MOON
power to communities

PFAN
Accelerating Investment for Climate and Clean Energy

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Impact Assessment Report

Moon

PRODUCED BY:

IMPACT AMPLIFIER

Contents

ADEME (the French Agency for Ecological Transition) launched a call for projects to support companies and NGOs that develop and implement innovative solutions to improve access to off-grid energy in sub-Saharan Africa.

The **Private Financing Advisory Network (PFAN)** provided support through business advising and the evaluation of their impacts. This report is the final product of the impact assessment conducted for Moon.

01. Introduction

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Moon's objective is to provide access to solar energy to hardest-to-reach rural communities in sub-Saharan Africa, with local subsidiaries in Senegal and Togo. When Moon initially launched, it used a pay-as-you-go (PAYG) rent-to-own scheme (i.e. leasing arrangements) but found that a fee-for-service (FFS) model better suited the affordability needs of their users. This impact report not only showcases Moon's overall impact but also compares the outcomes of the two payment models across the two countries.

METHODOLOGY

The impact assessment process began by requesting all available documentation from Moon. This documentation was crucial in gaining a comprehensive understanding of Moon's business operations, serving as a prerequisite for developing the impact framework and assessment tools.

Furthermore, a detailed plan was developed to identify and address any gaps in the information being collected by Moon that were necessary for tracking the inputs, outputs, outcomes and impact metrics as outlined in the impact framework. The plan outlined the specific information needed, the methods through which it would be gathered and the responsible parties involved in data collection.

Finally, in collaboration with Moon, baseline and impact questionnaires were developed. These questionnaires were designed to collect data from Moon's beneficiary groups, allowing for a more direct and accurate assessment of the impact generated by its initiatives.

Impact Amplifier developed an impact framework encompassing a problem and solution statement, theory of change and a set of metrics to measure the project's inputs, outputs, outcomes and overall impact. In addition to establishing the framework, Impact Amplifier has also designed baseline and impact questionnaires which were utilised to gather data for this report. The collection of impact data was facilitated by Moon's internal team, but the analysis and report herein were done by Impact Amplifier.

02. Project background

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A. PROBLEM STATEMENT

Over 50% of the 1.1 billion people in sub-Saharan Africa do not have access to the electrical grid. The vast majority of these households are rural, making up 78% of those without electricity.[1] This lack of access is particularly acute in Senegal and Togo, where only 38% and 7% of rural households respectively have access to electricity.[2]

While off-grid energy solutions are available, particularly solar, in sub-Saharan Africa, access and affordability are the primary issues. Only 30% of off-grid households are able to afford quality solar products at the current prices. Beyond the inability to pay, cheap and low-quality solar products are negatively affecting the trust in communities in need of affordable energy and distorting price expectations.[3]

Rural households are constrained by not only their access to energy but also telecommunications. An estimated 70% of the West African population does not own a cell phone, and it is further predicted that cell phones will remain largely inaccessible for rural populations based on cost.

Households not connected to the grid or who cannot afford to purchase solar home solutions rely predominantly on wood/charcoal to cook and candles and flashlights or paraffin/kerosene for lighting. If they have a cell phone, they charge it with old car batteries or wherever power is available.

The consequences of this type of energy and digital poverty are severe. It causes:

- Economic activity to be confined within daylight hours
- Study time to be limited to daylight hours
- Extreme health risks within and outside the households, including fires caused by paraffin/kerosene lamps and stoves, internal air pollution from wood and charcoal and early childhood poisoning from paraffin/kerosene ingestion (commonly decanted in cups, which children think is water before their olfactory systems have been formed)
- Basic human needs like safety and security, healthcare, education and economic opportunities to be compromised because of limited or no telecommunications

In addressing rural energy poverty, telecommunications and digital access are critical imperatives with lasting social and economic benefits. However, the long-term solutions will not be exclusively the domain of the state, centralised or carbon-based, but renewable, de-centralised and delivered by a myriad of public, private and civil society actors.

1. Moon, 2021.
2. Se4all-africa, 2022.
2. Lightinglobal, 2018.

B. PROVIDED SOLUTION

An affordability study conducted by Acumen and SolarAid found that solar energy customers identify having “access to more and brighter light, improved energy reliability and reduced expenditure as the most significant advantages [to having solar energy in their homes]. These same customers also mentioned improvements in feeling more secure/safe, healthier, cleaner and happier in [their] home.”[4] Moon has designed a solution to provide solar energy to homes with its affordable solar home system (SHS) and connectivity solution (MoonPhone). In 2017 Moon was the first West African renewable energy provider to bundle an energy and digital solution into one.

Moon’s value proposition is providing affordable solar lighting to the communities it serves in Senegal and Togo. It strongly believes that its systems positively affect the social, environmental and economic aspects of these beneficiary communities. Extensive research conducted by Moon revealed that 50% of the rural populations it caters to can only afford up to 8,000 CFA ($13) in monthly instalments for access to solar lighting.

Moon’s entry-level hardware installed in homes comprises 3-5 lamps, a solar home system (SHS) kit, cables and an optional MoonPhone. The solar home system is paired with an “in-house locked” smartphone operated on in-house designed software and has access to a payment application preinstalled on the phone, which gives beneficiaries access to cloud-based content hosted by Moon. Currently, Moon has two types of payment solutions, a PAYG system, operational in Togo, based on a rent-to-own logic, and a PAYG as well as an FFS model operational in Senegal. Though the PAYG model was first introduced in Senegal in 2017, this payment model will be phased out in Senegal as of 2022, as Moon is moving to the FFS model exclusively.

The rationale behind the decision to phase out the PAYG payment system lies in the discovery that Moon’s beneficiaries often cannot afford an upfront payment and the high monthly instalments of the PAYG system. The PAYG payment solution requires an upfront amount of $15-$30, and a monthly instalment of $7-$12 over a period of 24-36 months for a three light system, whereas a FFS model has no upfront payment and only requires a $3-$6 monthly instalment for three or five lamp solution. Most of Moon’s beneficiary households have never taken out a loan and often do not realise the financial commitment. Their spending behaviour is characterised by only using small amounts of money available on a day-to-day basis, whereas the PAYG solution forces households to guarantee a minimum monthly income. Since access to lighting and energy is such a dire need of the beneficiary population, continuing to apply a PAYG solution would risk debt becoming a burden, sometimes referred to as the “social impact credit trap”.

4. Acumen,2017:29

C. THEORY OF CHANGE

Moon assumes that an energy offering with a controlled cost structure (PAYG or FFS) will have a meaningful impact on the environment and the lives of rural communities in West Africa (Senegal and Togo). The project assumes that these devices (SHS +MoonPhone) are affordable and sustainable as well as a better alternative to the current energy forms available in the regions they operate within. Moon further assumes that there are social and economic returns that access to lighting, power to charge devices and internet connection will provide.

These assumptions are based on the fact that a large percentage of the rural population in Senegal and Togo are unelectrified and digitally isolated. Furthermore, the state will not solve this problem in the near to medium term, and some households will simply never be connected to the network. This energy divide, Moon believes, contributes to lower economic activity because of a lack of cell phone connectivity and limited power, an inadequate amount of lighting time for education/studying/social activities, as well as adverse health consequences. Furthermore, the current energy forms for lighting used in these areas, such as burning kerosene/wood/coal, are poisonous to the environment through Co2 emissions.

There is still uncertainty about whether the PAYG model, where beneficiaries rent to own the equipment after 24 months, versus a FFS model, where the equipment stays in the ownership of Moon, has a more meaningful and sustainable impact. Both of these solutions will be tested as part of the impact measurement methodology. Based on these assumptions, a theory of change was developed with three core components:

1. PAYG and FFS solar and digital solutions for off-grid populations in Senegal and Togo, where beneficiary households pay a monthly service fee tailored to their energy needs with the result of either owning the Moon equipment at the end of 24 months or renting the equipment for a monthly fee.
2. Mobile teams of salaried sales agents that support beneficiaries (repair equipment) as well as a call centre for beneficiary assistance.
3. Collecting the equipment that has reached the end of its life and recycling it into the waste economy.

Moon believes that these interventions will provide an affordable and culturally acceptable energy alternative that will have meaningful social and environmental benefits for the climate, health, education and economic activity.

D. IMPACT TRACKING: OUTPUTS, OUTCOMES AND IMPACT METRICS

The following metrics will measure the outputs, outcomes and impact of Moon's installation. These are defined as:

- **Outputs** - The immediate quantifiable direct results that are achieved after implementing an activity like the number of SHS installed.
- **Outcomes** - The medium-term quantifiable changes that occur as a result of the project activity, which is observable after some time (weeks, months), like households had two extra hours of useable light per day.
- **Impact** - The long-term quantifiable changes that occur as a result of the specific activity over a sustained period (years, decades), like households using the extra hours of usable light to study and work, which resulted in better grades at school and increased income. The better grades provided access to higher education and better economic prospects and the increased income was used to pay for better schools and enhanced food security.

Theory of change

01 INPUT	Moon SHS entry level	MoonPhone software and hardware				
02 ACTIVITIES	Installation of Moon entry level SHS	Activation of MoonPhone	Collection of monthly payments (PAYG/FFS)	Sales through salaried sales agents	Call centre services	Collection of recyclable items
03 OUTPUT	Amount of GHG reduced/avoided	Amount of traditional energy sources replaced	Number of additional hours of light used for studying	Number of additional people with access to a cellphone	Number of additional cell phone charges per day created	
	Number of people feeling significantly healthier, cleaner, happier in their home	Number of hours digital access used for economic activity	Number of people using SHS and cell phone in entrepreneurial activity	Number of extra hours of economic activity after dark		
04 OUTCOME	Reduced GHG emissions	Reduced environmental waste	Energy savings per household	Additional hours of light after dark used for studying	Increased studying time after dark	Increased positive feelings related to health, cleanliness and happiness	Increased income because of light access
05 IMPACT	Total reduced GHG in Senegal and Togo	Total reduced environmental waste in Senegal	Increased student marks and school pass rate	New schools accessed	Increased economic opportunities for students	Improved happiness	Total amount spend on basic human needs as a result of extra income	Improved access to basic human needs

Overall impact

TRACKING ENVIRONMENTAL, SOCIAL AND ECONOMIC IMPACT	
OUTPUT: HOUSEHOLD DEMOGRAPHICS	– Country – Date of Moon installation – Number of clients per village/commune – Gender – Age – Number of people in your household – Students' grades – Employment status of residents – Household income
OUTPUT: DEVICE INSTALLATIONS	– Number of Moon SHS installed (entry-level) per village in Senegal and Togo – Number of MoonPhones activated per village in Senegal and Togo – Number of solar street light solar systems installed per village in Senegal
OUTPUT: USAGE RATE	– Number of households making use of Moon SHS and MoonPhone in each village in Senegal and Togo – Percentage of households making use of Moon SHS and MoonPhone in each village in Senegal and Togo
OUTPUT: SUPPORT	– Number of sales agents per community – Type of support services required per community – Frequency of support required per community
OUTPUT: ENERGY CREATION	– Number of hours per day of lighting created (calculated based on the lighting available in homes and credits purchases) – Number of hours per day of appliance charges created (calculated based on charging ports available in homes and credits purchases)

TRACKING ENVIRONMENTAL, SOCIAL AND ECONOMIC IMPACT	
OUTPUT: PAYMENT AND COST	– Number of PAYG payment structures per community – Amount spent per household on PAYG – Number of FFS payment structures per community – Amount spent per household on FFS – Number of cash payments per community – Amount spent per household in cash – Percentage of default rates on payments on PAYG and FFS models – Percentage of cancellation per village for PAYG or FFS models – Percentage of systems that fail and need replacement per village – Additional amount spent on energy per month (if any) traditional energy continued to be used post-SHS – wood, candles, kerosene lamps and batteries – Total energy spent per month
OUTPUT: GHG EMISSIONS	– Amount of traditional energy sources replaced (wood, candles, kerosene lamps and batteries)
OUTPUT: RECYCLING	– Amount of environmental waste collected per village/country
OUTPUT: DIGITAL ACCESS	– Number of people with access to a MoonPhone per household
OUTPUT: HAPPINESS	– Number of people feeling significantly healthier, cleaner, happier in their home

ENVIRONMENTAL	
ENVIRONMENTAL OUTPUT:	– Amount of traditional energy sources replaced (wood, candles, kerosene lamps and batteries) – Number of solar systems installed (SHS) – Amount of environmental waste collected per village country
ENVIRONMENTAL OUTCOME:	– Energy savings per household – Reduced GHG emissions by x per annum, per household – Amount of GHG emissions reduced/avoided per household in comparison to an electrical grid connection – Reduced environmental waste by x per annum, per village/country
ENVIRONMENTAL IMPACT:	– Total reduced GHG in Moon households in Senegal and Togo – Total reduced GHG reduced/avoided per household in comparison to an electrical grid connection – Total reduced environmental waste from communities in Senegal

SOCIAL	
SOCIAL OUTPUT:	– Number of additional hours of light after dark per day created – Number of people feeling significantly healthier, cleaner and happier in their home
SOCIAL OUTCOME:	– Number of additional hours of light after dark per day used for studying – Increased time spent studying based on internal lights after dark – Increased positive feelings related to health, cleanliness, and happiness
SOCIAL IMPACT:	– Percentage increase per annum in student marks average – Increased rate of academic year completion (versus school norms) – New schools accessed because of better marks – Increased economic opportunities because of school year completion and better marks – Improved happiness

ECONOMIC	
ECONOMIC OUTPUT:	– Number of people using SHS in an entrepreneurial activity – Number of hours used for economic activity because of extra light.
ECONOMIC OUTCOME:	– Total amount earned – Percentage of increased income because of access to light – Number of people whose income increased because of extra light hours
ECONOMIC IMPACT:	– Amount of money spent on basic human needs - healthcare, energy, education, food security, effluent, housing, water – Improved access to these basic human needs that enhanced the quality or quantity of healthcare, education, food security, energy, water, effluent and housing

E. PROGRESS TO DATE

Moon started their operations in 2017 in Casamance, Senegal, where they had their first 1,000 users. Moon has recently started operations in Togo and plans to deploy another 200,000 solar kits over the next five years. By the end of 2022, Moon had powered 20,000 rural households in sub-Saharan Africa with a team of 70 talents and plans to reach over 100,000 people in more than 3 countries by 2026. Additionally, Moon is working on a powerful solar offering for productive use beyond its current one.

Moon has not been gathering any impact data for their SHS but has learnt that 50% of the rural population cannot afford more than 8,000 CFA ($13) monthly instalments. A one-off impact study was, however, conducted by French university students in September 2021, where they applied the Global Off-Grid Lighting Association (GOGLA) methodology to calculate various impact metrics related to Moon's social, economic and environmental impact. Some of these indicators are included in the inputs, outcomes and impact measures used in this document.

Moon found that affordability is one of the main obstacles they face in the rural communities where they operate. Unfortunately, an information gap exists regarding what Senegalese and Togolese people actually spend on traditional energy every month. An affordability analysis was, however conducted by the Government of Togo in 2018. The study showed that only half of the Togolese rural communities can afford 160 FCFA per day (25c) or $7,5 per month. This amount is, however only the case for 30% of off-grid households in Togo.[4] For these reasons of affordability, Moon has introduced a FFS model and, as a result, has achieved the highest market penetration.

4. Lightinglobal 2018.

03. Data collection and analysis

03. Data collection and analysis

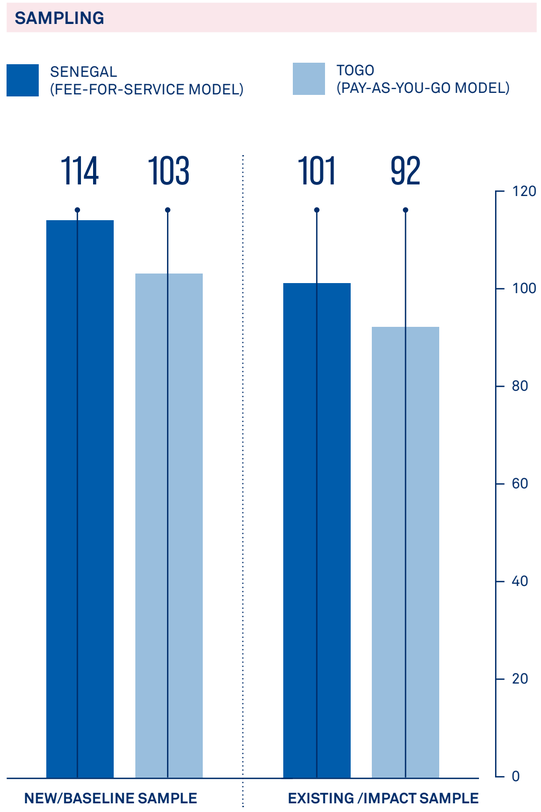
SAMPLING

For this impact assessment, participants were selected through a random sampling method. The population list of both new and existing Moon clients from selected communities in Senegal and Togo served as the sample set. The choice of communities included in the sample was based on a higher concentration of clients to minimise data collection costs and time constraints.

The impact sample consisted of existing clients with similar income levels. These participants were selected based on their country, village, and payment method (PAYG or FFS). The impact questionnaire used for data collection included questions from the baseline questionnaire and additional qualitative questions that were better suited for in-person interviews.

The baseline sample included only new client sign-ups. This sample served as a proxy for Moon's entire client base, enabling an understanding of the impact achieved through Moon's interventions.

Data was collected for both fee-for-service paying clients in Senegal and pay-as-you-go paying clients in Togo. In total, 410 Moon clients were interviewed. This comprised 217 new/baseline sample clients (114 in Senegal and 103 in Togo) and 193 existing/impact sample clients (101 in Senegal and 92 in Togo).

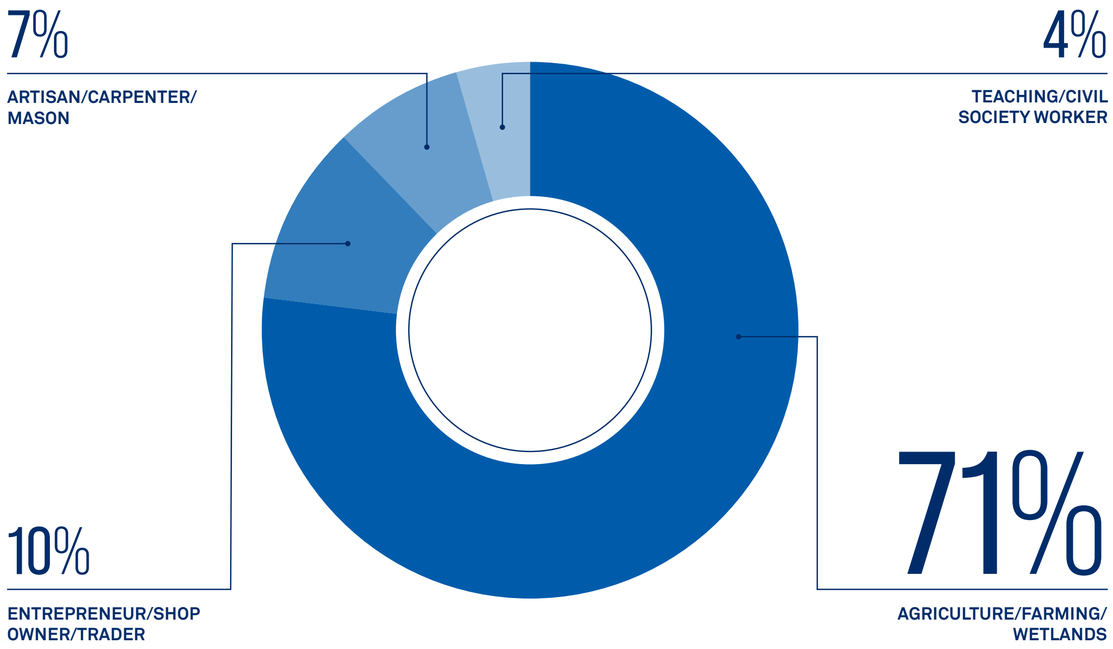


CUSTOMER DEMOGRAPHICS

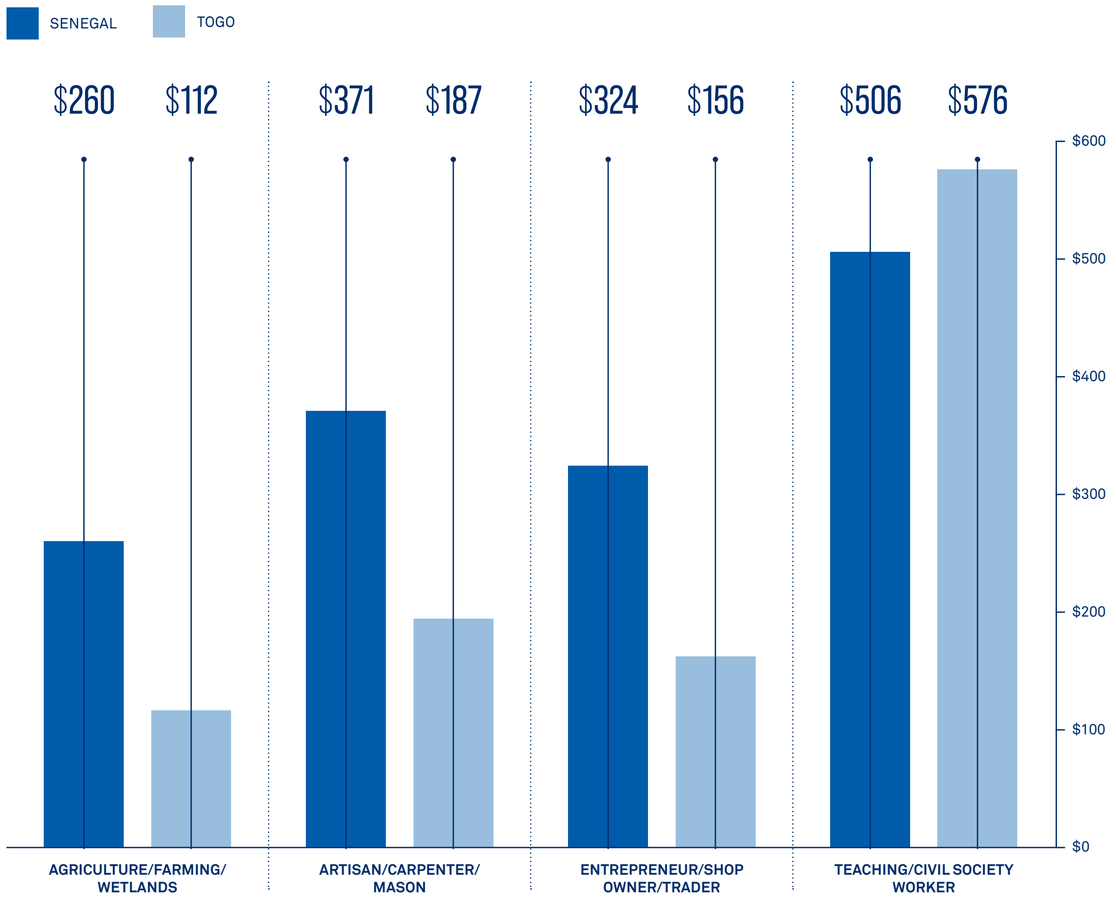
The Moon client base comprises agriculture workers or farmers in the majority (71%), followed by entrepreneurs, artisans and teachers or civil society workers.

Their household incomes range from the highest earning group – teachers and civil society workers at an average of $506 - $576 monthly – and the lowest earning group being agriculture workers, with an average income of $112 - $260 per month. Artisans and entrepreneurs were similar to agricultural workers in terms of income, with a range of $156 - $371 monthly.

MAIN SOURCES OF INCOME AND OCCUPATIONS



DEMOGRAPHY AND INCOME IN SENGAL AND TOGO



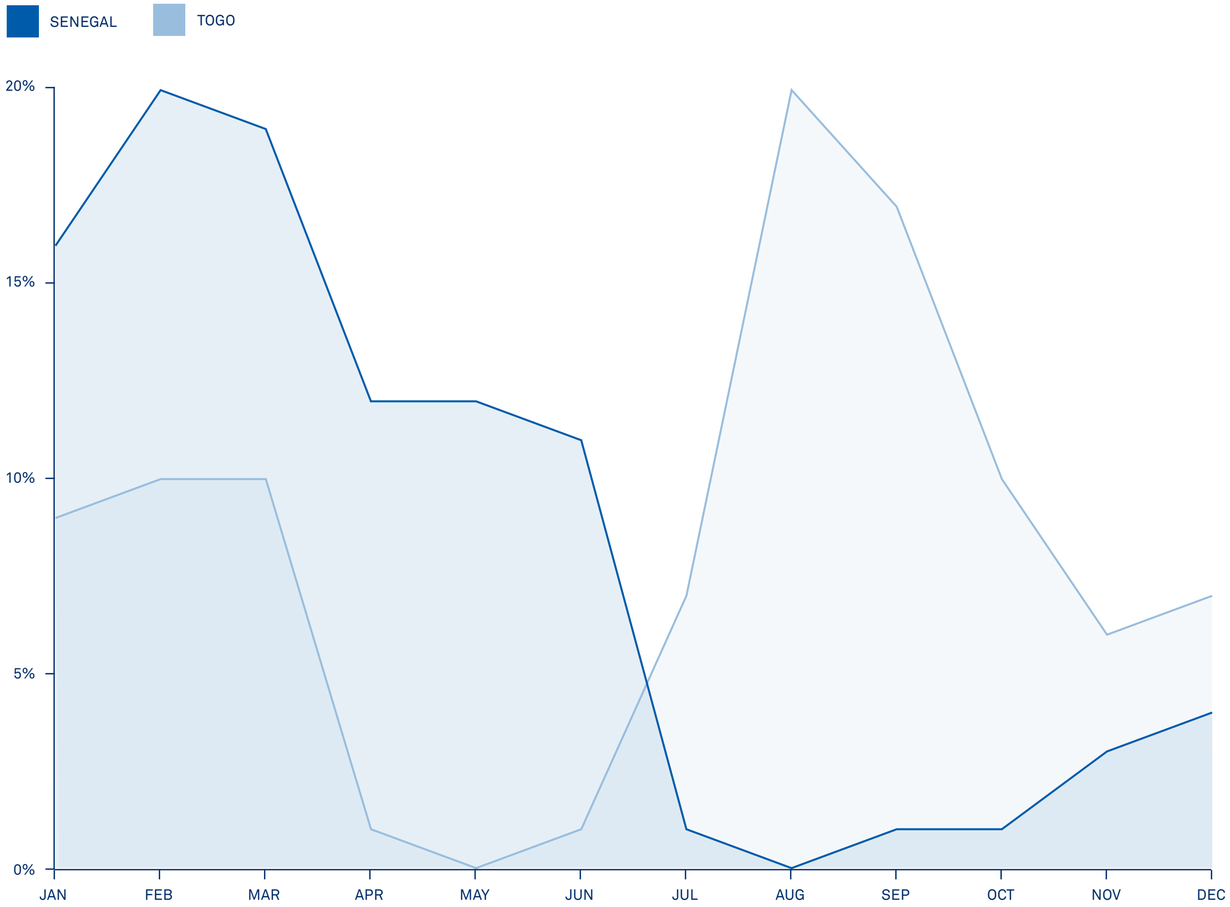
CUSTOMER DEMOGRAPHICS

At certain times during the year, agricultural workers in Moon communities, representing 71% of Moon clients, do not have any income. These months are shown in the chart below to be different for Togo and Senegal depending on the time of year considered.

Togo had its highest percentage of agricultural workers with no income (55%) during January, February and March, with a continuation of a high percentage of agricultural workers with no income (35%) during April, May and June.

In Senegal the most frequent occurrences of no income (37%) were observed during August and September. However no income (29%) among agricultural workers during the first three months of the year was also observed.

TIME DURING THE YEAR THAT THERE IS NO INCOME FOR AGRICULTURE ON SENEGAL & TOGO



MONTHS WITH THE MOST FREQUENT OCCURRENCES OF NO INCOME IN TOGO AND SENEGAL

37%

OF AGRICULTURE WORKERS IN SENEGAL HAVE NO INCOME DURING AUGUST AND SEPTEMBER

55%

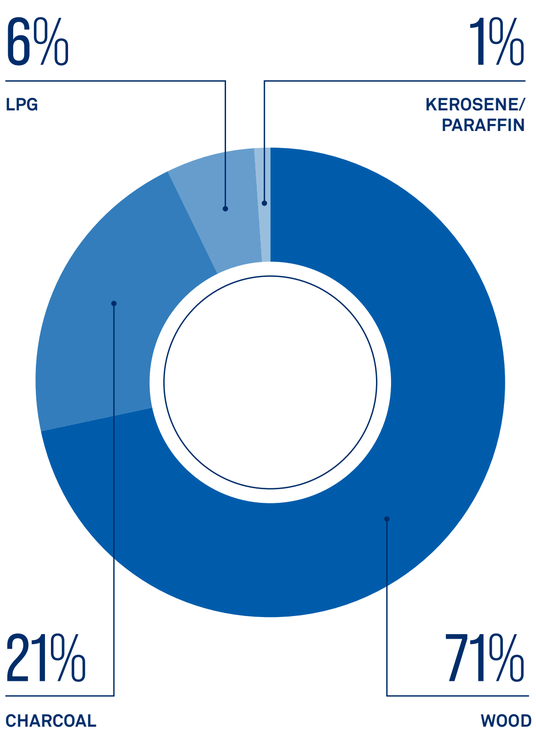
OF AGRICULTURE WORKERS IN TOGO HAVE NO INCOME DURING JANUARY, FEBRUARY AND MARCH

CUSTOMER DEMOGRAPHICS

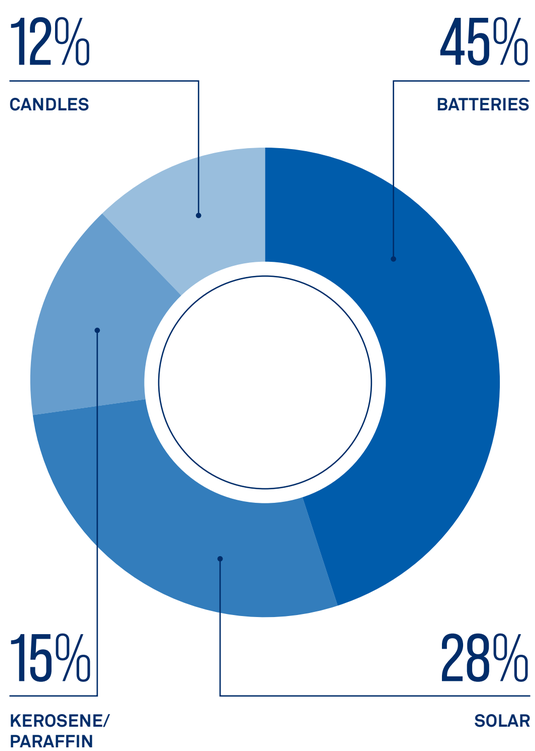
The energy sources used for cooking in Moon communities are generally wood and charcoal, followed by LPG and kerosene/paraffin in a few cases.

Light sources are generally batteries and solar, followed by kerosene/paraffin lamps and candles.

SOURCES OF ENERGY FOR COOKING IN MOON COMMUNITIES



SOURCES OF ENERGY FOR LIGHT IN MOON COMMUNITIES



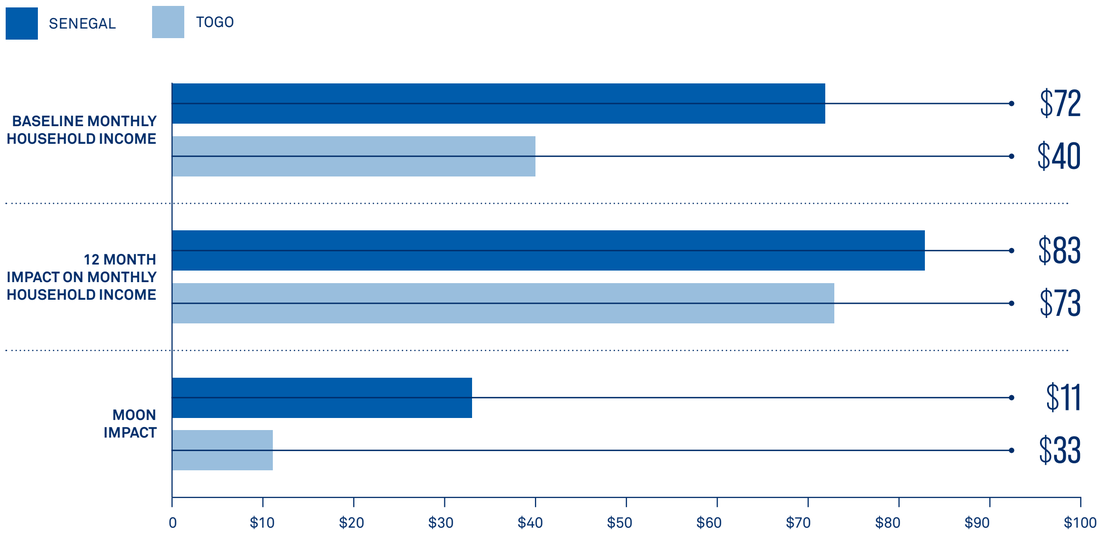
Impact findings

MOON'S IMPACT ON INCOME AND SPENDING IN SENEGAL AND TOGO

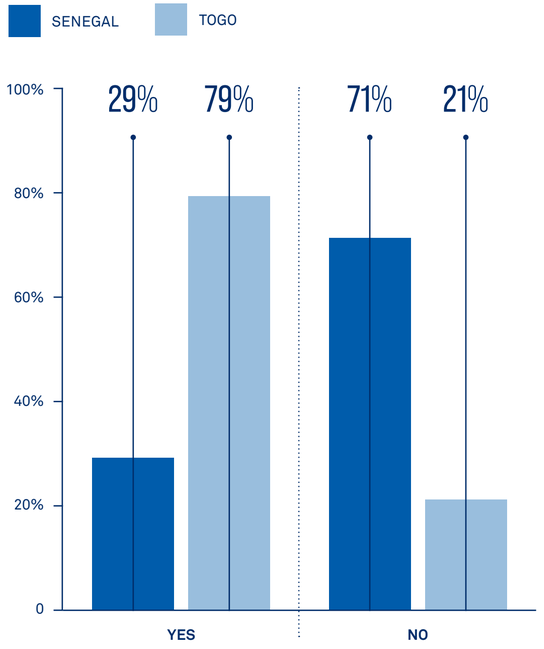
Moon clients demonstrated that having access to the Moon solar home system positively impacted their household income, regardless of the type of payment method used. A significantly more significant positive impact on income was found among PAYG clients in Togo, demonstrating three times the impact of that experienced by FFS clients, with an increase of $11 for FFS and $33 for PAYG clients per month. The chart below shows the impact on average monthly household income demonstrated by payment method as well as country location.

Improved access to light at night in particular positively impacted the extra income earned by households across various professions and industries, demonstrating the importance of reliable lighting in enhancing productivity, extending working hours, attracting customers and enabling entrepreneurial activities. The additional income generated may improve the economic well-being of households and contribute to poverty reduction. This however requires further exploration into how the extra income earned was spent.

IMPACT ON ABERAGE MONTHLY HOUSEHOLD INCOME IN SENGAL AND TOGO (USD)



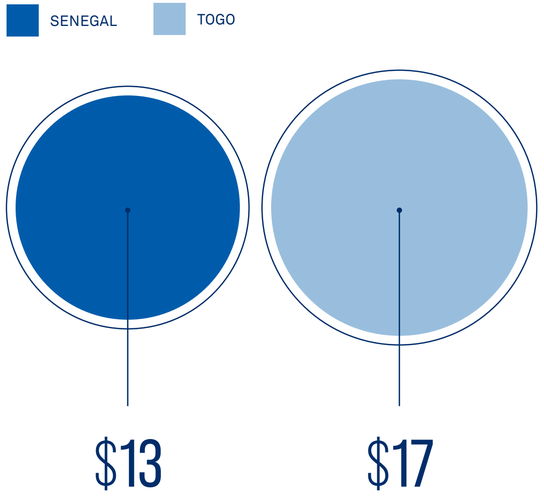
EXTRA INCOME DUE TO MOON LIGHTING IN SENEGAL AND TOGO



The chart below reflects that the majority of respondents in Senegal, accounting for 71% of the total, claim that the availability of extra light at night, specifically Moon lighting, contributed to generating extra income.

Moon clients in Senegal who experienced an increase in income generated $13 extra per month on average. Though fewer clients experienced an increase in income due to Moon lighting at night in Togo, extra income generated was higher, with an average of $17 per month.

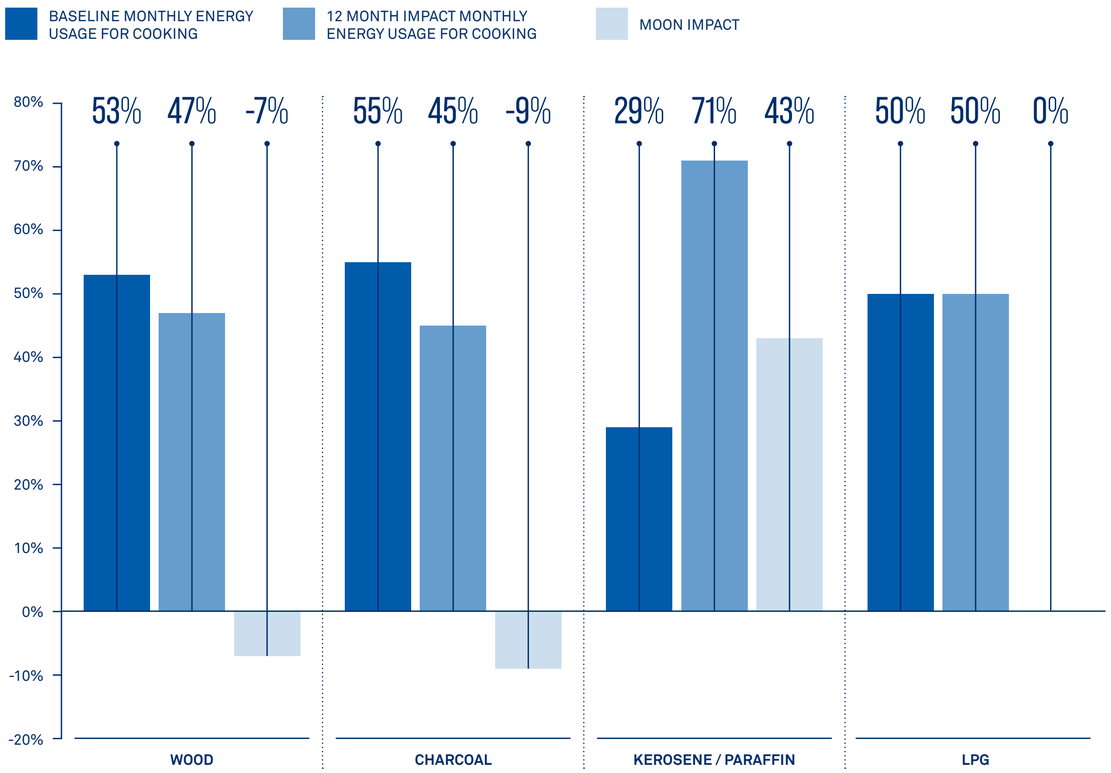
EXTRA INCOME DUE TO MOON LIGHTING



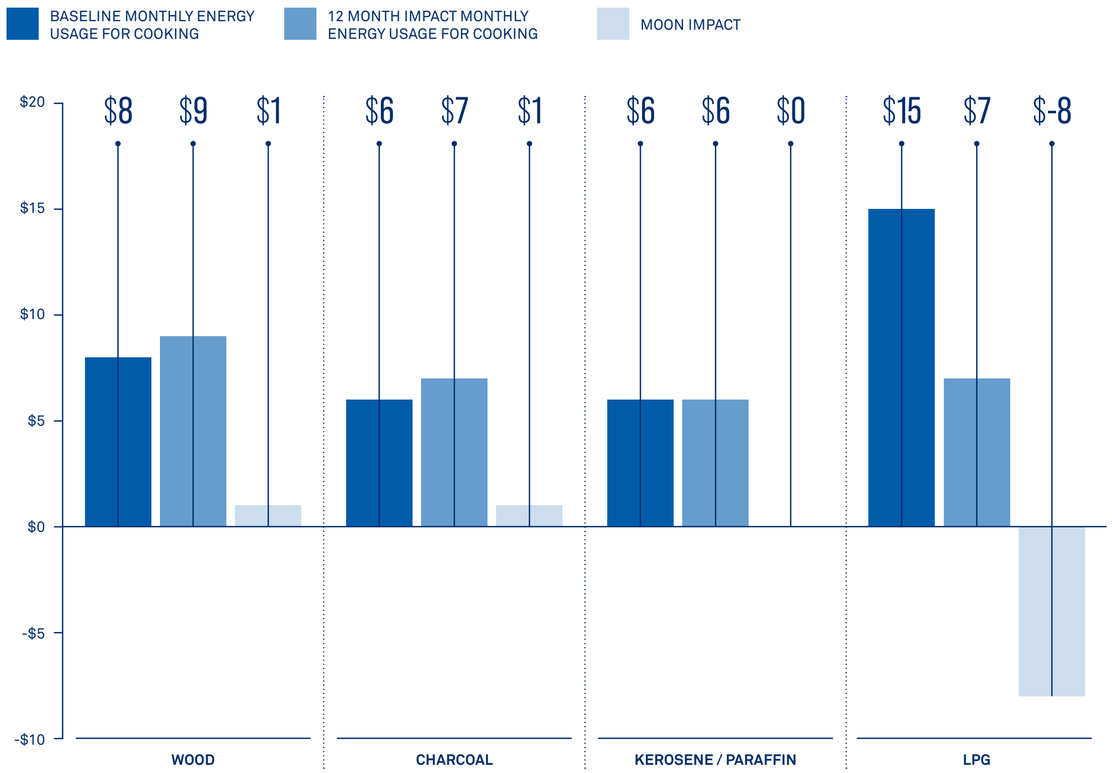
MOON'S IMPACT ON COOKING IN SENEGAL AND TOGO

Before the availability of the Moon solar home system, the primary energy sources for cooking were wood, charcoal, kerosene/paraffin and LPG. The Moon system is not used for cooking, but post its intervention it altered the mix of energy used for cooking and how much was spent on a monthly basis as demonstrated in the charts below.

ENERGY USAGE FOR COOKING IN SENEGAL



AVERAGE MONTHLY SPEND ON VARIOUS ENERGY SOURCES IN SENEGAL (FFS) FOR COOKING

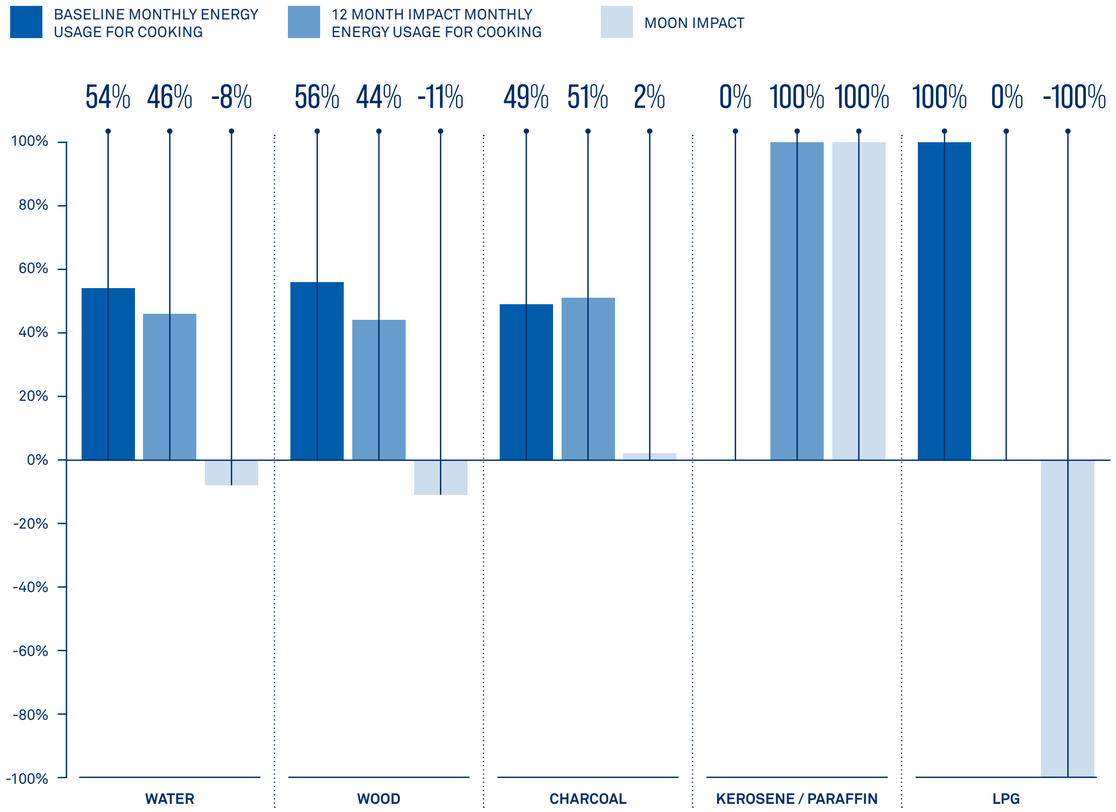


MOON'S IMPACT ON COOKING IN SENEGAL AND TOGO

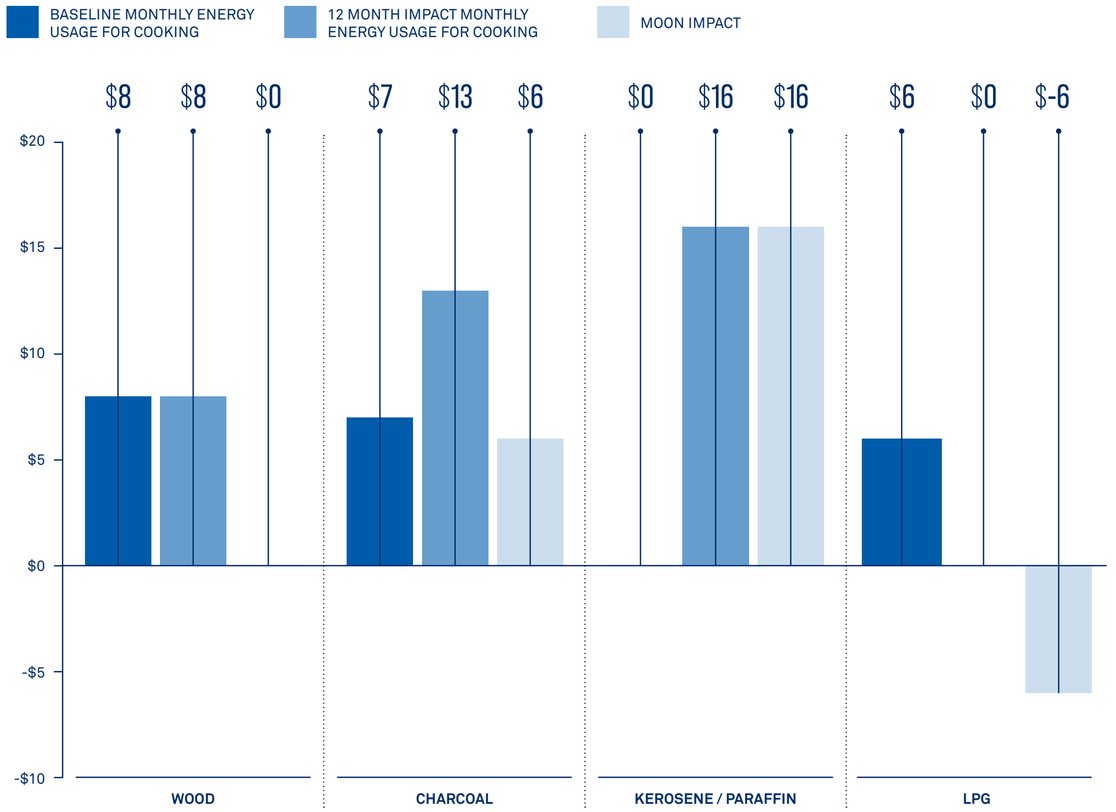
This could have been because of increased income and/or savings from the Moon system and clients' shifting habits based on energy preferences.

It requires further exploration, however, to determine the causal relationships for this behaviour.

ENERGY USAGE FOR COOKING IN TOGO



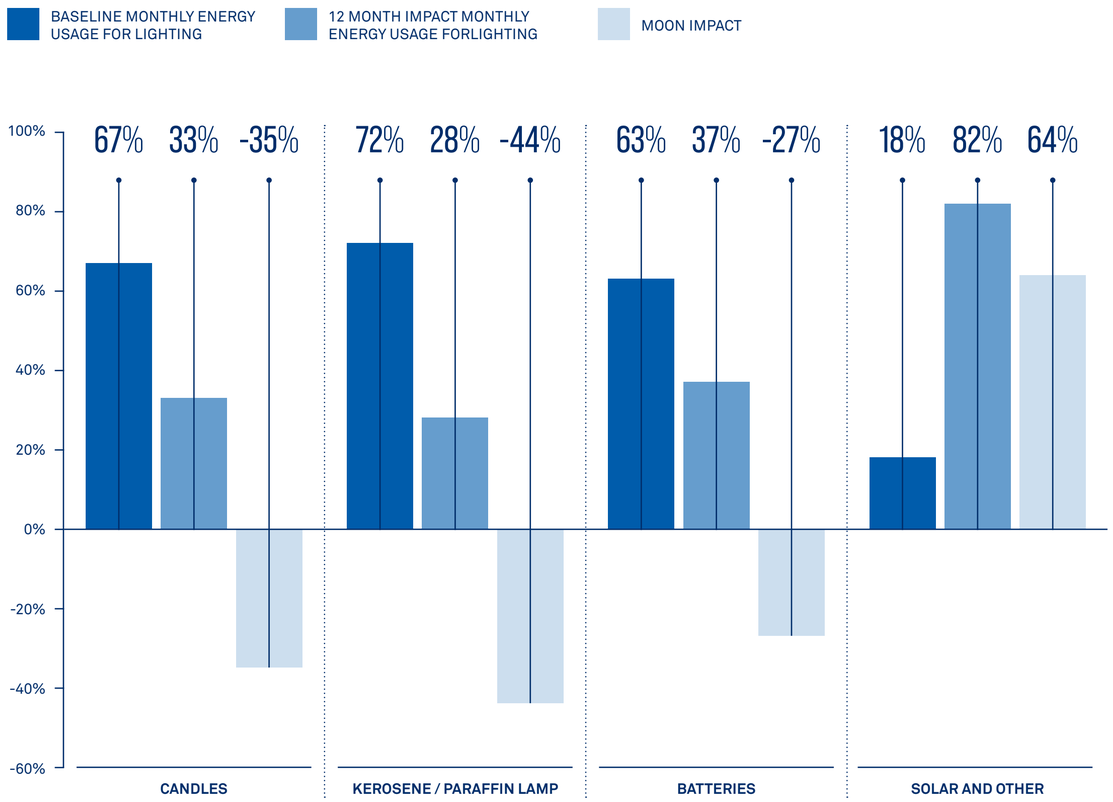
AVERAGE MONTHLY SPEND ON VARIOUS ENERGY SOURCES IN TOGO (PAYG) FOR COOKING



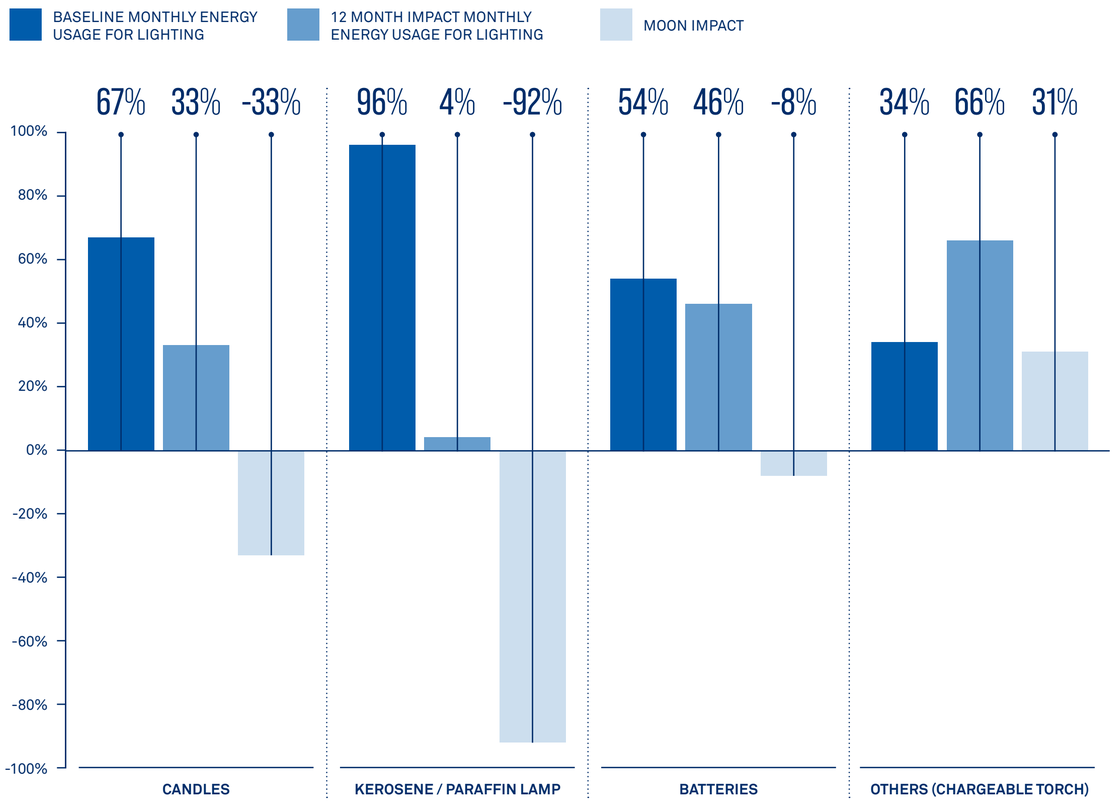
MOON'S IMPACT ON LIGHTING IN SENEGAL AND TOGO

The Moon solution also had a significant positive impact on reducing the usage and buying of non-renewable energy sources such as candles, kerosene/paraffin lamps and batteries. A decrease in the use of candles and kerosene/paraffin lamps can be observed in both Senegal and Togo.

ENERGY USAGE FOR LIGHTING IN SENEGAL



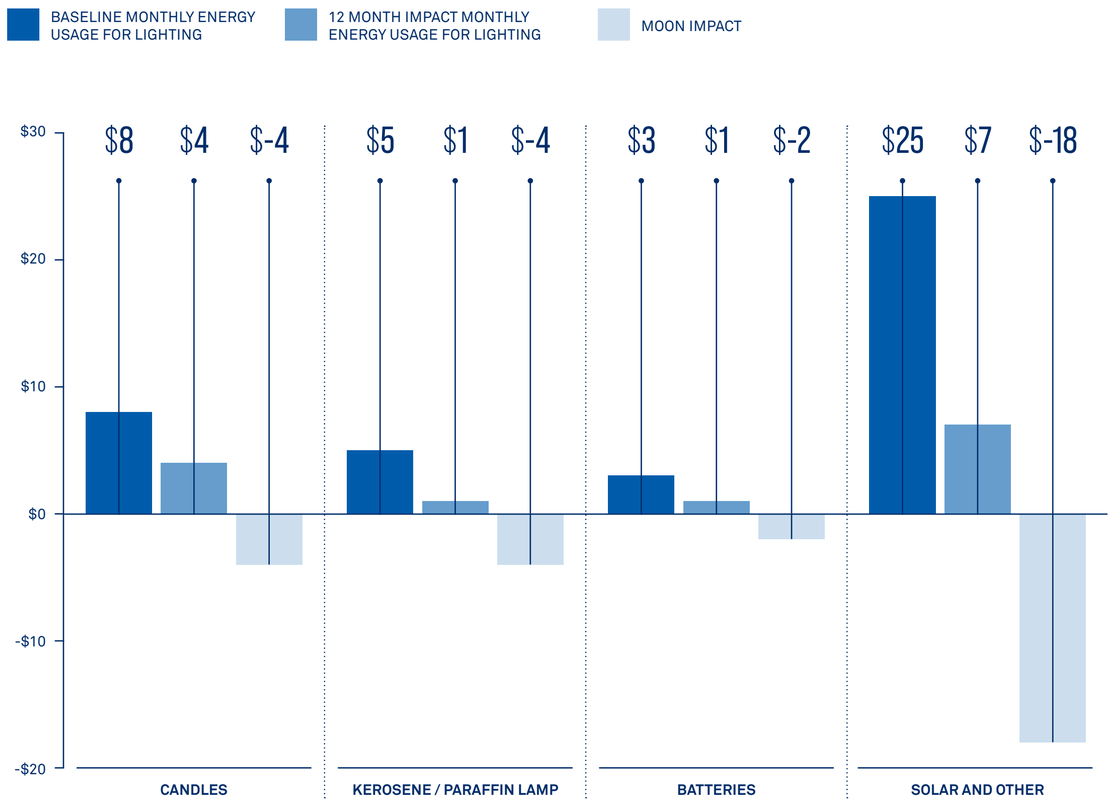
ENERGY USAGE FOR LIGHTING IN TOGO



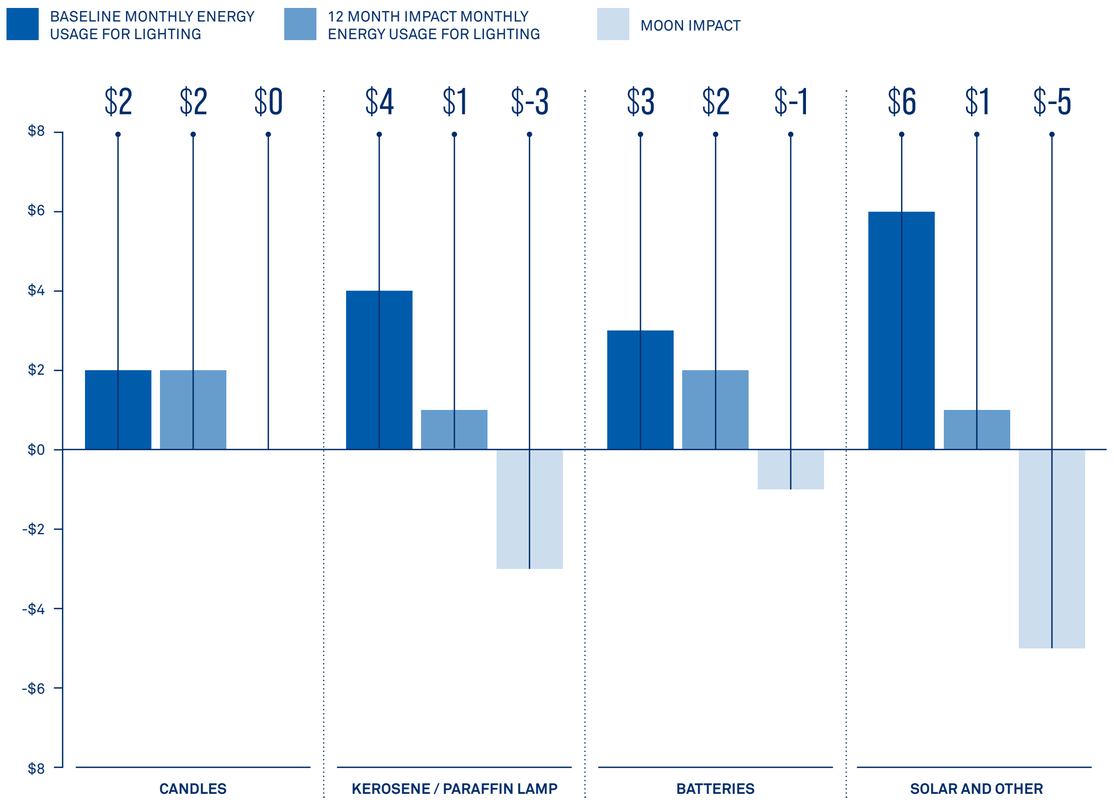
MOON'S IMPACT ON LIGHTING IN SENEGAL AND TOGO

The most significant spending decrease was found on solar and other sources of light resulting in a decrease of $18 in monthly spending in Senegal, where an FFS payment system is used, and a $5 decrease in Togo, where a PAYG payment system is used.

AVERAGE MONTHLY SPEND ON LIGHTING IN SENEGAL



AVERAGE MONTHLY SPEND ON LIGHTING IN TOGO



MOON'S IMPACT ON LIGHTING IN SENEGAL AND TOGO

This decrease in expenditure suggests the successful adoption of more energy-efficient and cost-effective lighting solutions. The findings highlight the potential for solar energy interventions to improve access to affordable and sustainable lighting options, resulting in substantial cost savings for households.

A significant 33%-35% decrease in candle usage for lighting was observed in both Senegal and Togo. The intervention substantially impacted the lessening of kerosene/paraffin lamp usage, leading to a 44% reduction in Senegal and a 92% reduction in Togo.

This reduction is particularly noteworthy as kerosene lamps are known to be inefficient and harmful to both health and the environment. The intervention also positively impacted battery usage for lighting, resulting in a 27% decrease in Senegal and an 8% decrease in Togo. This reduction suggests a shift towards more sustainable and efficient lighting options.

The intervention had a remarkable impact on the usage of other lighting sources, such as solar lighting and Moon kits, with a substantial increase of 64% in Senegal and 31% in Togo. This indicates the successful adoption and implementation of alternative and renewable lighting solutions. These impact results demonstrate the effectiveness of the intervention in promoting energy efficiency and the use of renewable lighting solutions.

The savings observed on cooking and lighting expenditures after the Moon intervention is reflected in the chart right.

33-35% DECREASE IN CANDLE USAGE FOR LIGHTING IN SENEGAL

44% REDUCTION IN KEROSENE/ PARAFFIN LAMP USAGE IN SENEGAL

27% DECREASE IN BATTERY USAGE FOR LIGHTING IN SENEGAL

64% INCREASE IN OTHER LIGHTING SOURCES (SUCH AS MOON KITS) IN SENEGAL

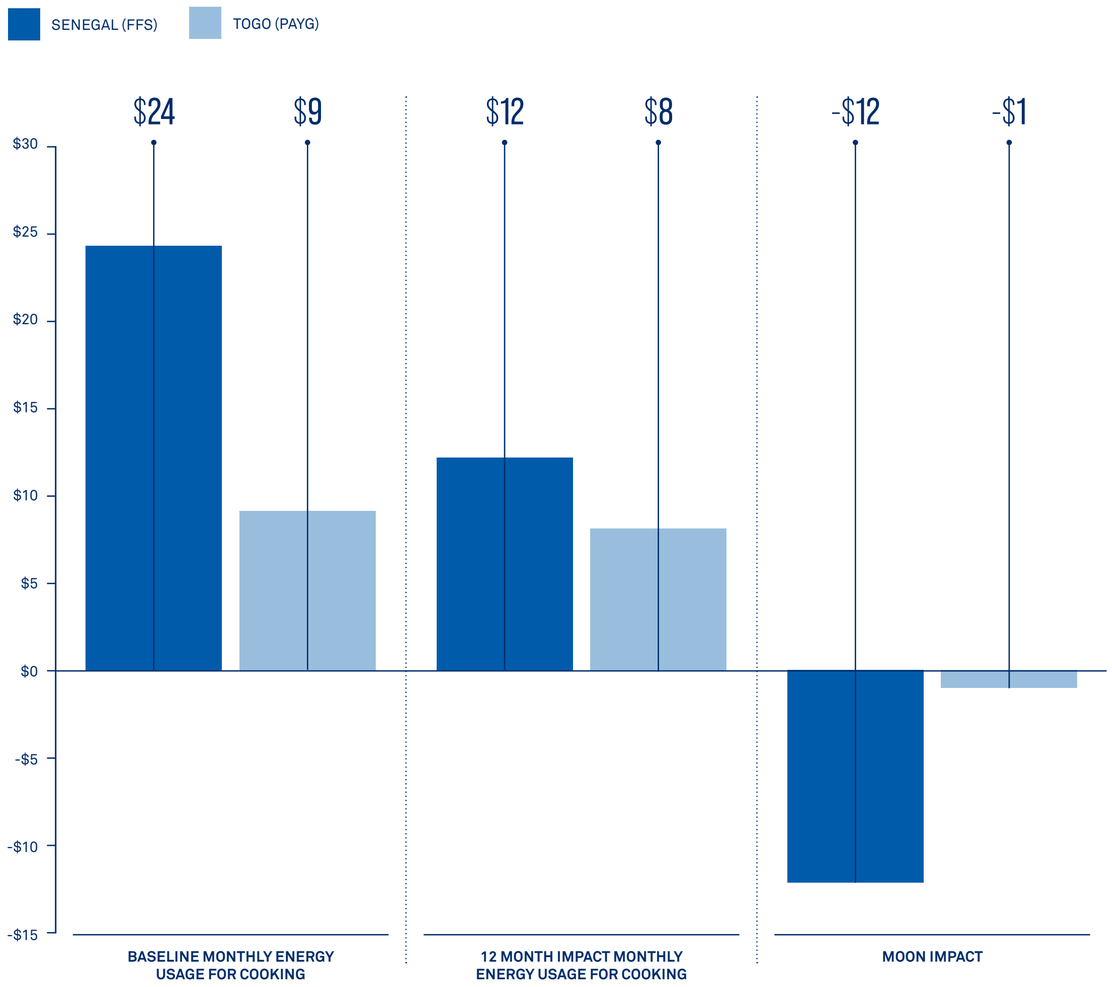
33-35% DECREASE IN CANDLE USAGE FOR LIGHTING IN TOGO

92% REDUCTION IN KEROSENE/ PARAFFIN LAMP USAGE IN TOGO

8% DECREASE IN BATTERY USAGE FOR LIGHTING IN TOGO

31% INCREASE IN OTHER LIGHTING SOURCES (SUCH AS MOON KITS) IN TOGO

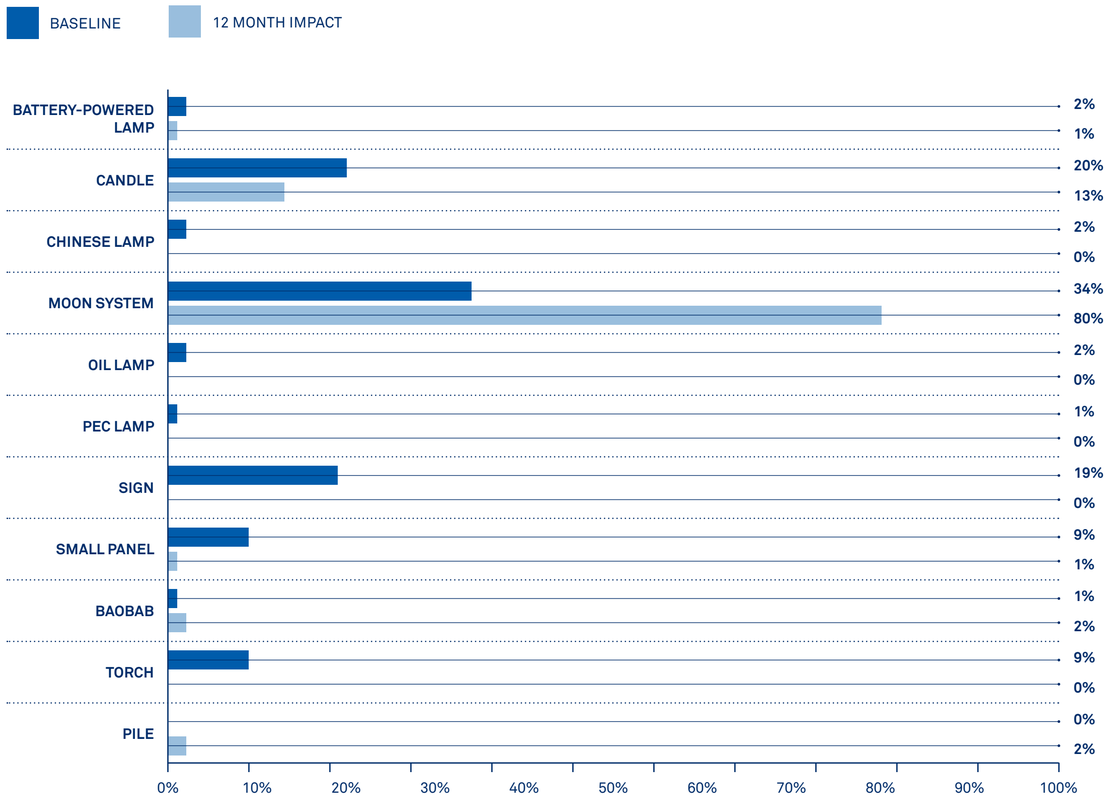
IMPACT ON AVERAGE MONTHLY SPEND IN SENEGAL AND TOGO



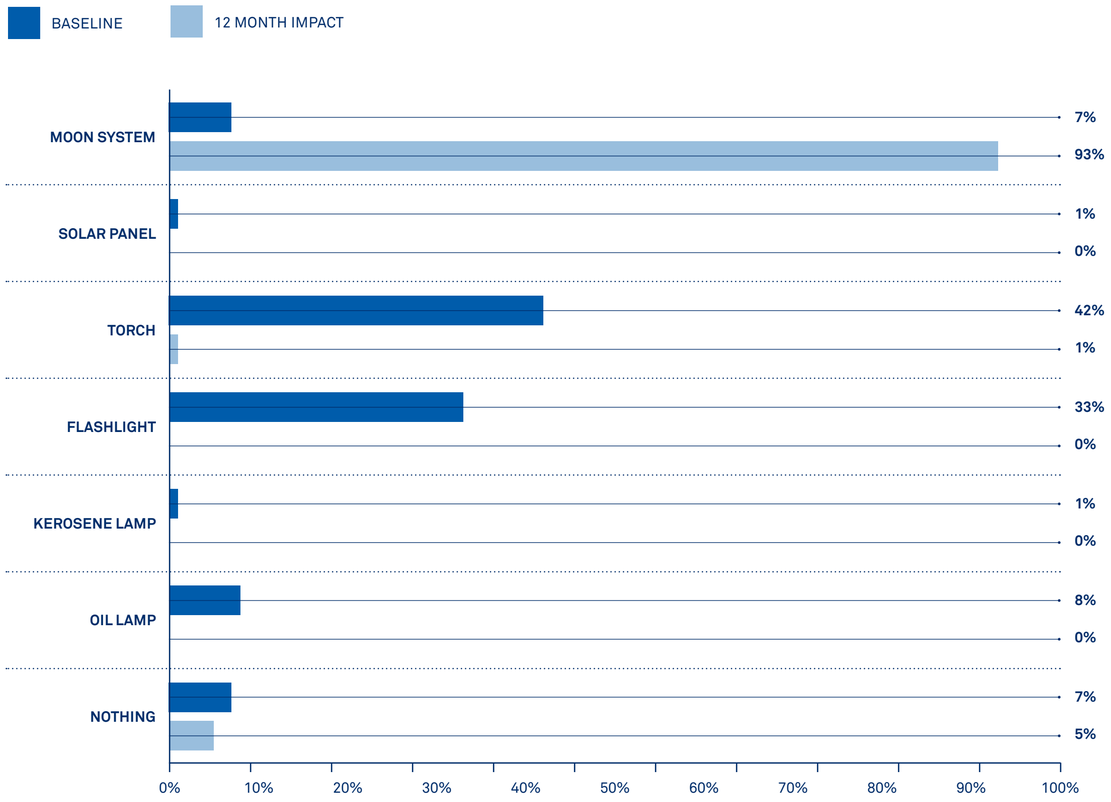
MOON'S IMPACT ON STUDENT ACADEMIC PERFORMANCE IN SENEGAL AND TOGO

Moon lighting had notable effects on the sources of light used for studying after dark. It resulted in a decrease in the usage of battery-powered lamps, candles, small panels and torches. Conversely, there was a significant increase in the usage of Moon kits. The percentages of students using Chinese lamps, oil lamps, PEC lamps, signs and piles were not specified for the post-intervention period. The findings suggest that the Moon intervention successfully promoted the adoption of more sustainable and efficient light sources while reducing reliance on less optimal options.

SOURCE OF LIGHT FOR STUDYING AFTER DARK IN SENEGAL



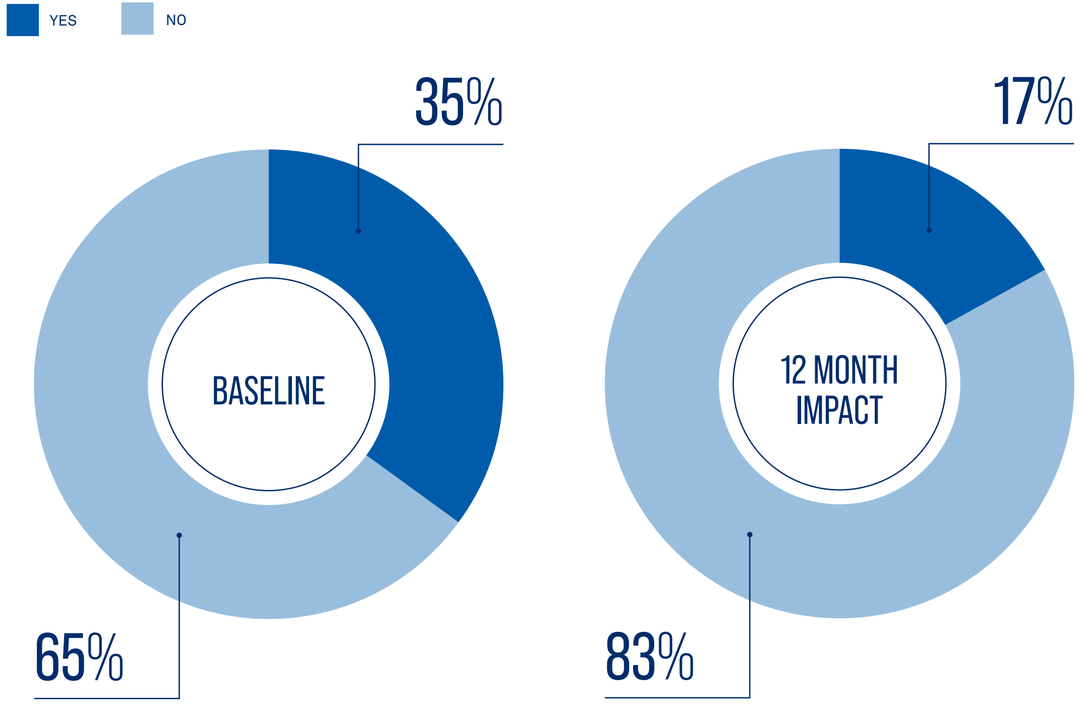
SOURCE OF LIGHT FOR STUDYING AFTER DARK IN TOGO



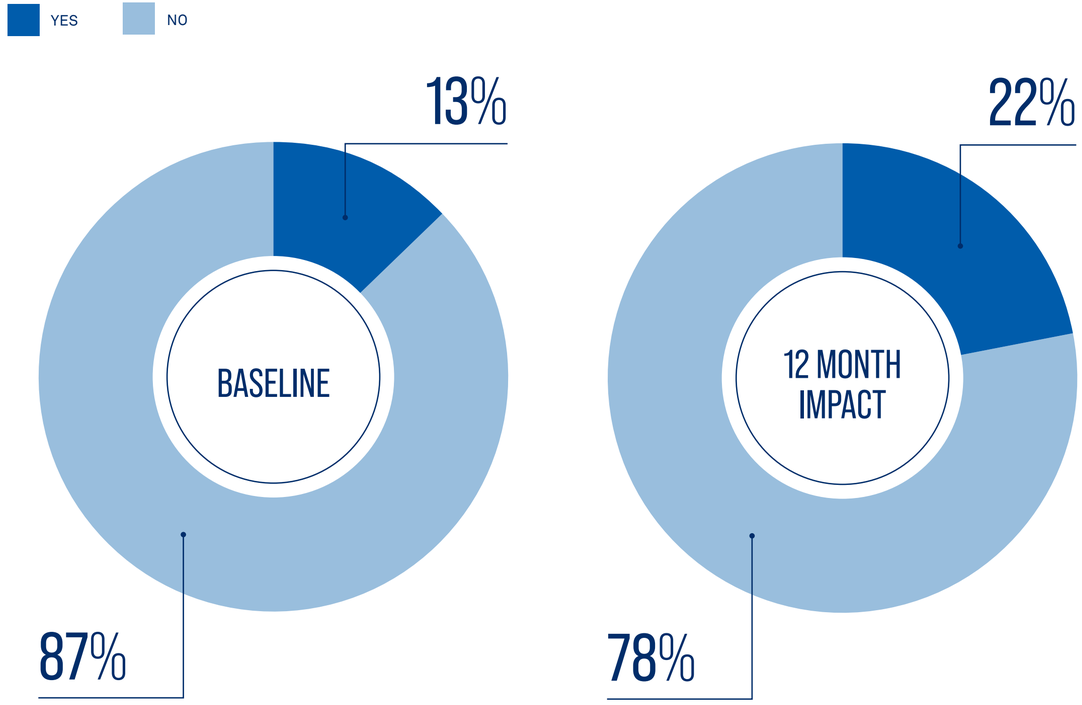
MOON'S IMPACT ON STUDENT ACADEMIC PERFORMANCE IN SENEGAL AND TOGO

Moon lighting had a positive impact on students' perception of their ability to study effectively due to access to proper light. The data in the charts below displays a decrease in the percentage of students who felt limited in their ability to study due to their access to light (from 35% to 17% in Senegal), supporting the effectiveness of the intervention in addressing limitations and enhancing studying conditions. This indicates that the intervention introduced more suitable light for studying. No decrease in perception was however found in Togo.

SOURCE OF LIGHT FOR STUDYING AFTER DARK IN SENEGAL



SOURCE OF LIGHT FOR STUDYING AFTER DARK IN TOGO

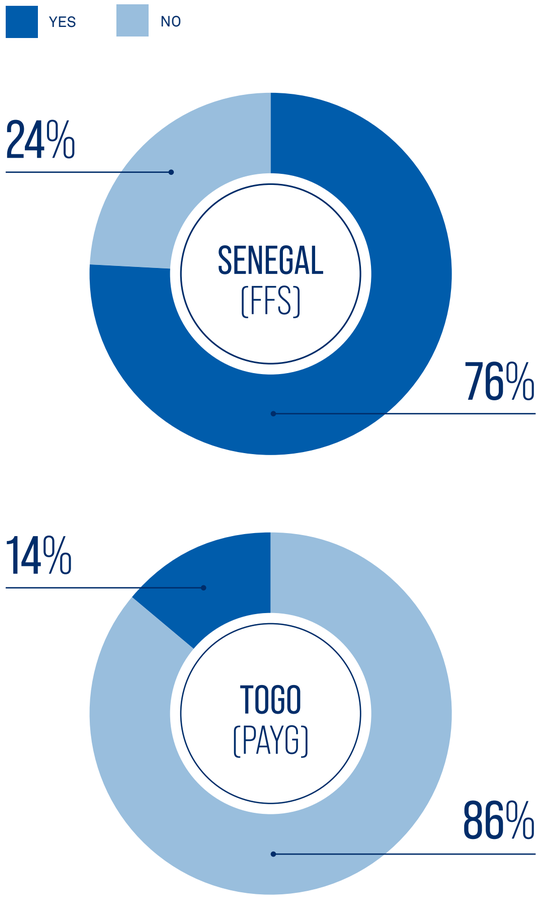


MOON'S IMPACT ON STUDENT ACADEMIC PERFORMANCE IN SENEGAL AND TOGO

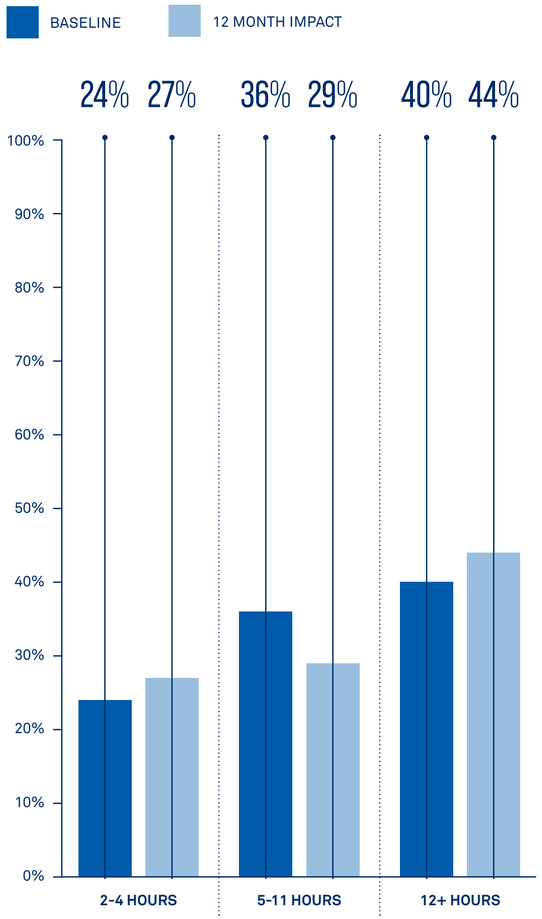
Access to Moon light had varying effects on the average daily access to light across different categories. There was a slight improvement in the average daily access to light in the 12 hours or more category and a decrease in the average daily access to light in the 5-11 hours category in Senegal. These findings indicate that the intervention likely had a positive impact on increasing the availability of light for individuals who previously had limited access or shorter durations of light. There was no significant effect observed in Togo.

The data highlights that a significant proportion of students in Senegal, comprising 76% of the respondents, believed that the type of light they used had an impact on their studying ability. This indicates that the quality and characteristics of light can play a role in either enhancing or limiting students' ability to study effectively.

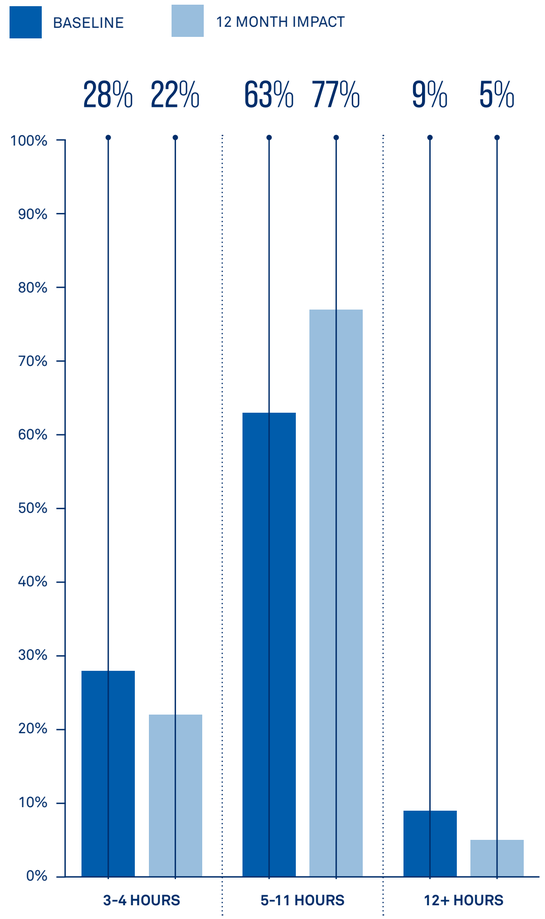
INCREASE IN STUDY ABILITY DUE TO ACCESS TO LIGHT IN SENEGAL AND TOGO



AVERAGE DAILY ACCESS TO LIGHT IN HOMES IN SENEGAL



AVERAGE DAILY ACCESS TO LIGHT IN HOMES IN TOGO

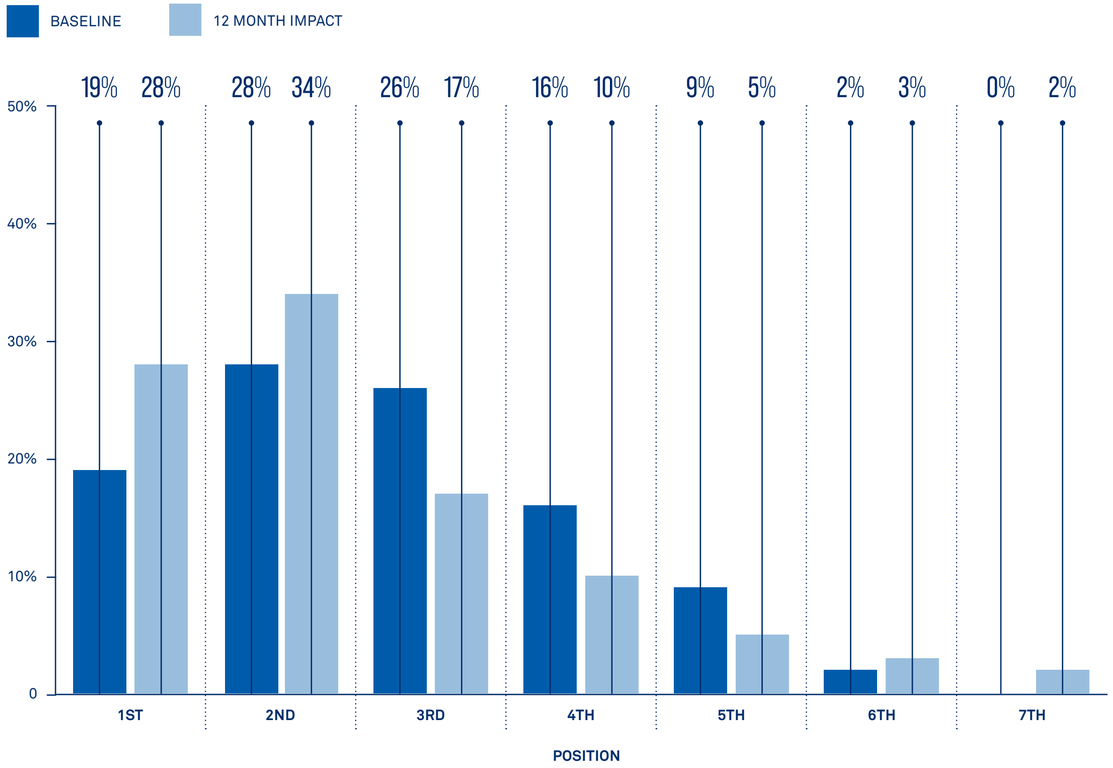


MOON'S IMPACT ON STUDENT ACADEMIC PERFORMANCE IN SENEGAL AND TOGO

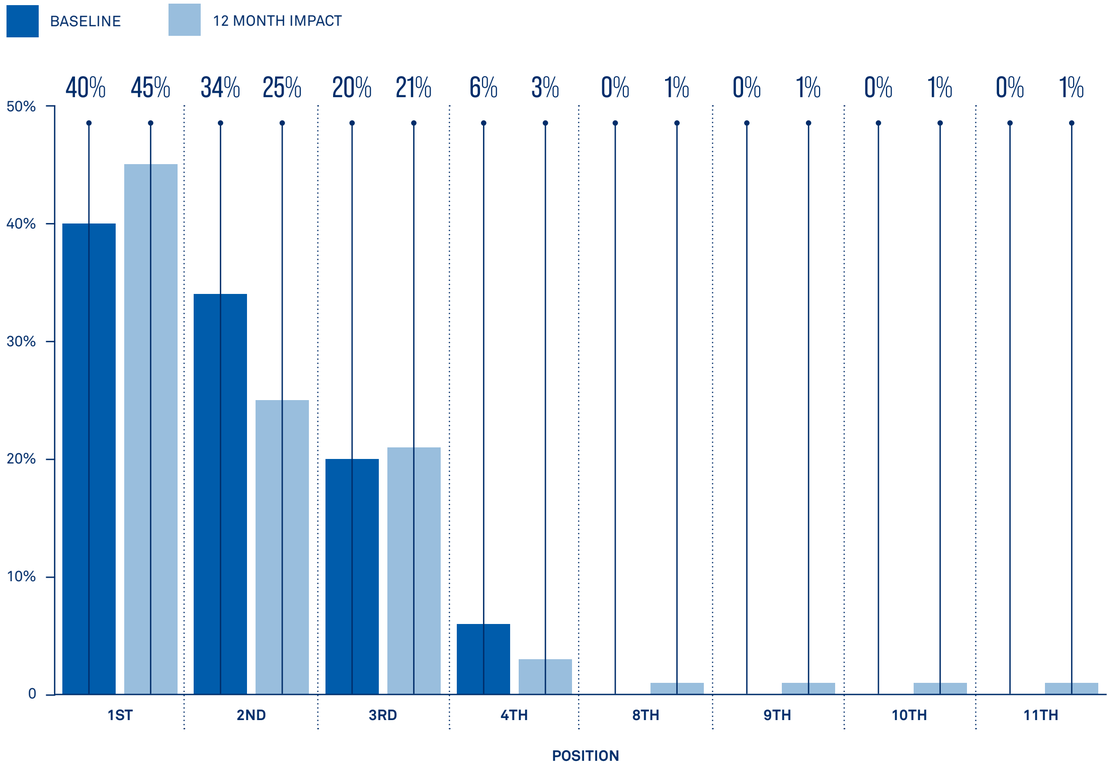
One of the assumptions tested in this impact assessment is the correlation between the ability to study at home and academic performance at school. The chart below displays a positive relationship between before and after the intervention academic performance in primary schools in Senegal. There was an overall improvement in the number of students in the 1st and 2nd positions. Position refers to the student's ranking or standing within their academic class.

In high school students' performance, however, the academic relationship in Senegal displayed a negative correlation between academic performance and access to light. In Togo, a positive relationship was displayed between academic performance for high school students and access to light, and a negative relationship between access to light and academic performance for primary school learners.

PRIMARY SCHOOL PERFORMANCE IN SENEGAL



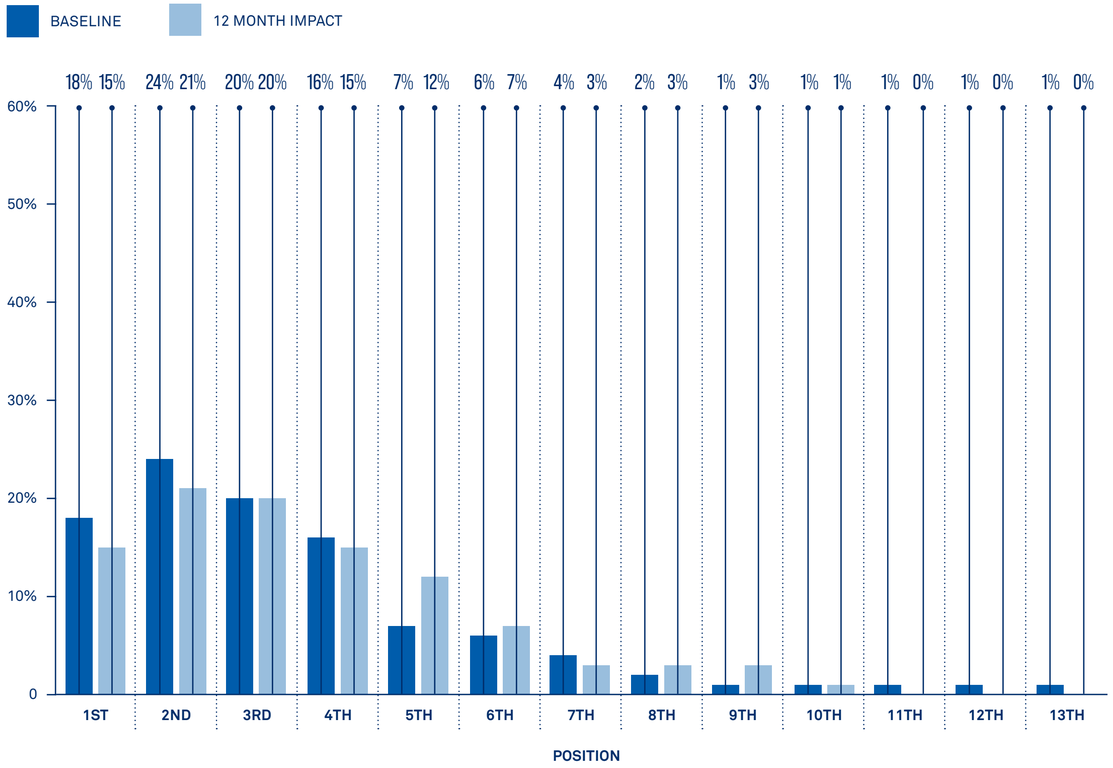
HIGH AND SECONDARY SCHOOL PERFORMANCE IN SENEGAL



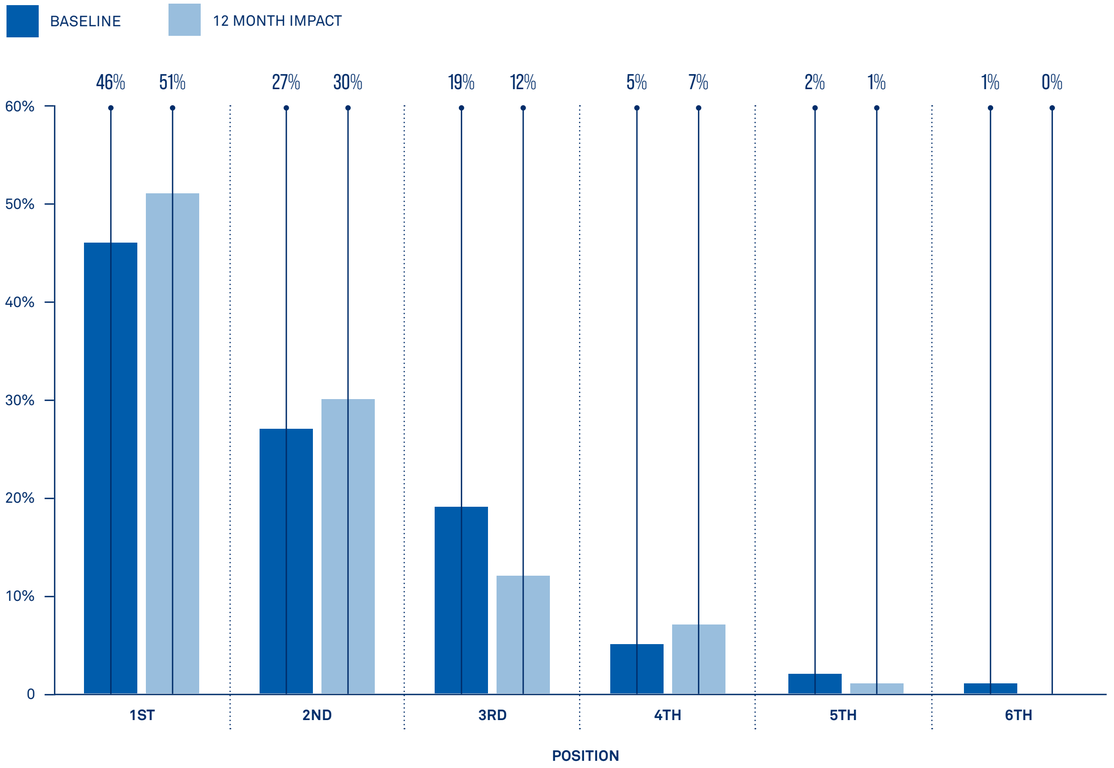
MOON'S IMPACT ON STUDENT ACADEMIC PERFORMANCE IN SENEGAL AND TOGO

These correlations require further review and may be a result of sample sizes per communities assessed or differences in user types in the samples selected and/or interviewee perceptions versus empirical evidence, as the academic performance is not being reported by the actual schools but by the parents and students. Reviewing school records before and after Moon's intervention is the only way to get the data required to determine a correlation between academic performance and the Moon system. The following represents the interviewees' reflections of academic performance before and after Moon's intervention.

PRIMARY SCHOOL PERFORMANCE IN TOGO



HIGH AND SECONDARY SCHOOL PERFORMANCE IN TOGO



MOON'S IMPACT ON THE LEVEL OF HEALTH AND HAPPINESS IN SENEGAL AND TOGO

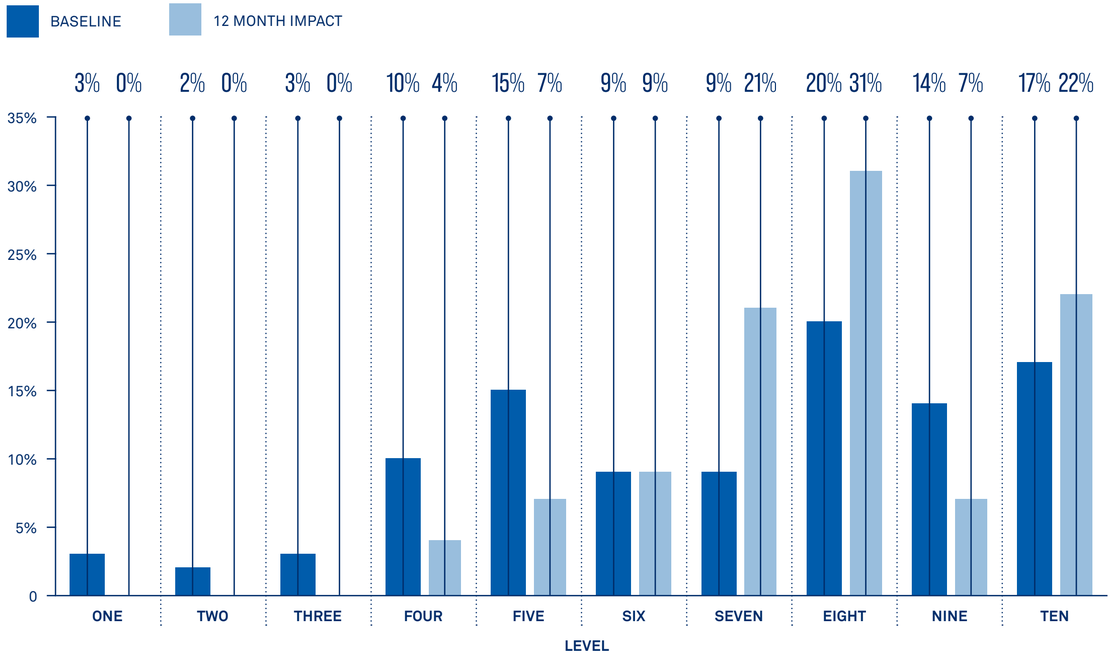
Health:

Moon's clients were asked to rate their level of satisfaction with their health on a scale of 1-10, with 1 being low and 10 high. At the baseline, the lowest level of satisfaction experienced (Level 1) was reported by 3% of Moon clients. The most commonly reported level of satisfaction at the baseline was Level 8 with 20%, and 17% of clients reported experiencing the highest level of satisfaction (Level 10). After 12 months of using the Moon system, the most commonly reported levels of satisfaction (Level 8 and Level 10) increased to 31% and 22% respectively.

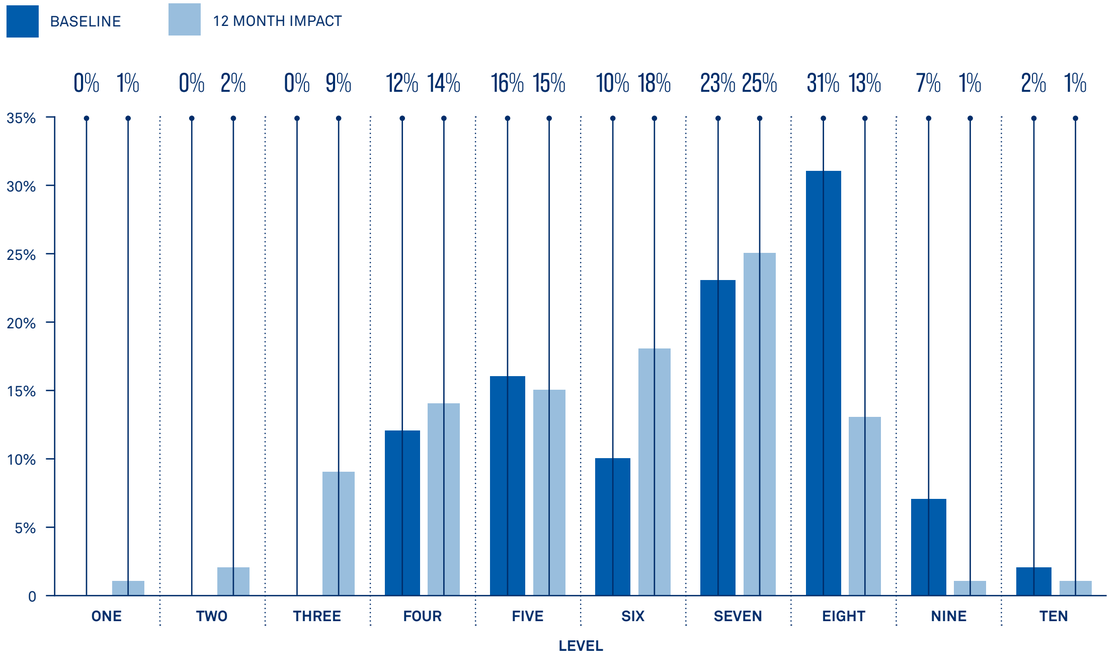
At the baseline in Togo, the lowest level of satisfaction experienced (Level 4) was reported by 12% of Moon clients, while the most commonly reported level (Level 8) was reported by 31%. After the 12 month impact, there were changes in satisfaction levels, with some levels experiencing improvements and others showing a decrease. The second most commonly reported level of satisfaction (Level 7) increased from 23% to 25%, while Level 9 and Level 10 decreased to 1%. However, it is important to note that Level 8, which was the most commonly reported level of satisfaction at the baseline, decreased to 13% after the 12 month impact.

Overall, Senegal showed more consistent improvements in satisfaction in their perceptions of health compared to Togo, where changes varied across different levels. These differences could have been caused by a spectrum of factors, thus any correlation to the Moon intervention should be made with caution.

LEVEL OF SATISFACTION WITH HEALTH IN SENEGAL



LEVEL OF SATISFACTION WITH HEALTH IN TOGO

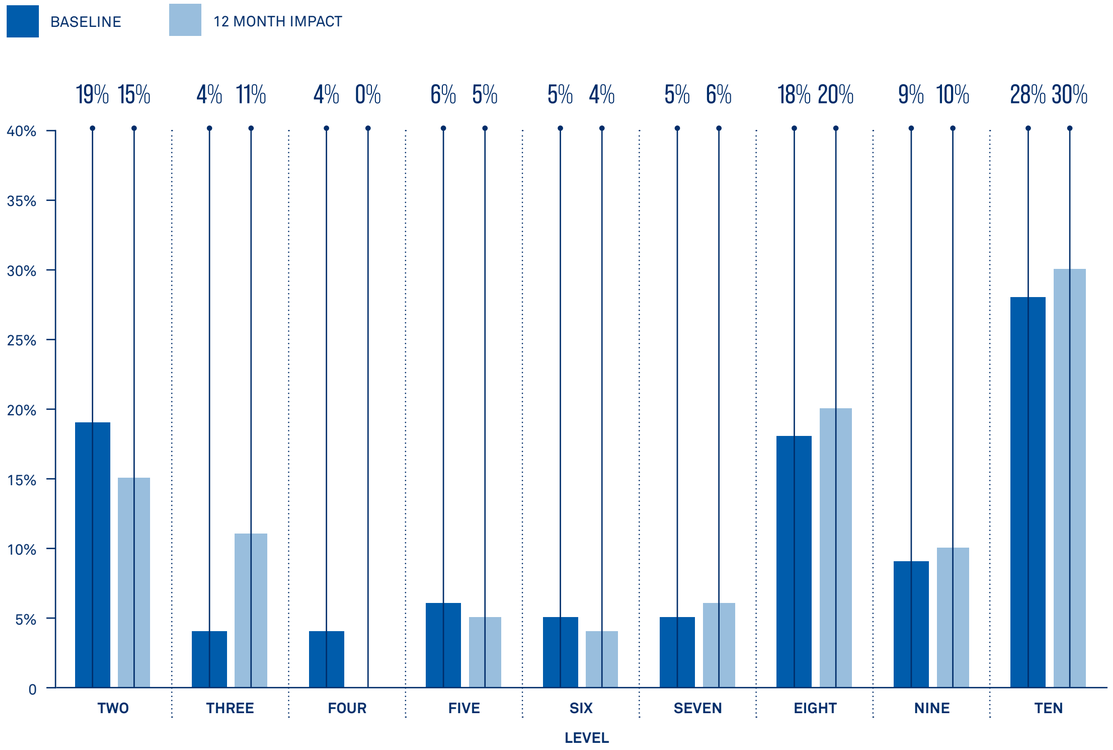


MOON'S IMPACT ON THE LEVEL OF HEALTH AND HAPPINESS IN SENEGAL AND TOGO

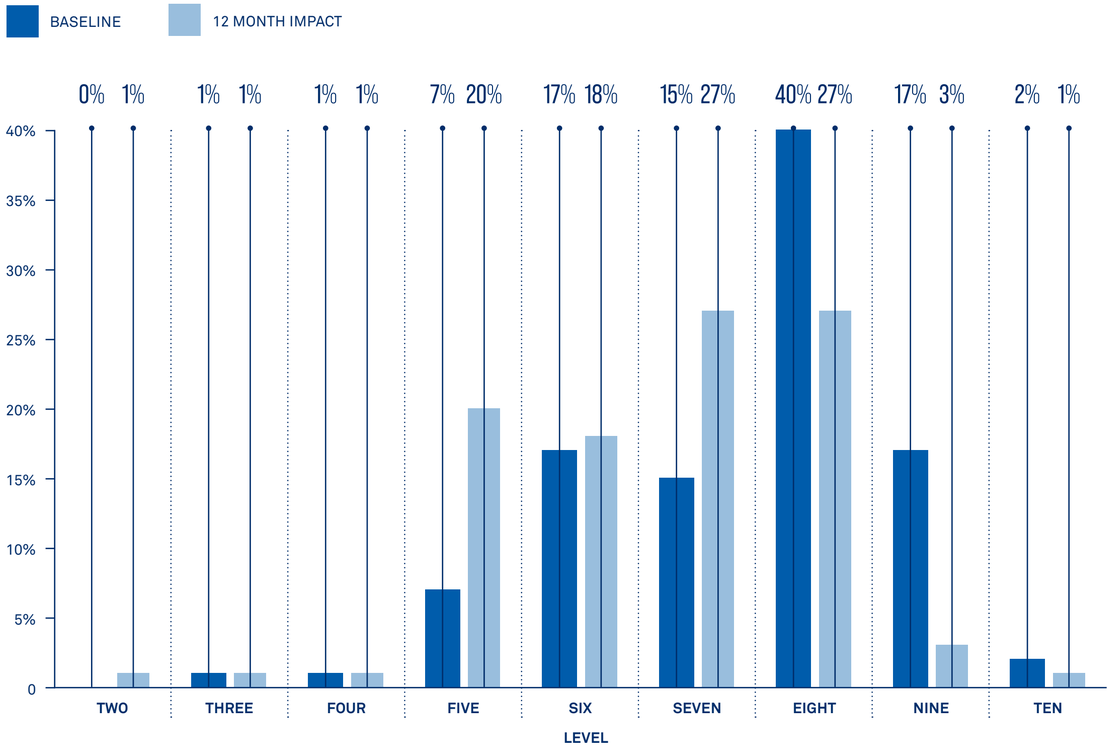
Happiness:

The change in the levels of reported happiness before and after the Moon intervention were also mixed. These differences could have been caused by a spectrum of factors, thus any correlation to the Moon intervention should be made with caution. However, the results from the interviews before and after the Moon intervention regarding how they rate their level of happiness on a scale from 1-10 is reflected below.

LEVEL OF SATISFACTION CAUSING IMPROVED HAPPINESS IN SENEGAL



LEVEL OF SATISFACTION CAUSING IMPROVED HAPPINESS IN TOGO

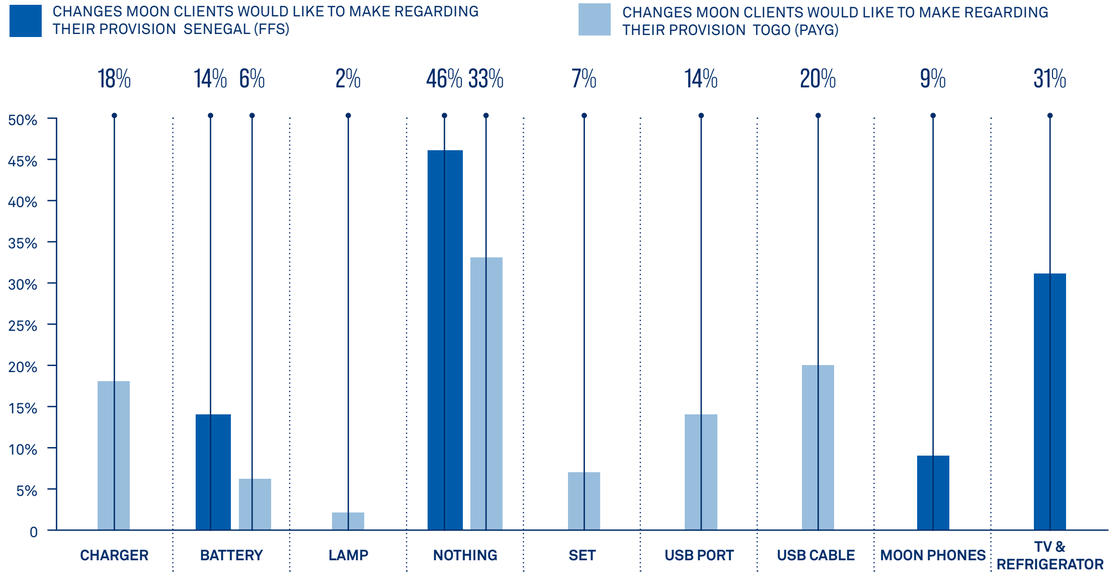


MOON'S CLIENTS DESIRED CHANGES TO ENERGY ACCESS AND USAGE

Moon clients in Togo (PAYG) and Senegal (FFS) reflected a range of changes they want in their energy access and usage. In Senegal, the most desired change was for a TV and refrigerator, with 31% of clients indicating a preference for this upgrade. In Togo, the highest desired change was for USB cables and chargers, as indicated by 38% of clients.

In both Togo and Senegal, a significant percentage of clients expressed no desire for any changes, with 33% in Togo and a higher 46% in Senegal. Senegal clients showed a preference for TV and refrigerator upgrades, suggesting potential demand for larger systems. On the other hand, Senegal clients were more content with the current provision, as indicated by the high percentage of clients choosing "nothing" to be changed. Desired changes varied across different types of provisions, with preferences for chargers, batteries, lamps, USB ports, USB cables and Moon phones. Overall, the data highlights the differing preferences and priorities of Moon clients in Togo and Senegal, emphasising the need for tailored solutions and understanding the specific needs of each market segment.

CHANGES MOON CLIENTS WANT REGARDING ENERGY ACCESS AND USAGE



04. Summary

04. Summary

Based on the data analysis, several key findings have emerged regarding the potential impact of the Moon systems on its clients.

Increased income opportunities:
There is a strong correlation between the availability of extra light from a Moon system at night and additional income for individuals engaged in various occupations such as agriculture/farming, education/teaching, trade and others.

The shift in energy usage: There is a strong correlation between changes in cooking and lighting energy sources before and after a Moon intervention, with a notable decrease in the use of traditional energy sources for lighting and a shift in priorities for cooking energy sources.

Energy savings: There was a strong correlation between energy savings and the introduction of a Moon system. Clients save on monthly energy spending on a range of energy products before and after having a Moon system.

Improved academic performance: Reviewing actual academic records of students before and after a Moon intervention is the only way to determine if there is a correlation between the two. Client perceptions of academic success are not a sound tool for this correlation.

The potential savings realised and additional income from increased economic activity may together have a material impact on the client's access to their basic human needs like health care, housing, food security, education and water access. This, however, requires further investigation, but the evidence suggesting that the Moon system is having a positive impact on its clients is very promising.

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