

Appliance Impacts Over Time

Longitudinal insights from off-grid TV, refrigerators, & solar water pumps users

February 2023

60_decibels



Photo: sunculture

Introduction

Contents

Headlines

- 03 / Project Overview
- 04 / Data Collection Summary
- 05 / Top Actionable Insights
- 06 / Customer Voice Snapshot

Deep Dive into Appliance Impacts

- 07 / Solar Water Pumps
- 19 / Refrigerators
- 29 / Televisions

Insights on All Appliances

- 37 / Customer Voice Snapshot
- 38 / Appliance Uptake Trend
- 39 / Discontinued Usage
- 41 / Customer Suggestions & Improvement Opportunities

Appendix

- 43 / Calculations, Definitions & Summary of Data Collected

Efficiency for Access is a global coalition promoting energy efficiency as a potent catalyst in clean energy access efforts. Since its founding in 2015, Efficiency for Access has grown from a year-long call to action and collaborative effort by Global LEAP and Sustainable Energy for All to a coalition of 20 donor organisations. Coalition programmes aim to scale up markets and reduce prices for super-efficient, off- and weak-grid appropriate products, support technological innovation, and improve sector coordination. Current Efficiency for Access Coalition members lead 12 programmes and initiatives spanning three continents, 62 countries, and 34 key technologies.

60 Decibels makes it easy to listen to the people who matter most. 60 Decibels is an impact measurement company that helps organizations around the world better understand their customers, suppliers, and beneficiaries. Its proprietary approach, Lean Data, brings customer-centricity, speed, and responsiveness to impact measurement.

Authors

This report was authored by Makena Ireri (CLASP), Siena Hacker (CLASP), Kat Harrison (60 Decibels), and Ivy Langat (60 Decibels). We thank Nyamolo Abagi (CLASP), Ruth Kimani (CLASP), Lisa Kahuthu (CLASP), E Feng Tan Loh (Energy Saving Trust) and Jakub Vrba (Energy Saving Trust) for their support throughout the project.

This study has been funded by UK aid and the IKEA Foundation. The views expressed do not necessarily reflect the UK Government's official policies or the IKEA Foundation.



60__decibels



Overview

This longitudinal study explores how customers' relationship with their off-grid appliances changes over time. We captured critical indicators through phone interviews with off-grid TV, solar water pump, and refrigerator customers to track product quality, durability, satisfaction, impact, and uptake. Customers purchased appliances from 22 companies.

Data in this report is categorised by product type and time since purchase. The customer cohort examined here is also represented in previous Efficiency for Access and 60 Decibels reports that explore the use and impact of off-grid appliances (electric pressure cookers, refrigerators, solar water pumps & TVs). This report specifically focuses on the change in impact over time. We recommend referencing the use and benefits reports together with this report for deeper insights. Where crucial, references have been made in this report.

We derived most of the insights from mixed samples categorised by ownership tenure. However, a smaller subset of customers was interviewed for consecutive years, forming our ideal study. This smaller subset allowed us to examine perfectly linear and controlled ownership dynamics, contrasting them with our larger, general sample. Ideal study results have only been included where they differ from the broader sample or where they help to offer additional insights into the interpretation of the general sample results.

We heard from 4,150 off-grid TV, solar water pump, and off-grid refrigerator customers since 2015 – they had a lot to share!



Breakdown By Country

Kenya	63%
Uganda	25%
Tanzania	10%
Senegal	0.2%
Rwanda	0.6%
Zambia	0.2%

Breakdown By Ownership Length

Up to 1 year	58%
1 – 2 years	33%
2 – 3 years	4%
3 – 4 years	3%
4+ years	2%

Data Collection Summary: General vs. **Ideal Sample**

We conducted 9,451 interviews with 4,150 solar water pump (SWP), off-grid TV, and refrigerator customers. Customers purchased products from 22 companies between 2016 and 2021. We conducted baseline, follow-up and longitudinal interviews with them between 2018 and 2022 & this data represents the **General sample**. During each interview round, the respondents owned their products for varying lengths of time, depending on their year of purchase. As a result, there is some variability in the data when we analyse by tenure.

To gain more clarity, we have selected an ideal sample group for each product for further analysis by tenure. **These groups purchased their products within a similar timeframe and were interviewed during the same baseline, follow-up and longitudinal rounds.** Throughout the report, we will include the ideal sample (in **yellow**) in the few instances where it substantially differs from the general sample. By highlighting significant differences, we aim to bring greater nuance and context to the full sample findings.

General: Sample Size Per Product Across Time

	Refrigerator	Solar Water Pump	TV	All Products
Up to 1 year	956	2113	2453	5518
1-2 years	298	452	2390	3140
2-3 years	119	244	29	392
3-4 years	100	139	-	239
4+ years	25	133	-	158
Total sample	1498	3081	4872	9451

Ideal Sample: Sample Size Per Product Across Time

	Refrigerator	Solar Water Pump	TV
Sample size	57	123	107
Purchase date	Q4 2019 – Q1 2020	Q4 2019 – Q1 2020	Q1 2019
Baseline interview	March 2020	March 2020	April 2019
Follow-up interview	December 2020	December 2020	July 2019
1st Longitudinal interview	July 2021	July 2021	March 2020
2nd Longitudinal interview	April 2022	April 2022	-

Top Actionable Insights



Impact results for solar water pumps were positive and increased as the length of ownership increased. Impact results for TVs and refrigerators, however, were mixed over time.

Quality of life tends to be lowest in the first year of pump ownership and increases over time. This trend may be influenced by the longitudinal nature of farming itself, meaning that benefits accrue to farmers across seasons and especially in times of drought, which may take years from purchase to occur. TV and refrigerators show less clear impact trends. The quality of life improvements for TV users decreases somewhat over time, meaning that their additional enjoyment does not increase – but not that their quality of life is decreasing. In fact, TV users Net Promoter Score increases over time.



For refrigerators and solar water pumps, the proportion of customers experiencing challenges increases as the length of ownership increases.

The top challenge reported by refrigerator customers was an ineffective cooling system, while solar water pump customers reported malfunctioning batteries. Further, these challenges increased over time. Addressing these issues can enhance customer experience and sustain usage. Quality assurance efforts, like those of [VeraSol](#), are crucial to ensuring that consumers receive high-quality and durable products.



Word of mouth is the most common way new customers learn about products. Users experiencing challenges are more likely to negatively perceive their appliances, representing a reputational risk to companies, potentially deterring new customers, and reducing beneficial impacts for existing users.

[Previous research](#) on this cohort shows that word of mouth is the top sales channel. If customers have a negative experience, they represent a reputational risk for companies and the sector overall. Companies should keep their users happy if they want to acquire new customers. Improved after sales service is key for companies, as is investing in the development of high-quality products and warranties. As seen above, challenges increase across time and impact trends are not always clear for users. Users who experience challenges are unlikely to experience an appliance’s full range of benefits, thus undercutting the technology’s positive benefits.



Income fluctuations show no discernible trends, making insights difficult to extract.

For some households, income can be irregular, sensitive to discuss, or tough to track. All these factors make accurately reporting household income difficult, making it challenging to discern insights into the impact of appliance ownership on household income. More specific methodology and deeper study are needed to fully understand the impact of appliances on end users’ income.

Customer Voice Snapshot



“The fridge cools whatever I put in it in a very short time. This is very good for business and that is why I recommend other people to purchase it.”

-Female refrigerator customer, Uganda

“I used to be the only one doing manual labour in the farm all the time; mostly fetching water. I used to get so tired but now I don't spend so much time getting water.”

-Female solar water pump customer, Kenya

“I cannot recommend it to anyone because I am not happy with the way I was treated by the team when they took my fridge. I would not want anyone to go through that and start blaming me.”

-Male refrigerator customer whose fridge was repossessed, Uganda

“As a mother, I enjoy stocking up food for up to a week for my household use. I have been able to save on daily purchases. I am happy that I bought the ... fridge.”

-Female refrigerator customer, Kenya

Solar Water Pumps



Customer Profile: Solar Water Pump Customers



We conducted 3,081 solar water pump interviews with **1,192 customers** through various rounds of baseline, follow-up, and longitudinal interviews between 2015 and 2021.

Notably, while the share of female customers did grow over time, they still make up less than a quarter of our data. As we explore in our [recent report](#), the sector must still work to ensure inclusive access to appliances for all. The average age also remains fairly static, perhaps reflecting that younger farmers are less able to access solar water pumps.

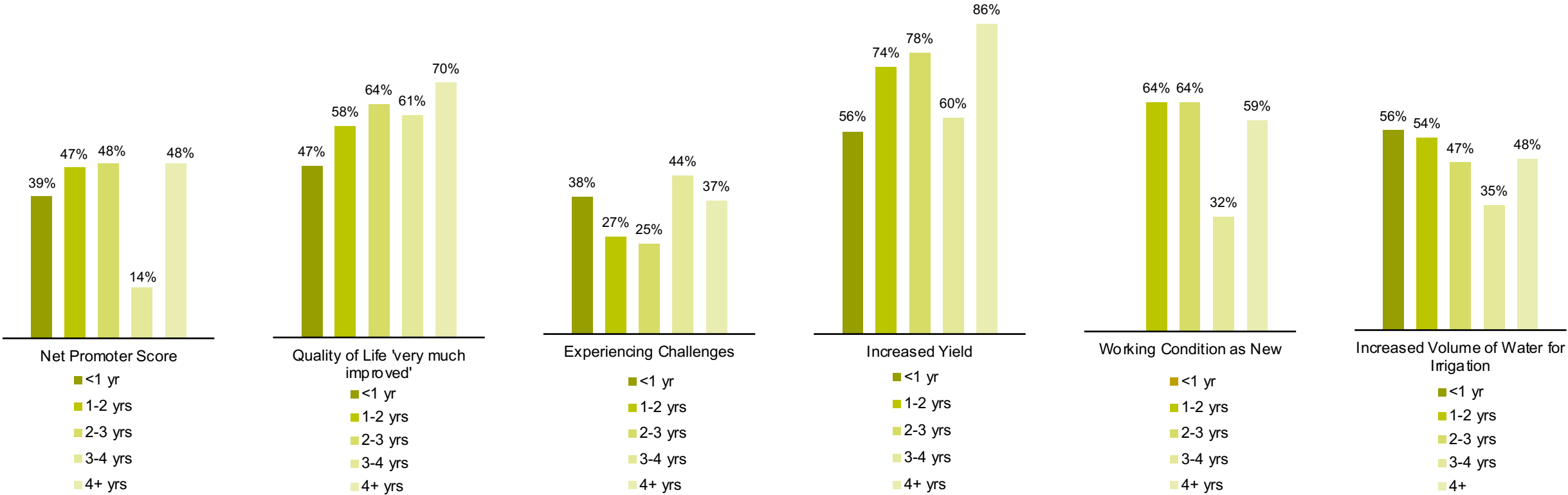
About the Solar Water Pump Customers We Spoke With

	2015/16 Data (n = 142)	2017/18 Data (n = 233)	2020 Data (n = 573)	2021 Data (n = 244)
% of Total Sample	12%	20%	48%	20%
% Female	13%	18%	21%	24%
Average age (years)	47	47	46	46
Average household size (# of people)	6.2	5.0	5.3	5.0
% Rural	--	--	65%	65%
% At least upper secondary educated in household	42%	42%	96%	97%
% First access	--	--	14%	6%
% Access to alternatives	18%	27%	22%	23%

Longitudinal Outcomes Summary



The charts below show outcomes by the ownership tenure for solar water pump customers, with a deeper dive in the following slides.



Impact Performance - Quality of Life



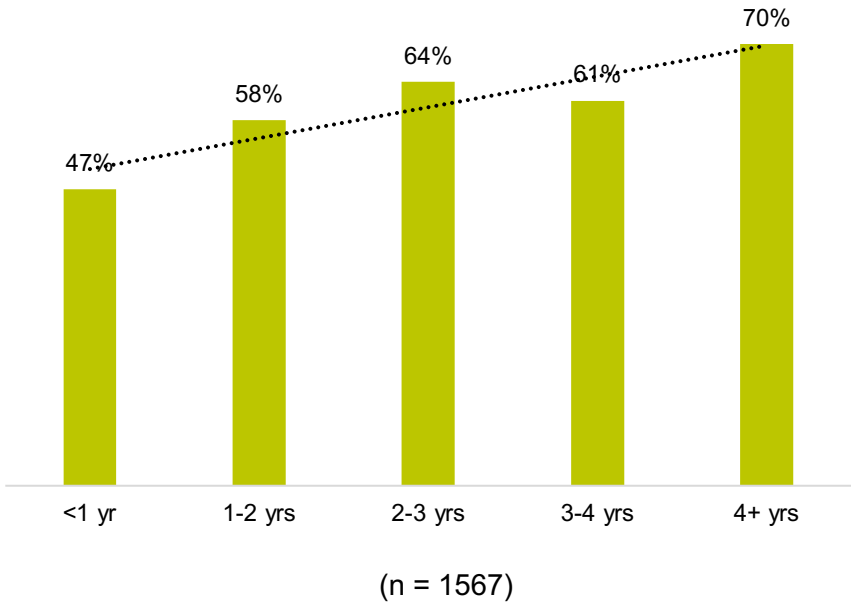
Impact on quality of life increases over time for solar water pumps.

To gauge the depth of impact, customers were asked to reflect on whether their quality of life has changed because of their solar product. However, quality of life is a self-reported and highly subjective measure which can be influenced by many external factors beyond the appliance's impact. Factors like a customer's experience with a company's after-sales services or repayment policies needs may play a role. Broader factors – such as the COVID-19 pandemic and market fluctuations – can also shape how a customer views the impact of their appliance in a given year.

Reported increase in quality of life tends to be lowest for solar water pumps in the first year after purchase. Because of the pumps' direct link to seasonal production through agriculture, it takes some time for effects to be seen, causing a lag in perceived benefits. SWP customers may also have a steeper learning curve requiring a behavioural change in irrigation, as well as access to better farm inputs such as seeds and improvements in other farming aspects to maximise their utility.

Perceived Quality of Life Change

Q: Has your quality of life improved because of the [Company] [appliance]?



Impact on Farm Productivity



Customers who had owned their solar water pump for the longest reported the highest yield improvements.

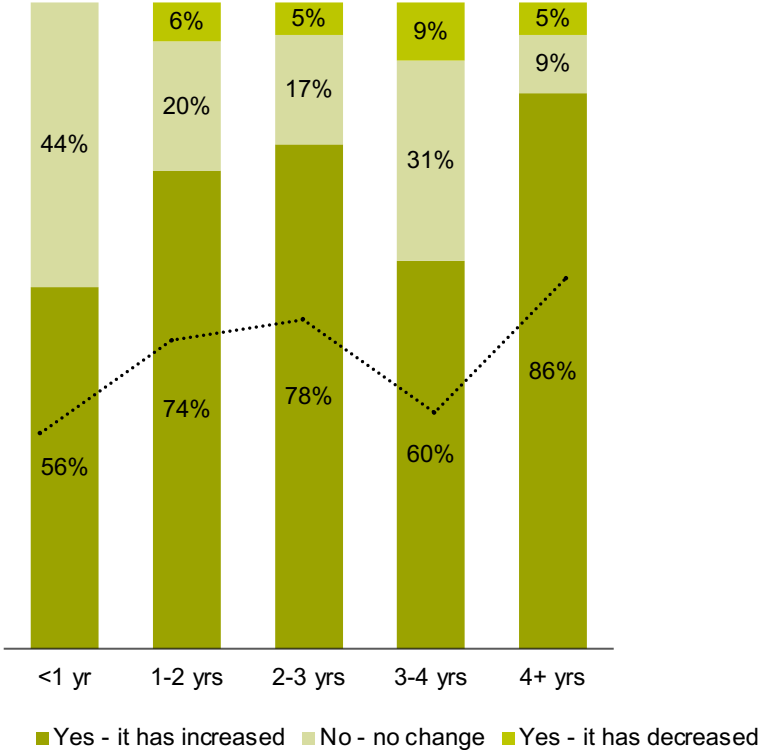
Yield improvements are greatest amongst customers who have owned their pumps for 4+ years, with improvements generally trending up over time. Though external factors may affect yield in specific seasons, these findings reinforce the long-term benefit accrual for SWP, i.e., increasing benefit over time.

After the baseline interview, less than 10% of users experienced a decrease in crop yield yearly. All of these customers also encountered a challenge with their solar water pump.

Improved quality of crops and access to water in the dry season were mentioned as the primary drivers for customers experiencing increased yields.

Change in Crop Yields

Q. Since [time since the last interview], has the crop/farm yield changed because of using [Company] [product]?



Top Reasons Reported

Q: Please explain how your yields have changed?
(n = 700)

- Improved quality of yield (62%)
“There has been a significant increase in produce from my farm. I have seen vegetables flourish and thrive simply because there is enough water for irrigation.” – Male, Kenya
- Access to water in the dry season for regular irrigation (41%)
“Makindu is an almost semi-arid region. This pump has helped me get my farm irrigated and constant turnaround as far as farm produce is concerned.” – Male, Kenya
- Reduced effort required (22%)
“The pump saves my time. I used to use a watering can, which took a lot of time. This solar water pump has increased my farm activities.” – Female, Rwanda

Impact on Earnings



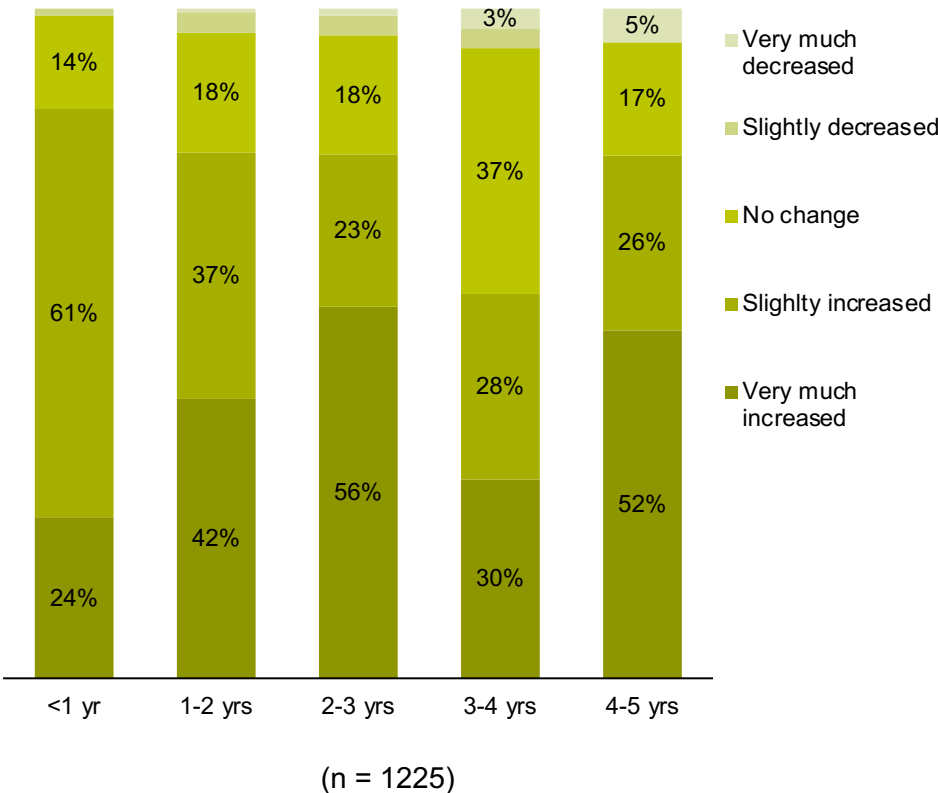
Increases in earnings varied across ownership segments.

Reported increases in earnings varied across ownership segments, with a significant increase in the group who owned their pump for 2-3 years and 4-5 years and saw their earnings “very much increase.” These same groups also had the highest reported yield increases. There seems to be a direct link between reported increased yields and income.

Such a link can suggest that for this cohort, the enabling environment supports their ability to convert yield to income. From [previous studies](#) on the same cohort we know 77% live above the poverty line of USD \$3.20/day. This suggests our sample comprises wealthier individuals who are likely to have access to good infrastructure, markets and services that enable the sale of produce. Further study into lower-income cohorts is needed to understand the coupling of yield and income and the effect of the enabling environment on lower-income farmers.

Change in Earnings

Q. In the past [time since the last interview], has the money you earn from your farm changed because of using [Company] [product]?



Impact on Volume & Availability of Water For Irrigation



Water usage increases most in the first two years of ownership.

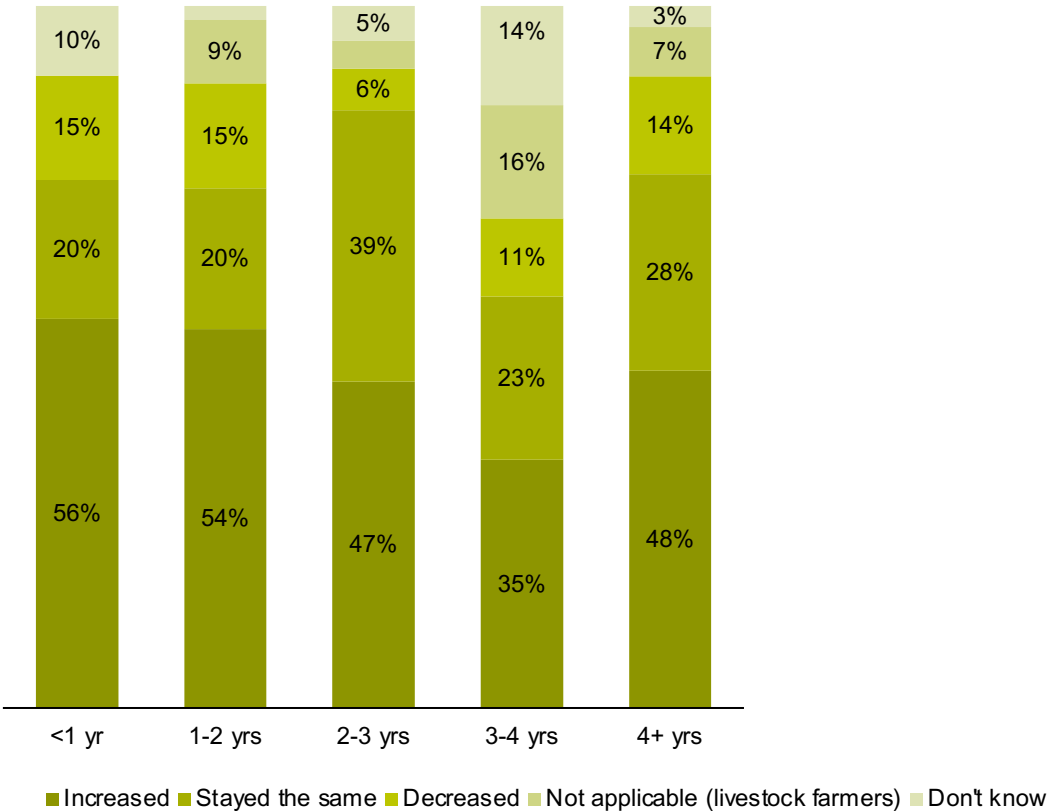
Nealy half of all customers increased their water usage for irrigation – this remained relatively steady over time. A significant portion, at least 20%, did not make any changes to water used for irrigation over time. From a [previous study](#), we know that most of these farmers were using fuel pumps (35%), watering cans (31%), or manual pumps (11%) for irrigation. Increased water usage may be a factor of the efficiency of water delivery (away from manual irrigation) and new irrigation from the minority that relied on rain.

It is interesting to note that the duration of tenure is not proportional to an increase in water usage; i.e., users do not continue to increase the amount of water they use with the SWP. This could suggest adequate pump sizing for user needs or that customers are using the pump at maximum capacity and have no ability to further increase the volume of water extracted. Additional study is needed to further understand water use dynamics.

While increased water usage represents an improvement in access to a vital resource for farmers, it is important to look at this data in the context of responsible resource management.

Change in Volume of Water Used for Irrigation

Q. Has the volume of water you use to irrigate your land changed since [time since the last interview]?



(n=1241)

Impact on Volume & Availability of Water For Irrigation



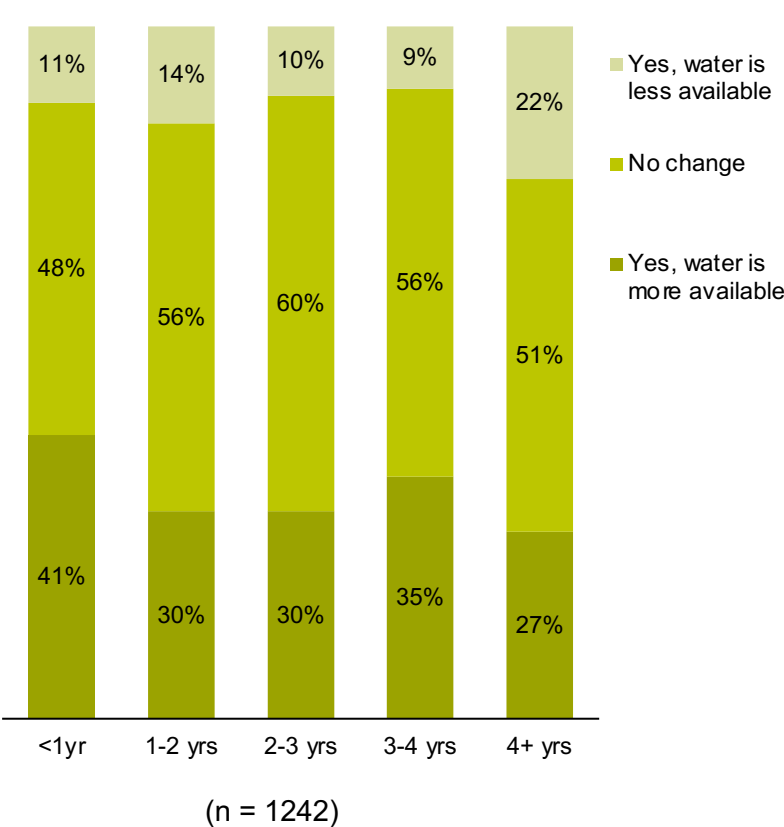
To understand customers' perceptions of climate and resource changes, we asked if they noticed changes in water availability from their primary water sources. Over time, customers in the ideal sample saw water availability reduce.

Interestingly, both customers that saw an increase and decrease in water access pointed to rainfall fluctuations as the reason for these changes. Many of these changes were seasonal and insights are affected by the time of the interview.

Climate change's effect on rainfall patterns is affecting farmers, pointing to the need to build resilience to water scarcity through a SWP. However, SWPs alone will not be enough as water sources and rainfall change. Other sustainable water practices must be incorporated in addition to SWP to fully cushion farmers from this climate change hazard, as we explore in this [recent report](#).

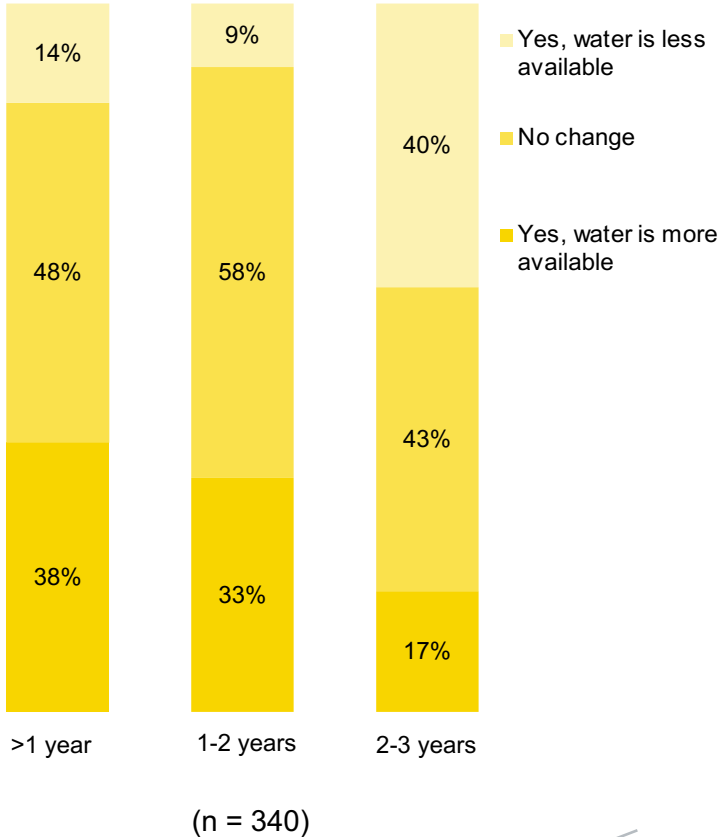
Change in Availability of Water from Primary Sources

Q. Have you noticed any changes in the availability of water from your primary water sources since [time since the last interview]?



Ideal Sample: Change in Availability of Water from Primary Sources

Q. Have you noticed any changes in the availability of water from your primary water sources since [time since the last interview]?



Impact on Volume & Availability of Water For Irrigation



Top Reasons Reported

Q: Can you describe the specific changes you have noticed? (n = 632)

1. No change (50%)

“There has been no change in water availability except when the sun is scorching hot, then the level of the water goes down.” – **Female customer, Kenya**

2. Increase in rainfall (26%)

“I have seen a slight increase in the quantity of water from the water source due to the rainy season we have witnessed in the year.” – **Male customer, Kenya**

3. Decrease in rainfall (9%)

“The volume of water has reduced, especially in this dry spell.” – **Male customer, Tanzania**



Image credit: Futurepump

Working Condition & Value for Money



We use the value for money question to understand whether customers feel the appliances are a good use of the money they spend on them.

Value for money generally increases over time for refrigerator and solar water pump customers. This suggests that as customers use the product, they value it more.

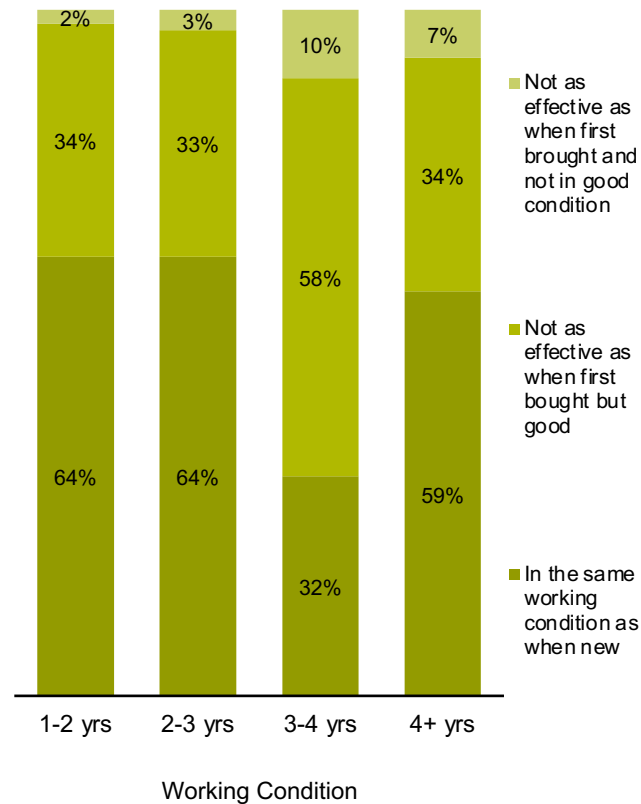
While working condition decreases over time, perceived value for money trends upwards, indicating that users' positive view of their pump outweighs its changes in working condition.

"The solar water pump is very good because there is no cost that I incur while using it. It only uses sunlight which is free of charge, so there is no cost of buying petrol."

Male solar water pump customer, Tanzania

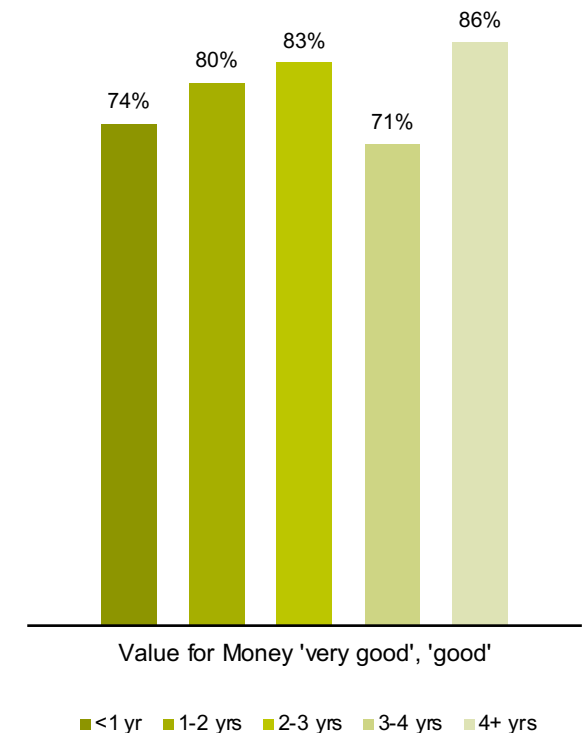
State of Appliance

Q: Is the [company] [product]... In the same working condition as new / Not as effective but still good / Not as effective and not good / Doesn't work? (n; SWP = 692)



Perceived Value for Money

Q: How do you rate the value for money of your [Company] [appliance]? (n; SWP = 1421)



Challenges



The number of customers experiencing challenges with their solar water pump increases over time.

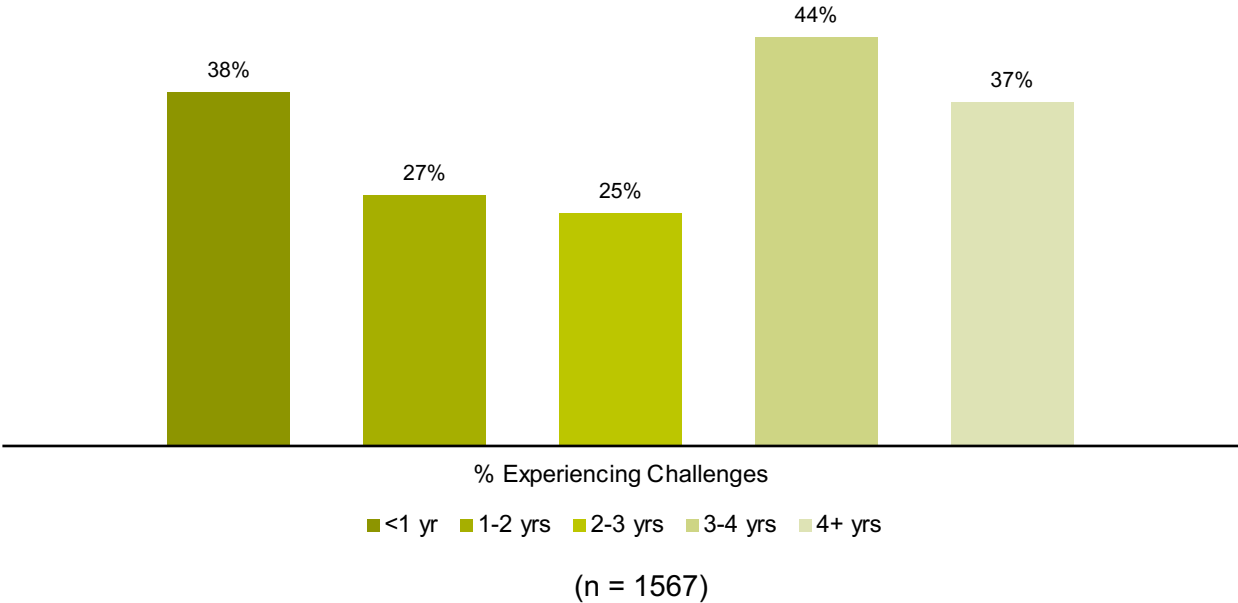
Even in their first year of ownership, almost 40% of users report challenges. This number is quite high, especially given the vital role that pumps can play in users' lives.

The challenge rate is also concerning, given the financial investment users are making. Nearly half of this cohort has to make unacceptable sacrifices in order to make product repayments. Users unable to use their pump due to challenges may be less likely to repay their loans and, if they do pay, are spending money on something that likely brings them little to no utility.

Companies rely on word-of-mouth advertising for solar water pumps – it is their leading sales channel for this cohort of customers. Customers who have negative experiences, however, are much less likely to recommend a solar water pump to others and may even warn against it. This presents not only a reputational risk to the company but can harm the sector as well.

Proportion of Customers Reporting Challenges

Q: In the last [time since last interview], have you experienced any challenges with using the [Company] [appliance]?



Customer Satisfaction: Net Promoter Score®



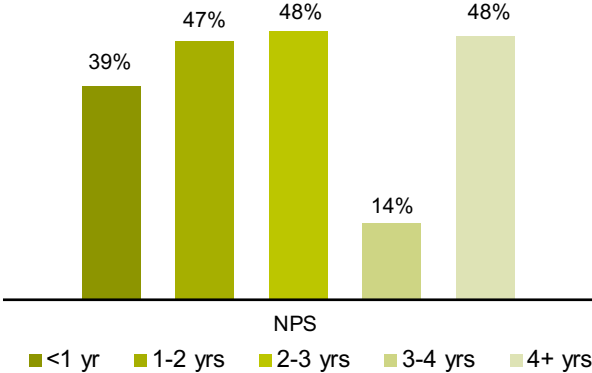
Of the three technologies in this report, solar water pump satisfaction was the highest.

The Net Promoter Score® is a gauge of satisfaction and loyalty. Anything above 50 is considered very good. A negative score is considered poor. Asking respondents to explain their rating highlights the main value drivers and dissatisfaction drivers, as shown on the right.

While an average of 51% of users are promoters, the solar water pump net promoter score decreases over time and remains under 50 across tenures.

Net Promoter Score

Q: On a scale of 0-10, how likely is it that you would recommend the [Company] [appliance] to a friend, where 0 is not at all likely and 10 is extremely likely?



SWP
(n = 1565)

Solar water pump

51% are Promoters

They love:

- 1. Efficiency and ease of use (77%)
- 2. Durability and reliability (32%)

39% are Passives

They like:

- 1. Increased efficiency in the farm (51%)
- 2. Reduced costs (15%)

But complain about:

- 1. Battery issues (4%)

10% are Detractors

They dislike:

- 1. Inefficiency (35%)
- 2. Price (9%)

Refrigerators



Customer Profile: Refrigerator Customers



We conducted 1,498 refrigerator interviews with **603 customers** through various rounds of baseline, follow-up, and longitudinal interviews between 2018 and 2021.

The average age, household size and education of these customers remained fairly consistent from 2018-2021.

We saw that **female reach increased from 25% in 2018/19 to 45% in 2021**, potentially reflecting a more inclusive market. There has also been a decrease in the proportion of customers using their refrigerators at their place of business, perhaps due to the effects of the COVID-19 Pandemic.

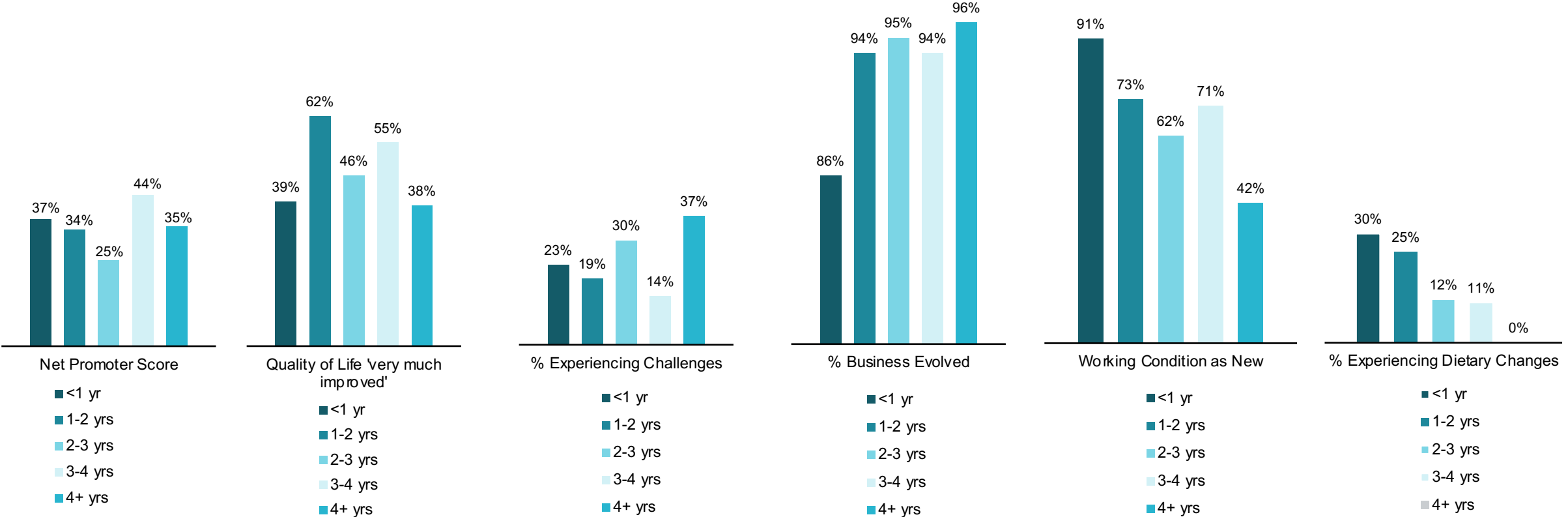
About the Refrigerator Customers We Spoke With

	2018/19 Data (n = 126)	2020 Data (n = 259)	2021 Data (n = 218)
% of Total Sample	21%	43%	36%
% Female	25%	38%	45%
% Business	89%	81%	70%
Average age (years)	40	38	39
Average household size (# of people)	6.8	5.9	5.0
% Rural	--	87%	72%
% At least upper secondary educated in household	29%	32%	31%
% Access to alternatives	19%	10%	17%

Longitudinal Outcomes Summary



The charts below show outcomes by ownership tenure for refrigerator customers, with a deeper dive on the following slides.



Impact Performance: Quality of Life



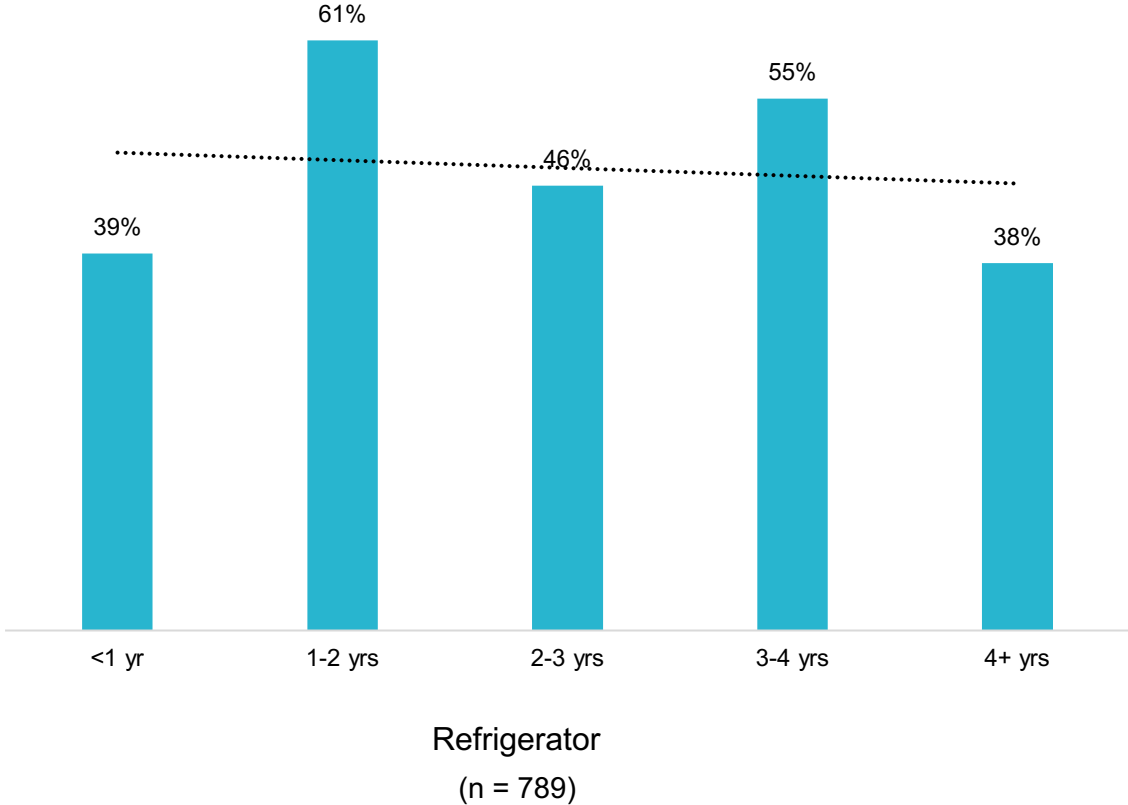
Impact on quality of life fluctuates for refrigerators.

To gauge the depth of impact, customers were asked to reflect on whether their quality of life has changed because of their solar product. However, quality of life is a self-reported and highly subjective measure which can be influenced by many external factors beyond the appliance’s impact. Factors like a customer’s experience with a company’s after-sales services or repair and maintenance needs may play a role. Broader factors – such as the COVID-19 pandemic and market fluctuations – can also shape how a customer views the impact of their appliance in a given year.

Notably, the general trends for quality of life are similar to the fluctuations in refrigerator users’ change in income. This may reflect the significance of income generation to how users perceive their refrigerator’s impact on their quality of life.

Perceived Quality of Life Change

Q: Has your quality of life improved because of the [Company] [appliance]?



Impact on Household Diet



The proportion of customers reporting dietary changes decreases with an increase in ownership tenure.

There was a decrease in the proportion of customers reporting dietary changes with an increase in tenure; this may be because families make changes as a result of the product shortly after acquiring the refrigerator and then don't need to make further changes as time goes by. Ultimately, this may reflect diminishing marginal improvements but not a decrease in absolute, cumulative improvement.

Top Reasons Reported

Q: Please explain how your diet has changed? (n = 207)

1. Ability to diversify diet (68%)

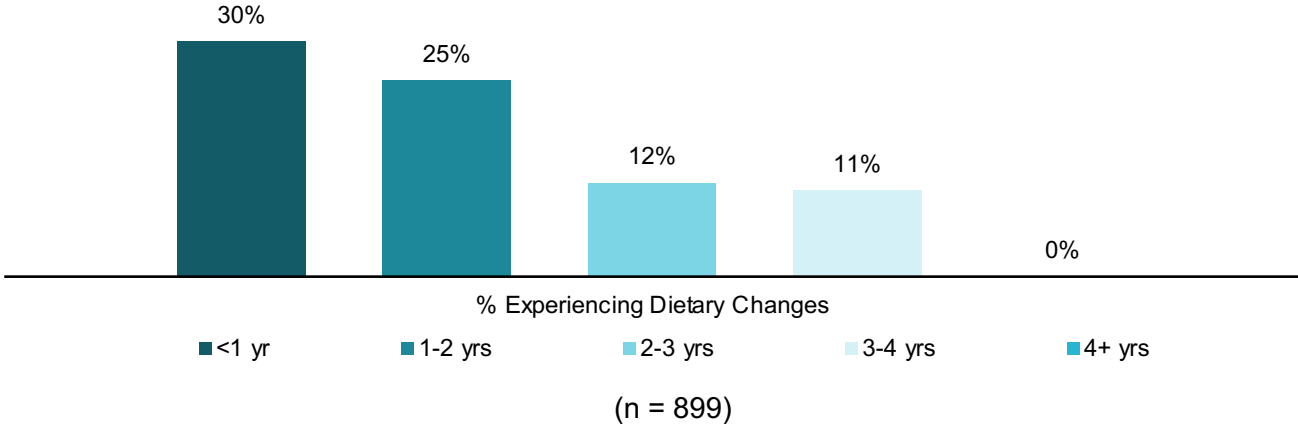
"I buy and store different food stuffs in my fridge which I can have at any time without struggling to look for them when I am preparing to cook." – **Male customer, Uganda**

2. Increased consumption of fresh and nutritious foods (55%)

"I can now have fruits preserved and other products that would go bad if they were not in the fridge. Therefore, I can eat what I want without worrying that they would go bad." – **Female customer, Uganda**

Diet Change for Refrigerator Customers

Q. Has your diet changed in any way since purchasing the refrigerator?



Impact on Businesses



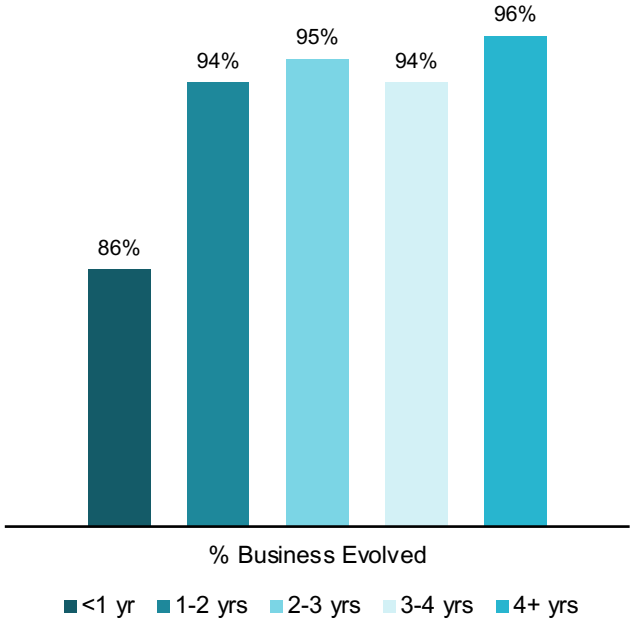
Customers who had reported using their refrigerator for business during previous data collection rounds were asked if they had experienced an evolution in their business since the last time they were interviewed.

The majority reported increased evolution in their businesses, with more than half of customers experiencing a business change mentioning an increase in income because of their product. It seems that increasing familiarity with this productive use appliance generates additional business innovation in customers. It's also important to note that the impact of business change is cumulative – this question investigates if a customer's business has evolved since the last round, but it is very likely that their previous business changes continue to impact their enterprise.

Interestingly, male refrigerator customers who use their product at home were more likely to report that they use it for income generation (18%) compared to female customers (2%). Perhaps this points to the unequal impact of gender roles, with female customers more often expected to perform domestic duties than income-generating activities.

Evolution of Business (Business users)

Q. Has your business evolved in the past [time since the last interview] related to the [Company] [product]? i.e., can you offer services differently to customers or any new services? (



(n = 632)

Top Business Changes Experienced

Q: Please explain how your business has evolved. (n = 710)

1. Increase in customers
"I now sell cold drinks which was not the case before. I am the only one with cold drinks in my area, and I now get more customers." – **Female customer, Uganda**
2. Longer hours of operation
"I now have extended working hours because of good lighting, the fridge helped me start selling cold drinks." – **Male customer, Uganda**
3. Increased inventory/supplies
"Solar fridge made my business big since I am the only one in my village with cold drinks. I now sell ice creams, yogurt and milk." – **Male customer, Uganda**

Change in Income



Income increases for the general sample fluctuate, while that of the ideal sample remains more stable.

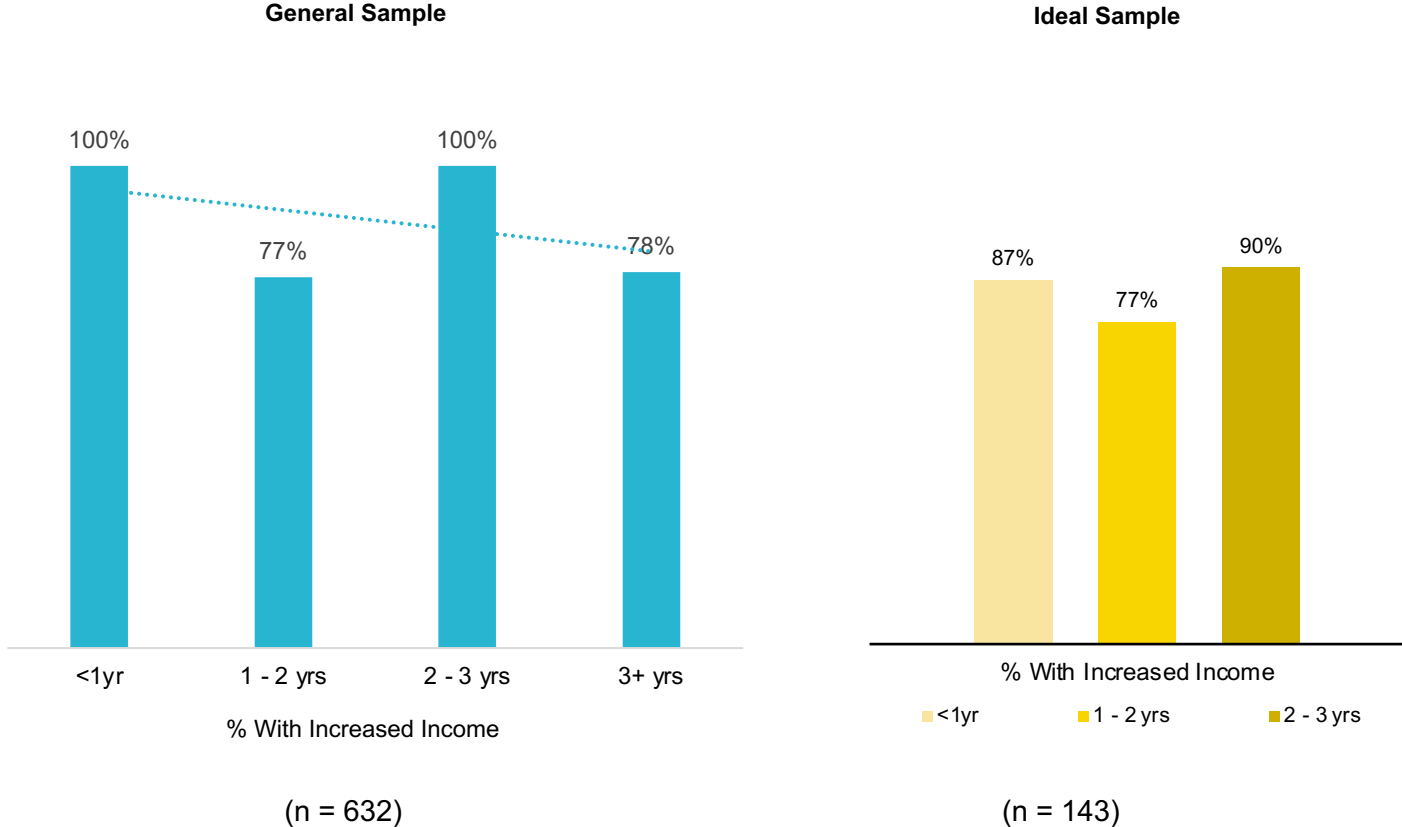
Interestingly for the ideal sample, the dip in income growth at 1-2 years corresponds to December 2020. The baseline and follow-up interviews were in March 2020 and July 2021, respectively, perhaps suggesting some relation to the pandemic’s impact on income.

Note: these are users’ self-reported perceptions of increase income. There is no quantitatively-derived figure for income to triangulate these self-reported values.

“The fridge is very good. I wish people can have them for business especially those in villages with no electricity. They can do well in business.” – Male refrigerator customer, Uganda

Change in Income for Productive Users

Q: In the past [time since last interview], have you seen an increase in your income, related to the [appliance]?



Working Condition & Value for Money

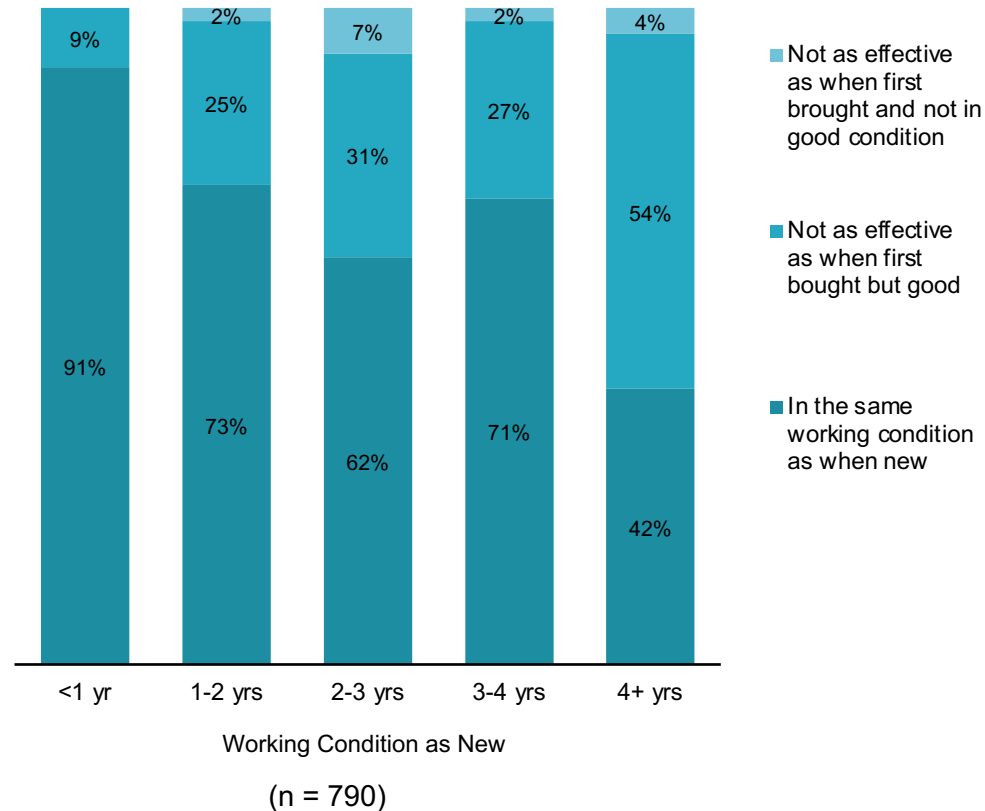


We use the value for money question to understand whether customers feel the appliances are a good use of the money they spend on them.

Value for money generally increases over time for refrigerator customers. This suggests that as customers use the product, they value it more. However, this is interesting when juxtaposed with the declining working condition of refrigerators over time. Even as fewer customers report that their refrigerator is working as new, their perceived value for money trends upwards.

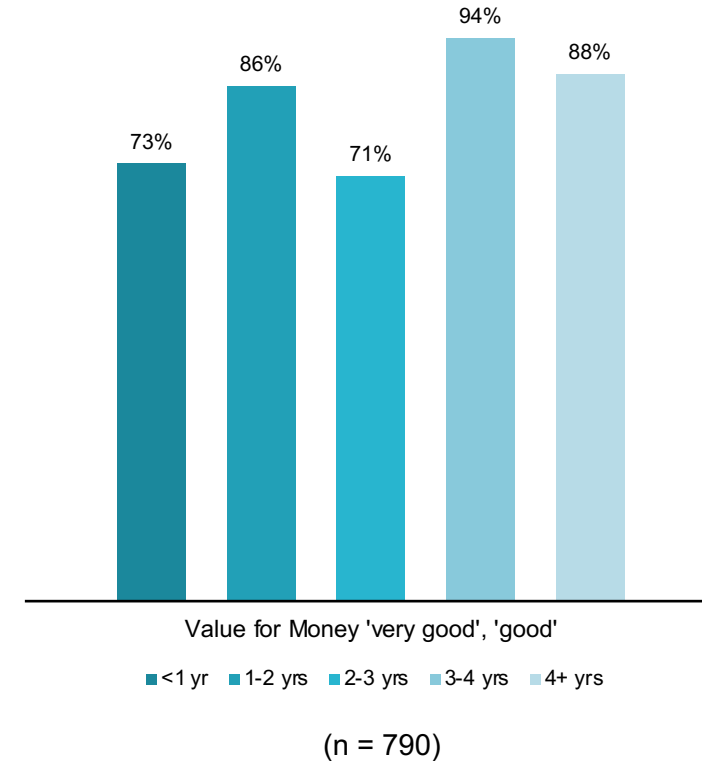
State of Appliance

Q: Is the [company] [product]... In the same working condition as new / Not as effective but still good / Not as effective and not good/ Doesn't work?



Perceived Value for Money

Q: How do you rate the value for money of your [Company] [appliance]?



Challenges



Over time, more refrigerator customers report experiencing challenges with their refrigerators.

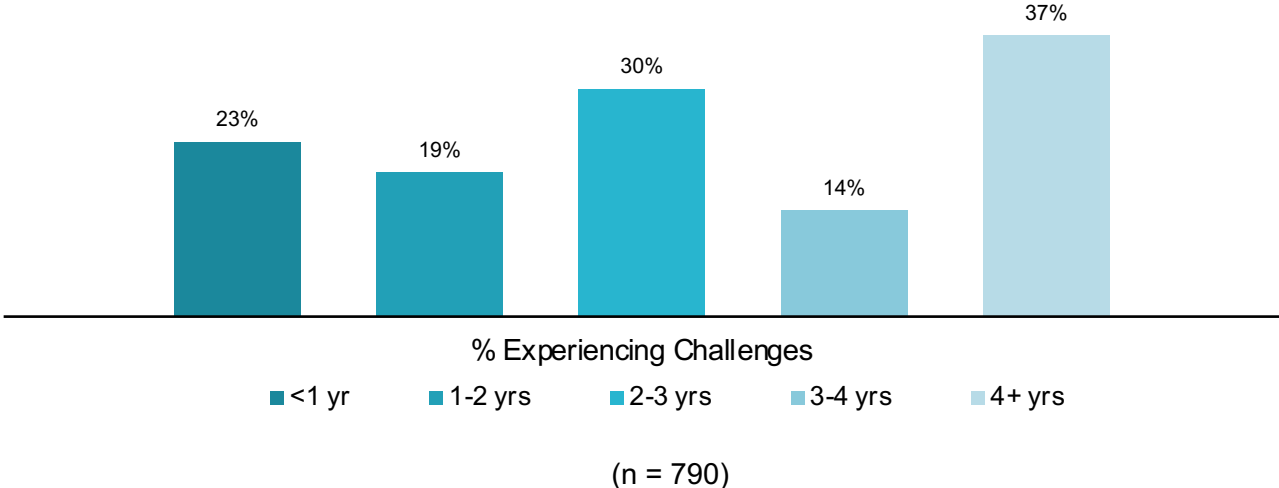
Refrigerators play an important role in users' lives – generating income at businesses and decreasing food waste -- and can be critical for things like safely storing medication. The challenge rate is thus concerning, with almost a quarter of users reporting a challenge after owning a refrigerator for less than a year.

Refrigerators represent a large cost for users. Users who are unable to use their refrigerators due to challenges may be less likely to repay their loans and, if they do pay, are spending money on something that brings them no utility.

Word of mouth is the largest way potential new customers learn about refrigerators – meaning that it represents companies largest sales channel. Customers are unlikely to recommend a refrigerator, however, when they have had a negative experience with it. Declining confidence in or satisfaction with refrigerators' quality presents not only a reputational risk to the company but to the off-grid appliance sector.

Proportion of Customers Reporting Challenges

Q: In the last [time since last interview], have you experienced any challenges with using the [Company] [appliance]?



Customer Satisfaction: Net Promoter Score

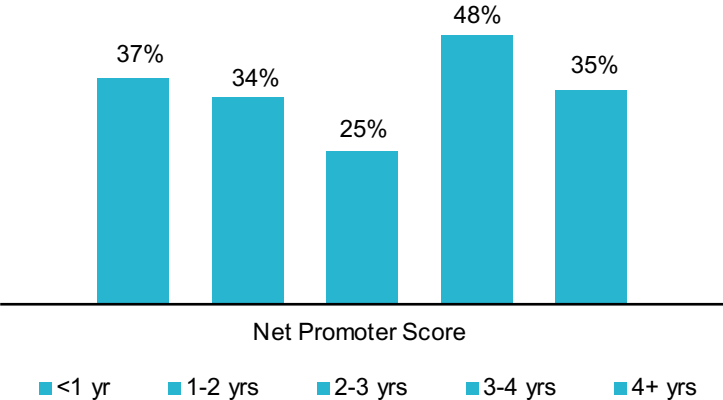


The Net Promoter Score® is a gauge of satisfaction and loyalty. Anything above 50 is considered very good. A negative score is considered poor. Asking respondents to explain their rating highlights the main value drivers and dissatisfaction drivers; these are explored on the next page.

“I do poultry farming, and I also have a fishpond because there is enough running water. My milk production is high because my cows have enough food due to ample water. I also do vegetable farming.”
– **Male solar water pump customer, Kenya**

Net Promoter Score by Product

Q: On a scale of 0-10, how likely is it that you would recommend the [Company] [appliance] to a friend, where 0 is not at all likely and 10 is extremely likely?



Refrigerator
(n = 790)

Refrigerator

48% are Promoters

They love:

- 1. Quality (51%)
- 2. Ability to increase income (29%)

40% are Passives

They like:

- 1. Quality (73%)
- 2. Durability (12%)

But complain about:

- 1. Price (26%)

12% are Detractors

They dislike:

- 1. Price (40%)
- 2. Poor customer service (28%)

Televisions



Customer Profile: TV Customers



We conducted 4,872 TV interviews with **2,355 customers** through various baseline, follow-up, and longitudinal interviews between 2018 and 2020.

All TV baseline interviews were conducted in 2018/19. For refrigerators and solar water pumps, we conducted 3 and 4 rounds, respectively. However, we only conducted one longitudinal round for TV users. As customer profile and demographic data are collected during the baseline rounds, there is only one column for TVs, compared to multiple columns for the other appliances.

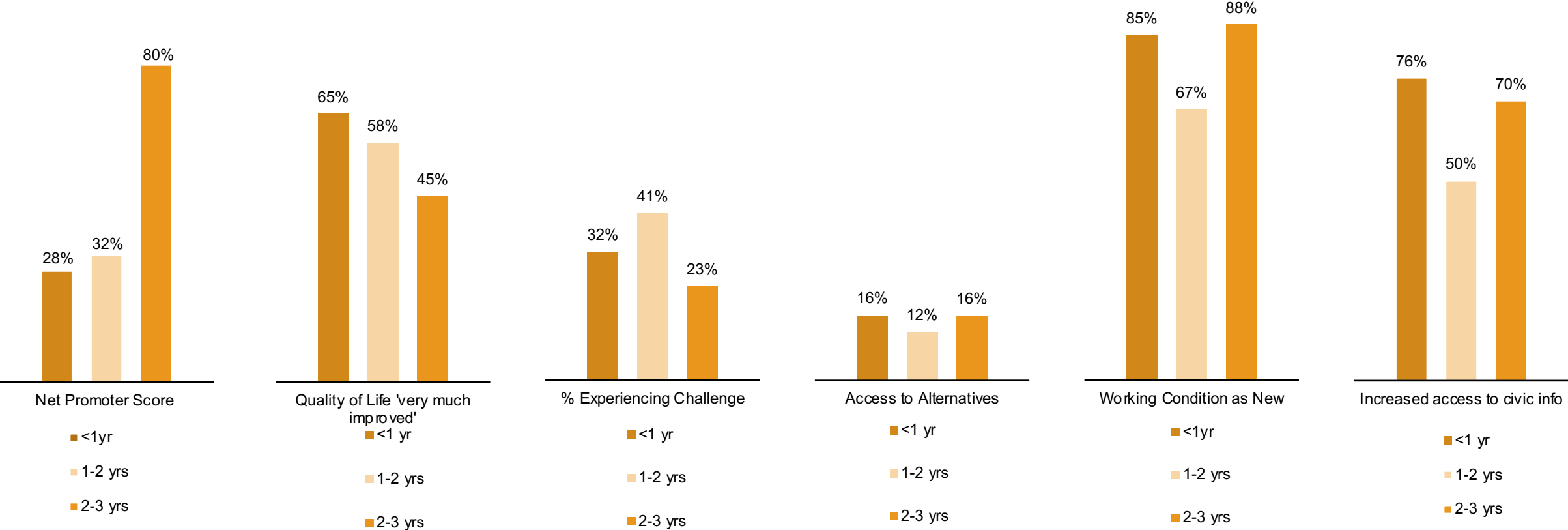
About the TV Customers We Spoke With

	2018/19 Data (n = 2355)
% Female	27%
% Business	5%
Average age (years)	39
Average household size (# of people)	5.7
% Rural	--
% At least upper secondary educated in household	61%
% Access to alternatives	17%

Longitudinal Outcomes Summary



The charts below show outcomes across time for TV customers, with a deeper dive on the following slides.





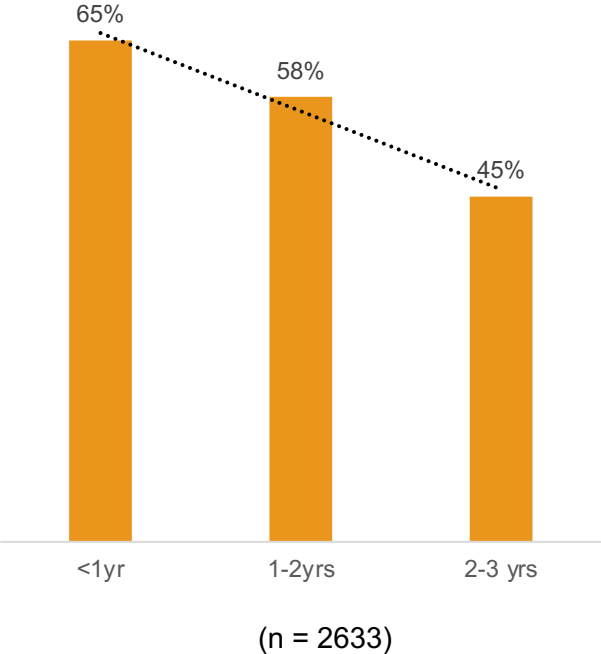
Impact on quality of life decreases over time for TVs, which is different than reported impacts for the other two appliances.

To gauge the depth of impact, customers were asked to reflect on whether their quality of life has changed because of their solar product. However, quality of life is a self-reported and highly subjective measure which can be influenced by many external factors beyond the appliance’s impact. Factors like a customer’s experience with a company’s after-sales services or repair and maintenance needs may play a role. Broader factors – such as the COVID-19 pandemic and market fluctuations – can also shape how a customer views the impact of their appliance in a given year.

For TVs, the impact on quality of life drops off a little in later years. This may be due to decreasing new positive changes (i.e., there isn’t an accumulative effect once products are used in the household). It is important to note that the downward trend does not mean that users’ quality of life is decreasing, but that the additional positive marginal impact is decreasing across time.

Perceived Quality of Life Change

Q: Has your quality of life improved because of the [Company] [appliance]?



Impact on Knowledge and Awareness



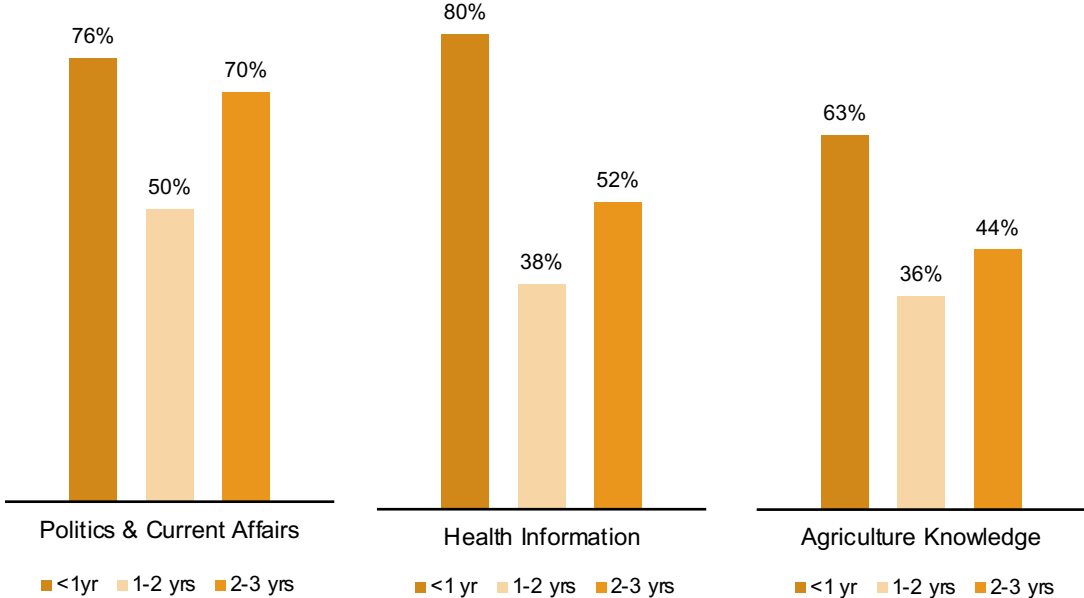
Increased knowledge and access to information across various topics appear to be the highest in the first year for TV users.

Changes in knowledge or awareness of current affairs & politics, health, and agriculture because of TV use were overwhelmingly positive. Interestingly, changes in knowledge and awareness appear strongest for newer customers and those who have had their TV for 2+ years, with a significant drop for customers between 1-2 years and a downward trend.

This trend suggests that knowledge and awareness peak at acquisition and the amount of information acquired across the years decreases marginally. As customers get more accustomed to this source of information, they do not perceive continued access to information as a new or additional benefit. This further supports the thesis that TV generates the most significant benefit immediately after acquisition and for about a year after when the new service is still novel to the users. It is important to note that this downward trend does not mean that users are no longer access information, but that there is a diminishing marginal benefit over time.

Change in Knowledge and Awareness

Q. Has your (or your family's) agricultural knowledge/political and current affairs/health information changed in the past year because of your TV?



(n = 2637)

Challenges, Working Condition, & Value for Money

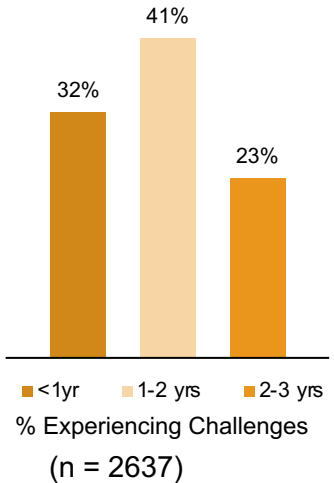


Value for money rankings drops over time for TV customers, which suggests that they experience the benefits of TVs soon after purchase and may acclimate to the appliance's impacts more quickly. While marginal improvements may diminish, in absolute terms, TV users are better off.

Even though TV users have similar challenge rates as solar water pump customers, they are much more likely to report that their TV is working as new (which interestingly increases over time). This may be due to the kind of challenges TVs bring. Being much less complex than solar water pumps or refrigerators, TV challenges may be more easily resolved, especially by after-sales support delivered over the phone.

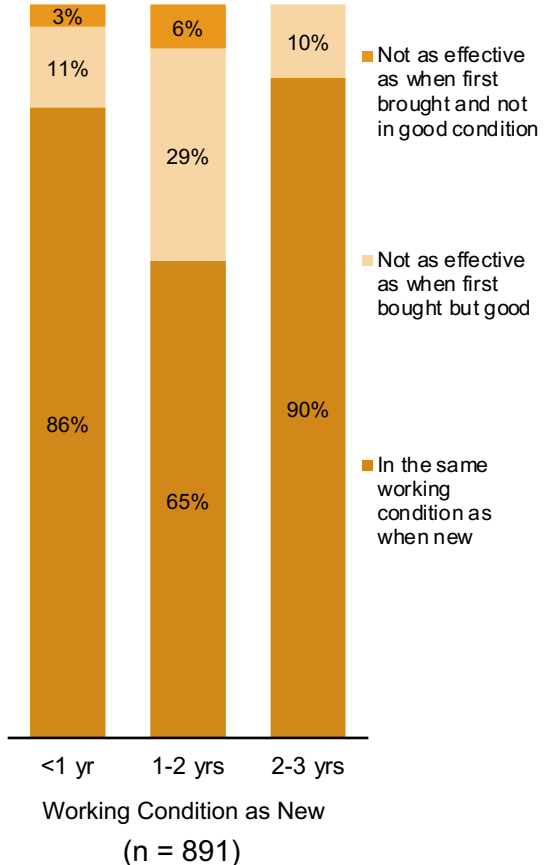
Proportion of Customers Reporting Challenges

Q: In the last [time since last interview], have you experienced any challenges with using the [Company] [appliance]?



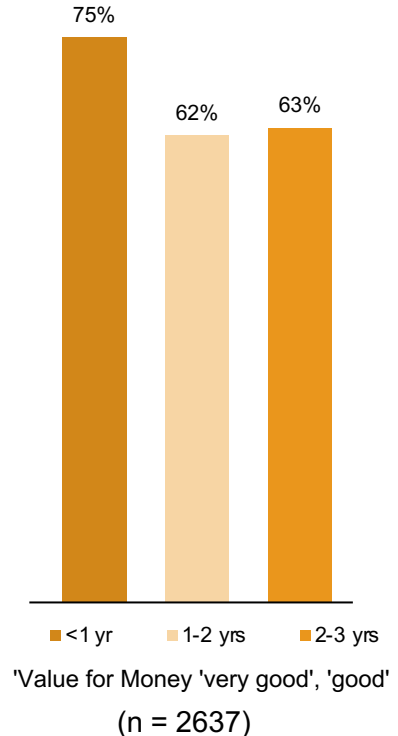
State of Appliance

Q: Is the [company] [product]... In the same working condition as new / Not as effective but still good / Not as effective and not good / Doesn't work?



Perceived Value for Money

Q: How do you rate the value for money of your [Company] [appliance]?



Net Promoter Score: Customer Satisfaction



The Net Promoter Score® is a gauge of satisfaction and loyalty. Anything above 50 is considered very good. A negative score is considered poor. Asking respondents to explain their rating highlights the main value drivers and dissatisfaction drivers; these are explored on the next page.

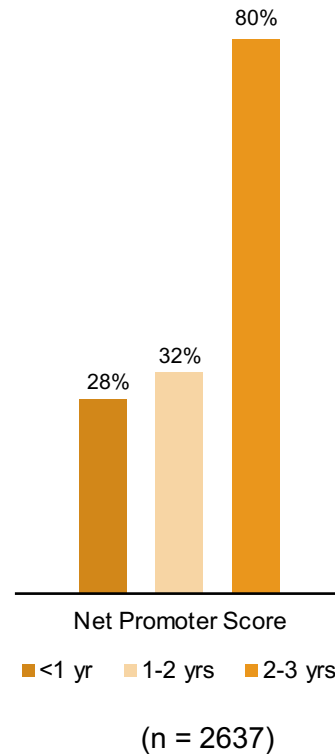
NPS increases for television users over time. While this may seem to contradict the quality-of-life impact trend, it actually paints a more nuanced picture. This upwards trend can show that the decrease is more reflective of diminishing marginal changes rather than the impact being negative.

"[Company] should continue with this service because it makes even us people with lower income [able] to use it because of [the] credit system that they have so all of us can afford to use it and enjoy good light and TV in our houses."

– **Male TV customer, Tanzania**

Net Promoter Score by Product

Q: On a scale of 0-10, how likely is it that you would recommend the [Company] [appliance] to a friend, where 0 is not at all likely and 10 is extremely likely?



TV

45% are Promoters

They love:

1. Quality of the TV; clarity of picture (50%)
2. Durability and reliability of the TV (31%)

40% are Passives

They like:

1. Good quality of TV (52%)
2. Affordability of the solar products (29%)

But complain about:

1. Prices of the Solar TV (10%)

15% are Detractors

They dislike:

1. Certain low-quality parts of the solar products (35%)
2. Slow response to reported issues (29%)

Insights on All Appliances



Customer Voice Snapshot



96% shared how these products had improved their quality of life.

"I have used the money I make from selling drinks stored in the fridge to re-invest in my business. This has increased my earnings and I can now pay school fees for my children without borrowing."

– **Female refrigerator customer, Uganda**

"I used to store 6 crates of soda but nowadays I store up to 30 crates because I have a fridge. I get a lot of clients and my business has really expanded since I also store and sell water."

– **Male refrigerator customer, Kenya**

"We get knowledge on various things. Before, we used to listen to news without watching it but by now we watch while listening. This is a development for us. Additionally, my children watch sports, and it keeps them busy."

– **Female TV customer, Rwanda**

"I am now using solar to irrigate my farm, so my yield and income have increased significantly. I can now send my children to school comfortably, eat whatever I want at home, and I have increased the amount of land under cultivation since I bought another farm."

– **Male, solar water pump customer, Tanzania**

All Technologies: Appliance Uptake Trend

Aside from TVs, the likelihood that customers purchased an additional appliance decreased over time.

12% of customers purchased additional off-grid products since they were last interviewed. Most that made additional purchases bought TVs, solar home systems, and solar water pumps. It's interesting to note that while purchases of other appliances decrease over time, the uptake of TVs almost doubles. From [sales figures](#) for the regions covered by this study, we know that TVs tend to be the most desired and purchased entry-level off-grid appliances. Additionally, their relative affordability compared to SWPs and refrigerators might further support sales.

There is a marginal increase in the number of customers who reported seeing more people own or buy these appliances in their community as the tenure of ownership increased, which seems to reflect the slower-than-anticipated growth of the off-grid appliance sector. The latest [solar market trend report](#) saw annual unit sales of off-grid appliances decline by 21% between 2019 and 2021 and were yet to recover by 2022.

Customers' Additional Off-Grid Appliance Purchases

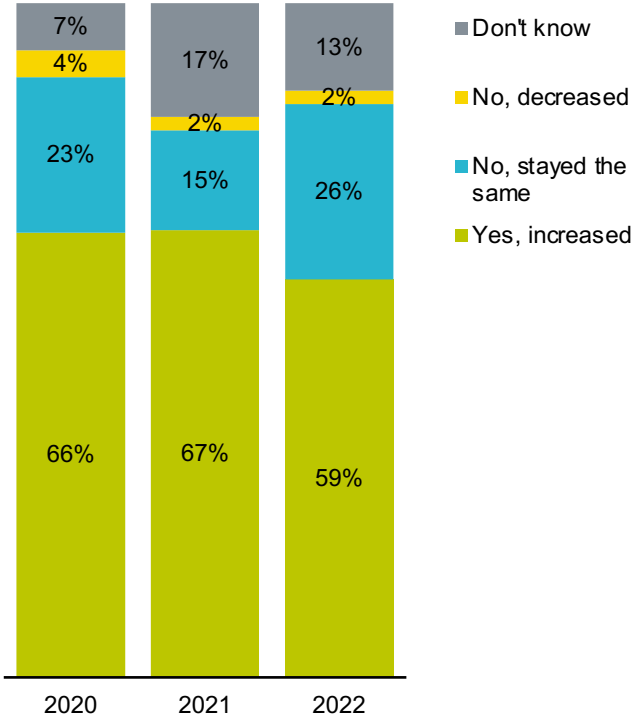
Q: Since [time since last interview], have you purchased any of these products? (n;2019 = 1103, 2021 = 450, 2022 = 546)

Percentage who purchased

Product	2020	2021	2022
TV	7%	7%	12%
Solar home system	2%	3%	1%
Solar water pump	2%	2%	1%
Refrigerator	<1%	<1%	0%
Fan	<1%	0%	0%

Appliance Uptake Trend

Q: Have you seen more people own/buy these [appliances] in your community? (n; 2020 = 893, 2021 = 448, 2022 = 546)



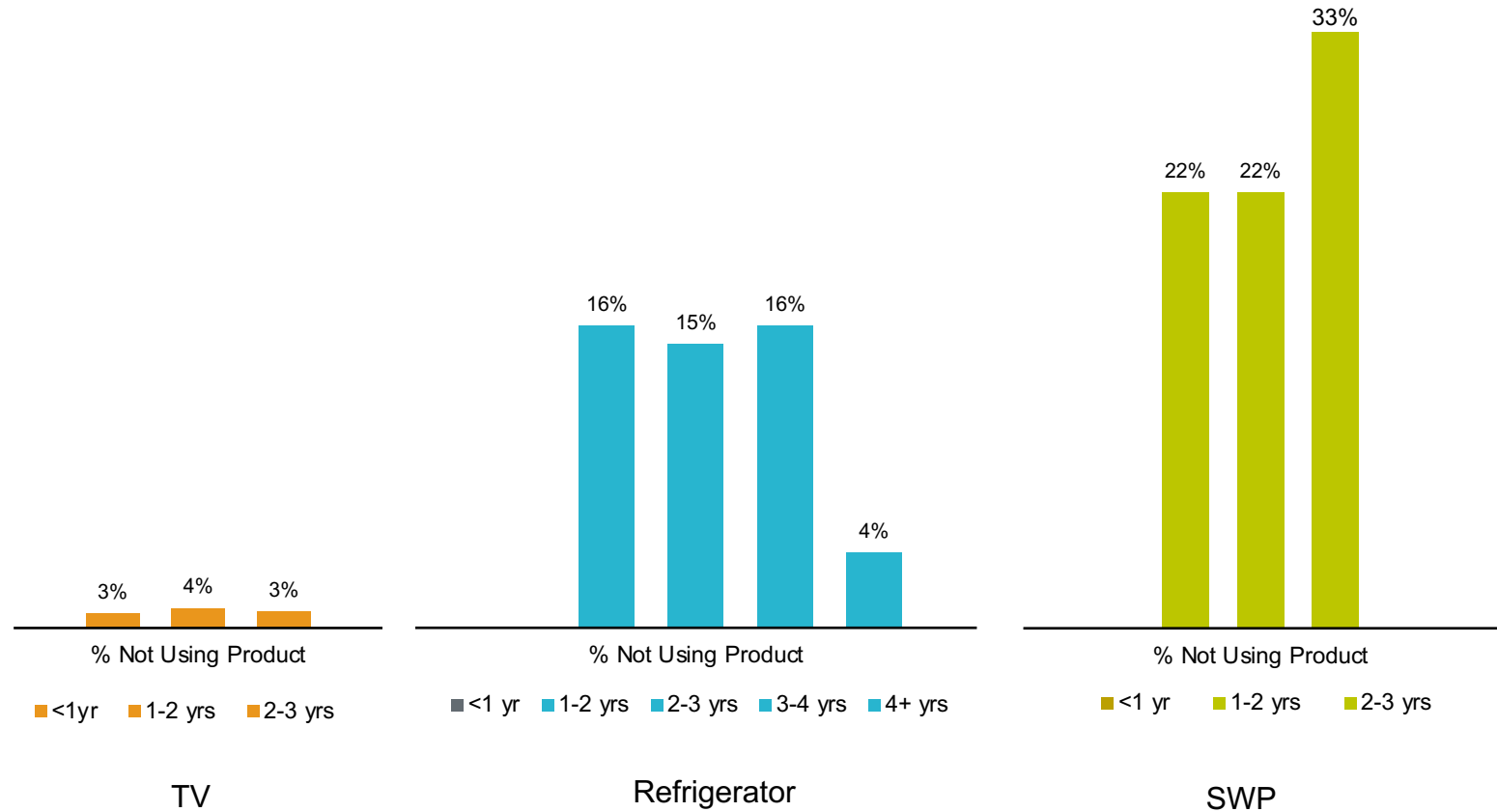
All Technologies: Discontinued Usage

For refrigerators and solar water pumps, a significant number of people no longer use their appliances. While discontinued usage trends are down for refrigerator owners, the opposite is true for solar water pumps: over 30% of customers no longer use their appliance by year 3-4 of ownership.

Interestingly, the percentage of customers who no longer use their TV remains much lower and consistent than the other technologies. This may be due to the lower price of TVs, making repayment easier and thus repossession less likely.

Discontinued Usage

Q: Do you still use your [Company] [product]? % answering "NO" (n = 704)



All Technologies: Discontinued Usage & Possession

A quarter of all customers no longer have their appliance, **55% of whom had their appliance repossessed**. While other reasons for discontinued use are shown in the graph, the high repossession rate is significant. Especially for solar water pumps and refrigerators – which remain unaffordable for many households and businesses – making repayments can often mean customers are forced to make unacceptable sacrifices. As seen from [previous research](#) on this cohort, there is evidence of over-indebtedness affecting customers. More **flexible and longer loan terms** may better enable customers to repay their loans without cutting back on consumption. **Improving the affordability of appliances is also critical** to lowering repossession rates and allowing more households to access their numerous positive impacts.

Top Reasons For Stopped Use

Q: Why did you stop using the [Company] [product]? (n = 145)

1. Issues with appliance (49%)

“The fridge broke down. I called the company for technical assistance, but they never came.”– **Female customer, Kenya**

2. Appliance was inefficient (21%)

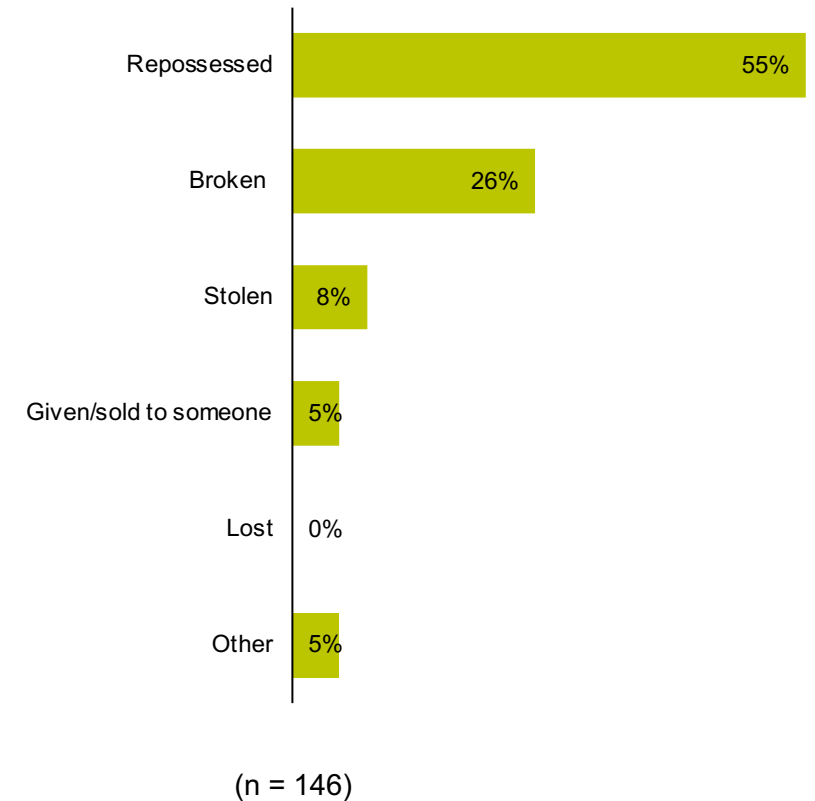
“My television stopped working, my torch stopped charging, my bulbs are not lighting therefore I stopped using the products because I called and promised to come but they have no.”– **Female customer, Kenya**

3. Business worsened (13%)

“I was locked out of my county, and I was not able to travel back as I was in Nairobi and I do the farming business upcountry.”– **Male customer, Kenya**

Reasons for no longer having the appliance

Q: Why do you no longer have the [Company] [product]?



All Technologies: Customer Suggestions & Opportunities for Improvement

Suggested Improvements

Q: Is there anything else you would like to share?



(n = 2,122)

52% of customers had a specific suggestion for improvement

38% could not think of a specific improvement & 10% had positive feedback at the end of the interview.

Of the customers who had suggestions for improvement, 13% asked for the companies to improve their customer service, while 7% talked about the improvement of product quality.

*“If one is late with a payment, the company should call the person and inform them, and give a grace period of even a month. Instead, they call and start threatening me of disconnection. Please have a good customer and public care relations.” – **Male TV customer, Kenya***

*“[company] used to have field agents but I don't see them anymore. I don't know what happened but they should bring them back because they used to do a good job in marketing.” – **Male refrigerator customer, Kenya***

*“Could [company] give me a big pipe because the one that I have is small and water is limited by the size of the pipes? They should also visit their clients more often.” – **Female solar water pump customer, Kenya***

*“Please replace my TV if you cannot repair it, tell me instead of taking me round and round for repairs.” – **Female TV customer, Kenya***

Appendix

Calculations, Definitions, & Summary Of Data Collected

Methodology: 9,451 phone interviews completed between 2015 and 2022

Survey mode	Phone
Country	Kenya, Uganda, Tanzania, Rwanda, Senegal, Zambia
Language	English, Kiswahili, Luganda, Kinyaruanda, French, Chichewa
Dates	2015 to 2022
Sampling	Random sampling
Response rate	78%

Accuracy

Confidence Level	~85%
Margin of error	~5%

Rural areas in the report refer to villages/countryside. During interviews, we asked respondents if they lived in a:

- City (a proxy for urban)
- Town (a proxy for peri-urban)
- Village or countryside (a proxy for rural)

For those who like to geek out, here's a summary of some of the calculations we used in this deck.

Metric	Calculation
Net Promoter Score®	The Net Promoter Score is a common gauge of customer loyalty. It is measured through asking customers to rate their likelihood to recommend your service to a friend on a scale of 0 to 10, where 0 is least likely and 10 is most likely. The NPS is the % of customers rating 9 or 10 out of 10 ('Promoters') minus the % of customers rating 0 to 6 out of 10 ('Detractors'). Those rating 7 or 8 are considered 'Passives'.
Customer Effort Score	How easy do you make it for your customers to handle their issues? This measure captures the aftersales care and customer service. Customers who have experienced a challenge are asked to what extent they agree with the statement: Do you agree or disagree with statement: Overall, [Company] made it easy for me to handle my issue : disagree (1), somewhat disagree (2), neither agree or disagree (3), somewhat agree (4), agree (5). The CES is the average score between 1 and 5. It is an important driver of uptake, adoption, and referrals, as well as of impact.