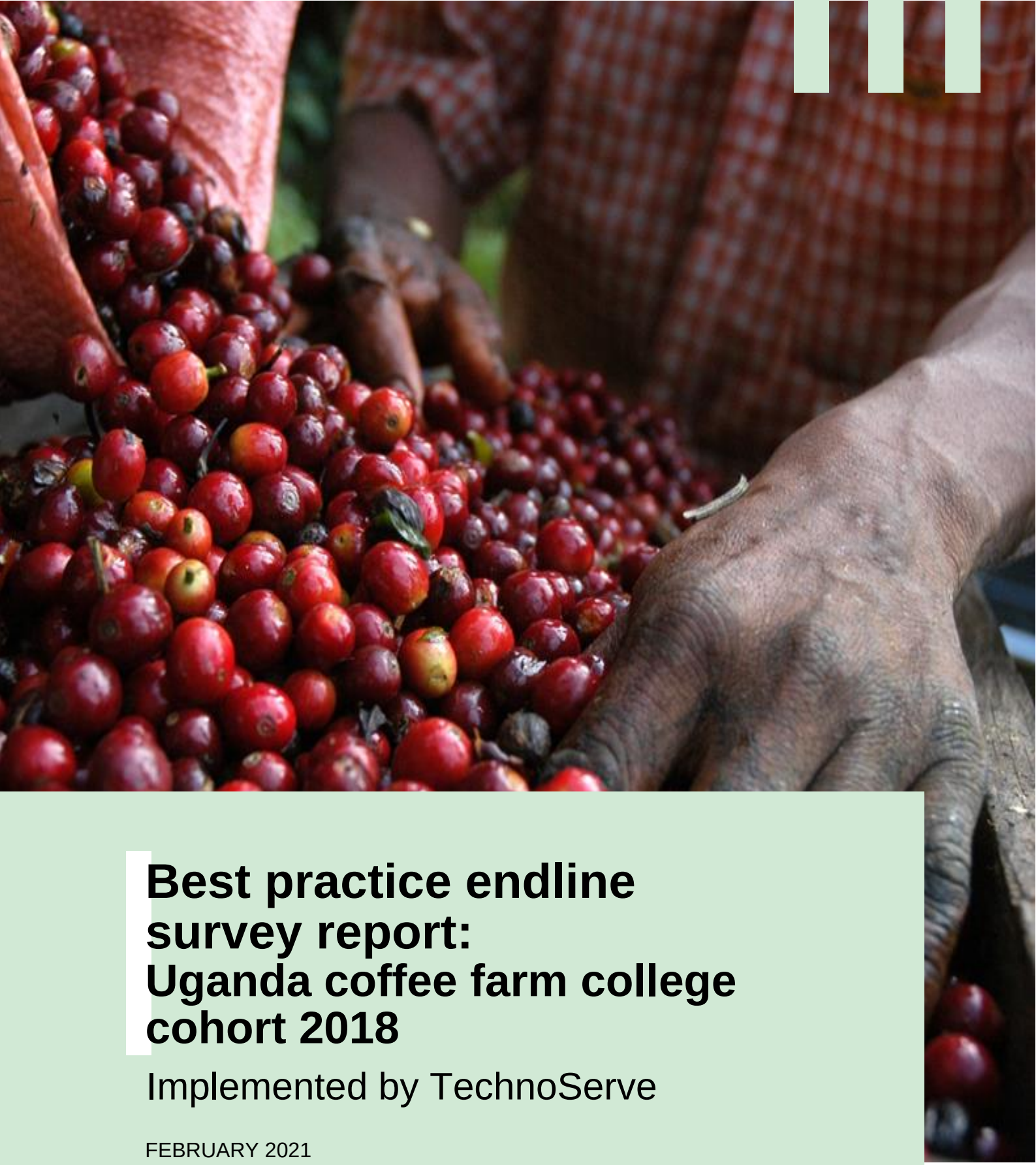

Best practice endline survey report: Uganda coffee farm college cohort 2018

Implemented by TechnoServe

FEBRUARY 2021

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EXECUTIVE SUMMARY

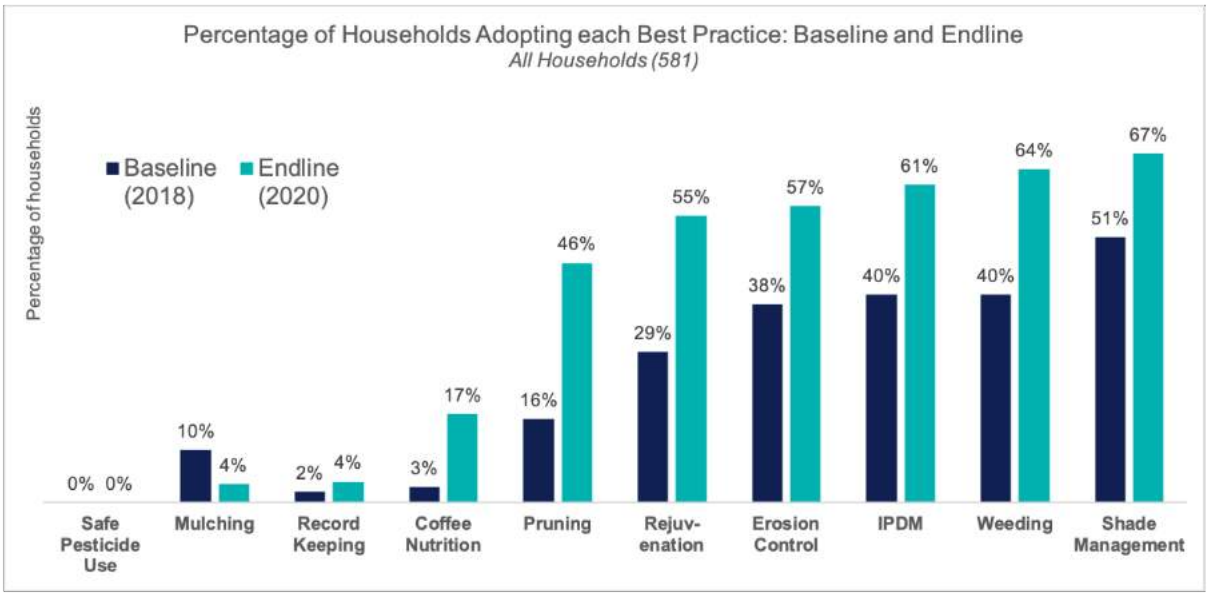
The TechnoServe Coffee Farm College Program, supported by Stichting Coffee Agronomy Training, Keurig Dr Pepper, Jacobs Douwe Egberts (JDE), and Enveritas, is a four-year training program that aims to improve incomes for 30,000 coffee farming households in Central and Western Uganda by increasing their coffee farm productivity. This will be achieved by promoting improved coffee agronomic practices at the farm level through a two-year structured and farm-based training program and the improvement of coffee farmers' access to recommended inputs.

The program worked with farmers in the Sembabule district from August 2018 to end of October 2020, delivering a total of 20 training sessions. Farmers have been trained on 14 topics designed to increase yields and improve coffee quality which in turn will increase farmer income and lead to improved socio-economic outcomes for their families. There was some disruption to the training caused by COVID-19, with group training stopped from the middle of March, and one to one household on-farm training delivered to the end of the program. Given that on-farm training took two to three months to reach all households, despite a short extension to the program, two planned review modules were not delivered. A total of 8,262 households registered in this cohort and attended at least one training. Of these, 6,916 farmers from 6,161 households (75% of registered households) can be considered as "trained" having attended at least seven (50%) of the 14 topics, and 39% of trained farmers are women. The target for the 2018 Cohort is 6,000 households trained.

AGRONOMY BEST PRACTICE ADOPTION SUMMARY

Farmers were assessed on ten agronomy best practices: record keeping, weeding, coffee nutrition, safe use of pesticides, integrated pest and disease management (IPDM), erosion control, shade management, rejuvenation, pruning, and mulching. Adoption of these best practices is based on rules developed by TechnoServe based on their experience and expertise in coffee farming.

Figure 1. Percentage of Households Adopting each Best Practice



As shown in **Figure 1**, baseline adoption of the agronomy best practices was low. No households were adopting safe use of pesticides and a negligible share of households were adopting the nutrition and record keeping best practices at baseline.

The results of the endline survey show an increase in adoption of best practices with eight out of the ten best practices having a statistically significant increase. Mulching was the only best practice that showed a decreased adoption rate from 10% of farmers mulching during the baseline to only 4% during the endline, and safe use of pesticides remained at 0%. Overall, the share of households that adopted half (five) or more best practices increased from 6% at baseline to 33% at endline. In addition, 70% of households saw at least one new best practice adopted, and almost half (48%) saw at least two new best practices adopted, since baseline.

The key drivers of yield improvement are expected to be pruning, rejuvenation, weeding and pest and disease management. Although soil health and nutrition are important, the soils in Sembabule are fertile and high in organic matter, unlikely to be limiting yield for most farms. A soil and leaf survey conducted by the program showed that soils were able to sustain yields of 3 kilograms of cherry per tree without the addition of fertilizer.

HOUSEHOLD CHARACTERISTICS SUMMARY

Household members. Households have six members on average, four of which are children (0 to 18 years). Overall, the level of education is moderate, with 84% of the women and 90% of the men having received some level of formal education. A quarter (25%) of male farmers either have had employment in the past or are currently employed outside of their coffee farms compared to just 16% of the women.

Land Ownership. At endline, farmers own a self-reported mean of 2.1 hectares of total agricultural land, 0.9 hectares of which is planted with coffee, with an average of 992 coffee trees.

House Quality. The building quality of the farmers' houses in the Sembabule district is good, with the majority of houses having improved roofs, walls, and floors. Over four-fifths (85%) of the households have access to electricity, either from the main line or solar panels.

WASH. Access to water, sanitation, and hygiene has increased, but remains limited. 12% of households have access to an improved toilet, up from just 7% at baseline. Only 26% of the houses have an improved water source, an improvement from 17% at baseline.

Assets. Many households have their own means of transport – 68% of households own a bicycle, 39% own a motorcycle, and 4% own a car. Most households (95%) have at least one mobile phone. Most households have some livestock, with 70% of households owning at least one chicken.

FINANCIAL PROFILE SUMMARY

Coffee Income. At endline, coffee households were highly dependent on coffee, with 60% of the households reporting that more than half of their total household income comes from coffee. This is an increase from the baseline, where majority of households (64%) reported coffee income represented between 25-50% of income.

Savings. Most households (86%) were using at least one savings method at endline, compared to only 50% at baseline. This increase was driven by households joining informal saving groups.

Shocks & Shortages. A majority of the households at endline (70%) reported they have been affected by at least one serious financial shock in the past year and less than half (40%) reported having suffered from a food shortage in the past year. This is an improvement compared to the baseline, when a higher share of households reported financial shocks and food shortages.

Poverty. Using the Progress out of Poverty (PPI) and Multi-Dimensional Poverty (MPI) indices, households were assessed on their poverty profiles at endline. Only 17% of the households were likely to fall below the international $1.90/day 2011 PPP poverty line using the PPI, a much lower proportion compared to rural households in Central Uganda (22%). Using the MPI, two-thirds (66%) of the households are considered multidimensionally poor, compared to 55% of the households nation-wide.

PERCEPTIONS SUMMARY

Farmer perceptions on yield, time, and income. Coffee farmers overwhelmingly self-reported increases in coffee yields, time spent working on coffee, and income from coffee, since joining the Coffee Farm College in August 2018. 81% of households reported experiencing an increase in yield since attending training, and 40% acknowledged this increase was substantial. For time spent working on coffee, 84% of households reported spending more time on coffee, with 31% stating this increase was high. Finally, 57% of households reported experiencing an increase in income, with 13% stating this increase was high.

Contact modalities. Farmers were asked about the usefulness of additional visits, phone calls, and SMS messages from TechnoServe farmer trainers. On a scale from 0 to 10, visits were seen as the most useful modality (mean score of 7.4), followed by phone calls (7.3), and then SMS messages (6.8).

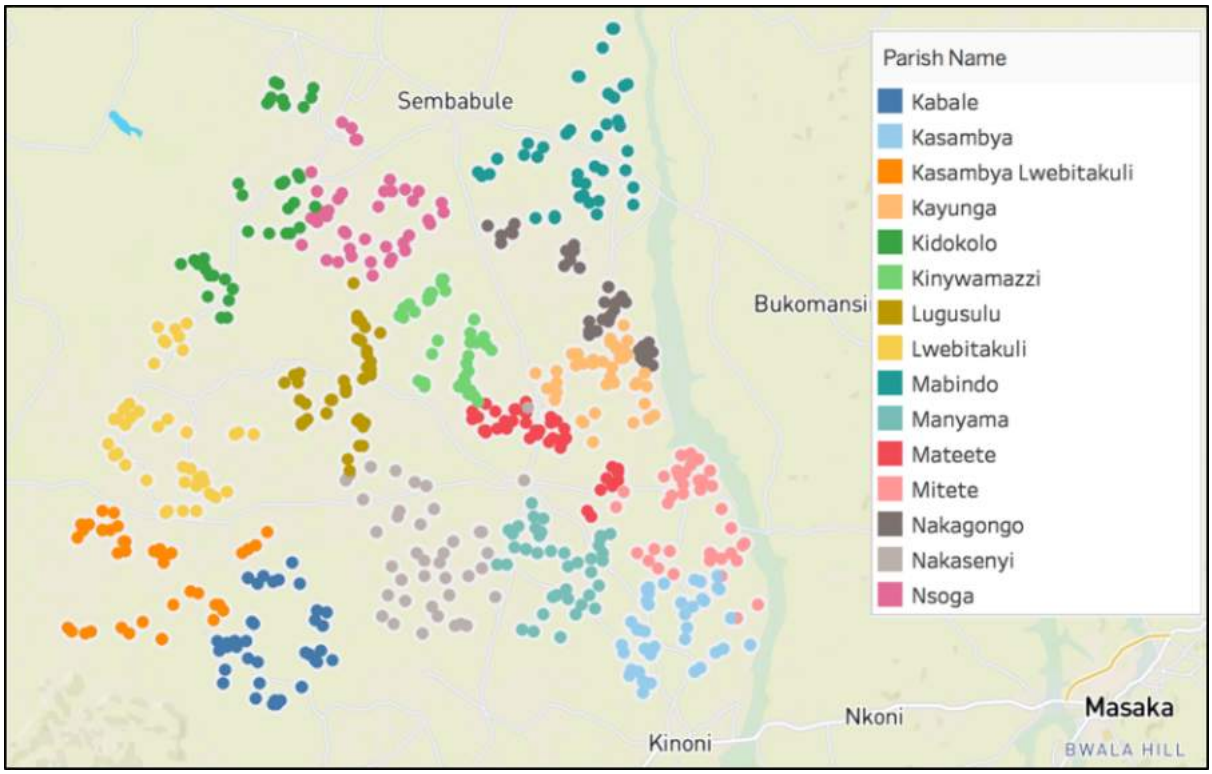
INTRODUCTION

In October 2020, the two-year Coffee Farm College, which began in August 2018, ended in the Sembabule district of the Central region of Uganda. Throughout the course of this program, Coffee Farm College farmers were trained on 14 topics to sustainably improve their coffee yields and support their households.

This report analyzes data from an endline survey of 581 households conducted in October and November of 2020 to measure the rate of adoption of agronomy Best Practices (BPs) after two years of the program and collect information on household characteristics. The survey was conducted both at the farm and the household level.

This report has been created with a strong emphasis on learning about the profiles of coffee farmers in the Sembabule district of Uganda. We explore the relation between attendance in the training program and best practice adoption, as well as household characteristics which could be influencing participation and adoption. We also explore intra-household gender relations including decision-making and labour roles within households. These insights will help inform the training content and the ongoing implementation of the Farm College in other cohorts.

Figure 2. Map of surveyed households, coloured by parish
(Courtesy: OpenStreetMap contributors & Tableau)



RESEARCH DESIGN

Laterite Ltd., a data, research, and advisory firm, led the development of the research design, supported survey development and implementation, and conducted the analysis for this study. A team of eight enumerators were managed by TechnoServe to conduct the survey using tablets.

Design and Sample Selection

Overall design. This is a two time-period study (baseline and endline) tracking a total of 600 households before and after the start of the Coffee Farm College trainings delivered by TechnoServe in Uganda's Sembabule District. All households included in the sample are farmers that signed-up during sensitization to participate in the program. This study does not use a counterfactual.

Sampling strategy. The design for this study is based on a one-stage clustered random sampling method, with stratification at the parish level:

- Stratification: the sample was stratified over 15 parishes across three sub-counties in the Sembabule district of Uganda.
- Clustering: within each parish, 40 households were randomly selected from Farm College sign-up lists created during training group formation.

Variables of interest. This study focuses on three sets of variables: (i) farmer and household characteristics, including data on demographics, diet, assets, and labour; (ii) coffee-related characteristics, including farm-based observations of agronomy best practices; and (iii) participation levels in the program. Households showed varying degrees of attendance in the training sessions conducted over the two years.

Hypotheses. The main hypothesis underlying the research design is that high attendance farmers (i.e. the farmers that attend half or more of the training topic sessions) will be more likely to experience an increase in the adoption of agronomy best practices by the end of the Coffee Farm College. In addition, our prior experience is that households with better socio-economic indicators at baseline will be more likely to attend the training sessions and thus more likely to adopt agronomy practices. Consequently, we will seek to measure the relative best practice adoption amongst the different attendance groups and also examine socio-economic characteristics of these farmers to understand some of the determinants of adoption. It is important to note that associations between attendance and adoption of agronomy best practices will not constitute evidence of impact; rather, such associations are expected symptoms that we would observe in the case where the program did have an effect on adoption of coffee best practices.

Best Practice Baseline and Endline Surveys

Survey Completion. Households were visited in September and October 2018 for the baseline survey, and in October and November 2020 for the endline survey. In both surveys, data was collected on demographics, diet, assets, and labour. In addition, farm-based agronomy best practices were observed. The overall rate of survey completion at baseline was 100% with 600 households interviewed. The overall rate of survey completion at endline was 97%, with 19 households either refusing to be surveyed, or unable to be surveyed. The data was weighted using inverse probability weights. These weights were determined by taking the inverse of the probability of sampling each household signed-up within a parish.

Matching to Attendance. Households that participated in the baseline survey and attended the Coffee Farm College are identified via a baseline farmer tracking survey and via in-house matching. In total, 464 (77%) of the baseline households in the sample were matched before the start of the endline survey. During the endline data collection, an additional 38 households were matched to their attendance records, for a total of 502 (86%) matched households. Households that are not matched are considered as not attending Coffee Farm College.

Survey Sections. The surveys included two main sections. The first section covered the demographic and socio-economic status of each household. With regard to demographics, farmers were asked about their marital status, age, education, employment status, and household size. The respondents were also asked to provide a recount of each child living in the household, their age, and education status. In terms of socio-economic characteristics, farmers were asked about land and asset ownership, income sources, nutritional diet, and financial shocks. There was also a strong emphasis on coffee tree ownership and production; farmers were asked about the number of coffee trees owned and the methods and quantities of coffee sold during the most recent coffee harvest season.

The second section focused on the agricultural practices that were taught during Coffee Farm College. First, farmers were asked to show records on coffee sold and costs incurred in the production of coffee. Farmers were then asked a series of questions and observations regarding pesticides, including products used on the coffee farm and how pesticides were managed, to determine whether the farmers were using these products safely. Finally, the data collectors requested whether they could visit farmers' main coffee field to determine the implementation rates of the good agricultural practices at the end of the Coffee Farm College. This appraisement was primarily based on direct observation of the coffee field by the data collectors.

Additional Questions at Endline. In the endline survey, additional questions around intra-household decision-making and gender relations were added, as well as questions around household perceptions of the TechnoServe Coffee Farm College and its impact on coffee yields, time spent on coffee production, and income earned from coffee.

10 Best Practices. Overall farmers were assessed on their 1) record keeping, 2) weeding, 3) coffee nutrition, 4) integrated pest and disease management (IPDM), 5) safe use of pesticides, 6) erosion control, 7) shade management, 8) rejuvenation, 9) pruning, and 10) mulching best practices.

Best Practice Rules. Each best practice was assessed using specific rules based on agronomic best practices for coffee farming. Coffee households meeting these rules were considered to have adopted the best practice. In this endline report, different rules were used than at baseline in order to be consistent with other TNS reports. As such, baseline results reported in this endline report differ to those in the baseline report, as they have been recalculated using different rules. **Appendix 5** documents these changes.

Endline Sample. The analysis of best practices and household characteristics has been structured around the entire endline sample of 581 coffee-farming households.

Picture 1. Coffee tree loaded with coffee, Sembabule District

The report continues with a summary of the main household characteristics and a profile of the average Sembabule coffee farming household participating in the Coffee Farm College. This profile is followed by a detailed description of the agricultural practice endline survey results and a detailed description of the selected household characteristics.

HOUSEHOLD DEMOGRAPHICS

The typical farm household has:
6 members
4 children (0-18 years)

Average Age

48 | 42

Most responsible for coffee farm

44% | 33% | 21%

Education
Any level of formal education

Literacy

	Education	Literacy
Women	84%	77%
Men	90%	85%
Children (6 – 14)	99%	

Land & Trees
self-reported means

2.1 total hectares
992 coffee trees
0.9 coffee hectares

Dietary Diversity

8

Food groups consumed *(out of 12)*

House Quality

House has improved:

Roof	99%
Walls	91%
Electricity	85%
Water Source	26%
Toilet	12%

Coffee Income

60%
earn more than half their income from coffee

95%
Own mobile phones
11% smartphones

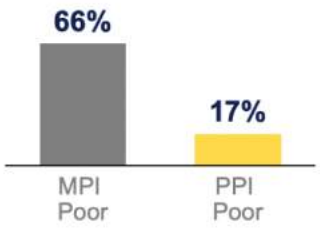
Transport

68%
39%

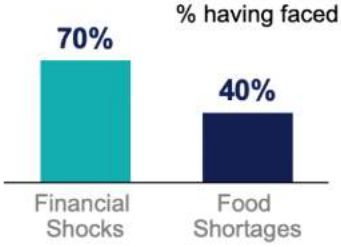
Livestock
Own at least 1

70%
48%
35%
19%

Poverty (MPI & PPI)



Shocks & Shortages
% having faced



AGRONOMY BEST PRACTICES

Farmers were assessed on 10 agronomy best practices (BP): rejuvenation, pruning, mulching, coffee nutrition, intercropping, weeding, shade management, erosion control, integrated pest and disease management (IDPM), safe use of pesticides, and record keeping.

Table 1. Best Practice Adoption Rates at Baseline and Endline

Includes all surveyed households at endline, both attending and non-attending

	Baseline	Endline
	2018	**2020**
No. of Households	581	581
Best Practices	**% Adoption Rate**	**% Adoption Rate**
Shade Management***	51%	67%
Weeding***	40%	64%
IPDM***	40%	61%
Erosion Control***	38%	57%
Rejuvenation***	29%	55%
Pruning***	16%	46%
Coffee Nutrition***	3%	17%
Record Keeping***	2%	4%
Mulching***	10%	4%
Safe Use of Pesticides	0%	0%
Average # of best practices adopted * *(out of 10)***	**2 BPs**	**4 BPs**
Households adopting 5 or more best practices ***	**6%**	**33%**
Households adopting 2 or more additional best practices at endline compared to baseline	**N/A**	**48%**

Notes for interpreting the table of results presented above:

- *The stars (*) indicate the significance level of best practice adoption differences between baseline and endline, using a logit regression with sampling probability weighing, clustered at the parish level.*
- *** Significant at the 1% level, ** significant at the 5% level, and * significant at the 10% level.*
- *Safe Use of Pesticides is defined for a sample size of 421 households at baseline and 419 households at endline, as all non-users of pesticide are considered as "Not Applicable".*
- *The percentages are weighted using sampling probability weights.*

Adoption of best practices varied widely at both baseline and endline, as shown in **Table 1**. The endline survey results show a statistically significant increase in the average number of best practices adopted, from 2 at baseline to 4 at endline, and 48% of households adopted two or more additional best practices when compared to baseline. All best practices (excluding safe use of pesticides) reported a statistically significant change in adoption rate, eight practices in an increasing direction and one practice in a decreasing direction (mulching). The percentage of households adopting at least half (5) of the best practices increased from 6% at baseline to 34% at endline.

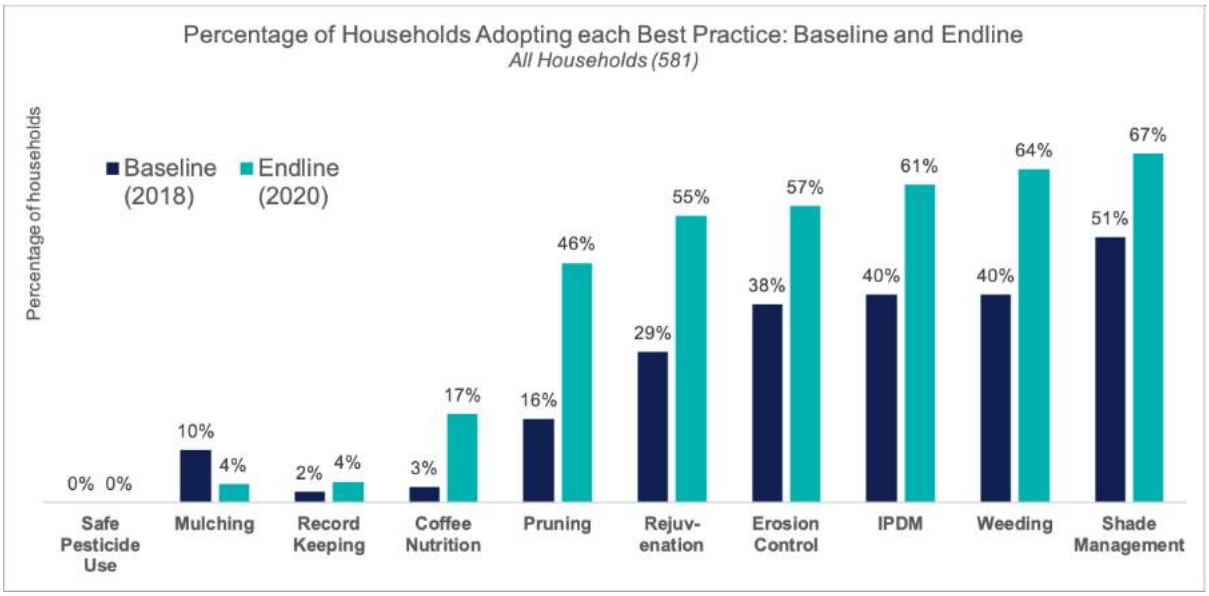
For the practices where farmers scored relatively well:

Shade Management is common in mixed coffee farming systems, such as those in Uganda, with high numbers of fruit trees, such as bananas in the coffee fields, resulting in relatively high adoption of the shade management best practice (67% at endline). Almost half (48%) of the households had good shade levels at endline (>20% shade) and 40% of households had planted shade trees in the past three years, which will provide shade in time.

Weeding can have a dramatic impact on coffee yield. Coffee Farm College taught farmers the importance of weeding under the canopy by hand-pulling, using a panga, or mulching. The training also explained why weeding by digging under the canopy is bad for coffee. Adoption of the weeding best practice increased from 40% to 64% from baseline to endline. This was led by a significant increase in the practice of pulling weeds by hand as well as by a decrease in the practice of weeding by digging.

IPDM adoption increased from 40% adoption at baseline to 61% at endline. Coffee Farm College taught households how to use cultural methods, such as crop hygiene, traps, good nutrition, etc. to reduce the incidence of pests and diseases, rather than reactively managing the pest or disease once the tree has been infected. At endline farmers reported knowing more methods for preventing both twig borers and coffee wilt disease (CWD).

Figure 3. Percentage of households adopting each BP at Baseline and Endline



There are numerous Best Practices where farmers continue to have low adoption:

Safe Use of Pesticides continues to be a concern, with no households passing the best practice, despite 72% of the farmers using at least one type of pesticide in the past 12 months. Almost all households (99%) failed for not using the minimum appropriate personal protective equipment (mask, goggles, and gloves).

Coffee Nutrition practices continue to be poor, with 50% of farms not using any fertilizer, and 17% using the wrong fertilizers, such as Urea and CAN instead of NPK (25:05:05 or 22:06:12), DAP, compost, or manure and zinc foliar feeds.

Mulching was the only best practice that reported significant decrease in overall adoption at endline (4%) compared to baseline (10%). While the use of mulch increased from 16% of households applying mulch to 19% at endline, the best practice for mulching requires a 2cm minimum thickness, which the households did not meet.

Figure 4 shows that only 6% of the households were adopting half (five) or more of the 10 BPs at baseline. At endline, this figure increased to 33%. At endline most households were adopting three to five best practices.

Figure 4. Distribution of number of BPs adopted at Baseline and Endline

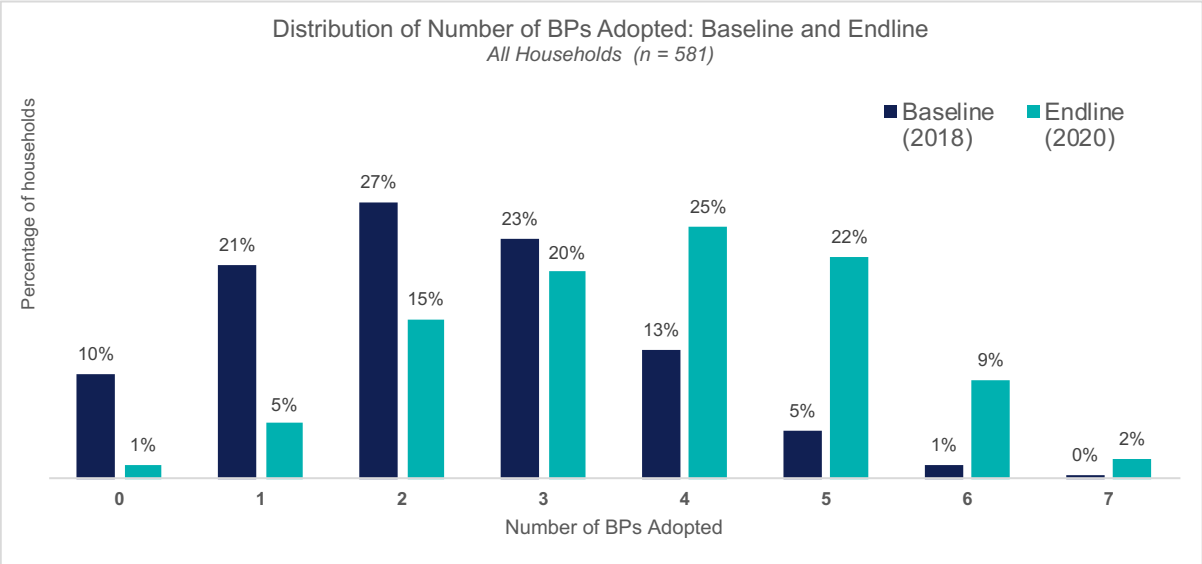
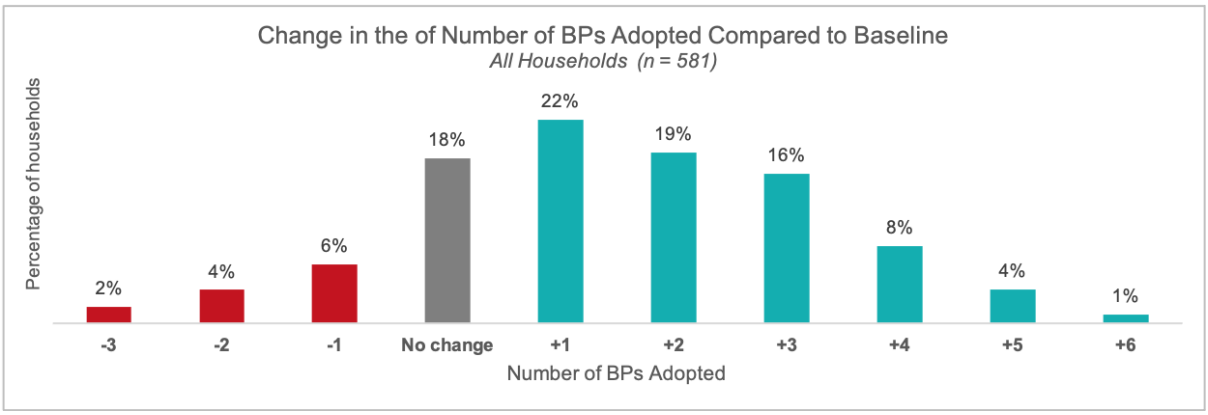


Figure 5 shows that 70% of households saw an improvement of at least one new best practice adopted since baseline, and almost half (48%) saw an improvement of two or more best practices.

Figure 5. Change in number of BPs adopted compared to Baseline



Understanding the overall adoption rate of best practices of coffee-farming households at baseline and endline is critical to observe the effect of the program, but it is equally interesting from a programmatic perspective to investigate the correlations between attendance to the TechnoServe Coffee Farm College and best practice adoption.

This sub-section analyzes best practice adoption at endline for the 502 households that could be matched with attendance records to the monthly Coffee Farm College trainings.[1] It compares households who have attended more than half of the training topics (7 out of 13)[2], the "*Trained Households*", to households who attended less than seven topics (1 to 6 topics) the *Low Attendance Households*.

For a comparison of the characteristics of *trained* and *low attendance* households, please refer to **Appendix 1**. For a comparison of best practice adoption by training on each specific topic, please refer to **Appendix 2**. For adoption rates for non-attending households, please refer to **Appendix 3**. For the parishes with highest adoption rates, please refer to **Appendix 4**.

Table 2. Low Attendance vs. Trained Households: Best Practice Adoption Rates by Training Attendance Levels at Endline

	Low Attendance Households	Trained Households
	Overall Average	Overall Average
No. of Households	63	443
Shade	60%	66%
Weeding	58%	65%
IPDM	58%	64%
Erosion Control*	72%	57%
Rejuvenation	53%	54%
Pruning	50%	46%
Coffee Nutrition	16%	18%
Record Keeping	4%	5%
Mulching	5%	4%
Safe Use of Pesticides	0%	0%
Average # of best practices adopted *(out of 10)*	**4 BPs**	**4 BPs**
Households adopting more than half (5) of the best practices	**26%**	**35%**

Notes for interpreting the table of results presented above:

- *The significance level of best practice adoption differences between baseline and endline was estimated using a logit regression with sampling probability weighing, clustered at the parish level.*
- *Safe Use of Pesticides is defined for a sample size of 419 households, as all non-users of pesticide are considered as "Not Applicable".*
- *The percentages are weighted using sampling probability weights.*

Of the households that could be matched to attendance, 88%, (443 out of 506) had attended at least seven topics of the Coffee Farm College, and within these 443 households, 75% attended 11–13 topics – indicating a high attendance rate. Of the 63 households in the "*Low Attendance*" group, 60% attended 4 or fewer topics. Households in the "*Trained*" group have higher adoption rates in 6 of the 10 BPs and lower adoption rates in 4 BPs. However, only one of these differences was found to be statistically significant - erosion control, which is lower for trained farmers. Other than this, households attending more than 7 training topics is not associated with greater best

[1] The baseline sample was randomly drawn from those that signed-up as potential program participants, rather than from attendance sheets. Farmers were then matched to their attendance records and it is assumed that if not matched to the attendance records that the household did not attend training.
[2] At the time of writing, attendance data is available until August 2020 and does not include the last training on sustainable farming.

practice adoption on any of the other 9 best practices when compared to households attending fewer than 7 training topics. When compared to baseline, however, households who attended trainings have improved best practice adoption.

REJUVENATION

Picture 2. Rejuvenated coffee tree

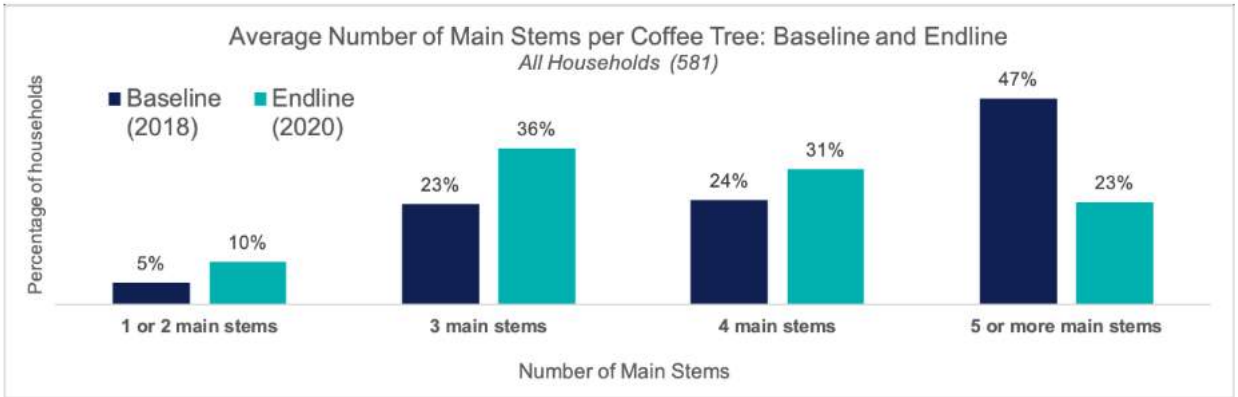
Rejuvenation adoption increased significantly from 29% at baseline to 55% at endline – the second most improved best practice after pruning. As seen in **Figure 6** the main determinant of this increase in adoption was the reduction in the number of stems from 5 or more, down to 3 or 4 main stems. At baseline, 47% of households averaged 5 or more main stems. At endline, this figure was just 23%, indicating a significant decrease.

Farmers in Uganda typically rejuvenate their coffee, but not systematically. They will allow new suckers to grow at any time and often have up to 10 main stems, all of different ages, some older than eight years. The Coffee Farm College taught farmers about the importance of rejuvenating in a systematic way, maintaining young main stems (less than eight years old) and keeping no more than four main stems, although two or three are ideal.

When asked why farmers decided to rejuvenate their coffee farm, 70% mentioned that learning and practicing this activity in the training session led to their decision to rejuvenate. 25% mentioned that the trainer visiting their farm was what led to their decision, and 28% mentioned seeing the impact in the demonstration plot as the reason for rejuvenating.

Figure 6. Number of Main Stems at Baseline and Endline

Maximum of four main stems recommended



PRUNING

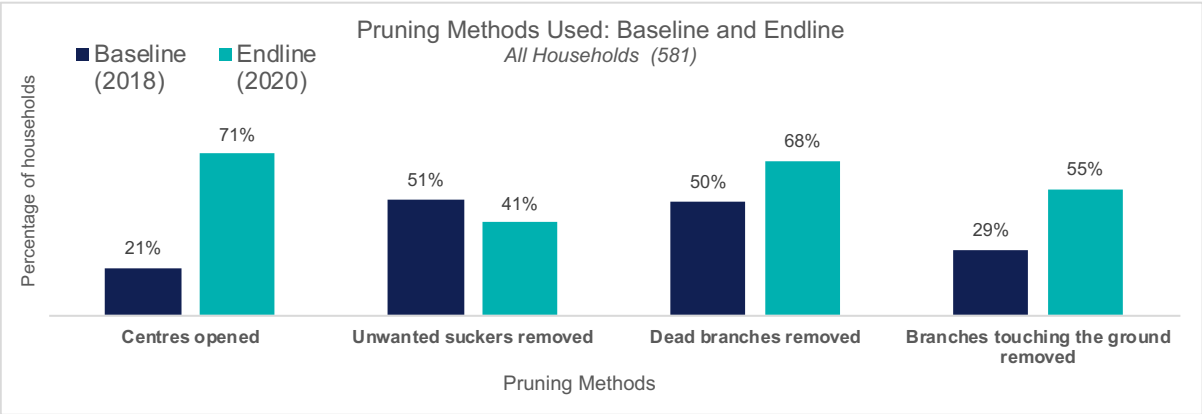
Pruning was the most improved best practice with an increase from 16% at baseline to 46% at endline. This increase was due to an increase in the number of pruning methods used, as households averaged less than 2 methods at baseline, and more than 3 methods at endline.

Picture 3. A partially pruned coffee tree

The Coffee Farm College taught four simple pruning methods: remove the dead branches, the branches touching the ground, the unwanted suckers, and the cross-over branches in order to open the tree centres. Pruning opens up the tree to light and air circulation, both prerequisites for good flowering and low disease and pest incidence. Adoption of the pruning best practice required the trees to be pruned using a minimum of three of the four methods that the Coffee Farm College taught.

As shown in **Figure 6**, there was increase in the usage of three of the four pruning methods between baseline and endline. The opening tree centres method increased from 21% adoption at baseline to 71% at endline. Two other methods improved by at least 18 percentage points, and one method (removal of unwanted suckers) decreased by 10 percentage points.

Figure 7. Pruning Methods Used – Baseline v. Endline



INTEGRATED PEST AND DISEASE MANAGEMENT (IPDM)

IPDM adoption increased from 40% adoption at baseline to 61% at endline. This improvement was driven by an increase in twig borer and coffee wilt disease (CWD) prevention methods. At baseline, farmers knew 1.7 methods on average for preventing twig borers, and 0.5 methods on average for preventing CWD. At endline, these increased to 1.9 methods for twig borer prevention and 0.7 methods for CWD prevention – a modest increase.

The use of pesticides – insecticides, fungicides, and herbicides – is moderately high in Uganda (72%). Many farmers are simply unaware of alternative pest and disease control methods. The Coffee Farm College taught households how to use cultural methods, such as crop hygiene, traps, good nutrition, etc. to reduce the incidence of pests and diseases, rather than reactively managing the pest or disease once the tree has been infected.

As IPDM methods cannot all be easily observed, the survey used two knowledge questions to assess household knowledge on managing a common pest, Twig Borer and a common disease, Coffee Wilt.

Figure 8 and **Figure 9** show the change in knowledge of the various management methods for CWD and Twig Borer infestations. After training, the percentage of farmers not knowing any methods decreased, and fewer farmers reported incorrect methods. There was also an increase in knowledge around the most crucial practices, the uprooting, removal, and burning of infested twigs and trees, which more than two-thirds of households correctly identified as a method at endline for both CWD and Twig Borers.

Figure 8. Coffee Wilt Disease Management Methods Known

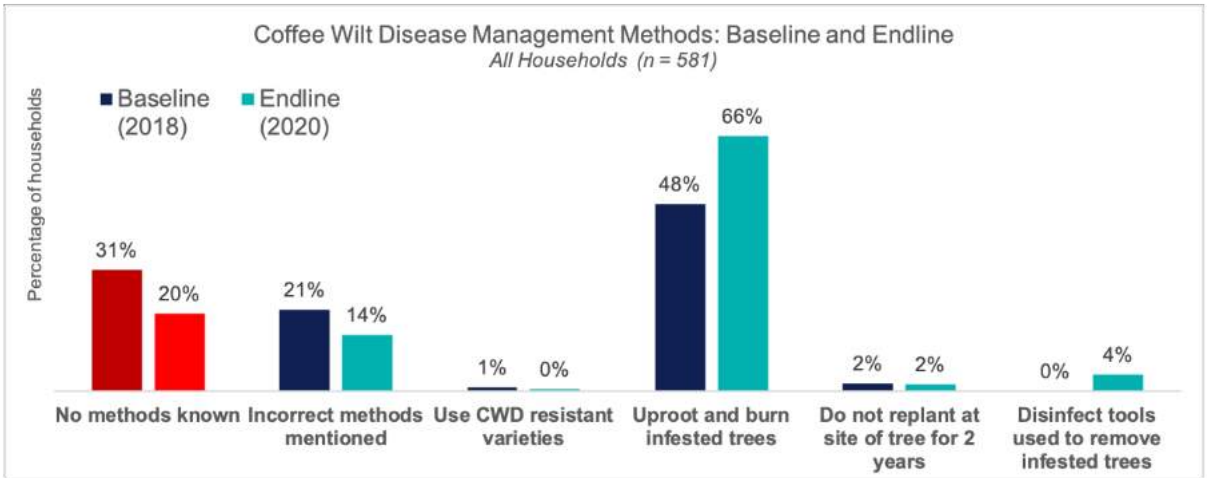
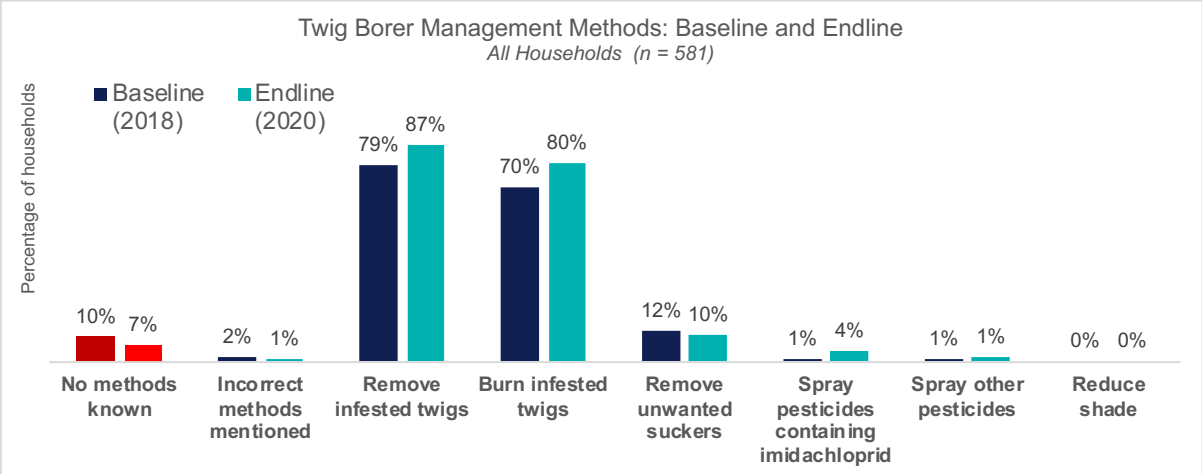


Figure 9. Coffee Twig Borer Management Methods Known

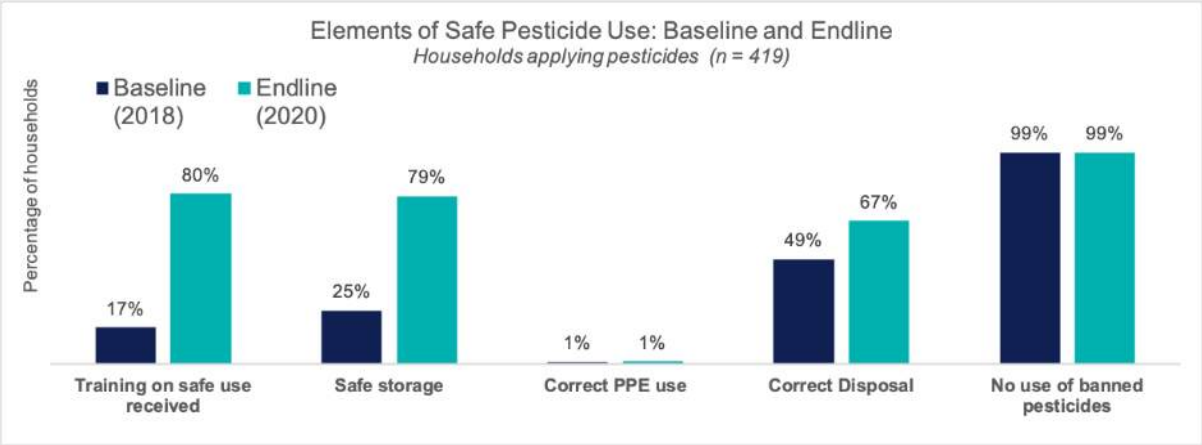


SAFE USE OF PESTICIDES

Due to the high use of pesticides in Uganda (72% reported using pesticides at endline), safe use of pesticides is an important best practice. Unfortunately, as was the case at baseline, no households passed this best practice. This failure is primarily due to one of the five elements of safe pesticide use – the use of personal protective equipment (PPE) – specifically masks, goggles, and gloves. **Figure 10** below displays these five elements and shows where farmers in Sembabule district have improved and where they are still falling short.

Figure 10. Elements of Safe Pesticide Use – Baseline vs. Endline

All five elements required to be considered safe.

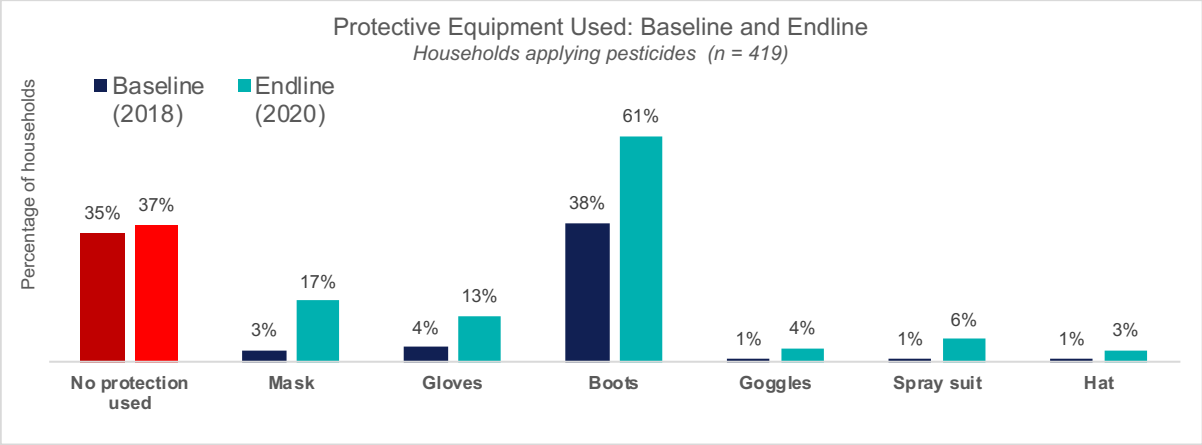


Safe pesticide usage requires adoption of a wide array of elements. The Coffee Farm College taught farmers about the hazards of using pesticides: how to read pesticide labels, which PPE to use, the safety procedures for purchasing pesticides, transportation, storage, and disposal of pesticide containers.

When using pesticides, farmers should wear PPE to stop any possible route of entry into the body by wearing a mask, goggles, gloves, spray suit, and boots. Gloves are especially important as hands can be exposed to the undiluted product when mixing pesticides. Farmers are considered to be using pesticides safely when they: i) have been trained on how to use pesticides safely, ii) do not store pesticides inside their homes and in a locked store outside of their home, iii) wear goggles, a mask, and gloves at a minimum, iv) discard pesticide containers by burning them, returning them to a contractor, or returned to the source, and v) do not use banned pesticides such as Parathion, Carbofuran, or Dieldrin.

Despite significant improvements in safe storage, disposal, and training received, 99% of households failed the PPE requirement. **Figure 11** shows this in more detail by highlighting the specific items of PPE that are lacking. Masks, gloves, and goggles are all required to pass, yet all three of these items have very low levels of adoption at endline (17%, 13%, 4% respectively). Further investigation is required in consultation with concerned stakeholders to understand if poor adoption of PPE is an issue of availability or cost, similar low adoption rates are seen in other countries in East Africa.

Figure 11. Personal Protective Equipment Use – Baseline v. Endline



COFFEE NUTRITION

Adoption of the coffee nutrition BP increased from 3% at baseline to 17% at endline. 50% of farms surveyed at endline are not using any fertilizer (including compost or manure), and 17% are using the wrong fertilizers, such as Urea and CAN instead of NPK (25:05:05 or 22:06:12), DAP, compost, or manure and zinc foliar feeds.

Generally, the soils in Uganda are some of the best in East Africa; the soil and leaf survey conducted at baseline indicated which nutrients were lacking and provided parish-specific recommendations, both to correct the soils and feed the coffee trees. Using just nutrients available in the soil coffee trees can produce up to 3 kilograms of cherry per tree. For farmers who wish to improve yields further and are not aiming for the organic market, the use of additional nutritional products can increase yields. Coffee Farm College farmers were taught the importance of balanced coffee nutrition, making and applying organic products such as compost and manure as well as application of certain formulations of NPK, at the correct rate (using a measure) and in

the correct place, under the tree canopy where the feeder roots grow, in order to prevent fertilizer wastage.

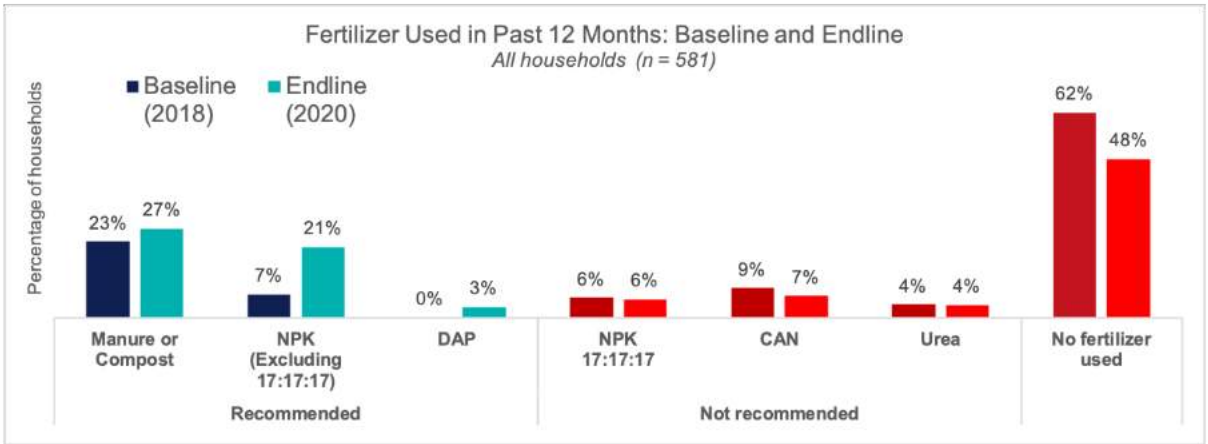
The coffee nutrition best practice requires that trees show no signs of nutrient deficiencies and farms apply at least one recommended nutritional product which can include compost or manure (counted as one), NPK, DAP, lime or zinc foliar feed.

At endline half of households (48%) did not use any nutritional products, including compost or manure on their farms, and 5% of farms showed nutritional deficiencies. Only 27% of farms used compost or manure, a slight increase from the baseline. 21% of farms used a recommended formulation of NPK, up from 7% at baseline. A combined 13% of farms used NPK 17:17:17 (6% not recommended), CAN (7% not recommended) or Urea (4% not recommended). **Figure 12** displays some of the improvements made since the baseline and also highlights the need for increased use of appropriate nutrition.

Picture 4. Nitrogen deficiency showing as yellow leaves

In terms of application, 42% of farms using granular fertilizers did not use a measure to apply fertilizer, and thus do not know the amount given to each tree. All households applied the fertilizer in the correct place, which is under the tree, and did not broadcast it over the field. This is an improvement from the baseline, where 2% of the households applying granular fertilizers broadcasted the fertilizer all over the field.

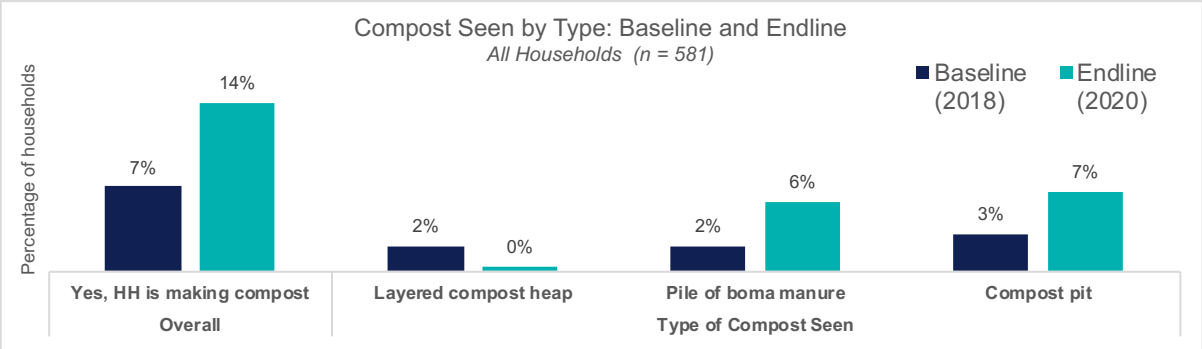
Figure 12. Fertilizer Used in the Previous 12 Months – Baseline vs. Endline



For composting, there was an increase in composting seen on the farm from 7% of households making compost (either compost pit, heap, or manure heap) at baseline to 14% at endline. This assessment only accounts for compost or manure heaps seen during the endline visit, the use during the rest of the year shown in **Figure 12** is self-reported, indicating the difference in numbers.

Compost or composted manure is a slow release, natural fertilizer returning key nutrients to the soil to help maintain soil quality and fertility. In addition, compost brings organic matter to the soil which helps to retain moisture and feeds micro and macro-organisms. Coffee Farm College teaches farmers to make compost heaps, when compared to making compost in a pit, heaps are: easier to turn, do not get waterlogged and will produce compost faster. **Figure 13** shows the distribution of the three compost methods for surveyed farmers, and depicts the changes from baseline to endline.

Figure 13. Type of Compost Seen on Farm – Baseline vs. Endline



WEEDING

Picture 5. Coffee tree weeded by digging.

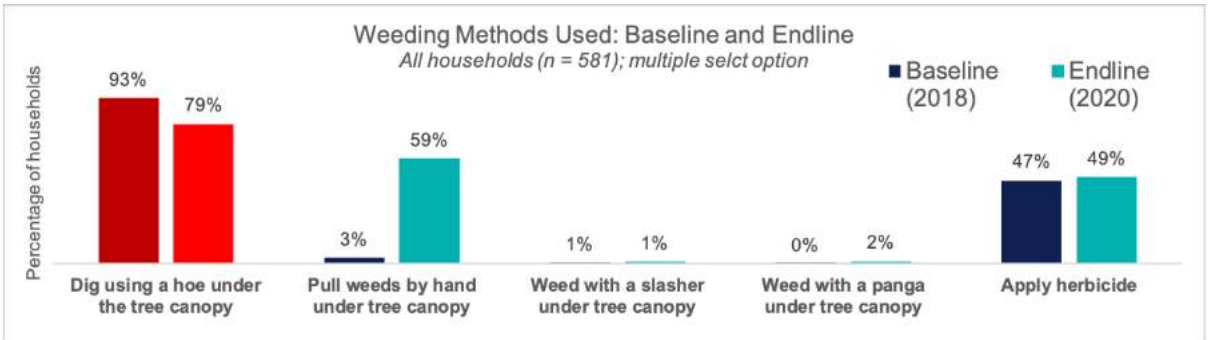
Adoption of the weeding best practice increased from 40% to 64% from baseline to endline. This was led by a significant increase in the practice of pulling weeds by hand (from just 3% at baseline to 59% at endline) as well as by a decrease in the practice of weeding by digging, which can damage the feeder roots. **Figure 14** highlights some of these improvements.

Weeds can have a dramatic impact on yield, so the area under the tree canopy, which is the main feeder root zone, should be kept as weed-free as possible throughout the season. This can be difficult during the rains, given that weed growth is rapid in tropical climates. Coffee Farm College taught farmers the importance of weeding under the canopy by hand-pulling using a panga or mulching with slashing, and intercropping with beans as options for between the rows. Coffee Farm College also explained why weeding by digging under the canopy is bad for the coffee, as it damages the feeder roots and can introduce Coffee Wilt Disease.

Adoption of weeding requires that i) the farmer pull weeds by hand, or uses a slasher or panga to weed under the tree canopy, ii) the farmer weeds at least twice per year, and iii) there are no or limited weeds under the tree canopy less than 30cm tall.

Where possible, observations were made to assess the weeding status, and other questions such as frequency of weeding were asked of the farmers. At endline, 16% of households failed because they were exclusively weeding by digging under the canopy. Another 16% of households failed because many weeds were observed by the enumerator under the canopy and 8% of households failed because weeds had reached heights of more than 30cm under the canopy.

Figure 14. Weeding Methods Used – Baseline vs. Endline



MULCHING

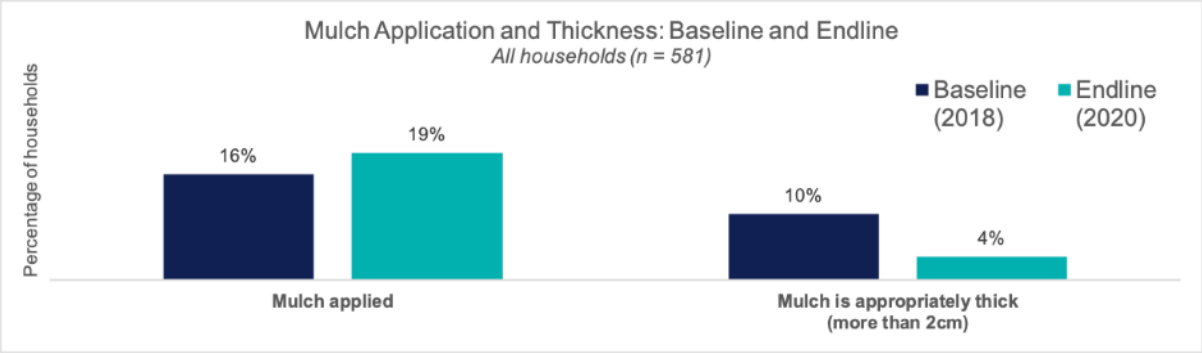
The mulching best practice decreased in adoption rate from baseline to endline. However, this decrease was despite the fact the percentage of farms applying mulch actually increased, from 16% at baseline to 19% at endline. As **Figure 15** illustrates, the reason for the failure is attributed to the thickness of the mulch applied, which must be more than 2cm to be considered fully adopted. Only 4% of farms adhered to this standard.

Picture 6. A well mulched tree.

Mulching has many benefits including the suppression of weeds, reduction of moisture loss from the soil, reduction of soil temperatures, and increase of soil organic matter. Mulching is especially important if shade levels are low. Coffee Farm College taught farmers about the benefits of mulching and how to mulch. Adoption of mulching requires that there is at least 2cm thick mulch applied.

While overall adoption of this best practice decreased for this cohort, future trainings should focus on the importance of mulch thickness to reap the benefits of mulching.

Figure 15. Mulch Application and Thickness – Baseline vs. Endline



SOIL EROSION CONTROL

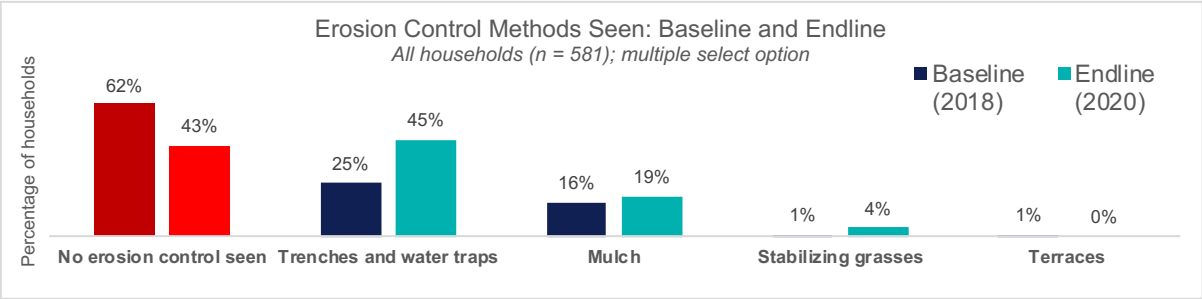
Picture 7. Water trap

Adoption of soil erosion control best practice increased from 38% at baseline to 57% at endline. A household is considered fully adopted if they employ one or more erosion control methods on the farm. This increase in adoption is therefore attributed to the increased use of certain methods, specifically trenches and water traps (counted as one), mulch, and stabilizing grasses. **Figure 16** illustrates the improvement since baseline on these various methods.

Soil erosion results in the loss of top-soil, leaving roots exposed and resulting in a loss of soil fertility, ultimately impacting yield. Coffee Farm College taught farmers the importance of erosion control in soil management, even on fields without slopes, where wind erosion can take place. Farmers learned various techniques to reduce soil erosion including planting stabilizing grasses, applying mulch, and terracing on steep slopes.

After receiving training, the number of farmers not using any form of erosion control decreased by 19%. The preferred method for farmers in Sembabule District were trenches and water traps, followed by mulch.

Figure 16. Erosion Control Methods Seen – Baseline vs. Endline



SHADE MANAGEMENT

Adoption of shade management best practice increased from 51% at baseline to 67% at endline. At baseline, 23% of households had a shade level of 20% or more, at endline, this increased to 48% of households.

Shade is common in mixed coffee farming systems, such as those in Uganda, with high numbers of fruit trees, such as bananas in the coffee fields, resulting in relatively high adoption of the shade best practice. Almost half (48%) of the households had good shade levels at endline (>20% shade) and 40% of households had planted shade trees in the past three years, which will provide shade in time.

Picture 8. Banana plants in a coffee farm

Shade is important for *Robusta* coffee, which evolved in the tropical forests of Uganda and Congo. Ideally, shade levels should be between 20-40%. Below 20%, coffee trees will be subjected to high temperatures and high levels of moisture loss from both the leaves and the soil. However, very high levels of shade can result in reduced flowering and therefore yields. Coffee Farm College taught farmers about the importance of shade management, the ideal shade tree varieties, and planting techniques. Adoption of shade management requires that more than 20% of the farm is covered by shade or that shade trees have been planted in the last three years, even if they are not currently providing the required shade levels.

Figure 17 illustrates the most common shade trees in the coffee fields were fruit trees: 69% of farms had bananas, significant increase from 47% at baseline, and 22% of farms had planted other fruit trees such as mango or avocado. Although these large fruit trees give high shade levels, and have other socio-economic benefits such as enhancing household diet and providing additional income, the farm can only accommodate a limited number of them. Only 6% of households had indigenous trees in the farm, while just 1% had planted exotic varieties like grevillea, which are generally considered unsuitable.

Figure 17. Shade Tree Types – Baseline vs. Endline

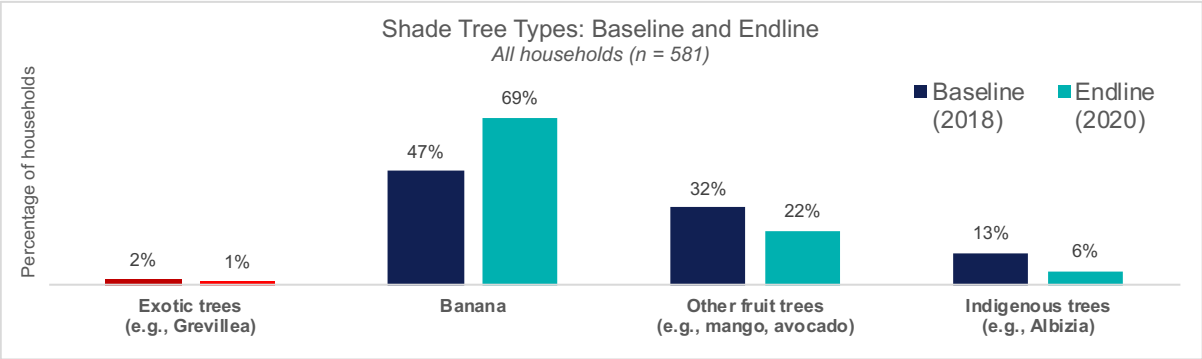
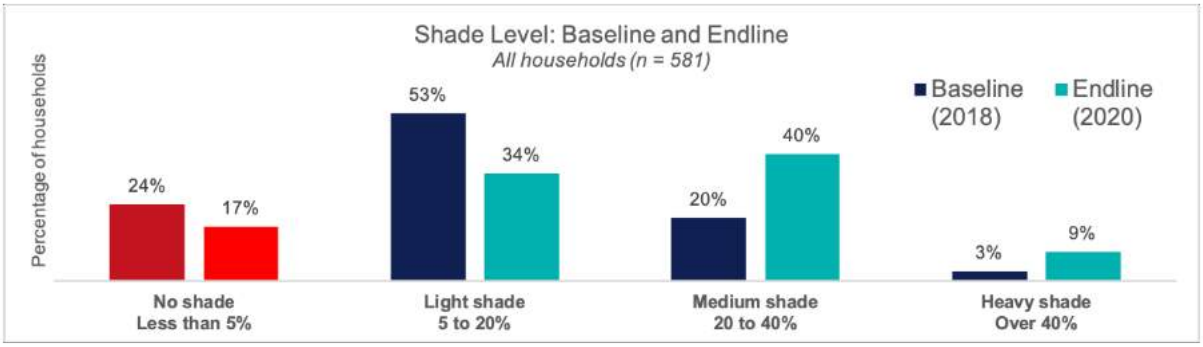


Figure 18 illustrates the shade levels found on coffee farms in Sembabule District at baseline and endline. It shows there has been an increase in shade levels since baseline, with 49% of households having at least a 20% shade level, and fewer households having no shade.

Figure 18. Shade Level – Baseline vs. Endline



RECORD KEEPING

Adoption of the record keeping best practice increased slightly from 2% at baseline to 4% at endline. The Coffee Farm College program provided a three-year pictorial record card (as illustrated in Picture 9) at the February 2019 training and trained farmers on how to keep financial records and calculate profit. However, during data collection, only 5% of the households presented a record book and only 4% had written records on it.

Picture 9. Coffee Farm College record card and farmer's record book.

During data collection, enumerators reported that farmers were often times reluctant to show their record cards as they had not started using them. Additionally, some data collectors might not have waited long enough for farmers to bring their record cards during the interview. This, combined with the fact that 68% of the households attended the February 2019 training, led Laterite and TechnoServe to follow up on households that attended any Coffee Farm College training to understand whether they had received a record book.

The team managed to reach 420 of 500 households targeted by phone, and of these, 62% stated to have received a record book from TechnoServe, bringing the rate of record book ownership to 50% for all households. TechnoServe was not able to follow up in person with the 163 households who stated they had kept farm records in their books. These households are *not* included in the best practice adoption calculation in this report, which may therefore underestimate the adoption of record keeping.

At endline 67% of households knew how to calculate farm profit and loss, compared to only 32% at baseline.

OTHER AGRONOMY PRACTICES

The following practices are important agronomic practices for coffee farming; however, they do not apply to all coffee households surveyed. Therefore, they are not considered key best practices, but were are still monitored during the endline survey.

COFFEE DRYING

Picture 10. Coffee drying on a tarpaulin

87% of households met the criteria for coffee drying; however, at the time of the endline survey, only 55 households (9%) were actively drying coffee. Of these, the vast majority were drying coffee correctly on tarpaulin or a plastic sheet on the ground. Eight of these households were drying the coffee on bare ground, which could result in contamination from the soil and isn't recommended. .

Proper coffee drying is crucial to produce improved quality coffee and minimize the risk of contamination. As harvesting season had nearly finished when the survey was conducted, households in Sembabule self-reported their coffee-drying practices. Correct coffee drying was assessed based on whether (i) the farmer is currently drying coffee on a plastic tarpaulin or on an elevated bed or (ii) the farmer is not drying coffee, but plans to do so in a tarpaulin or on tables.

Of the 526 households not currently drying, 88% plan to dry on a tarpaulin or plastic, and 3% plan to dry on the bare ground. Coffee Farm College promoted the use of plastic tarpaulins or raised beds for drying coffee to prevent contamination from drying the cherry on the bare ground. The training also stressed the importance of harvesting red cherry, turning during drying, and using good storage techniques to avoid the development of mould or further contamination.

COFFEE PLANTING

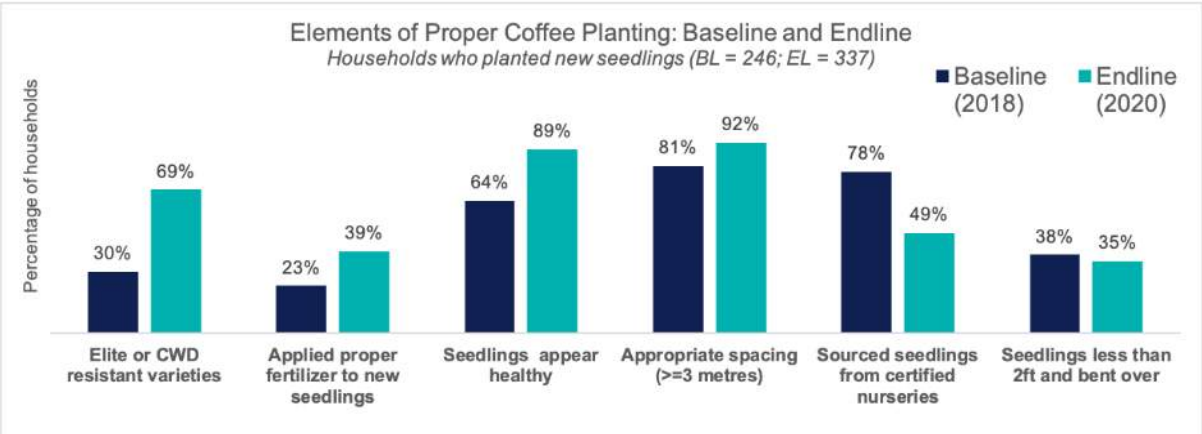
Good coffee seedlings and correct planting are essential for a healthy coffee tree and future high production. The Ugandan Government's Operation Wealth Creation (OWC) program, in collaboration with the Uganda Coffee Development Authority (UCDA), has provided seedlings to farmers since 2015. During the baseline survey, 41% of coffee households reported planting new coffee seedlings in the past 12 months. At endline, 58% of households reported planting new seedlings.

Picture 11. A young coffee tree

As illustrated in **Figure 19**, there are numerous elements to consider for proper coffee planting: (i) the variety of coffee is elite or clonal with Coffee Wilt Disease resistance; (ii) the new seedlings come from certified nurseries (UCDA or Government); (iii) the farmer applied an approved nutrition product; (iv) seedlings look healthy; (v) the seedlings were planted in rows three meters apart; and (vi) for seedlings taller than 60cm, the stems are bent to initiate sucker production. If suckers are taller than 30cm, the best four suckers have been selected.

While households improved on four of the elements above, they regressed in two elements. In particular, the criteria on sourcing seedlings from certified nurseries saw the sharpest decrease from 78% at baseline to just 49% at endline. At endline, farmers opted to source seeds from non-certified sources, including 16% who grew the seedling themselves, and 9% who used seedlings grown by neighbours. In addition, only 39% of households applied an approved fertilizer to the seedlings. Additionally, there was a significant increase in the use of Elite or CWD resistant varieties compared to baseline, which is a positive step.

Figure 19. Elements of Proper Coffee Planting – Baseline vs. Endline



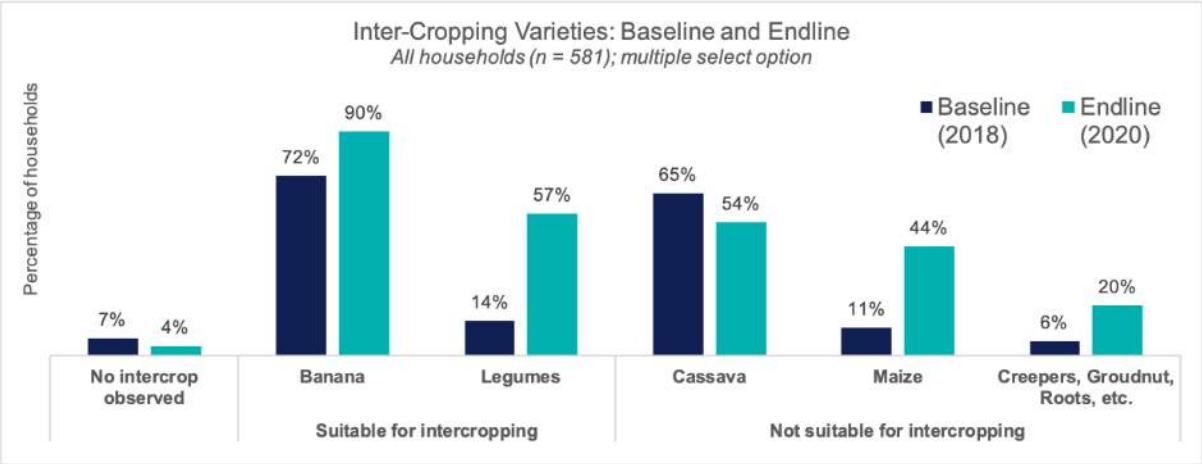
INTERCROPPING

Intercropping has two key benefits: diversification of income and usage as a cover crop during the rains to reduce the incidence of soil erosion. With the wider spacing associated with Robusta coffee, it is possible to intercrop between the rows of mature coffee trees.

The intercropping is practiced correctly if farmers are intercropping their coffee trees with legumes, such as beans, or fruit trees, such as bananas. Farmers should not use maize, cassava, creepers – such as pumpkin, roots and tubers, or groundnuts – or other crops on the coffee field, which are either greedy crops (maize) or would require the field to be dug for harvest. The survey observed all crops used and not the main crop so interpretation of the findings is difficult, for example one maize plant in a field of beans would be acceptable.

Figure 20 illustrates the crops seen as an intercrop. There was an increased observation of maize as an intercrop, seen at 44% of farms at endline compared to just 11% at baseline. Intercropping using suitable crops like banana and legumes also increased significantly and the use of cassava (another unsuitable crop) decreased between baseline and endline. For the small percentage (4%) of coffee farming households in Sembabule not growing any intercrops, this practice was considered as "not applicable".

Figure 20. Inter-Cropping Varieties – Baseline vs. Endline



HOUSEHOLD CHARACTERISTICS

The following section covers demographic, socio-economic, and financial information on the entire endline sample of 581 households.

HOUSEHOLD COMPOSITION AND FARMER AGE

Household Composition: Households have, on average, six members, four of which are children (0 to 18 years). Both female and male coffee farmers are likely to be in their forties, with a mean age of 42 for women and 48 for men. Of the male farmers, 9% are less than 30 years of age, whereas 21% of female farmers are less than 30 and can be considered "youth".

Figure 21. Distribution of Household Size at Endline

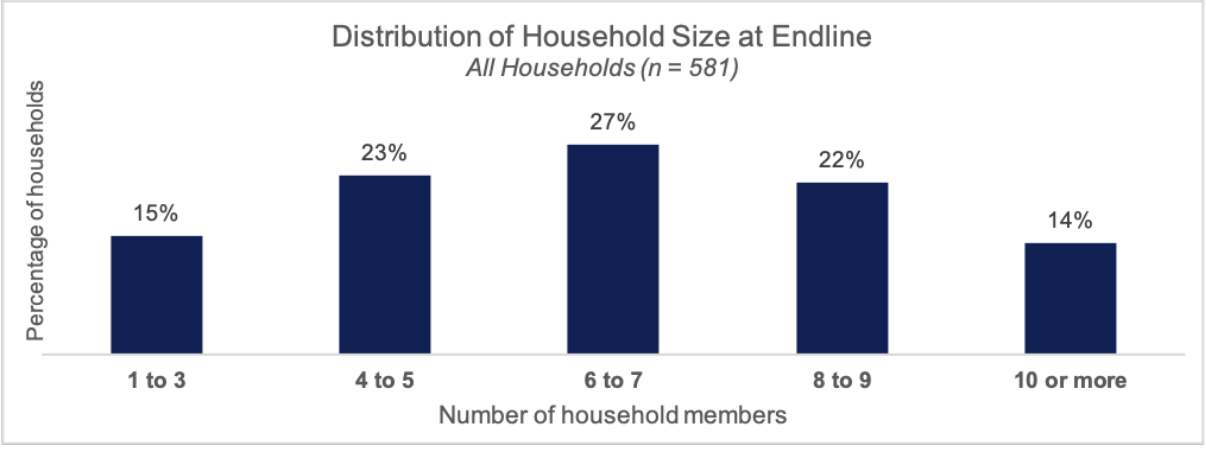


Figure 22. Distribution of Number of Children at Endline

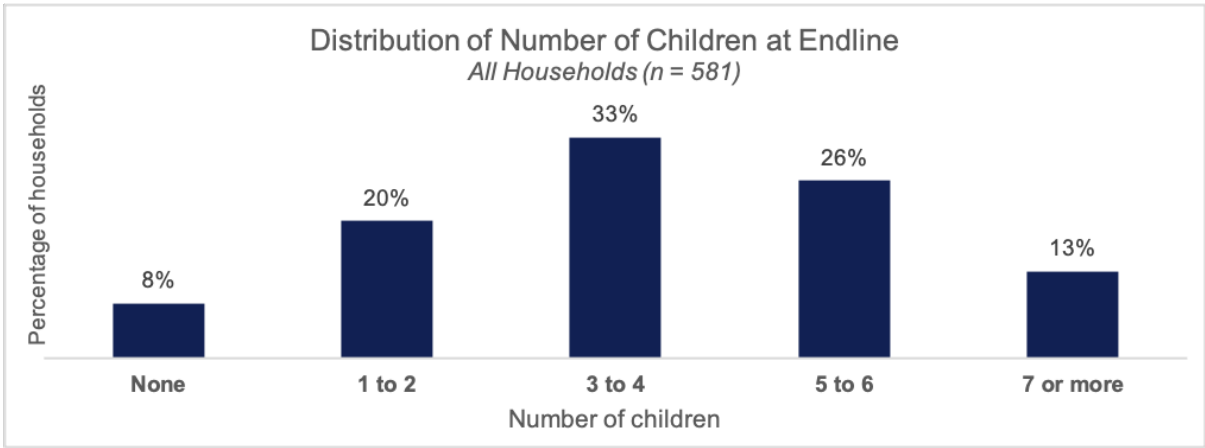
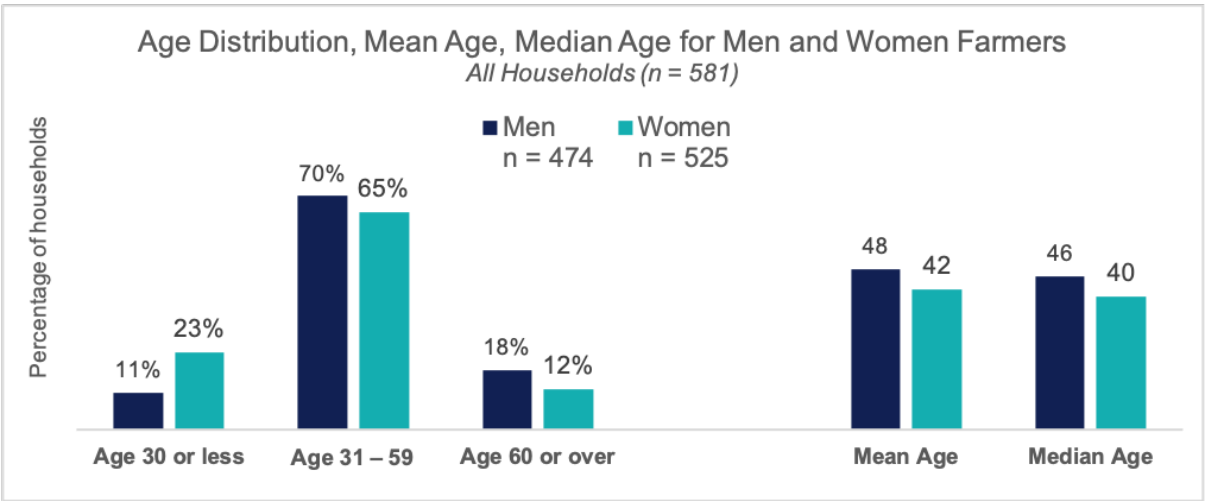


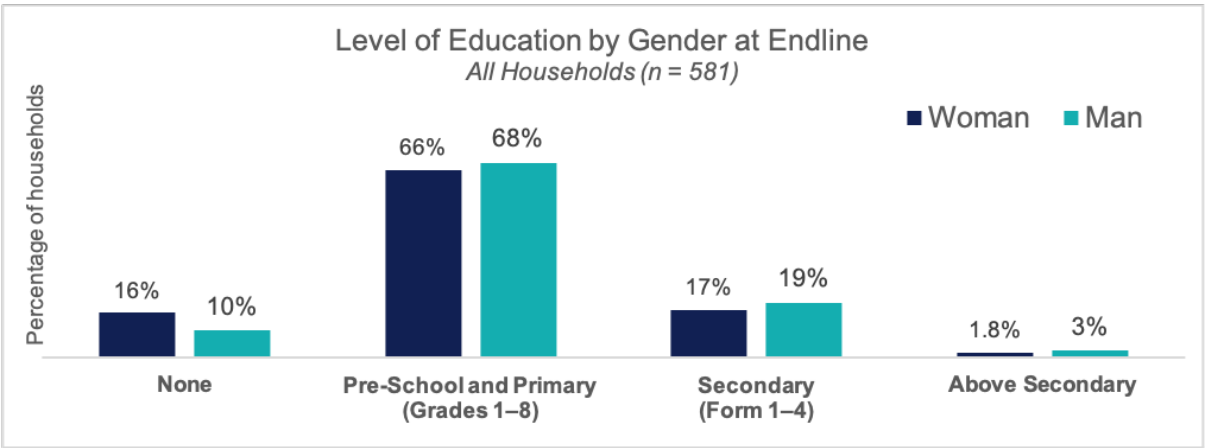
Figure 23. Median and Mean Age Distribution by Gender



EDUCATION

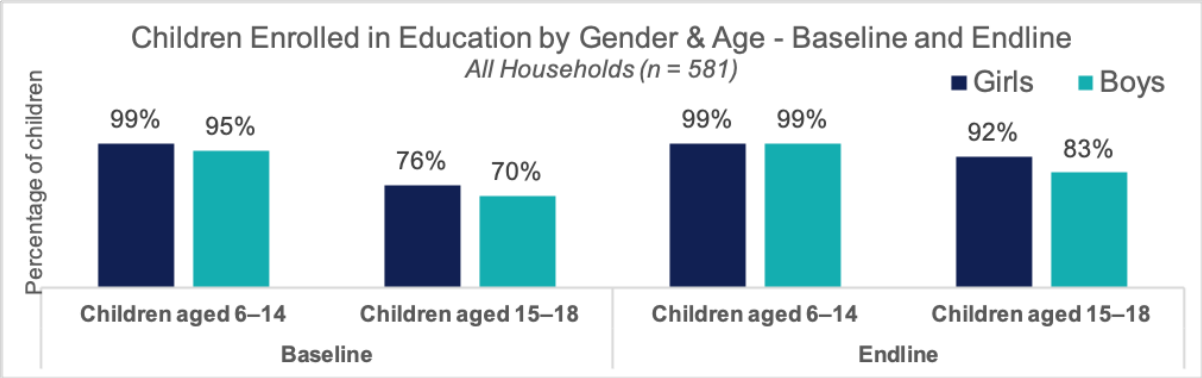
Overall, the level of education is moderate, with 84% of the women and 90% of the men having received some level of formal education. Men are slightly better educated, as 22% of the male farmers have education above the primary level (either Secondary or above Secondary), compared to only 19% for the women.

Figure 24. Level of Education by Gender



For children aged 6–14, 99% of both boys and girls were enrolled in formal education at endline. This is a slight increase from the baseline for boys, where 95% were enrolled. For children aged 15–18, there has been a significant increase in school enrolment since the baseline for both boys and girls. At baseline, just 76% of girls 15–18 were enrolled in school. At endline this rate increased to 92%. Similarly, for boys, at baseline enrolment levels for 15–18 year olds were much lower (70%) compared to endline (83%).

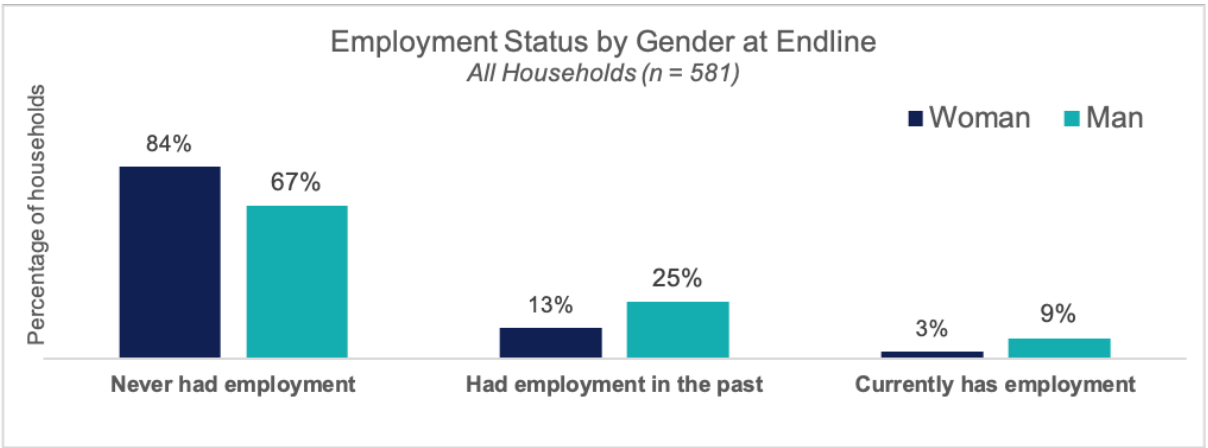
Figure 25. Child Education by Gender and Age



EMPLOYMENT STATUS – OUTSIDE THE COFFEE FARM

A quarter (25%) of the male farmers either have had employment in the past or are currently employed outside their coffee farms compared to just 16% of the women. There is a significant increase in men who are currently employed at endline (9%), compared to baseline (3%).

Figure 26. Employment Status by Gender at Endline



PAID LABOR AND CHILD LABOR

At endline, over half (59%) of the farmers had hired paid labour to work on the coffee farm in the past 12 months. The average reported wage for an eight-hour work day was 8,525 Ugandan Shillings, equivalent to $2.30 USD. This is an increase from baseline, where the average wage was reported to be 7,887 Ugandan Shillings, equivalent to $2.00 USD. The national minimum wage in Uganda is 130,000 Ugandan Shillings per month, approximately 5,909 Ugandan Shillings per day ; therefore, the wages earned on the coffee farms are slightly above the monthly minimum wage.

Of the 476 households with school-aged children (6-14 years old), 75% report that their children work in the coffee fields. For these 476 households, 4% of households reported that farm work sometimes interfered with access to education for their own children, especially during harvest. Less than 1% (4 farms) of households reported hiring labour below 14 years of age.

LAND OWNERSHIP

Farmers own a self-reported mean of 2.1 hectares of total agricultural land, 0.9 hectares of which is planted with coffee, with an average of 992 coffee trees. To account for outliers due to self-reporting, the 1st and 99th percentiles of the statistics have been trimmed. The median for total land is 1.4 hectares, with 0.8 hectares of coffee land, and 750 coffee trees. Two-thirds (66%) of coffee trees were planted after 2000, and 68% of households stated that they planned to plant more coffee over the next 12 months.

Figure 27. Distribution of Total Farm Size in Hectares

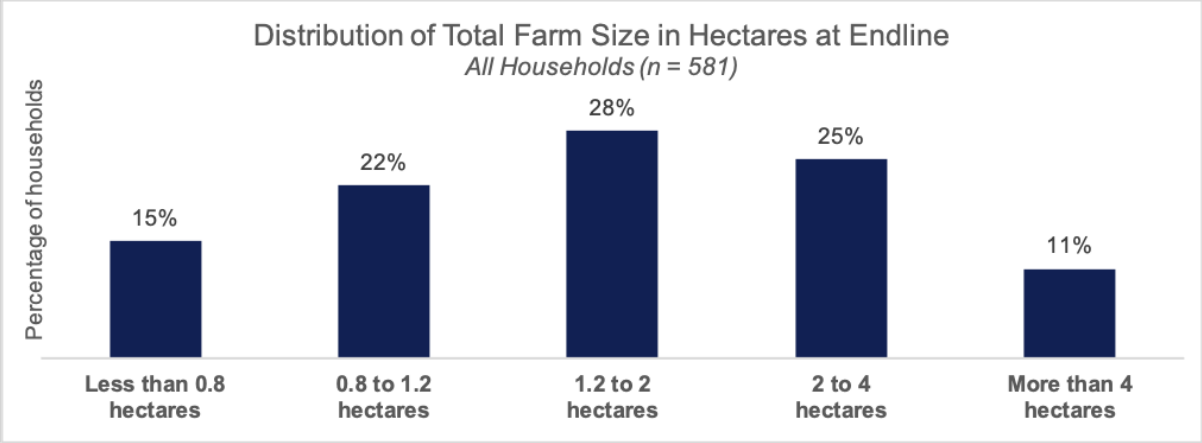


Figure 28. Distribution of Number of Coffee Trees

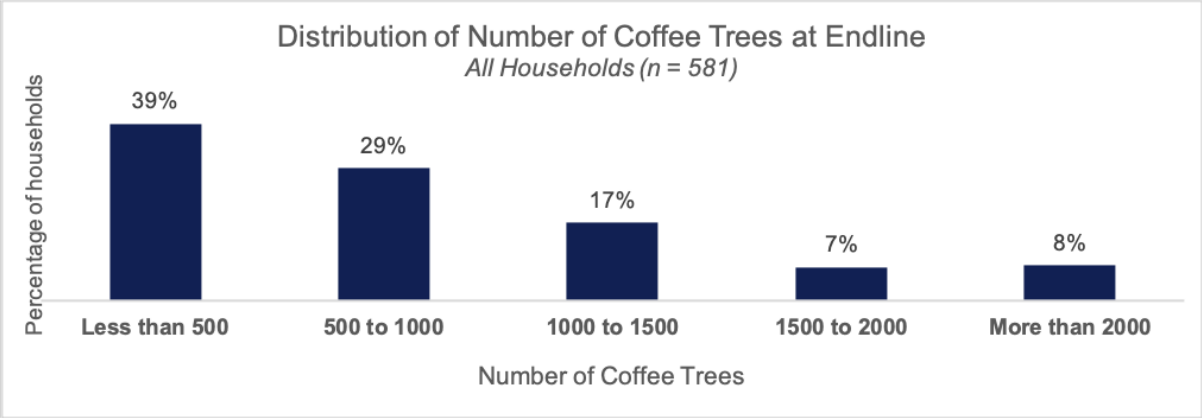
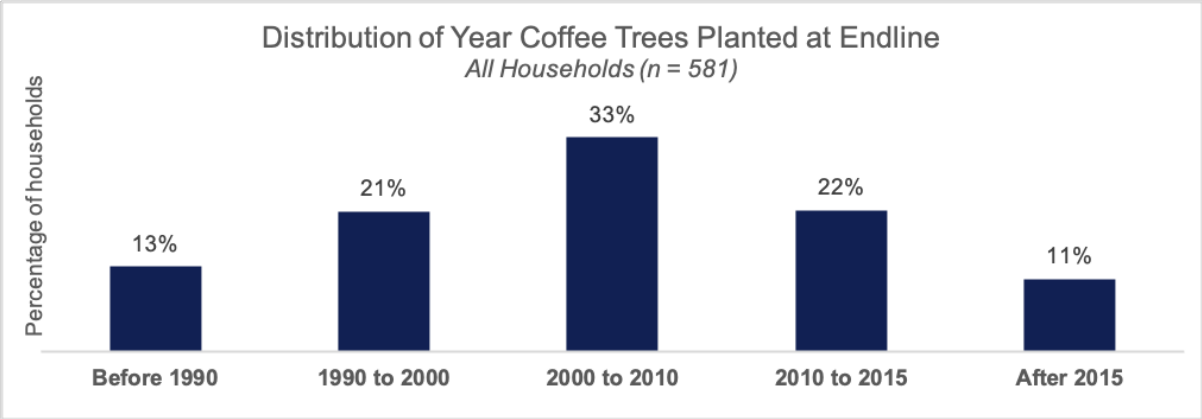


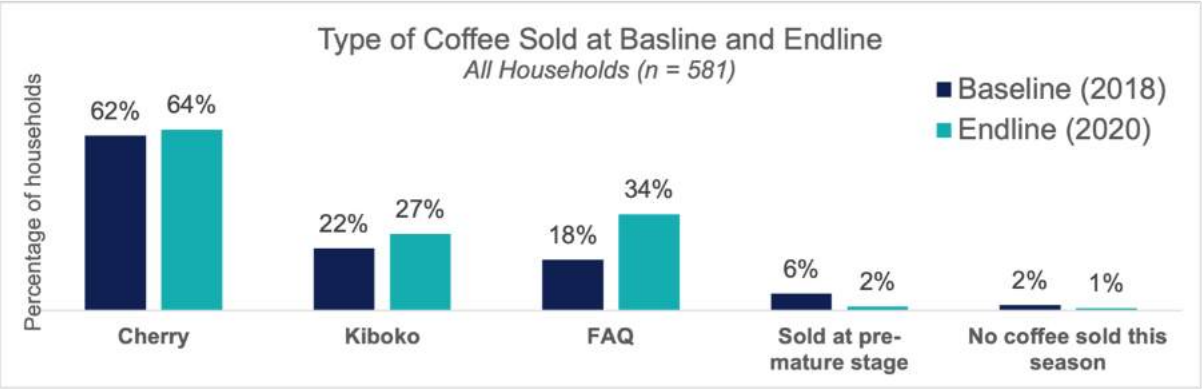
Figure 29. Distribution of Year of Planting



COFFEE PRODUCTION

Production data was collected in kilograms of cherry, kiboko (sun dried cherry), and FAQ (parchment) produced in the 2020 harvest season. This data is self-reported, and can be seen as a guideline only, given limited record keeping and the tendency to round yields to the nearest 100 kg. As reported in **Figure 30**, a negligible proportion of the farmers (1%) reported not selling any coffee in 2020, while the majority sold cherry (64%). One-third (34%) of farmers sold FAQ, while 27% sold kiboko. Additionally, 2% of households pre-sold their coffee prior to harvest. Compared to baseline, the percentage of households selling FAQ has nearly doubled, from 18% at baseline to 34% at endline. FAQ fetches higher prices than the other forms, so this increase is a positive finding.

Figure 30. Type of Coffee Sold



At endline, the mean self-reported yield per tree was **2.0 kg cherry equivalent** with a median yield of **1.6 kg cherry equivalent** per tree. This is up from baseline, where the mean self-reported yield per tree was 1.3 kg cherry equivalent, with a median of 0.9 kg cherry equivalent.

Given the median farm has 750 coffee trees at endline, an estimated farm production would be about 1,200 kg of cherry equivalent. Sold as kiboko (600 kg), this would earn the household about **$360 USD**. Conducting the same calculation using means instead of medians, households would earn about $595 USD.

Assumptions for yield per tree calculations:

- 1kg of kiboko = 2kg of cherry
- 1kg of FAQ = 4kg of cherry
- 1kg of kiboko = $0.60 USD
- 1st and 99th percentiles were trimmed to account for mistakes in self-reported data

ASSET OWNERSHIP

Households own, on average, 8 of the 23 surveyed assets. This is an increase from an average of 6 assets at baseline. The top five largest improvements since baseline have come from access to electricity (+17 percentage points from baseline), ownership of proper shoes (+14), ownership of television (+11), ownership of at least one pig (+9), and access to improved water source (+7). Two transportation assets, – bicycles and motorcycles – decreased since the baseline by 5 and 1 percentage points respectively. However, this is partially offset by an increased ownership of cars or trucks (+2).

House Quality: The building quality of the farmers' houses in the Sembabule district is good. Almost every household (99%) has improved roofs (corrugated iron or tin sheets), 85% of the houses have access to electricity, mostly from solar panels, which is up from just 68% at baseline. More than half (56%) of the houses have cement sealed floors.

Water and Sanitation: 12% of the farmers have access to an improved toilet[3], up from just 7% at baseline. Only 26% of the houses have an improved water source,[4] yet this is an improvement from just 17% at baseline. Children are responsible for collecting water in 66% of households and the average time to complete the return journey to collect water was 39 minutes. For some households, this took as long as three hours.

Livestock: Most households have some livestock, with 70% of households owning at least one chicken, 48% owning at least one pig, 19% owning at least one cow, and 35% owning at least one goat or sheep.

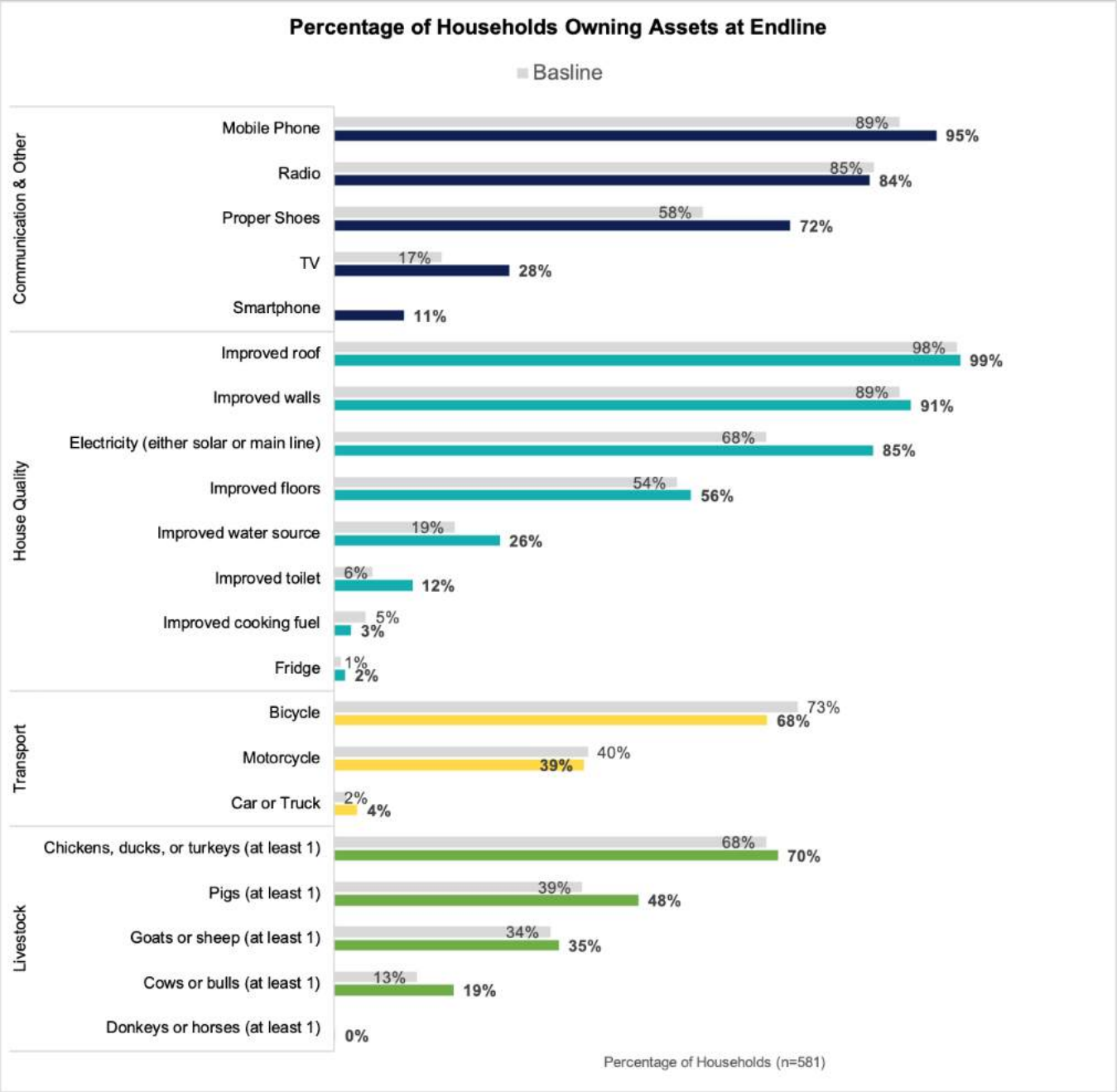
Communication: Ownership of communication devices is high among farmers in Sembabule. Almost all households (95%) own at least one mobile phone, which is most usually used for calling (99%), mobile banking (61%), sending and receiving messages (51%). Most households (84%) also own radios, while a much lower proportion (28%) own a television.

Transport: Many coffee households own their own means of transport, 68% of households own a bicycle, and 39% own a motorcycle, with 4% owning a car.

[3] Improved access to sanitation consists of ventilated improved pits, flush toilets, or composting toilets that are not shared with other households.

[4] Improved water access consists of having access to a protected dug well or spring, tube well, water tank, or a public or private tap. If the water source is not at the house, it should not be more than a 30-minute roundtrip.

Figure 31. Household Ownership of Assets at Endline

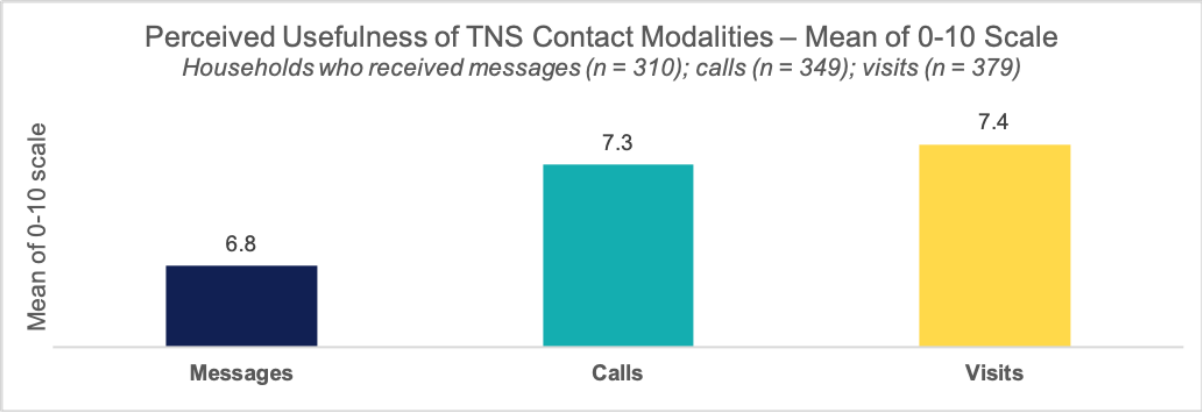


PERCEPTIONS & IMPACT

To help TechnoServe improve the program and assess its impact on farm households, questions were asked about farmer perceptions of the Farm College.

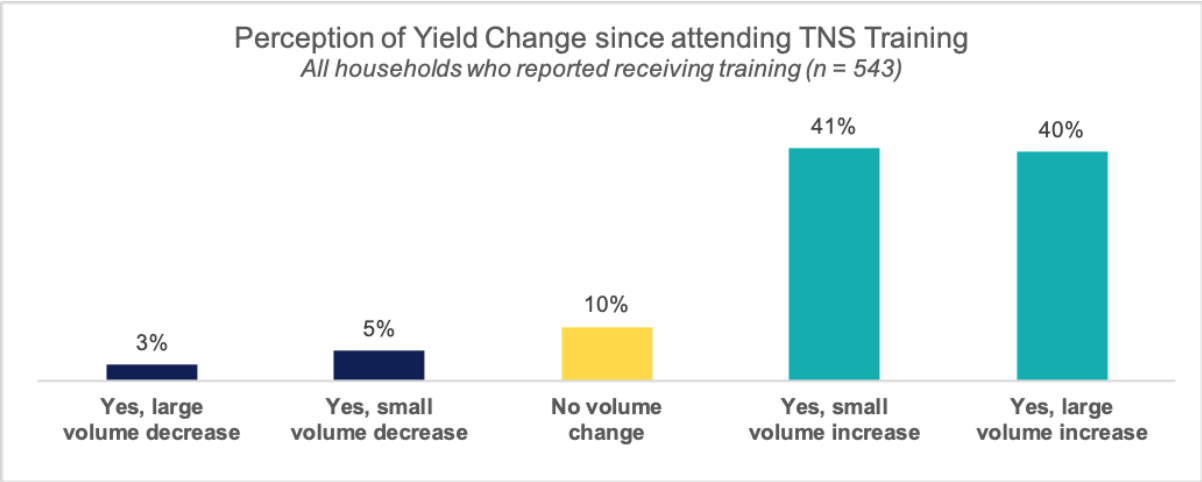
Contact Modalities (Message, Call, Visit)
To assess the usefulness of the various ways farmers are contacted and trained, farmers were asked to score each modality (messages, calls, visits) from 0 – 10 on usefulness, with 10 being the most useful and 0 being not at all useful. **Figure 32** reports the findings, showing that on average visits were seen as the most useful modality with an average score of 7.4, , followed by phone calls (7.3), and then messages (6.8). Note that all of the calls conducted were during the COVID-19 lockdown period, which may impact responses for perceived usefulness as they were the primary modality used in that period.

Figure 32. Perceived Usefulness of TNS Contact Modalities (Mean of 0-10 scale)



Perceptions on Yield Change
Farmers at endline were asked to rate the change in coffee yield that they experienced since joining Coffee Farm College. As seen in **Figure 33**, 81% of households reported experiencing an increase in yield since attending training, and 40% said this increase was large. Only 8% of households reported a decrease in yields since training, and 10% reported no change.

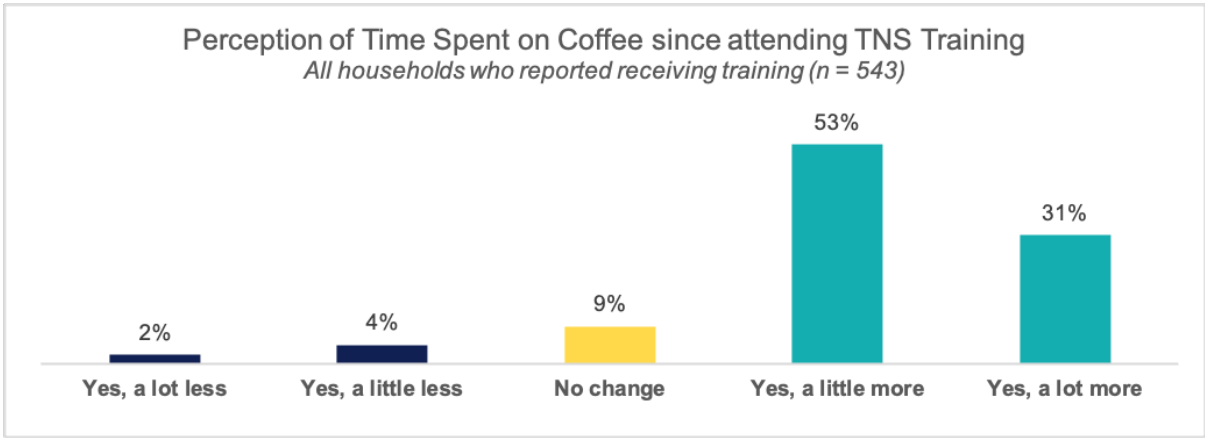
Figure 33. Perception of Yield Change since attending TNS training



Perceptions on Time Spent on Coffee Production

During endline, farmers were asked to rate the change in time spent on coffee production since joining Coffee Farm College. As seen in **Figure 34**, 84% of households reported experiencing an increase in time spent, with 31% saying this increase was high. This is likely due to the increased attention to best practice adoption, as many were not adopting best practices at baseline. Only 6% of households reported a decrease in time spent on coffee since the training.

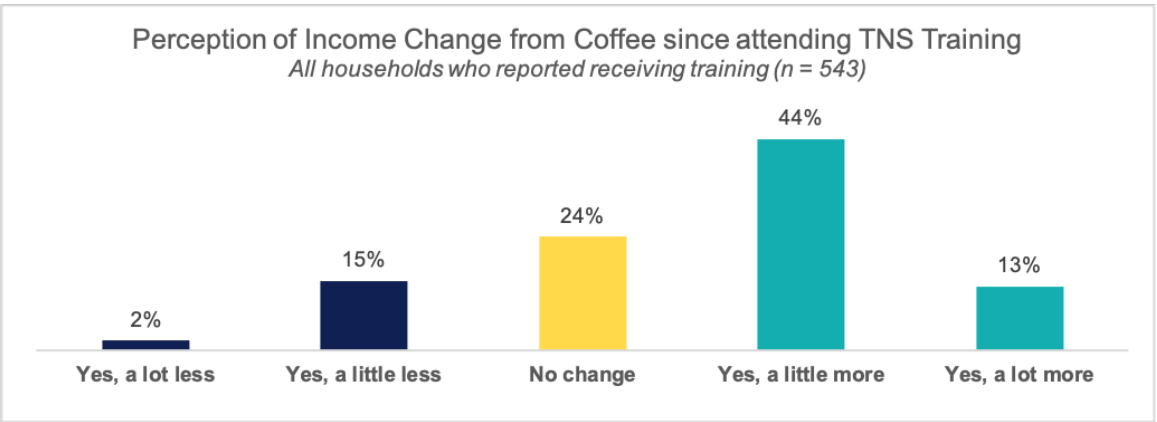
Figure 34. Perception of Time Spent on Coffee since attending TNS training



Perceptions on Coffee Income

Farmers at endline were asked to rate the change in income from coffee since joining Coffee Farm College. As seen in **Figure 35**, 57% of households reported experiencing an increase in income, with 13% saying this increase was high. 17% reported having lost income since the start of training, and 24% reported no change. Given the endline was conducted during the COVID-19 pandemic, when incomes were already low for many farmers, it is possible that the farmers reporting a loss of income since the trainings are a reflection of the pandemic, and not necessarily the impact of the Coffee Farm College. Nevertheless, it appears that the majority of participating coffee farmers in Sembabule District perceive the program to have generated a positive contribution to income, which is a primary goal of the Coffee Farm College.

Figure 35. Perception of Income Change from Coffee since attending TNS training



THEME OF INTEREST: GENDER

In the endline survey, additional questions relating to intra-household decision-making and gender relations were added to help understand how women's participation in the program translates to intrahousehold relations (e.g., gender roles and preferences, decision-making on income and savings, decision-making on food purchases).

Three questions guided the research:

- How are women able to translate their participation in the intervention into their ability to negotiate intrahousehold relations to make decisions over the use of income?
- How can we understand the different roles and preferences of men and women to plan interventions that meet the objectives and aims of the program?
- How are we reaching and meeting the needs of different women through the program?

FINANCIAL DECISIONS (INCOME & SAVINGS)

In order to understand how women can translate participation in the Coffee Farm College into their ability to negotiate intrahousehold relations, questions on decision-making on income and savings were asked.

Figure 36 reports the primary decision-maker on income decisions for both coffee income and non-coffee income. It shows that making decisions jointly (both man and woman equally) is the most common way households in Sembabule District make decisions on both coffee income (29%) and non-coffee income (33%). However, when households do not make decisions jointly, both coffee income and non-coffee income decisions are primarily made by men. Men are involved at least equally in 80% of coffee income decisions, compared to just 48% of women. For non-coffee income, women play a more primary role as they are involved at least equally in 57% of households. However, men are still the majority decision-makers on non-coffee income, with 77% of households including men at least equally in these decisions.

It is important to note that 5% of households at endline are single-adult female households, and 13% of households are single-adult male households, which are indicated below. In these households, decisions are made by only women or only men, as it is the only option.

Figure 36. Decision-maker on Coffee and Non-Coffee Income

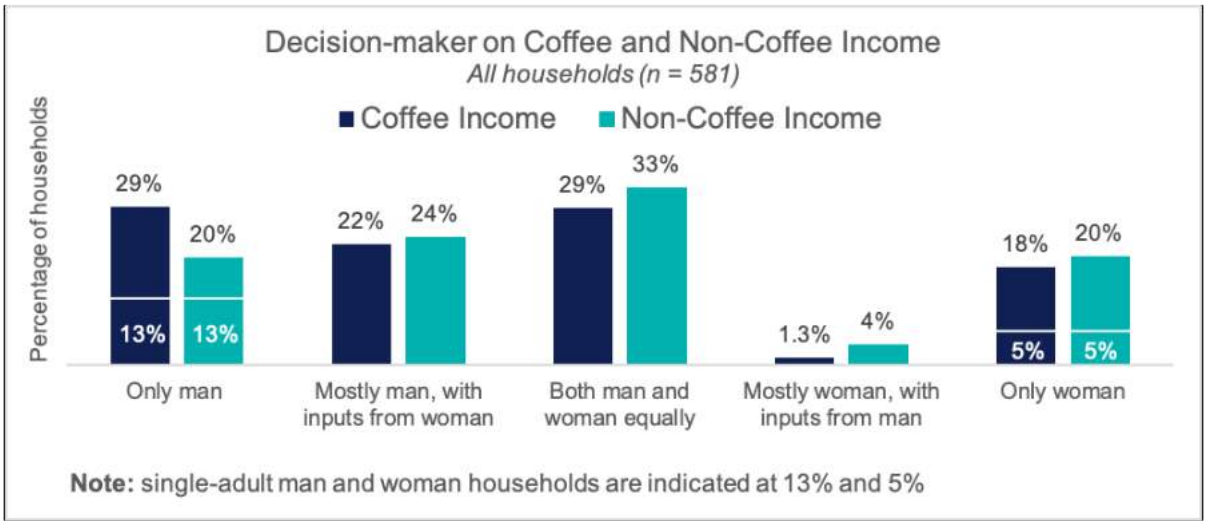


Figure 37 reports the primary decision-maker on decisions for both major and minor expenditures. Major expenditures include expenses including: 1) house construction and renovation; 2) paying school fees; 3) buying a bicycle or motorbike; 4) going on a religious trip; or 5) purchasing large appliances for the house. Minor expenditures include expenses such as: 1) food purchases for daily consumption; 2) rural-urban transport; 3) buying household items like soap and cosmetics, charcoal, and firewood; or 4) kerosene purchases.

Men tend to make sole decisions regarding major expenditures of the household. The most common way for coffee households to make minor expenditure decisions is jointly (both man and woman equally) (23%). For major expenditures, men are involved at least equally in 80% of households, compared to just 45% of women. For minor expenditures, however, women play a leading role, as women are involved in these decisions at least equally in 65% of households, compared to just 57% for men.

Again, it is important to note that 5% of households at endline are single-adult female households, and 13% of households are single-adult male households, which are indicated below. In these households, decisions are made by only women or only men, as it is the only option.

Figure 37. Decision-maker on Major and Minor Expenditures

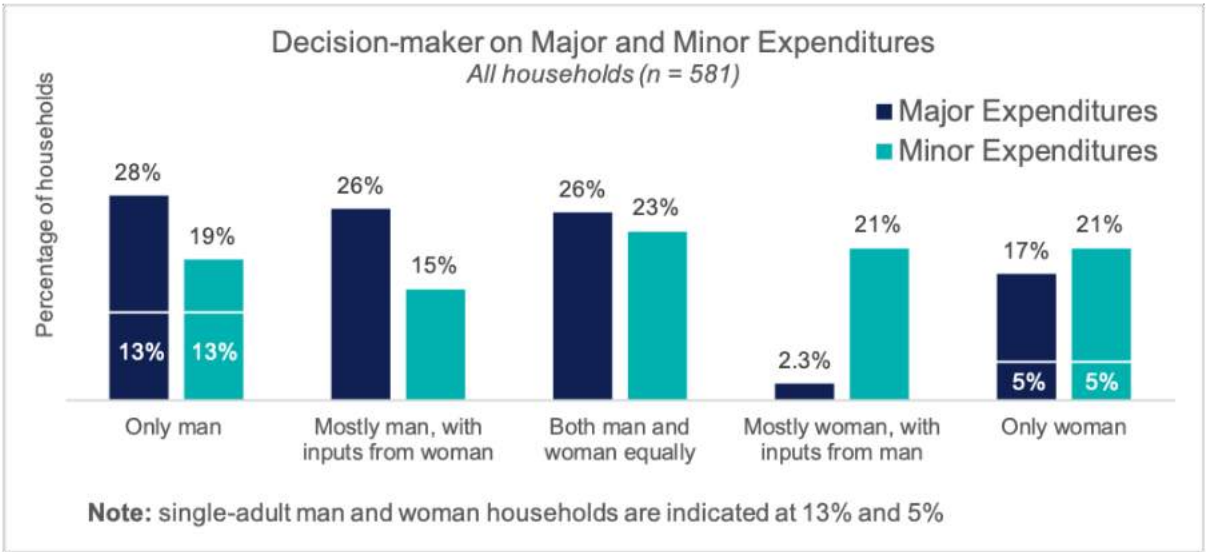
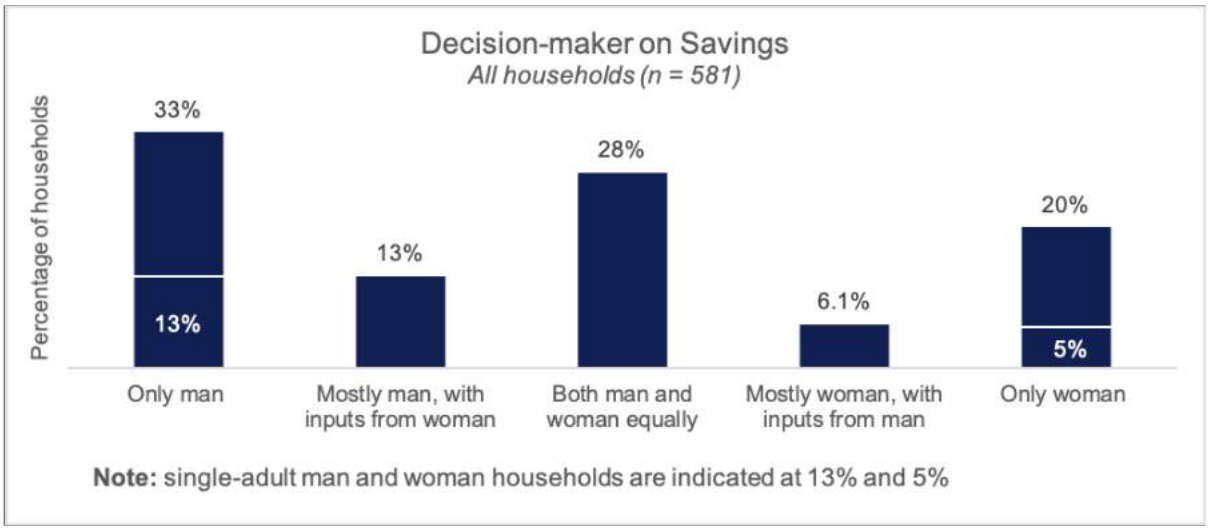


Figure 38 reports the primary decision-maker on savings decisions, and shows that the most common decision makers on savings are men by themselves (33%). Joint decision-making (both man and woman equally) was also common (28%). Overall, men are involved in savings decisions at least equally in 74% of households, compared to just 54% for women.

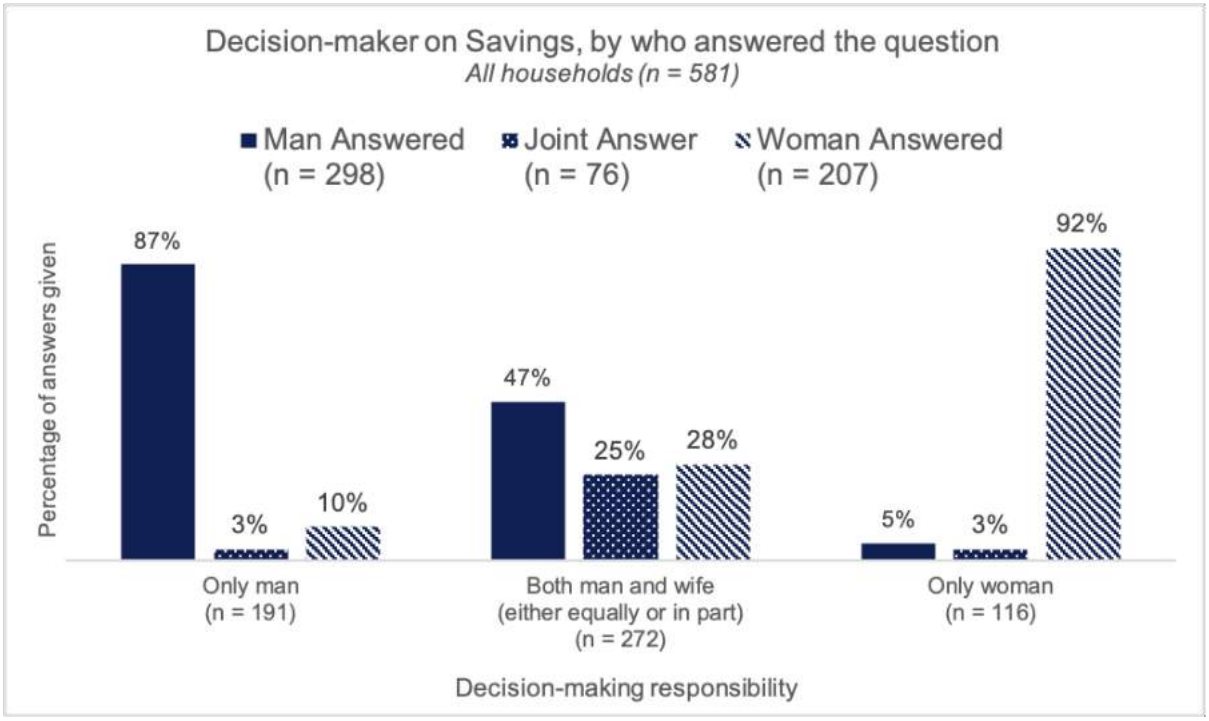
Again, it is important to note that 5% of households at endline are single-adult female households, and 13% of households are single-adult male households. In these households, decisions would be made by only women or only men, as it is the only option.

Figure 38. Decision-maker on Savings



Enumerators were then asked to observe who answered the question to gauge intra-household gender relations. **Figure 39** disaggregates the information based on who answered the question and shows a strong bias towards the gender of the person responsible for decision-making. For example, in the 116 households where women are the sole decision-makers on savings, the woman answered the question in 92% of the cases, suggesting that women are speaking for themselves when it relates to something they are responsible for. A similar pattern was observed with male participants, where the vast majority of men answered when they were solely responsible for decisions on savings. For joint decision households (either equally or in part), both men and women participated in answering the question, but men more so than women.

Figure 39. Decision-maker on Savings, by who answered the question



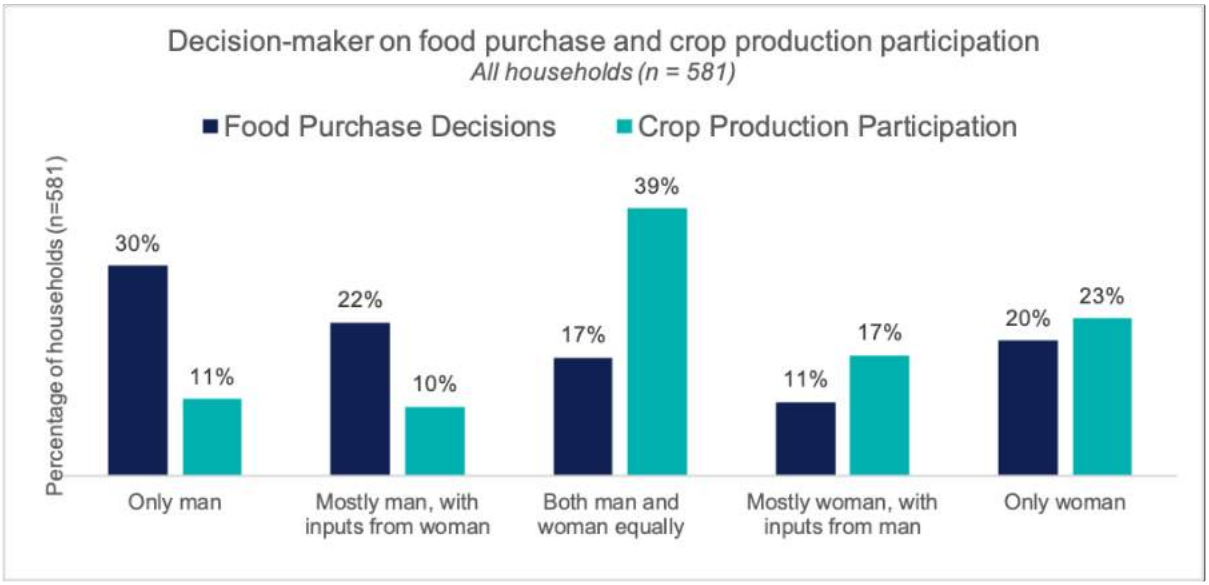
FOOD DECISIONS

In order to further understand the roles of men and women in the household, questions regarding food purchase decisions and crop production participation were also asked. **Figure 40** reports the primary decision-maker for both food purchase and crop production participation decisions.

For **food purchase decisions**, it is most common for men to make these decisions by themselves (30%). Men are involved at least equally in food purchase decision-making in 69% of households, compared to just 48% for women.

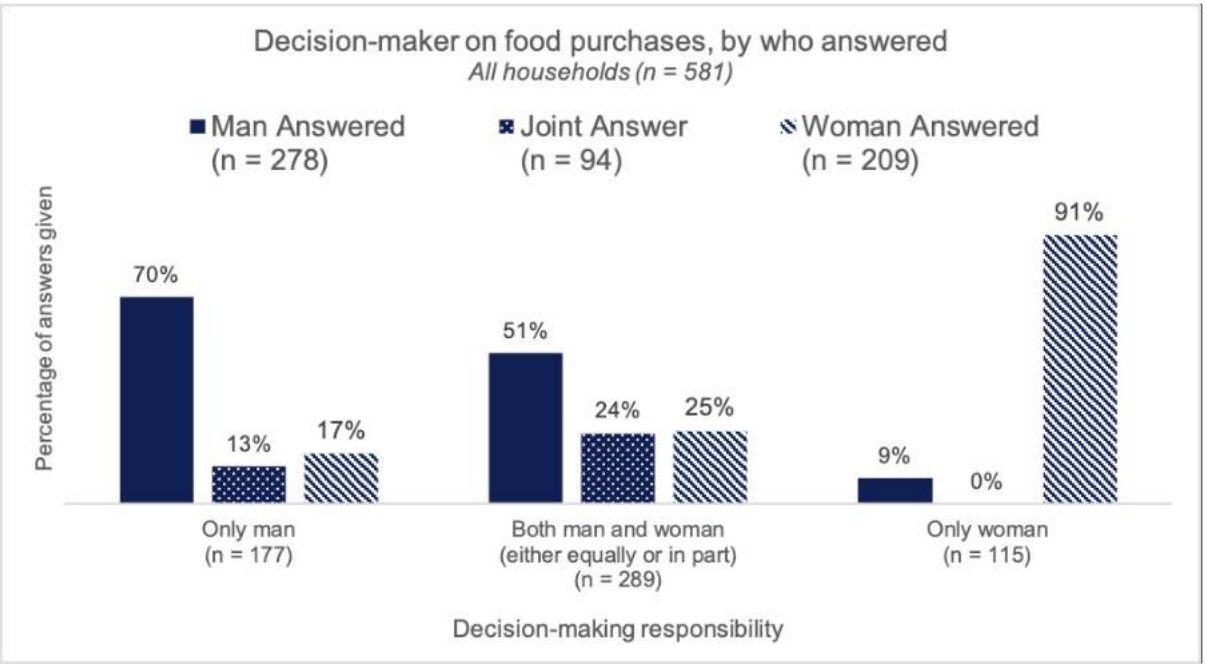
For **crop production participation decisions**, it is most common for households to make these decisions jointly and equally (39%). Women are involved in these decisions at least equally in 79% of households at endline, compared to 60% for men.

Figure 40. Decision-maker on Food Purchase and Crop Production Participation



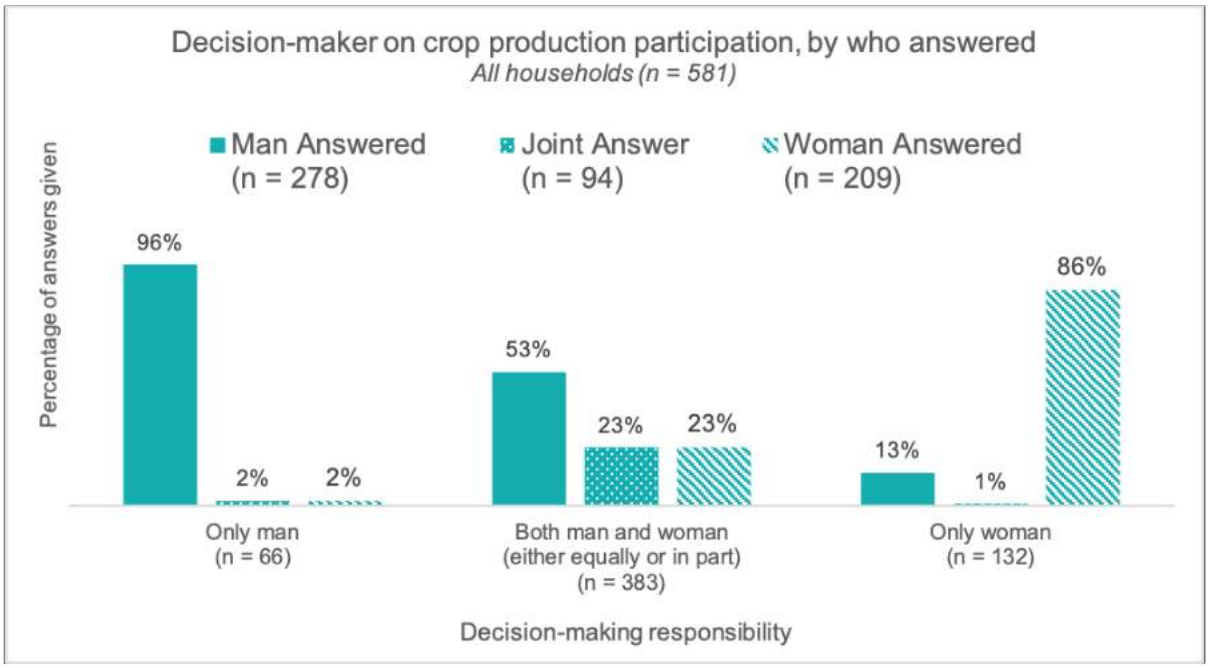
Again, after asking these questions on food production decisions, the enumerators were asked to observe who answered the questions to gauge intra-household gender relations. **Figure 41** disaggregates the information based on who answered the question and again shows a strong bias towards the gender of the person responsible for decision-making. For example, in the 177 households where men are the only decision-makers on food purchases, the man answered the question in 70% of the cases. A similar and even more pronounced pattern in seen with women, where the vast majority of women answered when they were solely responsible for decisions on food purchases. For joint decision households (either equally or in part), both men and women participated in answering the question, but men more so than women.

Figure 41. Decision-maker on Food Purchase Decisions, by who answered



A similar analysis was conducted on crop production participation decisions in **Figure 42**. Again, there is a strong bias towards the gender of the person responsible for decision-making, with women and men speaking for themselves when they are responsible, and answering together when there is joint responsibility.

Figure 42. Decision-maker on crop production participation, by who answered



ALL DECISIONS

Figure 43 provides a summary of all of the decisions asked about in the endline survey, and highlights the most common answer. It shows that joint-decision making is very common with men making slightly more decisions than women for some decision categories. However, there are still a significant percentage of households where women are leading the decision-making process.

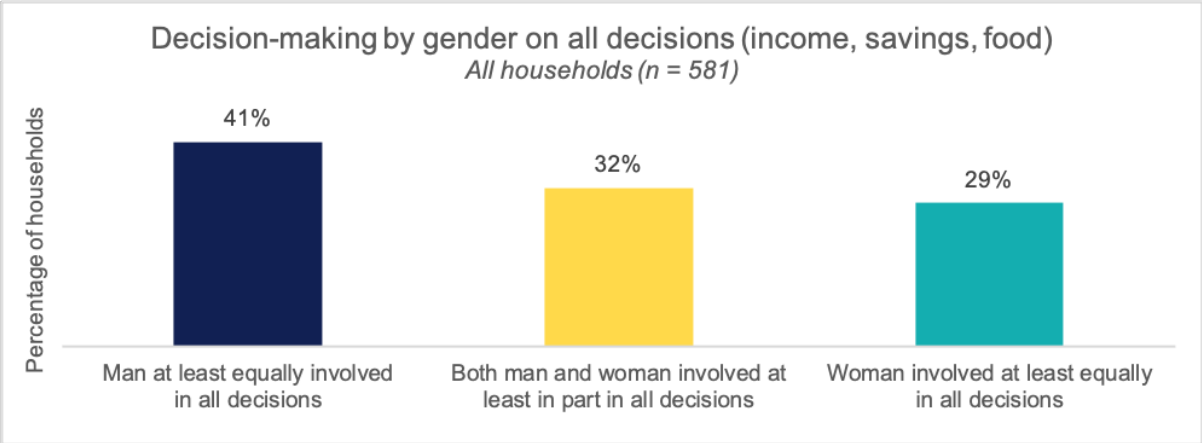
Figure 43. Summary of decision-making across seven decisions

	Decision-maker				
	Only man	Mostly man	Jointly	Mostly woman	Only woman
Coffee income	29%	22%	29%	1%	18%
Non-coffee income	20%	24%	33%	4%	20%
Major expenditures	28%	26%	26%	2%	17%
Minor expenditures	19%	15%	23%	21%	21%
Savings	33%	13%	28%	6%	20%
Food purchases	30%	22%	17%	11%	20%
Crop production participation	11%	10%	39%	17%	23%

Note: 13% of households are single-adult male, and 5% of households are single-adult female

To further assess overall decision-making across all types of decisions (income, savings, food), **Figure 44** analyzes the households where men, women, or both are involved at least equally in all decisions. In 41% of households men are involved at least equally in all decisions where questions were asked (income, savings, food). In 29% of households women were involved at least equally in all decisions. In 32% of households, both men and women were involved at least in some part in all decisions. These findings reinforce that men are overall the primary decision-makers in Sembabule District , but that joint decision-making and female-decision households are very common as well.

Figure 44. Decision-making by gender across all decisions (income, savings, food)

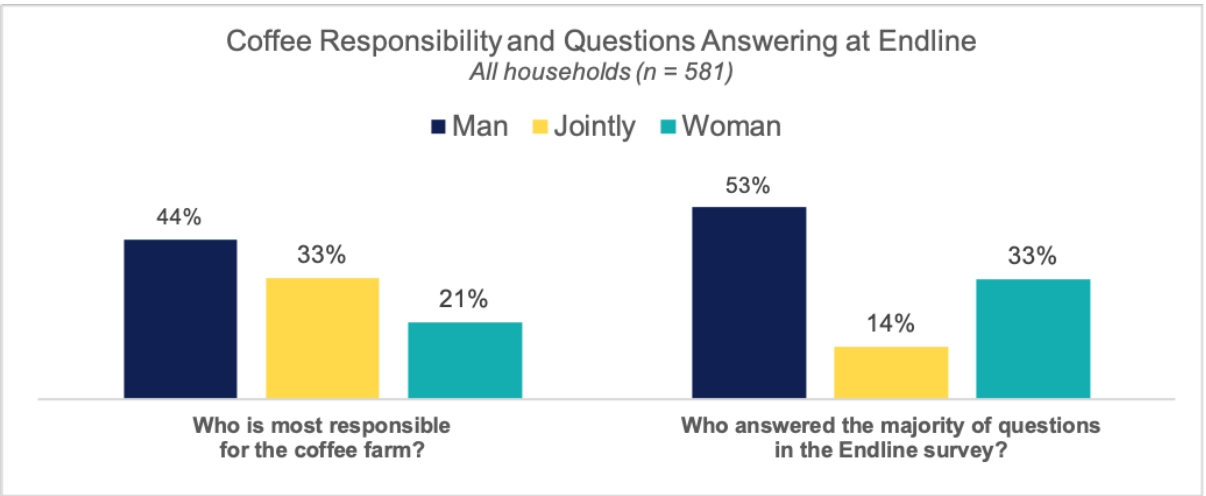


These findings highlight that women and men are responsible for different decisions within the household, and that many decisions are made jointly. Both women and men feel free to answer the questions about their decision-making when they are responsible, and allow their partner to answer when they are responsible. For joint decision-making households, men tend to be the primary question respondent, but women also contribute a considerable amount.

COFFEE FARM RESPONSIBILITY

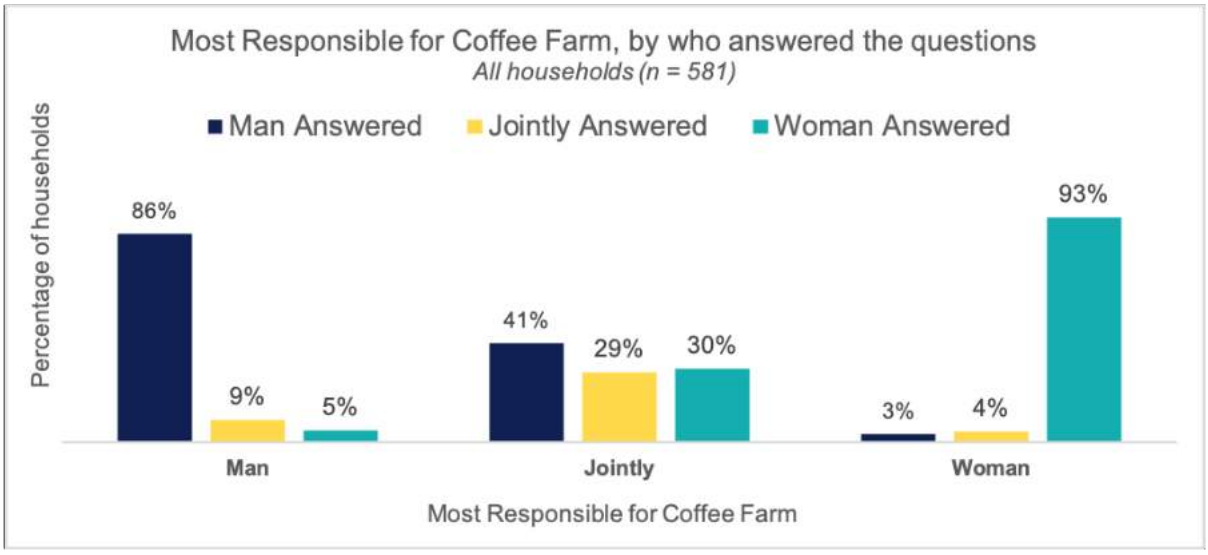
In order to further assess roles and responsibilities on the farm, respondents were asked who is most responsible for the coffee farm. In addition, at the end of the survey, enumerators were asked to record which respondent (man or woman) answered the majority of the questions throughout the survey. **Figure 45** illustrates that men are primarily responsible for the coffee farm (44%) and were also the primary respondent to the majority of survey questions (53%).

Figure 45. Coffee Farm Responsibility and Question Answering at Endline



To assess this further, **Figure 46** depicts who answered the majority of the questions throughout the entire endline survey, depending on who is responsible for the farm. Similar to the decision-making analysis, a strong bias towards the gender of the most responsible farmer was found. That is, when women were most responsible, women overwhelmingly (93%) answered the question. A similar pattern was found for men. This further suggests that women are empowered enough to: a) be responsible for the coffee farm; b) answer questions on their responsibility. It also shows that men and women allow their partners to answer for their own work, a sign of cooperative intra-household gender relations.

Figure 46. Coffee Farm Responsibility, by who answered the questions

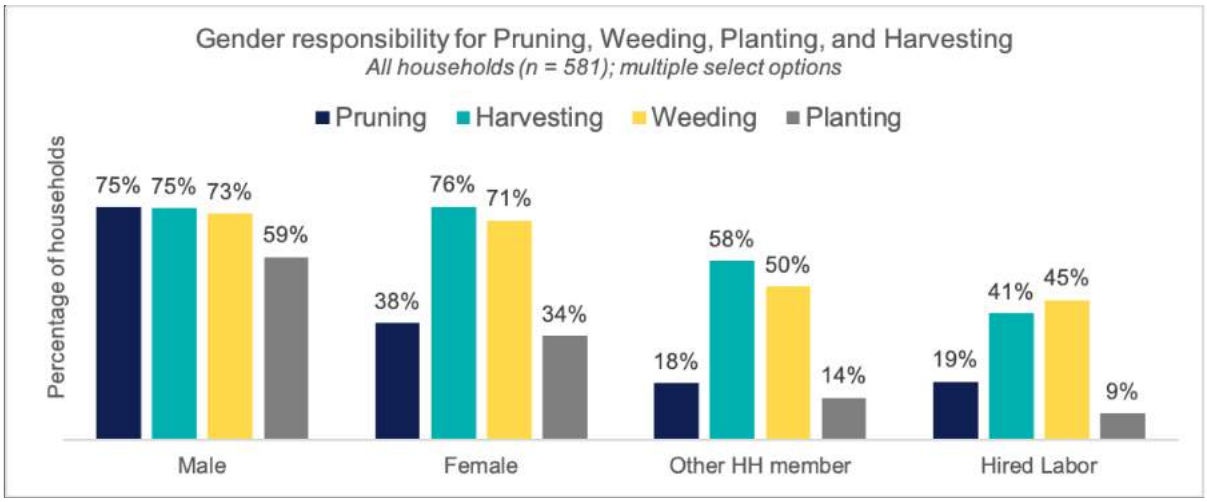


INTRA-HOUSEHOLD LABOUR DISTRIBUTION

To assess gender roles with respect to coffee production, questions were asked on the gender responsibility for four coffee farming practices: pruning, harvesting, weeding, and planting.

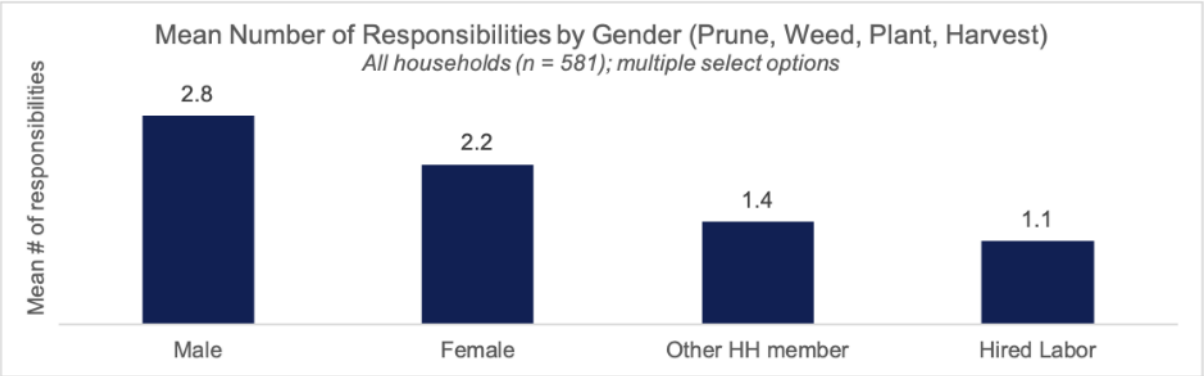
Figure 47 reports the findings, and shows that men and women have different responsibilities on the farm. Men are highly involved in all four practices, but are least involved in planting. Women are primarily involved in harvesting and weeding, and much less involved in pruning and planting. Harvesting and weeding, being less technical skills, are also the activities where other household members (often children aged 6–14) are most involved, and also the activities where hired labour is used.

Figure 47. Gender responsibility for Pruning, Weeding, Planting, and Harvesting



To further assess the intensity of labour required from each gender, **Figure 48** reports the mean number activities where each member is involved, and shows that men are involved in 2.8 of the 4 activities on average, compared to 2.2 for women. However, this metric does not capture the time spent on each activity, which would be a truer test of intensity of labour.

Figure 48. Mean Number of Responsibilities by Gender



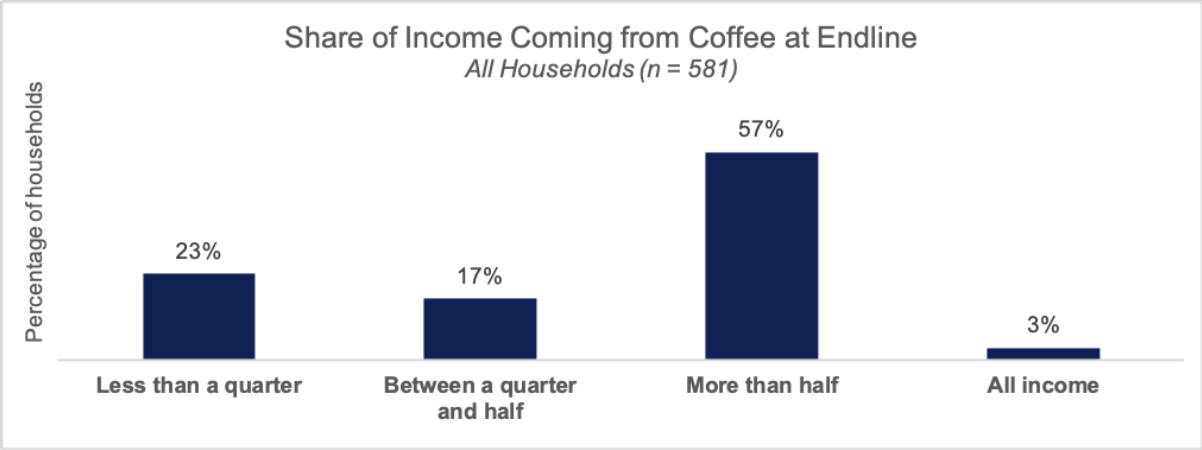
FINANCIAL PROFILE

This section is dedicated to understanding the income profile of households. Examining the financial profile of a household is useful to understand the wealth and vulnerability of the household.

INCOME DISTRIBUTION

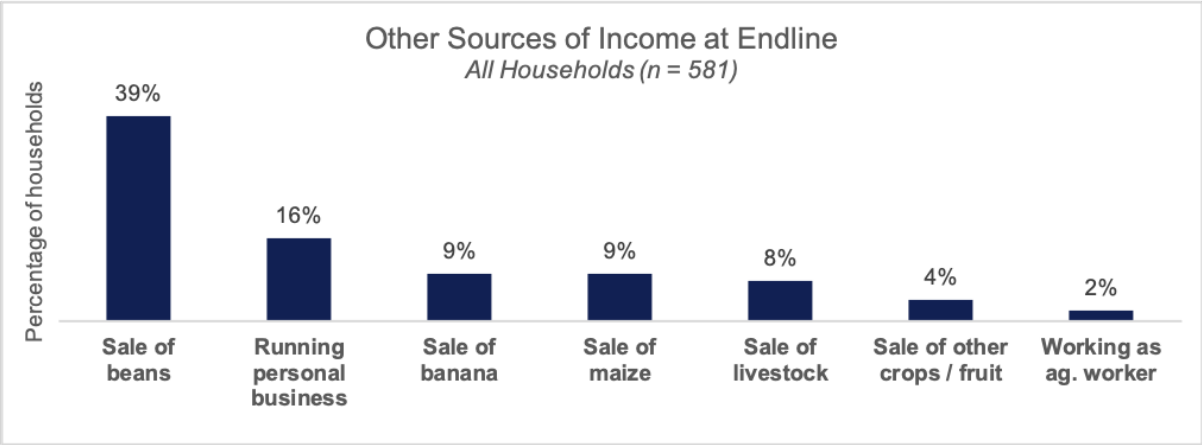
A major program goal of Farm College is to increase incomes and reduce poverty through increased coffee production and sales. **Figure 49** shows the dependence of households on coffee for income based on self-reported data.

Figure 49. Portion of Total Household Income from Coffee



In 2020, coffee households were highly dependent on coffee, with 60% of the households reporting that more than half of their total household income comes from coffee. This is a shift from baseline, where the majority of households (64%) recorded coffee income representing between 25% and 50% of income. The COVID-19 pandemic may be a factor in this shift as households may have lost other sources of income and are more dependent on coffee. As reported in **Figure 50**, other major economic activities in the area are: 1) the sale of maize, beans, and bananas (57%) 2) running personal businesses (16%); 3) the sale of livestock (8%).

Figure 50. Other Income Sources at Endline

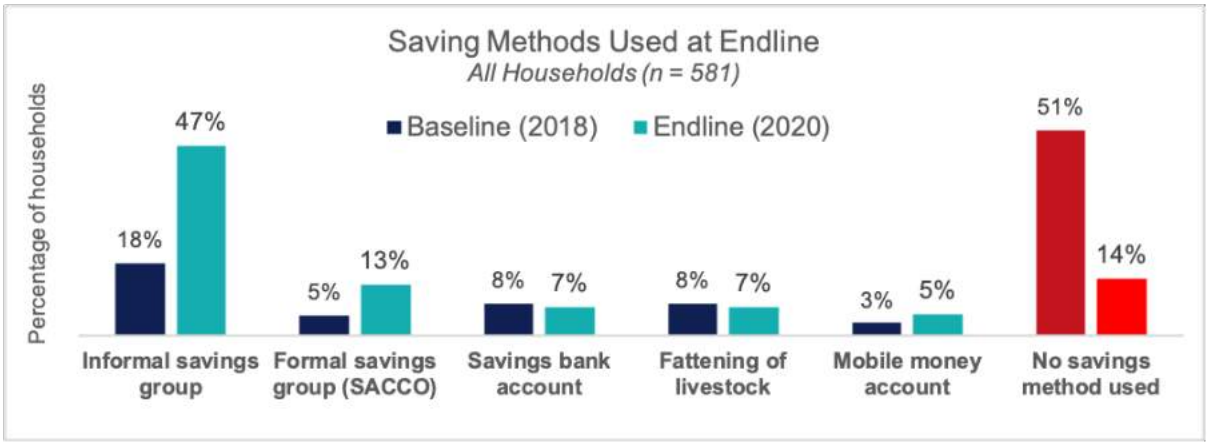


SAVINGS

For any household, savings are an important shield against financial shocks and coffee price volatility. 14% of the households reported that they do not use any method of savings. This is down dramatically from 51% at baseline, which appears to be driven by a rise in membership to informal savings groups.

Farmers were asked about their main saving methods, which is reported in **Figure 51**. 47% of the farmers mentioned informal saving groups as their main savings method, up dramatically from just 18% at baseline. 13% of farmers use formal savings groups (e.g., SACCOs), and only 7% of the households use formal saving bank accounts as their saving method. The same proportion of households (7%) report fattening of livestock as their main saving mechanism. A lower proportion of farmers (5%) use a mobile money account for savings.

Figure 51. Saving Methods Used at Endline



VULNERABILITY PROFILE

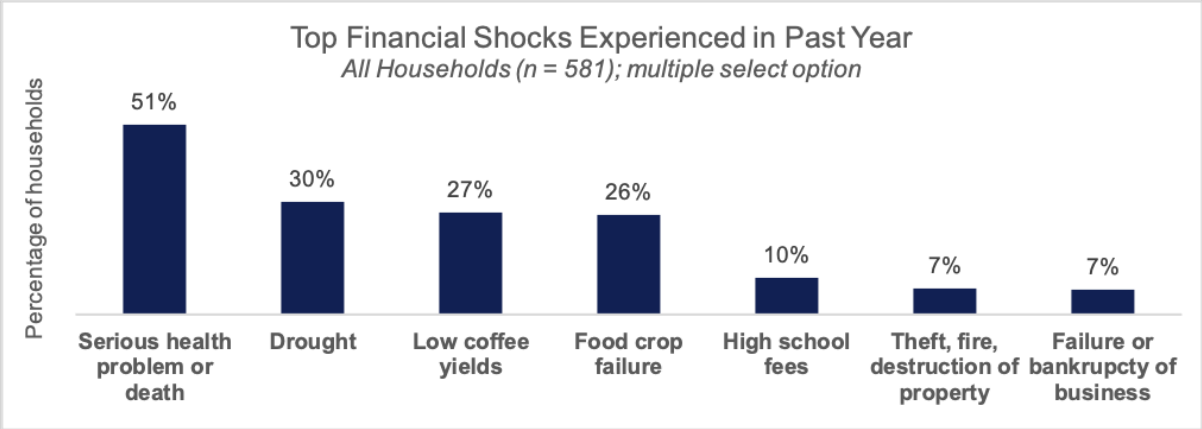
This section explores the vulnerability of households by studying the financial shocks and incidence of food shortages faced by farmers in Sembabule.

FINANCIAL SHOCKS

A shock or crisis is defined as any event that leads to a serious reduction in the farmer's asset holdings, causing the household income to fall substantially or result in a significant reduction in food consumption. A majority of the households at endline (70%) reported they have been affected by at least one serious financial shock or crisis during the last year. At baseline, this figure was 80%.

Households in the endline survey reported an average of 1.4 financial shocks in the last year, with the most common being a serious health problem or death (51%), drought (30%), and low coffee yields (27%). **Figure 52** reports the remaining most common shocks.

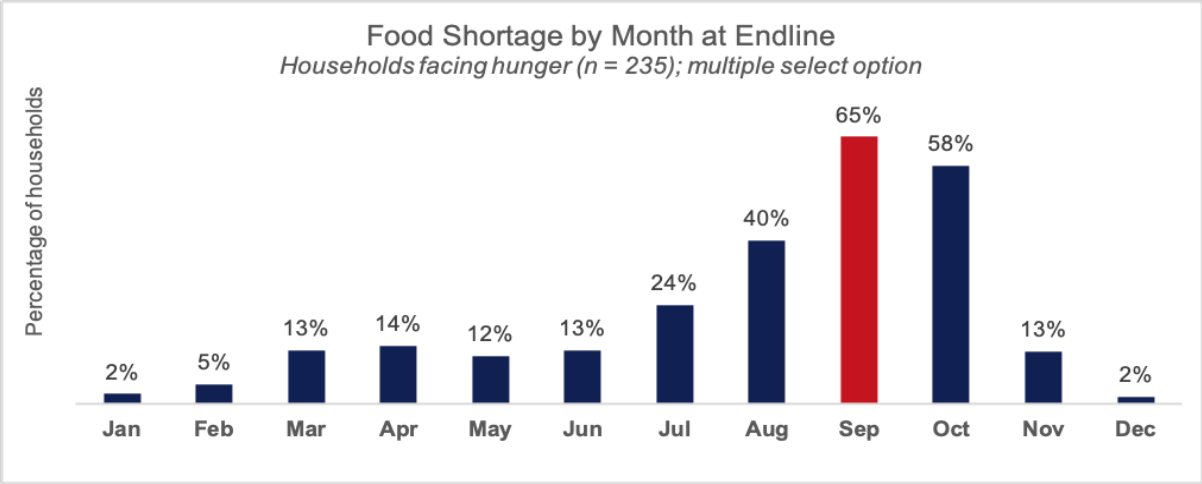
Figure 52. Top Financial Shocks Faced by Households



FOOD SHORTAGES

Food shortages can be debilitating for households, adversely affecting their health and ability to work on their farms. At endline, 235 households (40%) reported facing food shortages over the last year, each for an average of one month. This is down considerably from baseline, when 65% experienced food shortages for an average of two months. **Figure 53** below depicts the months of the year in which food shortages were most common, and shows August to October experiencing the most food shortages. The peak came in September, when 65% of the 235 households who experienced shortage, went hungry.

Figure 53. Main months of food shortage for 235 households facing food shortage



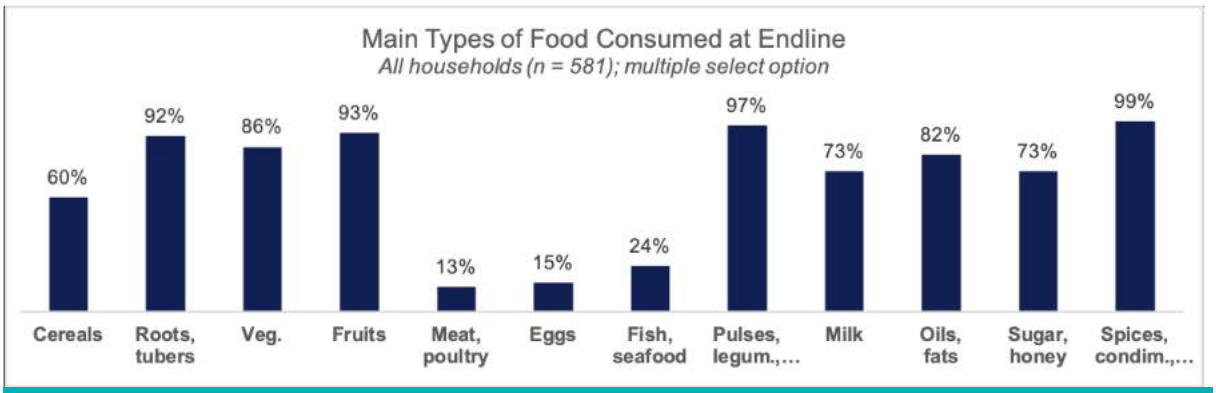
HOUSEHOLD DIET

In order to combine data from a large number of individual food groups, a single index was constructed using a method promoted by the Food and Agriculture Organization of the United Nations (FAO 2011). The household dietary diversity score (HDDS) reflects, in a snapshot, the economic ability of a household to access a variety of foods. Studies have shown that an increase in dietary diversity is associated with socio-economic status and household food security.

The HDDS takes integer values between 0 and 12; the higher the score, the better the dietary diversity. The average household in the endline survey has a HDDS score of 8, indicating a moderate dietary diversity for most farming households.

The most frequent food groups consumed by sampled farmers were pulses or legumes such as beans or peas (97%), fruits (93%), roots and tubers (92%), and spices or condiments (99%). A large majority of the households also consumed vegetables (86%), oils or fats (82%), sugar or honey (73%) and milk products (73%). Consumption of cereals fell from 77% at baseline to just 60% at endline. A lower percent of households (13%) reported having consumed meat (predominantly beef), fish (24%), and eggs (15%). Matooke, a staple dish in most of Uganda consisting of mashed starchy banana, was one of the most widely consumed food items at endline, with more than half (77%) of the households reporting having eaten this dish during the past 24 hours. Other popular dishes include boiled or mashed cassava (38%) and ugali (33%).

Figure 54. Main Types of Food Consumed



POVERTY ANALYSIS

This section provides a brief overview of two poverty assessment tools – the Progress out of Poverty Index (PPI) and the Multi-Dimensional Poverty Index (MPI). The purpose of these poverty assessment tools is to understand the relative poverty profile of the farmers involved in the Farm College program.

PROGRESS OUT OF POVERTY INDEX

The PPI is a poverty measurement tool comprised of a country-specific survey with 10 simple, easy-to-answer multiple-choice questions.[5] It was developed by Grameen Bank and managed by Innovations for Poverty Action (IPA). It is primarily used by NGOs, social enterprises, and a few foundations and has been customized for 61 developing countries to date, including Uganda (Schreiner 2011).

The total score that a household can achieve ranges between 0 (most likely to be below a poverty line) and 100 (least likely to be below a poverty line). The PPI scoring can be used to estimate three basic quantities. First, the poverty likelihood of a household, which is the probability that a household has per-adult or equivalent per-capita consumption below a poverty line. Second, the PPI score can estimate the poverty rate of a group of households at a point in time using the average scores of each household. Third, it can estimate the changes in the poverty rates of a group of households between two points in time.

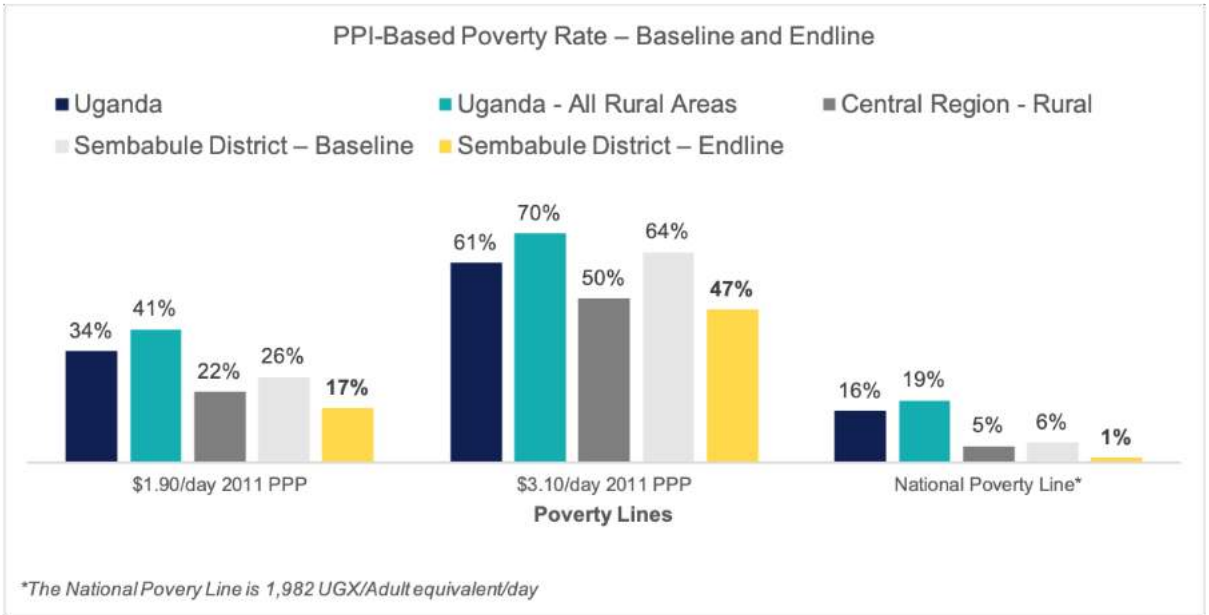
The Simple Poverty Scorecard (Schreiner 2011), used to measure the poverty likelihood of farmers in Central Uganda, is based on indicators related to the household composition (such as the number of household members), education (such as the level of education of a woman/wife), housing quality (such as the wall and roof materials of the house), and the ownership of durable assets (such as mobile phone or shoe ownership). For a detailed description of the questions used to build the poverty profile of Farm College coffee farmers, please refer to

Appendix 6.

[5] For more information on the Poverty Probability Index, visit https://www.povertyindex.org/about-us.

The results of this section compare the PPP-based poverty rate of coffee farmers in Sembabule to the Uganda National Household Survey 2016 ((UBOS) 2018), a nationally representative survey covering 7,500 households country-wide.
Figure 55 below shows the results of the PPI analysis for Sembabule District from both baseline and endline. The regional values do not change between baseline and endline as the same survey is used. The PPI value for a region represents the percentage of a given population that lives below the poverty line indicated.

Figure 55. PPI-Based Poverty Rate



As illustrated above, PPI-based poverty has fallen since baseline in all categories compared to national and regional averages. That is, the households belonging to the 2018 cohort of the Farm College are in a better position in terms of poverty levels, when using PPI calculations. Only 17% of the households at endline are likely to fall below the $1.90/day 2011 PPP poverty line, which is down from 26% at baseline, and now less than Central Region averages (22%). At the national poverty line level, only 1% of Sembabule households surveyed fall below the poverty line.

MULTI-DIMENSIONAL POVERTY INDEX

The global MPI is an international measure of poverty that complements traditional income-based poverty measures by capturing the deprivations that each person faces with respect to education, health, and living standards. It was developed and managed by the Oxford Poverty & Human Development Initiative and supported by UNDP. It is primarily used by UNDP (Human Development Report), World Bank, and other large institutions, and covers over 100 countries.[6]

Understanding the multiple facets of poverty like lack of education, health deprivation, and poor standards of living is critical to truly assessing the relative poverty of the beneficiaries. The MPI tool provides a multi-dimensional perspective of the relative poverty of farmers. Note that *incidence* refers to percentage of people that are multi-dimensionally poor/deprived, and *intensity* refers to proportion of indicators in which these poor people are deprived. The

[6] For more information, visit: http://hdr.undp.org/en/content/multidimensional-poverty-index-mpi

TechnoServe MPI was adapted[7] to the endline survey and compares the data of the surveyed households to that of the Uganda 2016 Demographic and Health Survey (Uganda Bureau of Statistics, 2018).

The results in **Figure 56** show that, on average, the coffee households in the 2018 cohort of Coffee Farm College are worse off than the national and regional averages. 66% of the households are considered multi-dimensionally poor compared to 55% of the households nation-wide, and 31% of the households in the Central Region of Uganda. However, this is slightly improved since baseline, where 69% of households were considered poor.

Figure 56. Multidimensional Poverty – Incidence and Intensity

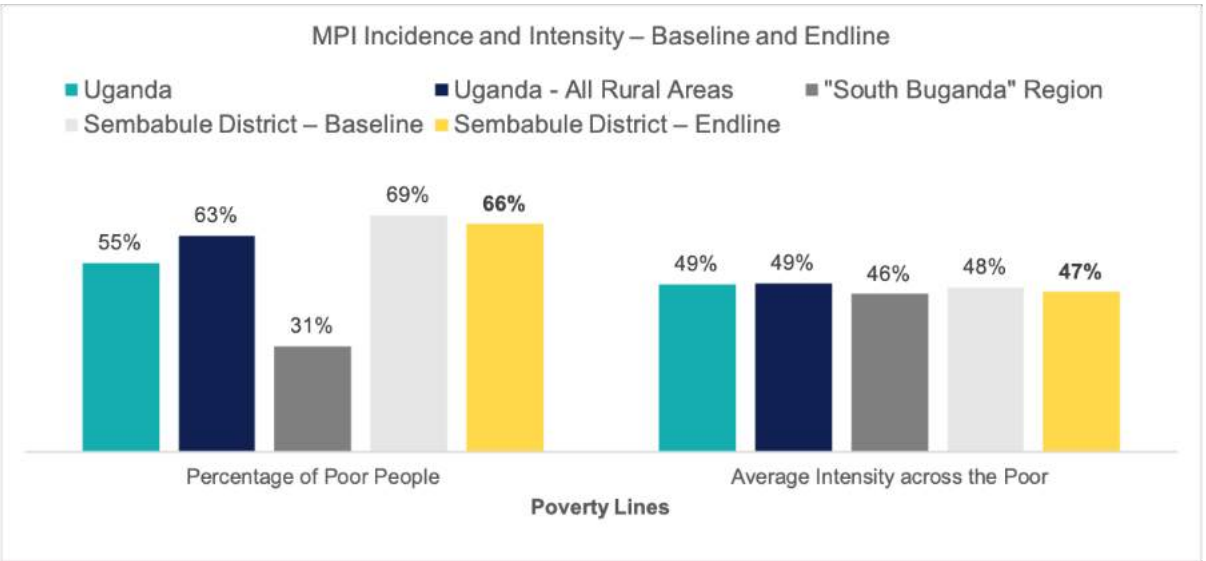
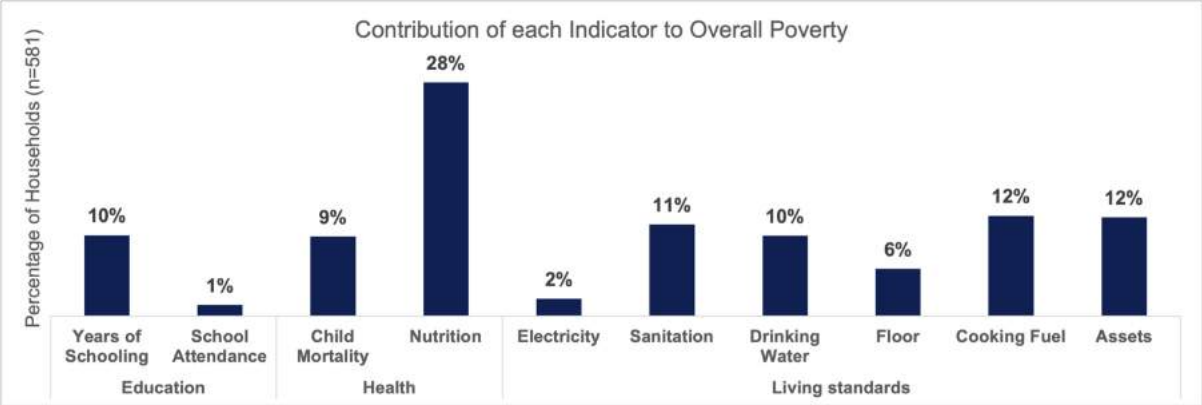


Figure 57 shows the contribution of the different indicators to overall poverty. The main contributor for the farmers in the 2018 Cohort of the Farm College is the nutrition component, as more than a quarter of the households (28%) have an HDDS score below or equal to 8, the threshold for deprivation in nutrition.

[7] The main change is the use of a Household Dietary Diversity Index (HDDS) instead of using Body Mass Index (BMI) based on scores for calculating nutritional deprivation. Numerous studies using cross-sectional data for sub-Saharan African and South Asian countries show a direct link between dietary diversity and the nutritional adequacy of a diet (Hoddinott and Yohannes, 2002; Ogle, 2001; Bhargava, 2015; Hatloy et al., 1998). Also, Arimond and Ruel (2004) show that dietary diversity does predict height-for-weight z-scores (HAZ), weight-for-age (WAZ) z-scores, and undernutrition – the very measures used in the global MPI. While this MPI may not be completely comparable with the global one, the HDDS we employed provides similar information at much lower data collection cost, hence its use is justified.

Figure 57. Contribution of each Indicator to Overall Poverty



APPENDICES

Appendix 1. Characteristics of Adopting Households

A comparison of the characteristics of (i) households adopting four or more best practices – High Adopters, to those (ii) households who have implemented three or fewer best practices – Low Adopters, reveals that the two groups are slightly different. Differences are statistically significant for women's age, women's education, men's literacy rates, land planted with coffee, asset ownership, and financial shocks faced. That is, high adoption households are statistically different than low adoption households in the following ways:

1% significance differences

- Women in high adoption households are *younger* on average (age 40) compared to low adoption households (age 44).
- Women in high adoption households have *more* formal education (88%), compared to low adoption households (82%).
- Men have *higher* rates of literacy in high adoption households (91%), compared to low adoption households (82%).
- Low adoption households have *less* land planted with coffee trees (0.8 hectares) compared to high adoption households (1.2 hectares)
- High adoption households own *more* assets (9) compared to low adoption households (8)

5% significance differences

- High adoption households were *more* likely to have faced a financial shock in the last year.

Table 3. Average Characteristics of Low and High Best Practice Adopting HHs

Statistically significant differences are highlighted in green.

	Low Adoption Households	High Adoption Households
	Adopting less than 4 BPs	Adopting 4 or more BPs
No. of Households	384	197
Number of household members	6	7
Number of children	4	4

Age of woman***	44	40
Age of man	48	47
Formal education rate – women***	82%	88%
Formal education rate – men	89%	92%
Literacy rate – women	75%	80%
Literacy rate – men***	82%	91%
Total agricultural land (hectares)	2.0	2.2
Land planted with coffee (hectares)***	0.8	1.2
% Faced financial shocks in last year**	67%	77%
% Faced food shortages in last year	38%	43%
Asset Ownership (number of assets)***	8	9
Coffee majority of income	59%	62%
HH Dietary Diversity Score	8.0	8.2

The stars (*) represent the significance level of the difference between the high adoption and low adoption groups.
*** *Significant at the 1% level,*
** *Significant at the 5% level,*
* *Significant at the 10% level.*

Appendix 2. Best Practice Adoption by Training on Each Specific Topic

A comparison of best practice adoption rates was conducted for households that were considered trained on a specific topic (sometimes this required attendance at multiple trainings) –*Attended Training on Topic* – and those who were not topic trained – *Did Not Attend Training on Topic*. None of the differences were found to be statistically significant.

Table 4. Best practice adoption by training on each specific topic

	Not Trained on Specific Topic	Trained on Specific Topic
	Overall Average	Overall Average
Shade	64%	66%
Weeding	59%	65%
IPDM	63%	63%
Erosion Control	60%	59%
Rejuvenation	47%	56%
Pruning	44%	47%
Coffee Nutrition	19%	17%
Record Keeping	2%	5%
Mulching	6%	4%
Safe Use of Pesticides	0%	0%
Average # of best practices adopted *(out of 10)*	**4 BPs**	**4 BPs**

The stars (*) represent the significance level of the difference between the high adoption and low adoption groups.
*** *Significant at the 1% level,*
** *Significant at the 5% level,*
* *Significant at the 10% level.*

Appendix 3. Best Practice Adoption by Non-Attending Households

A comparison of best practice adoption rates was also conducted for the 79 households who did not attend Coffee Farm College. **Table 5** reports these rates as well as the adoption rates and also reports the rates for *Low Attending Households* (less than 7 topics attended) and *Trained Households* (more than 7 topics attended).

Table 5. Best practice adoption for non-attending households at endline

	Non-Attending Households	**Low Attend. Households**	**Trained Households**
	Overall Average	Overall Average	Overall Average
No. of Households	79	63	443
Shade	78%	60%	66%
Weeding	62%	58%	65%
IPDM	42%	58%	64%
Erosion Control	44%	72%	57%
Rejuvenation	61%	53%	54%
Pruning	42%	50%	46%
Coffee Nutrition	16%	16%	18%
Record Keeping	2%	4%	5%
Mulching	2%	5%	4%
Safe Use of Pesticides	0%	0%	0%
Average # of best practices adopted *(out of 10)*	**3 BPs**	**4 BPs**	**4 BPs**
Households adopting more than half (5) of the best practices	**29%**	**26%**	**35%**

Appendix 4. Best Practice Adoption by Parish

Comparison of households from the 15 parishes shows that there is a variation in best practice adoption between the parishes – see **Table 6**.

Highest Adopting Parishes

- *Nsoga* – Nsoga averaged the most amount of best practices adopted (4.3), and the second most households adopting 5+ best practices (45%)
- *Mateete* – 38% of farmers in Mateete are adopting more than 5 best practices, and households average 4.2 best practices
- *Nakagongo* – 46% of farmers are adopting more than 5 best practices (most of all parishes); households average 3.9 best practices

Low Adopting Parishes

- *Kasambya* – only 22% of farmers are adopting 5 or more best practices, and they score the lowest average best practices at endline (3.4).
- Lugusulu – farmers at endline averaged just 3.3 best practices, the lowest of any parish.

Table 6. Best Practice Adoption, by Parish

For each best practice, the two highest adopting parishes are highlighted in green, and the two lowest adopting parish is highlighted in red. (*n = 581)*

	Kabale	Kasam-bya	Kasambya Lwebitakuli	Kayunga	Kido-kolo	Kinywa-mazzi	Lugus ulu	Lwebita-kuli	Mabindo	Man-yama	Mateete	Mitete	Naka-gongo	Naka-senyi	Nsoga
No. of households															
Record Keeping	0%	6%	5%	7%	6%	0%	3%	6%	5%	8%	5%	3%	8%	5%	5%
Safe Use of Pesticides	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Weeding	72%	64%	54%	73%	64%	65%	60%	71%	67%	82%	58%	61%	59%	54%	61%
IPDM	46%	47%	56%	56%	69%	51%	55%	65%	62%	53%	68%	74%	64%	74%	79%
Rejuvenation	49%	58%	56%	68%	69%	43%	53%	53%	49%	45%	53%	45%	77%	59%	61%
Pruning	41%	44%	38%	46%	61%	43%	35%	49%	49%	50%	30%	65%	62%	44%	58%
Nutrition	8%	8%	10%	5%	6%	27%	20%	24%	15%	21%	40%	26%	13%	10%	16%
Mulching	8%	3%	5%	5%	6%	8%	3%	0%	5%	3%	5%	0%	3%	0%	0%
Erosion	51%	47%	59%	51%	56%	68%	40%	47%	64%	63%	73%	61%	54%	51%	76%
Shade	82%	61%	64%	54%	50%	76%	63%	57%	74%	55%	88%	71%	54%	64%	71%
Adopted 5+ BPs	**21%**	**22%**	**21%**	**32%**	**42%**	**35%**	**30%**	**27%**	**41%**	**34%**	**38%**	**42%**	**46%**	**38%**	**45%**
Sum BPs (Endline)	**3.6**	**3.4**	**3.5**	**3.7**	**3.9**	**3.8**	**3.3**	**3.7**	**3.9**	**3.8**	**4.2**	**4.1**	**3.9**	**3.6**	**4.3**
Sum BPs (Baseline)	**1.8**	**1.5**	**1.9**	**2.3**	**1.9**	**2.6**	**2.1**	**2.3**	**2.5**	**2.0**	**3.0**	**2.6**	**2.6**	**2.2**	**2.8**

Appendix 5. Best Practice Rule Changes since Baseline

In the baseline report, best practices were scored using a new, more complex rule methodology, combining feedback from HRNS. At endline, the decision was made to revert back to the standard TNS rules which are consistent with all other countries as well as the program proposal. This endline report uses these standard TNS rules, and has converted all baseline results to these usual rules. **Table 7** displays the original baseline rules as well as the usual TNS rules used at endline, and describes the difference between the two methodologies. A discussion will be held with the wider UCAT team on the rules in light of the findings.

Table 7. Rules changes since Baseline to revert to usual TNS rules

	Original Baseline Rule	Updated Rule at Endline (Usual TNS Rules)	Comment
10 Best Practices	Adopted if:	Adopted if:	
Record Keeping	1. Farmer has a Record Book ***AND*** 2. This has records of either coffee sold ***OR*** hired labour costs or other costs	1. Farmer has a Record Book ***AND*** 2. This has records of either coffee sold ***OR*** hired labour costs or other costs	No change. Already consistent with usual TNS rules.
Safe Use of Pesticides	***N/A*** if farmer has not sprayed pesticide. If farmer <u>has</u> sprayed pesticide: 1. Farmer has been trained on how to safely use pesticide ***AND*** 2. Famer is not storing pesticide ***OR*** farmer stores pesticide outside the house and the store is locked ***AND*** 3. Farmer used masks googles and gloves at a minimum ***OR*** contractor used masks goggles and gloves items ***AND*** 4. Containers not washed and re-used for other purposes ***AND*** not thrown into the fields or compound	***N/A*** if farmer has not sprayed pesticide. If farmer <u>has</u> sprayed pesticide: 1. Farmer has been trained on how to safely use pesticide ***AND*** 2. Famer is not storing pesticide ***OR*** farmer stores pesticide outside the house and the store is locked ***AND*** 3. Farmer used masks googles and gloves at a minimum ***OR*** contractor used masks goggles and gloves items ***AND*** 4. Containers not washed and re-used for other purposes ***AND*** not thrown into the fields or compound	No change. Already consistent with usual TNS rules.

	AND not thrown into the rubbish pit ***AND*** not buried ***AND*** not thrown into pit latrine/toilet 5. No banned pesticides used	***AND*** not thrown into the rubbish pit ***AND*** not buried ***AND*** not thrown into pit latrine/toilet 5. No banned pesticides used	
Weeding	1. Farmer has pulled weeds by hand, used a slasher under the tree canopy, used a panga to weed under the tree canopy, dug under the tree canopy, or applied herbicides ***AND*** 1.1. Farmer has NOT exclusively dug under the tree canopy exclusively ***AND*** 2. Farmer weeds twice or more per year ***AND*** 3. There are few OR no weeds ***AND*** 4. If there are few weeds, they are less than 30cm tall ***AND*** 5. Weeds have not reached the flowering stage	1. Farmer has pulled weeds by hand, used a slasher under the tree canopy, used a panga to weed under the tree canopy, dug under the tree canopy, or applied herbicides ***AND*** 1.1. Farmer has NOT exclusively dug under the tree canopy exclusively ***AND*** 2. Farmer weeds twice or more per year ***AND*** 3. There are few OR no weeds ***AND*** 4. If there are few weeds, they are less than 30cm tall	Weed flowering criteria was removed in order to be consistent with usual TNS rules in other countries and cohorts.
IPDM	1. Farmer can name at least 4 out of 9 IPDM methods ***AND*** 2. Farmer mentions uprooting and burning infested trees for CWD ***AND*** 3. Farmer mentions removing and burning infested twigs for CTB	1. Farmer can name at least 3 out of 9 IPDM methods	Reverted to usual TNS rules which require 3 out of 9 methods, and do not specify conditions on specific methods.
Rejuvenation	1. Most trees have 4 main stems or less ***AND*** 2. The oldest trees are 8 years old or younger ***OR***	1. Most trees have 4 main stems or less AND 2. The oldest main stems are 8 years or younger	Reverted to usual TNS rule for rejuvenation, which requires 4 or fewer main stems and main stems 8 years or younger.

	1. At least one tree is older than 8 years ***AND*** 2. The oldest main stems are 8 years or younger ***AND*** 3. Most trees have 4 main stems or less ***AND*** 4. At least 25% of the farm has been rejuvenated ***AND*** 5. Suckers are less than 30cm tall OR Suckers are more than 30cm tall AND there are 4 or less suckers		
Pruning	1. Trees have been pruned using <u>4 of the 5</u> methods listed	1. Trees have been pruned using <u>3 of the 4</u> methods listed	Reverted to usual TNS rule for pruning, which requires 3 methods to be seen. In addition, the responses choosing the option "Broken / unproductive stems and/or branches removed" were removed, as this option is not typically given in any other countries or cohorts. As such, the usual TNS rule of 3 of 4 methods is used.
Coffee Nutrition	1. Nearly all leaves are dark green ***AND*** 2. <u>At least two</u> of the following are used: compost or manure (counted as 1), NPK, Foliar Feeds, Lime and DAP. If foliar feed is used only count if this is zinc/boron based ***AND*** 3. IF fertilizer is applied to the soil, the fertilizer has been applied using a measure, and is not broadcast	1. Nearly all leaves are dark green ***AND*** 2. <u>At least one</u> of the following are used: compost or manure (counted as 1), NPK, Foliar Feeds, Lime and DAP. If foliar feed is used only count if this is zinc/boron based ***AND*** 3. IF fertilizer is applied to the soil, the fertilizer has been applied using a measure, and is not broadcast	Reverted to usual TNS rule for good soils (based in soil survey results since the baseline) where organic production is common, which requires one product be used, instead of two.

Mulching	1. Farmer has applied mulch ***AND*** 2. Mulch applied on up to 25% of the farm ***AND*** 3. Mulch is more than 2cm thick	1. Farmer has applied mulch ***AND*** 2. Mulch is more than 2cm thick	Reverted to usual TNS rules which do not include the 25% farm proportion criteria.
Erosion Control	1. At least two erosion control methods seen	1. At least one erosion control methods seen	Reverted back to usual TNS rules which requires just one erosion control method seen. In addition, the options of trenches and water traps were combined into one single option, as trenches are not typically an option under TNS rules.
Shade	1. There is 20% shade or more ***OR*** 2. There is less than 20% shade but shade trees have been planted in the last 3 years	1. There is 20% shade or more ***OR*** 2. There is less than 20% shade but shade trees have been planted in the last 3 years	No change. Already consistent with usual TNS rules.
Other Agronomy Practices			
Composting	Originally considered a BP	No longer considered a BP	Not usually considered a standalone BP as it is included under Coffee Nutrition. This is consistent with TNS rules in other countries and cohorts.
Intercropping	Originally considered a BP	No longer considered a BP	Not usually considered a standalone BP under usual TNS rules. Question was changed.
Coffee Planting	Not considered a BP	Not considered a BP	No change
Coffee Drying	Not considered a BP	Not considered a BP	No change

Appendix 6. MPI and PPI Scorecards

Figure 58. MPI Scorecard

The dimensions, indicators, deprivation thresholds and weights of the MPI

Dimensions of poverty	Indicator	Deprived if…	Related to	Weight
Education	Years of Schooling	No household member aged 10 years or older has completed five years of schooling.	MDG2	1/6
	Child School Attendance	Any school-aged child+ is not attending school up to the age at which he/she would complete class 8.	MDG2	1/6
Health	Child Mortality	Any child has died in the family in the five-year period preceding the survey	MDG4	1/6
	Nutrition	Any adult under 70 years of age, or any child for whom there is nutritional information is undernourished in terms of weight for age*.	MDG1	1/6
Living Standard	Electricity	The household has no electricity.		1/18
	Improved Sanitation	The household's sanitation facility is not improved (according to MDG guidelines), or it is improved but shared with other households**.	MDG7	1/18
	Improved Drinking Water	The household does not have access to improved drinking water (according to MDG guidelines) or safe drinking water is at least a 30-minute walk from home, roundtrip***.	MDG7	1/18
	Flooring	The household has a dirt, sand, dung or 'other' (unspecified) type of floor.		1/18
	Cooking Fuel	The household cooks with dung, wood or charcoal.	MDG7	1/18
	Assets ownership	The household does not own more than one radio, TV, telephone, bike, motorbike or refrigerator and does not own a car or truck.	MDG7	1/18

Figure 59. PPI Scorecard

Indicators	Responses	Score
1. How many members does the household have?	A. Nine or more	0
	B. Seven or eight	5
	C. Six	8
	D. Five	12
	E. Four	18
	F. Three	22
	G. One or two	32
2. What is the highest school grade that the female head/spouse has completed?	A. None, or pre-school	0
	B. Primary standards 1 to 6	1
	C. Primary standard 7	2
	D. Primary standard 8, or secondary forms 1 to 3	6
	E. No female head/spouse	6
	F. Secondary form 4 or higher	11
3. What kind of business (type of industry) is the main occupation of the male head/spouse connected with?	A. Does not work	0
	B. No male head/spouse	3
	C. Agriculture, hunting, forestry, fishing, mining, or quarrying	7
	D. Any other	9
4. How many habitable rooms does this household occupy in its main dwelling (do not count bathrooms, toilets, storerooms, or garage)?	A. One	0
	B. Two	2
	C. Three	5
	D. Four or more	8
5. The floor of the main dwelling is predominantly made of what material?	A. Wood, earth, or other	0
	B. Cement or tiles	3
6. What is the main source of lighting fuel for the household?	A. Collected firewood, purchased firewood, grass, or dry cell (torch)	0
	B. Paraffin, candles, biogas, or other	6
	C. Electricity, solar, or gas	12
7. Does your household own any irons (charcoal or electric)?	A. No	0
	B. Yes	4
8. How many mosquito nets does your household own?	A. None	0
	B. One	2
	C. Two or more	4
9. How many towels does your household own?	A. None	0
	B. One	6
	C. Two or more	10
10. How many frying pans does your household own?	A. None	0
	B. One	3
	C. Two or more	7

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