputs (DFID, 2011).

Evidence was gathered to address seven indicators: 1) average monthly UNICEF staff cost; 2) average monthly UNICEF operational cost; 3) cost of E4I contractual services to implement the pilot project; 4) cost of OPM contractual services for the external independent evaluation; 5) transaction costs as a percentage of the total transfer value; 6) unit cost of solar devices; and 7) existence of operational evidence of procurement policies and procedures being documented and followed. Based on the available evidence, the project meets the definition of 'good in the standards for economy.[47]

The project has managed to minimise the transaction costs attached to the cash transfers (M-Pesa charges and banks' charges), being 50% lower than the benchmark value. Monthly average staff costs, as well as operational costs associated with UNICEF's activities are also below the benchmarks, as set up in the budget proposal. UNICEF concentrated its involvement over 12-18 months, roughly covering the period of the top-up payments, while staff members allocated relatively less time to the project before and after the payment cycles. The pool of experts combines different levels of seniority, with larger involvement observed for more junior or locally based staff. Lastly, some senior roles have been vacant for significant periods. These factors drove staff costs down, although some vacancies might also have affected UNICEF's capacity to provide the expected support to the pilot project during this time.

Contractual services related to implementation and evaluation cost more than expected. Both service providers received additional funding compared to the original contract value to cover unexpected activities. This is partly due to challenges emerging from contextual factors, some of them not foreseeable at the planning stage (for example, the effects of the COVID-19 pandemic or security issues emerging in Garissa). In other cases, poor underlying assumptions during the planning and costing process seem to explain the observed extra costs. For example, the project likely underestimated the resources necessary to operate in the targeted counties and risks associated with piggybacking on the government's systems for the project's operations. This led to overspending on targeting, and underestimating transport costs and costs of engaging with county government officials.

[47] The current assessment has been revised to incorporate UNICEF's comments to the first draft of the VfM assessment. In particular, UNICEF staff costs and the costs for QA and TA activities have been reviewed to reflect updated estimates provided by UNICEF. UNICEF clarified that the first calculations overestimated the actual staff costs because they assumed a timeframe of 12-18 months, coinciding with the period of the payments to the households during which time UNICEF's inputs were most intensive. The VfM analysis covers the entire duration of the pilot (36 months) hence estimates of staff costs had to be adjusted to consider average staff inputs over a longer timeframe. The analysis of the revised cost information changes some of the conclusions presented in the previous version of this section. The VfM Technical Note documents these changes.

While the project followed sound procurement practices for the selection of the solar suppliers, the final cost of the solar devices was above the budgeted amount.

7.3.2 Efficiency analysis

The VfM analysis also assessed whether the project resources have been managed efficiently, for the project's delivery of outputs. Drawing on FCDO's VfM framework, efficiency is concerned with the relationship between inputs and outputs, which are the goods and services the project delivers. The efficiency analysis focuses on the way in which the resources have been managed for the project's delivery of outputs. We focus on three metrics related to efficiency: allocative efficiency,[48] technical efficiency,[49] and dynamic efficiency.[50] On the basis of the available evidence, the project meets the definition of 'average' in the standards for allocative, technical, and dynamic efficiency.

Allocative efficiency

The allocative efficiency dimension addresses the issue of using an appropriate combination of resources to achieve the maximum advantage for a given cost. We look at the pilot project expenditure and identify how much has been spent on specific activities and items to assess whether the project activities have been delivered with regard to the budget. We also explore evolution of expenditure over time, to assess whether the system in place considers changing variables to rebalance the resources and to create a most efficient use of the resources. Evidence was gathered to address three indicators: expenditure by activity compared to budgeted amounts; time series of expenses by cost item from the beginning of the project until September 2020; spending by cost centre and the cost to transfer ratio.

We assess allocative efficiency as 'average' in the standards for efficiency. The pilot project allocated significantly larger resources to set-up and inception activities, as well as implementation, compared to the budgeted amounts. At the same time, spend on UNICEF TA costs and QA costs, captured by the total costs for UNICEF staff incurred by the project, is below the budgeted amount. This may, in fact, represent a potential efficiency saving that might have freed up resources to directly support the implementing partner through further financing. Overspending for implementation and some of the evaluation activities was partially due to issues in conducting the vulnerability assessment and adapting the design of the project to the effects of the SAU migration and recertification process, as well as issues in the coordination of the repayment exercises. In addition, the total amount transferred to beneficiaries is lower than the budgeted resources. This might indicate that despite the large resources allocated to administering the project, the project has only partially succeeded in retaining beneficiaries.

Technical efficiency

The technical efficiency dimension addresses the issue of using given resources to the maximum advantage. We investigate the management of the delivery of project outputs

[48] Delivery according to budget and allocation of resources reflecting the relative priority given to project activities and associated costs.
[49] Delivery according to the project implementation plan (at required quality and quantity, on time), allowing for reasonable exceptions or changes due to adaptive programming, to capitalise on opportunities and/or to manage risks.
[50] Ability of the project institutional framework to adapt to new financial challenges and the existence of systems in place for learning and evaluating performance.

compared to the project implementation plan and targets. In particular, we assess whether the project implementation plan has been delivered with regard to quantity, quality, and timeliness. Evidence was gathered to address three indicators: adherence to implementation timeline; whether key logframe achievements are on track to meet targets; and cost per beneficiary enrolled in the project and cost per beneficiary purchasing the solar devices.

Our judgement suggests that the pilot project meets the definition of 'average' in terms of technical efficiency. The project implementation plan has only been partially delivered with regard to quantity, quality, and timeliness. While some implementation adjustments are expected in a pilot project, the project experienced severe delays during the procurement process and at the inception phase, due to internal and external factors. In particular, the identification of eligible households was far more time- and resource-intensive than initially expected. This is because households were not identified through the first vulnerability assessment, and a listing exercise (the verification exercise) was needed to check which Inua Jamii households met the categorical targeting criteria. In addition, a second verification exercise was conducted to ensure potential beneficiaries were still eligible after the recertification and migration exercise conducted by the SAU. While the implications of the migration were outside the control of the project, the project potentially underestimated the risk of this activity to the targeting and enrolment activities, especially because the project stakeholders were aware of the recertification exercise during the set-up phase of the pilot project.

Despite the initial delays, by June 2020 most of the logframe targets had been achieved. Nonetheless, 22% of enrolled households decided not to purchase the solar device, the average length of payment delays is about six times higher than the target, and 30% of beneficiaries do not regularly make repayments for the device, compared to an expected repayment rate of 100%. The attrition rate is quite high and presents the project with some lessons for subsequent phases. Furthermore, some of the findings reported against the logframe indicators seem to differ from the recent midline survey results, potentially showing that achievements are not fully sustainable.

We have seen that the pilot project has cost nearly US$ 1.2 million to support 1,692 households purchasing a solar device, out of 2,175 households enrolled. Of this, about US$ 255,000 was distributed in cash to recipient households, and about US$ 942,000 was spent on other expenses related to the administration and evaluation of the cash transfer, as well as the provision of ancillary services to beneficiaries. Such services include skills training and BCC to own and manage the solar device and improve the learning performance and health of beneficiary children. The observed spending reflects the learning objective of the pilot, and its intention to test an innovative approach to improve access to energy for the poorest segment of the population. The unit cost per beneficiary is US$ 296[51] compared to an average transfer of US$ 151 per beneficiary to pay the solar device. While this is partly explained by learning and start-up costs associated with a pilot phase, activities to facilitate the repayment of the devices underperform compared to the target, indicating a modest level efficiency in the use of resources.

[51] The unit cost takes into account spending on supplies and commodities; contractual services for E4I; travel costs, transfers and grants to counterparts (excluding beneficiaries) and general operating and other direct costs. The unit cost excludes costs related to the external independent evaluation and costs associated with UNICEF's TA and QA.

Dynamic efficiency

The dynamic efficiency dimension considers how well the pilot project has reallocated resources to reflect evolving circumstances and opportunities in the context of the project's implementation. It considers the systems in place for learning and evaluating performance, and considers the ability of the institutional framework to adapt to new financial challenges.

From a dynamic perspective, the project has achieved an 'average' level of efficiency. The project modified the payment schedule to minimise the risks associated with delayed repayment for the solar devices. In response to a lack of awareness of the project payment process and the functioning of the solar devices, the implementers set up communication campaigns and capacity building sessions to better support households.

However, some risks that could have been foreseen were not sufficiently identified ahead of time and tackled proactively and in a timely manner. For example, during the November switch-off, the project only negotiated an extension to the device activation period with the solar providers after most of the devices had been switched off. Furthermore, the project lacks a solid management information system and cases of data inconsistencies were observed in the reporting of beneficiaries' accounts, as well as amounts disbursed to the banks. This makes knowledge management more cumbersome and less efficient, and limits effective tracking of beneficiaries and adaptive learning.[52]

[52] Implementers clarified that the SAU changed the way beneficiaries are identified in early 2020. Under the new system, a beneficiary cannot be a caregiver and a caregiver can only be responsible for one beneficiary household. This should facilitate the identification of beneficiaries and minimise the risk of duplication going forward.

8 SUSTAINABILITY

Box 8: Summary of findings related to sustainability

The preliminary assessment of sustainability suggests there is a high degree of commitment to scaling up the pilot project by the national government. However, the issue of financial sustainability will need to be addressed in any scale-up scenario. While it is too early to assess sustainability at the household level, early indications suggest that households might struggle with the costs of maintaining the solar devices.

- **Stakeholder commitment:** Stakeholders in the MoE, SPS, and SAU have endorsed the pilot project and are interested in scaling it up. KOSAP was widely mentioned as a potential vehicle for scale-up.
- **Financial sustainability:** The solar devices are expensive products for the target market and are highly subsidised by the project in order to 'seed' the market, create awareness, and overcome the issue of affordability. However, in Phase 2 of the pilot, and in a scale-up scenario, it is not clear how consumer affordability would be addressed.
- **Sense of ownership:** The qualitative findings suggest that beneficiaries feel a low level of ownership of their devices.
- **Maintenance of devices:** A majority of beneficiary households have a fully functioning device at midline. Households indicated that they are willing to repair their device, but the affordability of replacement parts and repair services remains a concern.

In this chapter we explore the initial indications regarding the sustainability of the Mwangaza Mashinani pilot project. However, a full assessment of project sustainability is premature at this stage and this will be further explored as part of the endline evaluation activities. At this stage, we focus on the potential sustainability of the pilot project in terms of stakeholders' commitment to scaling up the project (Section 8.1) and initial indications of households' willingness to maintain the solar devices (Section 8.2).

8.1 Stakeholder commitment to scaling up the pilot project

8.1.1 Commitment from stakeholders

At the national level, the MoE and MLSP (represented by the SPS and SAU) have endorsed the pilot project and would like to see the project scaled up. Stakeholders in both ministries felt that they could run a scaled-up version of the project from their ministry (given alignment with policy objectives in the energy and social protection sectors). However, it is not clear that either ministry is currently in a position to scale up the project as neither ministry has been very involved in either the design or the implementation of the project. In addition, officers at the Department of Children's Services and Department of Social Development, who would be involved with implementation should the project be scaled up through the MLSP, are already very capacity constrained. These constraints are likely to be exacerbated with the imminent roll-out of the Enhanced Single Registry, Nutritional Improvements Through Cash and Health Education Programme, and economic inclusion pilots under the Kenya Social and Economic Inclusion Project.

As part of the implementation review, KOSAP was widely mentioned as a programme that could take the Mwangaza Mashinani pilot project to scale. However, at that time (November 2019), stakeholders in KOSAP and the MoE, in general, felt that they had not been kept up to date on the progress of the project, and felt that conversations around alignment between KOSAP and the project had stalled, due to changes in management at UNICEF.

The solar suppliers both indicated interest in scaling up their involvement in the project and both were interested to explore new markets. The guarantee mechanism was mentioned as a key aspect of the project that would incentivise exploring new markets.

8.1.2 Financial sustainability

The Mwangaza Mashinani pilot project provides highly subsidised products to vulnerable households, which is necessary in order to 'seed' the market and to overcome the issue of affordability of accessing solar energy. The solar devices offered through the project are expensive products for the target market and, even on a pay-as-you-go basis, affordability is a challenge for households. As discussed in Section 4.3, only 40% of households paid the KSH 250 commitment fee using their own money. Further, interviews with the solar suppliers also indicated that very few households made repayments during the time of the Inua Jamii payment delays (see Section 0). In addition, the value of the cash top-up provided by UNICEF is high relative to the Inua Jamii payments (at more than 70% of the value of the regular Inua Jamii transfers). Hence, without the subsidy, affordability will remain a constraint.

Further, the solar products require periodic maintenance and it is likely that the lithium batteries will need replacement after a few years' use. This maintenance would need to be paid for by households themselves, and can be costly (e.g. US$ 20 to replace a battery). On top of this, some maintenance issues will also require households to pay for the services of people who are able to undertake the repairs.

In a scale-up scenario, it is not clear how consumer affordability would be addressed. For example, KOSAP currently addresses affordability on the supply side by introducing results-based financing for solar devices and cook stoves. The programme does not have a subsidy element, although stakeholders at KOSAP acknowledged that if they are to reach the most vulnerable households, the programme might need to include a subsidy. Therefore, it is important for the Mwangaza Mashinani pilot project to engage with KOSAP around whether and/or how a subsidy approach could be integrated into the programme, by presenting a viable and tested implementation model that could be integrated into KOSAP to ensure that the most vulnerable households are able to afford clean energy lighting solutions.

The MoE also mentioned the Equalisation Fund as an alternative means of scaling up the pilot project. This would see the project being led by counties in which marginalised communities reside, rather than there being a nationally-led scale-up. This will be explored further as part of the endline county-level implementation review.

8.2 Ownership and maintenance of solar devices

The qualitative research conducted in January 2020, and the quantitative midline survey, present a preliminary understanding of ownership and maintenance of the solar devices. At the time of the qualitative research, households had not used their device for very long and,

even by the time of the midline survey (June 2020), a minority of households had needed to repair the solar devices.

While households demonstrate a strong need for the solar devices, it was not evident during the qualitative research that households would use their own funds for major repairs or replacements after the project ended, especially since beneficiaries believe they would have to sell their produce or stretch their savings to afford repairs.

Some interviews suggested that the beneficiaries would like to maintain the devices beyond the completion of the Mwangaza Mashinani pilot project. However, these should be viewed as preferences and intentions – and not signalling a sense of ownership *per se* – given that the project is still in the pilot stage and, at the time of undertaking the qualitative research, many beneficiaries had not yet encountered the need to use personal financial resources to address substantial maintenance issues.

The project design intended to encourage savings groups in the community. However, in the four communities visited for the qualitative study, only one BWC in Kilifi reported a savings group having started in order to enable households to save for solar device repairs in the future.

While BWCs and CCs in the qualitative sample are aware that households need to make six payments before they fully own the device, few beneficiaries reported knowing how many times they need to pay in order to fully own the device. Payment delays, resulting in 'double' payments, does not help to instil clarity around how much or how long beneficiaries have to pay for their device. The lack of clarity around payments suggests that beneficiaries do not know when they will fully own their devices, which constrains not only their sense of ownership, but also their agency in the transaction.

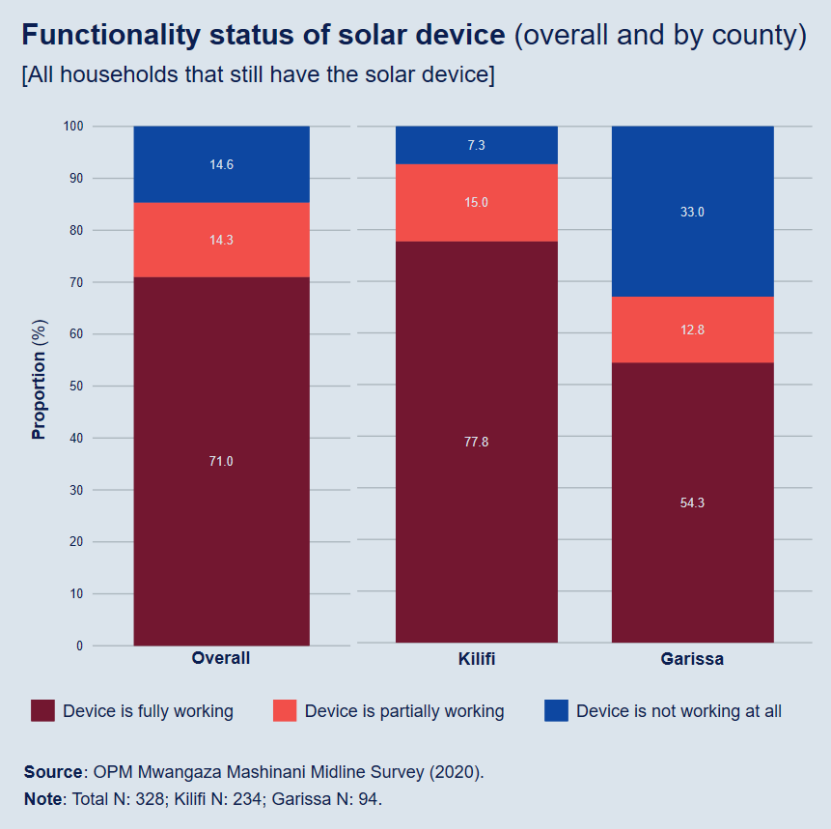
8.2.1 Willingness to maintain and repair the devices

At the time of the qualitative study, very few households had needed to get in touch with the solar provider for device repairs. However, most households demonstrated the knowledge and willingness to make a call to their main POC if required. Interviews in the qualitative research revealed that households are careful with the devices and wary of young children breaking them, which is why children are typically not allowed to use the devices at all. Despite taking great care with their devices, households experienced a number of maintenance issues that caused their devices to stop working. For example, a common issue was the breaking or fraying of wires, which are susceptible to inclement weather or damage by animals: for example, rats chewing wires. CCs in both Kilifi and Garissa said that they could fix smaller problems like broken wires for the households themselves, but for more technical problems they would ask households to contact solar providers directly.

The quantitative midline, which took place six months later, finds that almost all households (98%) that have received a solar device from the project still have it. While the majority of the beneficiary households (71%) have a fully functioning device, 15% of households reported that their device was not working at all, while another 14% cited that their device was partially working. Figure 31 shows that more households in Kilifi have a fully functional device at midline (by 24 percentage points), while more households in Garissa cited that their device was not working at all (by 26 percentage points). We find no differences in the functionality of the solar device by the gender of the household head or type of cash transfer. As mentioned in Section 4.5, 40% of households who know a POC for reporting

maintenance issues reported such issues. This indicates that while the majority of households have fully functioning solar devices, a sizeable proportion have faced maintenance issues.

Figure 31: Functionality of solar devices (overall and by county)



Source: OPM Mwangaza Mashinani Midline Survey (2020).
Note: Total N: 328; Kilifi N: 234; Garissa N: 94.

9 MIDLINE ASSESSMENT OF THE TOC

This chapter provides an assessment of the project's ToC on the basis of the evidence from the quantitative and qualitative research activities undertaken to date. Figure 32 shows the ToC diagram, with a visual indication of our assessment of whether or not key aspects of the ToC were upheld (it also shows which ToC elements could not be measured entirely at midline due to either COVID-19 restrictions or the requirements of the mobile phone survey mode).

While the findings presented in this report articulate the evidence collected across the DAC criteria and evaluation questions, we highlight here some of the key insights emerging on the ToC itself, especially regarding pilot activities and outputs, as well as their related assumptions. Outcomes and impacts will be fully assessed at endline.

9.1 Activities

Cash top-up and solar device supply: These two central activities took place in line with the ToC: banks transferred the pilot project cash top-up in coordination with the Inua Jamii payment mechanism (there were significant issues concerning the reliability and regularity of the Inua Jamii transfers, though, which are discussed in the section on outputs), and the distribution of solar devices to beneficiary households was successful. The related assumptions on interest, willingness, and ability of solar suppliers and micro-entrepreneurs to distribute the devices according to specifications were therefore upheld. Evidence gathered through conversations with solar suppliers also indicates that the solar market was not distorted, which was another assumption in the ToC. However, only two suppliers, d.light and Bright Sky Solar Solution (distributors of the BioLite solar device), participated in the pilot, while the original ToC stated that 'several solar system suppliers' would be contracted.

Beneficiary targeting and enrolment: The midline survey sample achieved shows that a large proportion of households that were eligible for the intervention and initially captured by the registration exercise were not ultimately enrolled. The enrolment approach was modified during implementation to ensure that the target number of beneficiary households could be achieved. The initial commitment fee of KSH 500 was reduced to KSH 250, but even then some of the households eligible for the intervention decided against participating, while others had to be helped financially to make this payment. This suggests that the assumption on the beneficiaries' willingness to make an upfront payment was not fully upheld. The original enrolment activity was therefore problematic and not entirely effective, especially in Garissa, where contextual issues are likely to have played a role in affecting enrolment. It thus seems reasonable to argue that the assumption on contextual factors not negatively influencing the intervention was at least partially incorrect, given the issues (e.g. security) affecting implementation more in Garissa than in Kilifi.

Communication and BCC: A key issue emerging around the planned activities included in the pilot ToC concerns the communication and behavioural change activities. While training at the community level, and specifically of CCs, took place, sensitisation and training of targeted beneficiaries was not provided as systematically and frequently as expected. Evidence also points towards a lack of support from community actors, such as BWCs, on livelihoods, which was one of the planned activities included in the ToC. Overall, the qualitative and quantitative research highlight an implementation failure of the BCC. The

related assumption on mobile phone access, through which some of the BCC was supposed to happen, is also problematic as not all beneficiaries live in areas with a reliable network, and older and less able individuals faced challenges using their mobile phones for the purpose of the intervention. The BCC failure has had far-reaching consequences for the operationalisation of the pilot (discussed in Section 4), including for the ability of pilot community structures and beneficiary households to deal with problems around cash transfer payments and repayments for solar devices.

Technical problems and grievances: Another activity that has not been fully achieved is the establishment of a project grievance system linked to other existing systems. The information at our disposal on the grievance system employed does not suggest any effective linkage with the national system. In addition, we find that, when it comes to payment issues or technical problems with the solar devices, only a minority of pilot households reached out to community actors for support, and they often did not receive clear and effective communication.

9.2 Outputs

Awareness of the use and benefits of solar energy: This intended output of the pilot was achieved. Evidence shows that awareness of the benefits of using solar energy among beneficiary households at midline is high and has improved over time compared to baseline. This also proves that, on the one hand, the assumption on beneficiaries valuing the solar devices was upheld, and, on the other hand, the main constraint for potential beneficiaries is not being able to afford the payments, rather than the lack of knowledge about the benefits of solar energy. The relevance of the pilot project's focus on affordability is thus confirmed.

Top-up payments and device repayments: The main issues concerning the outputs listed in the ToC relate to the reliability of the conditional bi-monthly top-up and the consequent ability of the beneficiaries to regularly make repayments and to provide customer feedback. These two key outputs were not entirely achieved due to problems affecting assumptions and activities concerning the reliability and timeliness of the Inua Jamii cash transfer payments, as well as the communication around these payment delays and the solar device repayment protocols. The assumption around the regularity and reliability of payments, both for the Inua Jamii transfers and the pilot project cash top-ups, is particularly problematic given that delays in receiving the money caused cash constraints to beneficiary households and, crucially, meant that solar devices were switched off and could not be used for a period of time. The lack of support and communication that some households experienced in relation to these payment delays, and the related solar device repayment protocol, further highlights the fact that assumptions concerning community structures' ability and availability to support are also problematic.

Sense of ownership: The lack of communication on payment and repayment amounts and timelines also means that beneficiary households are not clear on whether and when they have full ownership of their devices. This has negatively affected the sense of ownership. The fact that the project seems to have paid the commitment fee for at least some of the solar device owners might have further undermined their sense of ownership. Thus, our evidence suggests that the challenges with the cash transfer system, compounded by the ineffective communication around it, led to a distortion of the sense of ownership of the solar devices.

9.3 Outcomes and impacts

The outcome, and especially the impact, stages of the ToC will be assessed fully at endline, when the planned in-person survey should be able to gather evidence on the full range of outcome and impact indicators. However, three key insights have emerged at midline:

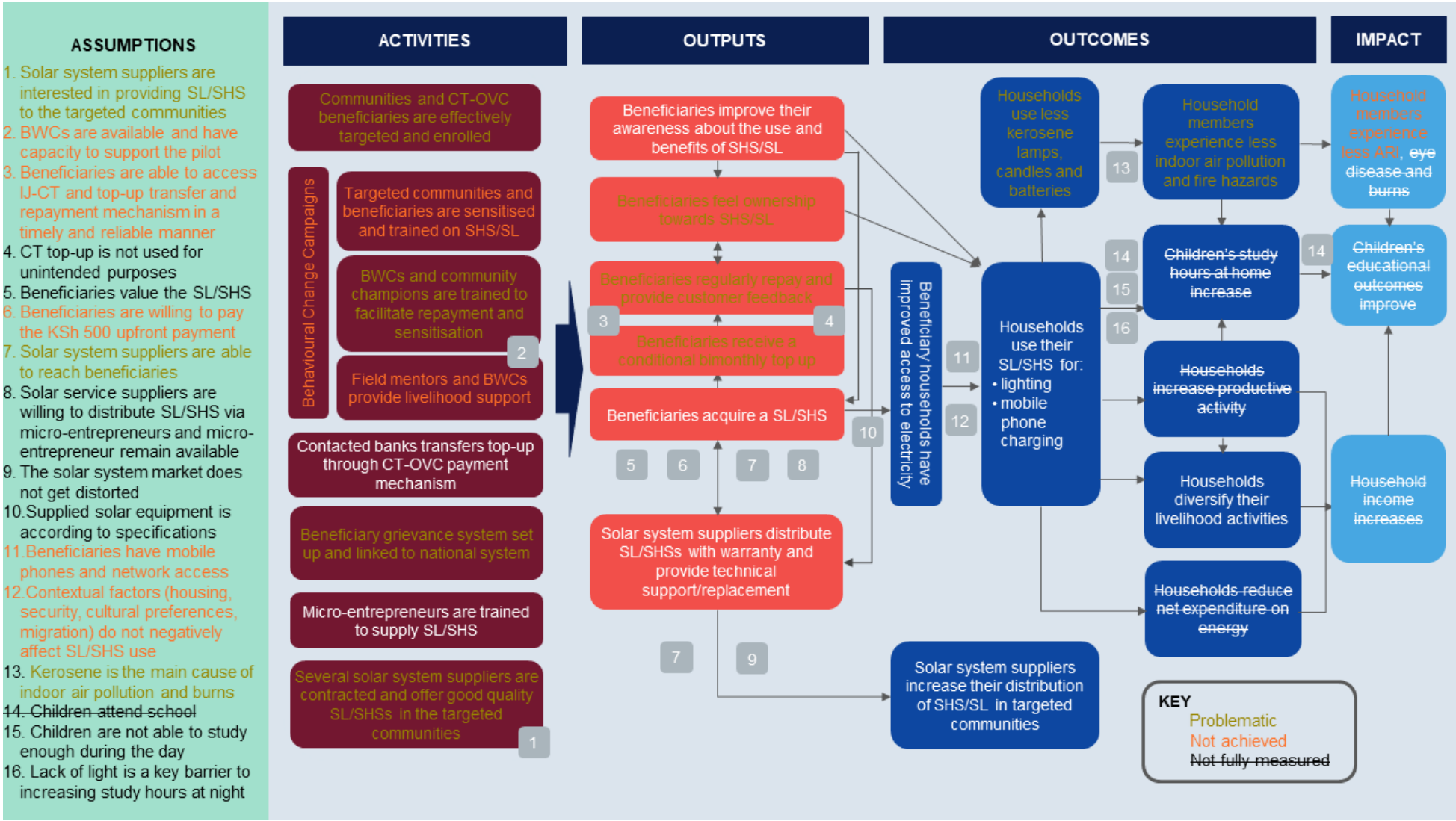
1. **Access to electricity:** Beneficiary households do have improved access to electricity thanks to the project, and use their solar devices for lighting and mobile phone charging, as expected.
2. **Modest impact on livelihoods:** This improved access to electricity has led to a modest positive impact on the number of working household members per household, and on the number of productive activities per household.
3. **No impact on health:** There is no discernible effect on indoor air pollution and no related impact on respiratory illnesses.

The lack of an impact on health is not surprising and was anticipated at baseline as the intervention does not aim to change cooking modalities, which contribute much more than alternative lighting fuels to indoor air pollution. In any case, a low prevalence of respiratory diseases across both the baseline and midline samples would suggest that these respiratory risk factors are not prevalent in the first place. Hence, even the relevance of the pilot project objective to improve respiratory health through this intervention is not clearly justified by the evidence emerging from our evaluation.

However, qualitative and quantitative evidence suggests that solar devices are used for livelihood activities, especially in Kilifi. More specifically, the quantitative impact analysis shows an improvement in the number of working household members, and in the number of productive activities per household, which can at least be partially attributed to the pilot project. Although this encouraging midline finding seems to validate some of the ToC causal mechanisms, a more comprehensive assessment of impact on household incomes (also taking into account time use indicators) should be carried out at endline, when we also hope to measure the project's impact on education (the latter could not be measured at midline due to the school closures, as part of the COVID-19 restrictions implemented in Kenya).

Finally, it is worth noting that our midline findings also suggest the existence of other potential unintended effects of the pilot project on beneficiary households, which were not part of the original ToC. These include, for instance, a better sense of security provided by having light at night, as well as an incentive to socialise, and improvements in households' social capital within their communities. Although it is not our intention to include these impact areas *ex-post* in the ToC for Phase 1 of the pilot project, which guides our assessment of the project as originally designed, we will nonetheless continue to gather information on these and any other emerging effects of the project.

Figure 32: ToC diagram of the Mwangaza Mashinani pilot project



10 CONCLUSIONS AND RECOMMENDATIONS

10.1 Conclusions

The analysis in this report draws on findings from the baseline and midline surveys, a midline round of qualitative research, the implementation review conducted at national level, and a VfM analysis. In this section, we summarise the conclusions based on the findings presented in Chapters 3 to 9.

10.1.1 Relevance

Overall, our findings suggest that the pilot project's objectives are relevant for the targeted households, solar suppliers, and the GoK. Specifically, the project's aim to improve the affordability of small solar devices is relevant for households, who are found to lack access to modern energy sources for lighting and mobile phone charging. Our findings confirm that affordability is the key constraint faced by these households. The project also aims to develop markets for solar energy by increasing the penetration of solar products in previously underserved communities. We find that the de-risking mechanism offered to the solar suppliers provides a sufficient incentive for them to explore new remote markets. Finally, we find that the pilot project is aligned with the GoK's priorities for social protection and energy in terms of supporting all Kenyans to live in dignity, and achieving universal electrification, respectively.

10.1.2 Effectiveness of pilot project operations

Overall, throughout the cycle of the pilot project's implementation we find that outreach and communications have been weak, and that this has undermined other aspects of the project's service delivery (e.g. repayments). First, Chiefs felt they were not adequately consulted or sensitised about the project prior to implementation, despite their primary role in supporting Mwangaza Mashinani beneficiaries. Second, the lack of communications and training on the payment system has led to confusion around entitlements and the process of making repayments, with community leaders and project structures feeling that they do not have sufficient knowledge to support households effectively. Third, despite an explicit focus of the pilot project on improving outcomes for women, there is no explicit gender or gender equality and social inclusion framework in the design of the project: in particular, as part of the BCC strategy.

The baseline survey results indicate that the targeting was largely successful, with most households selected through the verification exercise meeting the eligibility criteria. Community leaders also perceive the project to have enrolled vulnerable households. However, due to the small-scale of the pilot project and the categorical targeting criteria, there was also the perception that not all vulnerable households had been included (see Box 9 below).

The pilot project was able to meet and exceed its enrolment target in the first phase of implementation. However, the process of enrolment differed by community, which undermined

the intended registration and targeting process. One-third of the baseline 'treatment' sample did not enrol in the project. In addition, many beneficiaries used money provided by project staff or family/friends to pay the commitment fee for the project themselves, particularly in Kilifi, which undermines the project design to ensure beneficiaries were serious and committed. Finally, while households were aware that there were two devices offered through the project, it is not clear that households made an informed selection, due to low levels of literacy and a lack of information about the solar devices.

Box 9: Piggybacking on the Inua Jamii

In preparation for scale-up, the pilot project should consider the appropriateness of continuing to piggyback on the Inua Jamii's delivery systems.

First, by targeting only beneficiaries of the Inua Jamii, the Mwangaza Mashinani project targets only vulnerable households that meet the Inua Jamii's categorical targeting criteria, while also inheriting the Inua Jamii's exclusion errors. Given the project's focus on enhancing access to modern energy for vulnerable households in underserved communities, a more inclusive approach to targeting that covers both Inua Jamii and non-Inua Jamii households could be better suited to achieving this objective. For example, the project could adopt a geographic targeting approach to cover all households residing in underserved communities. Once rolled out, the Enhanced Single Registry can also be used for targeting vulnerable households.

Second, expanding the eligibility criteria would also address the inherent tension between integrating new interventions with the Inua Jamii, and supporting vulnerable households that do not receive support from the cash transfer programmes. On the one hand, layering the Mwangaza Mashinani intervention on top of the existing cash transfer programme is likely to enhance the resilience of Inua Jamii beneficiary households. On the other hand, there is a preference, at county level, to avoid 'double dipping', by spreading support to vulnerable households that do not benefit from the Inua Jamii (Gardner *et al*., 2020).

Finally, the Inua Jamii suffers frequent payment delays, which are passed on to the Mwangaza Mashinani project (see Section 4.4) To avoid this, the project could continue to use Inua Jamii bank accounts to make payments, while de-coupling the timing of the payments from the cash transfer programmes, as discussed during the implementation review. If the project's eligibility criteria were to be expanded beyond beneficiaries of the Inua Jamii, the project could also look to using other means to pay beneficiaries. For example, the COVID-19 response has shown the potential of using M-Pesa, and other mobile money platforms, to provide cash support to vulnerable households (Doyle, 2020).

Overall, we find that the payment and repayment mechanisms of the project have posed the biggest challenges to implementation. The Mwangaza Mashinani pilot project's payment system is aligned with the Inua Jamii, in terms of timing and using the same bank accounts. Therefore, many of the challenges faced by Inua Jamii beneficiaries in accessing their payments are inherited by the project (see Box 9). In particular, payment delays are particularly problematic as households are not able to make timely repayments to the solar providers, resulting in their devices being switched off. It is unlikely that delays to the Inua Jamii payments will abate and, in a scaled-up version, this could pose a challenge for solar suppliers, who require timely repayment for the devices. Households also struggle with the repayment process due to a lack

of financial literacy or challenges using M-Pesa. In many cases beneficiaries require support from Chiefs and CCs to facilitate repayments.

Finally, the majority of households are not relying on the appropriate POCs for problems related to the devices or cash top-ups. This is likely to reduce the effectiveness of the grievance mechanism, and to result in households being unlikely to get the support they need. Further, the project's grievance mechanism is not yet integrated with the national system.

10.1.3 Awareness and use of devices

The midline survey finds that households have good awareness about the benefits of solar energy, even when they do not own solar devices, and the increased presence of solar energy in their community increases this awareness. This supports findings on relevance that affordability, rather than a lack of knowledge about the benefits of solar energy or where to acquire solar devices, is the main constraint on acquiring a solar device.

As expected, there has been a significant increase in the use of solar devices among beneficiary households, and a reduction in the use of other sources of lighting. We find the most important benefit of the solar devices is providing light to households at night. Households also use the solar devices to charge mobile phones, and to provide lighting for children's study, productive purposes, and so that children can play. In addition, the solar devices improve quality of life as they are used to light up the outside of the house for security and other purposes, such as socialising.

Overall, we find qualitative evidence that the solar devices save households time (for phone charging) and money (including reduced spending on phone charging and other lighting sources).

10.1.4 Impact

In terms of health outcomes, we find no impact of the pilot project on household members' respiratory conditions. An investigation of impact on the experience of eye irritation and burns will take place at endline. There is, however, evidence that the project has had a positive impact on some livelihood outcomes, such as the number of working household members and the diversity of activities by households. However, at the time of the midline survey this had not translated into additional income for households.

As discussed in Chapter 9, the impact level of the pilot ToC focuses on impact on health, livelihoods, and children's education. However, the midline findings suggest that there are other potential and important unintended effects of the pilot project on beneficiary households' well-being. For example, households reported having a better sense of security and felt incentivised to socialise, thereby improving their social capital within their communities. These impacts can be further investigated as part of the endline survey.

10.1.5 Efficiency

County-level coordination appears to be more efficient than at the national level. The design phase of the project would have benefitted from more involvement from the suppliers and other relevant stakeholders, including the MoE/KOSAP, who could have helped to shape the repayment terms and products, rather than responding to prescribed parameters. At the county level, technical working groups are said to be well attended and active, creating good political buy-in and commitment from county-level stakeholders. The project has also coordinated with local structures involved in the implementation of the Inua Jamii.

At the community level, we find that the majority of households are not aware of the CC in their area. Where they are aware of the CC, they frequently contact them for support and to raise issues. When utilised, CCs are seen to provide requisite information to Mwangaza Mashinani beneficiaries, to provide support on technical issues related to the solar devices, and to represent the beneficiaries collectively. More households in Kilifi cited that there was a CC in their area compared to households in Garissa, which is likely to impact on service delivery.

Findings from the VfM analysis indicate that the pilot project meets the definition of 'average' VfM. In terms of economy, the project managed to minimise the transaction costs attached to the cash transfers (M-Pesa charges and banks' charges) as well as operational and staff costs. However, contractual services have cost more than expected. While the pilot project followed sound procurement practices for the selection of the solar suppliers, the final cost of the solar devices was above the budgeted amount.

Regarding cost efficiency, the majority of activities have been implemented within budget, though the pilot project did allocate significantly more resources to set-up and inception activities, as well as implementation, compared to the budget. This was due to delays in the procurement process and some unforeseeable challenges emerging from contextual factors. Despite the initial delays, by June 2020 most logframe targets had been achieved. Nonetheless, 22% of enrolled households decided not to purchase the solar device and 30% of beneficiaries do not regularly make repayments for the device. With a unit cost per beneficiary of US$ 296[53] compared to an average transfer of US$ 151 per beneficiary to pay for the solar device, the pilot shows a modest level of efficiency in the use of resources, owing in part to the innovative approach tested by the project and learning and start-up costs associated with a pilot phase. While higher costs are expected in a pilot project, the combination of high unit cost and quite high attrition rate presents the project with some lessons for subsequent phases.

10.1.6 Sustainability

Our preliminary findings on sustainability suggest that there is a high degree of commitment from stakeholders to scaling up the pilot project. Across the board, stakeholders were keen to see the Mwangaza Mashinani project scaled up as it is aligned with priorities in both the energy and social protection sectors. However, in any scale-up scenario affordability of the product for this market demographic will continue to remain a challenge. Possible scale-up channels, such

[53] This excludes the costs for the external independent evaluation and costs associated to UNICEF's TA and QA.

as KOSAP, will need to consider whether and how subsidies can be used to reach the most vulnerable households.

It is too early to assess the sustainability of the pilot project at the household level fully. This will be explored at endline. However, early indications of sustainability suggest that, while households are willing and keen to maintain and repair their devices, affordability of replacement parts and repair services remains a concern and may undermine households' ability to maintain and continue to use the solar devices. In addition, the lack of clarity on who to contact when the solar device stops working poses a threat to households' ability to maintain their device.

10.2 Recommendations

In this section, we present a number of implications and points for consideration either in the second phase of implementation of the Mwangaza Mashinani pilot project or during the scale-up.

Relevance: To ensure that the pilot project remains relevant for both users and suppliers of solar devices, a number of elements should be considered:

- The design of the second phase should consider whether and how affordability can be further addressed, with particular consideration given to setting the value of the commitment fee. For example, the project could consider removing the commitment fee altogether as we find that the majority of households did not pay the fee themselves but at the time of the midline had working devices and continued to use their device frequently.
- The second phase of the pilot project should be used to 'sell' the project to a larger range of solar suppliers. The project should raise awareness among solar suppliers, drawing on the successes and lessons learned during Phase 1 (including the findings from the evaluation to date), and the potential for involvement in the scale-up, in order to attract further suppliers to sign memoranda of understanding with the project in Phase 2.
    - In addition, solar devices are relatively expensive products for this segment and cheaper, lower-tier solutions (e.g. solar lanterns) may be a more appropriate and affordable introduction to clean lighting for poor households. The second phase of the pilot project should consider offering a wider range of solar products to beneficiaries, including cheaper solar solutions. This could be achieved by partnering with additional solar suppliers in Phase 2.
- The project currently offers two incentives to suppliers to expand into underserved markets: higher than market price unit costs for solar devices, and a payment guarantee.
    - In Phase 2, a de-risking mechanism, such as the 85% guarantee offered to suppliers, should be retained to leverage private sector financing and to support considerably de-risked opportunities for the private sector in a traditionally commercially unattractive sector. This will be important if the project is expanded to even more remote areas. However, the project could consider altering the mix of incentives offered to solar suppliers, to lower the cost of the product for households, and to lower the cost of the

project, by offering higher levels of guarantee to suppliers who offer lower unit costs for the solar devices.

Effectiveness: To improve the effectiveness of implementation, there is an opportunity to refine the existing project operations or to test alternative models for implementation during Phase 2 of the pilot, including considering which aspects of the Inua Jamii's delivery systems to piggyback on (see Box 9). Our findings suggest a few key areas of implementation could be usefully reviewed:

- It is imperative that a strong communication and engagement strategy is developed during the inception phase in order to strengthen the processes of communication, outreach, and sensitisation.
  - During the preparatory stages of Phase 2, structures at all levels (i.e. local government, Chiefs, Assistant Chiefs, BWCs, and CCs) should be properly engaged and sensitised so that they are able to fully support households during the project. Clear channels for maintaining ongoing communication during implementation should also be established.
  - The communication strategy should utilise a combination of communication channels, including in-person meetings (e.g. *barazas* followed by smaller group meetings to provide information to the most vulnerable and marginalised households), especially in remote areas where radio and/or television transmission is limited.
  - This sensitisation should take place prior to engaging potential beneficiaries and should focus on all aspects of the project's delivery systems, including targeting and enrolment, selection of devices and installation, payments and repayments, and grievance mechanisms.
  - This strategy should also consider how best to engage households to ensure that they are fully informed before deciding whether to participate in the project and, later, selecting their device.
  - Beneficiaries also need to be aware of the resources that exist to assist them during the project.
  - Finally, the strategy should consider whether the BCC component should be included in Phase 2 as, in spite of limited BCC in Phase 1, households use their devices frequently and in line with the project ToC (i.e. for livelihood activities and to allow children to study at night).
- Gender should be explicitly incorporated into the project's design and implementation. This could be achieved, for example, by following the United Nation's Gender Equality and Social Inclusion framework, to systematically address issues related to gender and inclusion. In particular, the BCC should be tailored to female and male beneficiaries: for example, tailored communications around promoting the benefits of solar energy, which might be different for men and women (see baseline results), ownership and usage of the product, which may have unintended impacts on women's time poverty, and maintenance of the product and capacity building (e.g. focusing on training female agents and CCs, while taking their needs into account, such as security concerns, means of travel etc.)

- The project should consider whether all the categorical targeting criteria are required for Phase 2, or whether different categorical criteria might be more appropriate to improve inclusion. For example, the project may want to focus on targeting all households residing in geographic locations that do not have access to electricity.
    - In a scaled up version, the project could also consider targeting vulnerable households through the Enhanced Single Registry, which will also contain data on vulnerable households not enrolled in the cash transfer programmes.
- The project should consider whether the commitment fee should be retained as part of the design, given that a large proportion of households did not pay it themselves.
    - If the commitment fee is retained, households should be given sufficient warning that a commitment fee will be required to enrol in the project, such that they are able to save the money, or the commitment fee amount should be reviewed such that households are able to pay for this themselves.
- The repayment model should be reviewed to ensure that payment delays are properly accounted for and protocols for extending light to households should be agreed with suppliers in advance. For suppliers, this might include pricing in a risk premium. For households, more flexible repayment plans (e.g. daily/weekly, rather than bi-monthly) might be more suitable, contingent on being acceptable to suppliers. Further research could focus on the acceptability of alternative repayment and financing mechanisms and repayment behaviour using these alternative mechanisms, for example.
- Further training of beneficiaries is needed across the board to enable a more standardised repayment system using the token and M-Pesa system.
- Chiefs, CCs, and BWCs should be properly trained on dealing with grievances from the project and households should be sensitised on the appropriate POCs for each type of grievance. This could be done during the BWC reconstitution process, originally scheduled to take place in 2020 but currently delayed due to COVID-19.
- The grievance and case management procedures should be reviewed, consolidated, and documented. To simplify the process for households and to improve service delivery, these procedures should allow households to lodge any type of grievance (e.g. related to payment of cash top-ups or device maintenance) with any of the grievance channels. Project POCs, including Chiefs, CCs, and BWCs, should be properly trained to deal with any grievance or case management issue related to the project, including how to escalate, delegate, and/or resolve issues. Households should be sensitised on this mechanism.
- The project management information system should link to the SPS's Single Registry, and, once rolled out, the Enhanced Single Registry, either directly (preferable) or using the complementary module.

Impact: To ensure that a comprehensive assessment of impact is undertaken, it is recommended that a full endline evaluation take place in order to measure the full set of impact indicators related to health (e.g. experience of eye irritation and burns), livelihoods (including women's time use), and children's education (including study hours).

Efficiency: To improve project coordination and to embed it in local structures, the structures set up to coordinate and facilitate project implementation in the communities, the counties, and at national level should be consolidated and strengthened.

- The role of the national technical working group and national steering committee should be clarified among key stakeholders. A meeting schedule for Phase 2 should be determined during the inception phase to ensure that national-level structures meet frequently and that key stakeholders are able to attend.
- The county-level technical working groups should continue to meet frequently. Ahead of Phase 2, these structures should meet to reflect on lessons from Phase 1, and to incorporate these into the implementation during Phase 2.
- At the community level, greater awareness raising around the role of CCs should take place to ensure that they are able to provide support to households.

In addition, **to enhance the economy of procurement and efficiency in the use of project resources**, we propose the following:

- The pilot project should intensify its efforts around better budgeting and forecasting of expenses, to minimise overspending. The project should improve its documentation of unexpected expenses, and the risk mitigation strategy that is in place. Budgets could be combined with sensitivity analysis based on risks to estimate the financial implications of potential risks.
- The accuracy of the management information system should be enhanced to better track the pilot project's performance and the beneficiaries' accounts. This would improve the ability to identify beneficiaries, and to track payments to suppliers and transfers to the banks. A standardised system should be in place, and should be agreed and used across stakeholders, to consistently report project information.
- The pilot project should consider updating targets in light of the evolving circumstances, as well as clearly outlining data sources and how indicators are derived.
- Using existing government system is likely to enhance harmonisation of service delivery and to be a sustainable solution if the GoK is willing to take ownership and scale-up the project. However, the pilot could have considered the implications of running on existing systems, and what the implication might be for control and reporting, and ensuring payments are done in time. In particular, given the crucial importance of regular repayments to use the solar devices, a mitigation strategy should be in place as part of the project planning to prevent deactivation of the devices due to delayed repayment caused by delayed disbursement of the Inua Jamii transfers. The project could explore ways to better integrate and track data and better handle information management across the different parties involved in the project implementation and the government systems. This would improve tracking of beneficiaries and payments.

Sustainability: To support households' maintenance of the devices and support the scale-up of the pilot project, the second phase of the project should have an explicit focus on sustainability, with an eye to scaling up.

- Engagement with key stakeholders at the national level should be deepened to ensure that there is sufficient buy-in for scale-up. In particular, the implementing consortium should consider more intense engagement with the MoE and KOSAP on the design of the pilot project for Phase 2, to enable the presentation of a viable and tested model that could be considered for scale-up by KOSAP. Any model presented to KOSAP should advocate for affordability issues for vulnerable households to be addressed within KOSAP, and should utilise findings from this evaluation to inform discussions.
- In addition, it is important that the project can expand and strengthen the formal role of CCs, so that they are able to continue to provide support to households as they begin to experience maintenance issues beyond the project cycle. This could be achieved by creating a cadre of service providers (i.e. CCs) in the community to manage repair and maintenance services, for a small fee. This would provide work and regular income for that cadre, and would provide an affordable system for sustaining the solar devices within the community.
- BCC activities should focus on supporting households to afford the maintenance of the devices once the project has ended (e.g. through the establishment of savings groups).

Finally, we recommend that during the inception and preparatory activities of Phase 2 of the pilot project's implementation the ToC is revised to update the impact pathways and underlying assumptions based on learnings to date. In particular, a revised ToC for the second phase of the project should revisit the anticipated impacts on health, and should consider including explicit impact pathways related to unintended impacts (e.g. on social capital).[54] This would not affect the ToC used as part of this evaluation of Phase 1 of the pilot project, but would help the implementing consortium to refine the project's objectives and operations for Phase 2 and, ultimately, for the full scale-up.

[54] As discussed in Chapter 9, it is not our intention to include these impact areas *ex-post* in the ToC for Phase 1 of the pilot, but this could be considered for Phase 2, based on the pilot project learnings.

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