Livius gGmbH

# An Assessment of Rural Poverty and Sustainability Indicators in Coffee Growing Regions of South and Southwestern Ethiopia

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**Abstract**

Enveritas evaluates 30 different sustainability standards in coffee growing communities. “Above Poverty Line” is the top economic standard in Enveritas’ sustainability standards. It is assessed by evaluating the probability of a household being under the poverty line.

This assessment applies the poverty probability assessment to a sample of 13,204 coffee producing households from nine coffee growing regions in Ethiopia. Field surveys were conducted by Enveritas between October and December 2018 and analyzed in 2019. The work was funded by a grant from Livius gGmbH.

The objective of the assessment is to identify the levels of rural poverty in coffee growing regions of South and Southwestern in Ethiopia and to evaluate the individual components of the poverty assessment and their respective contributions to poverty levels. The second objective is to identify correlations between poverty levels and other sustainability indicators, such as clean water, soil conservation, and worker wages.

The assessment finds that between 30-35% of farmers in the targeted coffee regions are expected to be above US$3.10 per day poverty line. It shows that the lowest levels of poverty are expected in Sidama A and Sidama B and the highest levels of poverty are expected in Yirgachefe and Sidama C.

Poverty probability was determined on the basis of eight independent components. The component that has the greatest influence on poverty levels is household size. A large household is more likely to be living below the poverty line than a small one. The component score that shows the greatest regional variance is, “How many gabi does the household currently own?” (A “gabi” is a heavy cotton shawl or blanket, woven locally across Ethiopia.) Other indicators that assessment utilizes are: "Can the male head/spouse read and write?", "Can the (oldest) female head/spouse read and write?", "What is the main source of energy for cooking?", "Does the household currently own any mattresses or beds?", "Does the household currently own any radios/radio-and-tape players/tape players?", "If the household farms, then does it currently own any plows?".

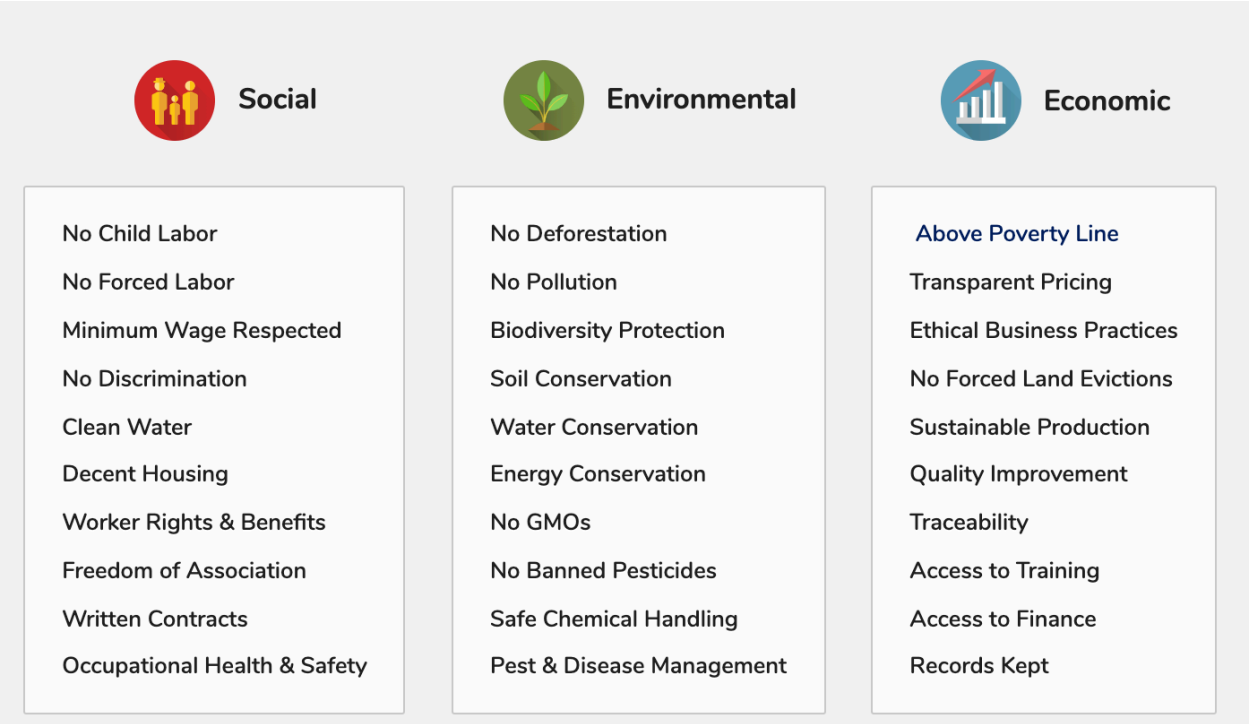
**Background**

Enveritas evaluates 30 different sustainability standards in coffee growing communities. These standards reflect the sustainability topics commonly covered by the United Nations' Sustainable Development Goals (SDGs), supply chain certification schemes, and international development efforts.

"Above Poverty Line" is the top economic standard in Enveritas' sustainability standards. Specifically, the standard considers two criteria:

- Coffee producing families have a standard of living above the United Nation's extreme poverty line, defined as $1.90 per person per day in Purchasing Power Parity (PPP) terms.
- Coffee producing families have a standard of living above the United Nation's $3.10 per person per day poverty line in Purchasing Power Parity (PPP) terms.

Exhibit 1. Enveritas global sustainability standards[1]




The next section describes the methodology used to assess whether producers are "Above Poverty Line".

[1] Available at: https://www.enveritas.org/library/standards/#/

**Poverty Assessment Methodology**

This assessment applies a poverty probability assessment to a population of 13,204 coffee producing households. The objective of the assessment is to identify the levels of rural poverty in coffee growing regions of South and Southwestern in Ethiopia. The secondary objective is to evaluate the individual components of the poverty assessment and their respective contributions to poverty levels.

The Poverty Probability Index (PPI®) is a poverty measurement tool for organizations with a mission to serve the poor. The PPI is statistically-sound, yet simple to use: the answers to questions about a household's characteristics and asset ownership are scored to compute the likelihood that the household is living below the poverty line. With the PPI, organizations can identify the farmers, customers, or employees who are most likely to be poor, integrating objective poverty data into their assessments and strategic decision-making.[2]

The tool was developed by the Grameen Foundation in 2005, when they commissioned the development of the Progress out of Poverty Index® (PPI®) with the support of the Consultative Group to Assist the Poor (CGAP) and Ford Foundation. Their goal was to create an easy-to-use poverty measurement tool for microfinance institutions, understanding that these institutions need reliable poverty data to manage their social performance.

Today, the PPI has proven its reliability and feasibility to many organizations around the world. Armed with client-level poverty data, these organizations are now making more informed decisions and assessments. The PPI is now used by a wide range of organizations—international NGOs, social enterprises, donors, investors, multi-national corporations, governments and more—across a variety of sectors including agriculture, healthcare, education, energy, and financial inclusion.[3]

This study uses the methodology and survey questions developed for application in Ethiopia by Schreiner 2016[4]. Schreiner's Ethiopia poverty-assessment tool is a variant of the PPI that uses eight low-cost indicators from Ethiopia's 2011 Welfare Monitoring Survey to estimate the likelihood that a household has consumption (from Ethiopia's 2010/11 Household Consumption and Expenditure Survey) below a given poverty line. Field workers can collect responses in about ten minutes. The scorecard's accuracy is reported for a range of poverty lines. The scorecard is a practical way for pro-poor programs in Ethiopia to measure poverty rates, to track changes in poverty rates over time, and to segment clients for differentiated treatment.

[2] Innovations for Poverty Action (IPA). *About the PPI: A Poverty Measurement Tool.* Available at: https://www.povertyindex.org/about-ppi, accessed May 2019.
[3] Ibid
[4] Schreiner, Mark. *Simple Poverty Scorecard Poverty-Assessment Tool Ethiopia*. Microfinance Risk Management, 2016.

All data was collected during the period October to December 2018. Questions and responses were translated into local languages in Ethiopia including Afan Oromo, Amharic, Gedeo, Segen, Sidamigna, and Wolaytigna.

The eight indicators used in the survey and response options are shown below. Each response is given a score and the final score is calculated as the total points for each response.

Table 1. The Ethiopia Poverty-Assessment Tool

| Indicator | Response | Points | Score |
|---|---|---|---|
| 1. How many members does the household have? | A. Seven or more | 0 | |
| | B. Six | 7 | |
| | C. Five | 11 | |
| | D. Four | 18 | |
| | E. Three | 25 | |
| | F. Two | 38 | |
| | G. One | 47 | |
| 2. Can the male head/spouse read and write? | A. No male head/spouse | 0 | |
| | B. No | 2 | |
| | C. Yes | 6 | |
| 3. Can the (oldest) female head/spouse read and write? | A. No female head/spouse | 0 | |
| | B. No | 5 | |
| | C. Yes | 12 | |
| 4. What is the main source of energy for cooking? | A. Firewood, charcoal, or crop residue/leaves | 0 | |
| | B. Dung/manure | 4 | |
| | C. Saw dust, kerosene, butane gas, electricity, solar energy, biogas, none, or other | 9 | |
| 5. Does the household currently own any mattresses or beds? | A. No | 0 | |
| | B. Yes | 5 | |
| 6. Does the household currently own any radios/radio-and-tape players/tape players? | A. No | 0 | |
| | B. Yes | 7 | |
| 7. How many *gabi* does the household currently own? | A. None | 0 | |
| | B. One | 3 | |
| | C. Two or more | 6 | |
| 8. If the household farms, then does it currently own any plows? | A. Does not farm | 0 | |
| | B. Farms, but does not have plows | 6 | |
| | C. Farms, and has plows | 8 | |

**Sampling Frame**

This study builds on earlier work conducted by Enveritas to determine the population of coffee farmers in Ethiopia. The methodology used to arrive at an empirically-sound estimate of coffee of farmers and sample frame relied on the following steps.

*1. Decide on population distribution model*

First, we plot the sample results and use the Cullen and Frey graph to decide on the distribution. A Cullen and Frey graph helps to recognize what is the possible distribution of population from which the sample is drawn.[5] Next, we plot the theoretical and empirical densities for chosen distributions and confirm the distribution choice. These plots help to determine if the data set come from population with given distribution (a log-normal model was chosen to explain Ethiopia coffee production trends by household). Finally, we perform tests to see if the data follows our chosen distribution using goodness-of-fit statistics. The Kolmogorov-Smirnov test is a nonparametric test of the equality of continuous, one-dimensional probability distributions that can be used to compare a sample with a reference probability distribution. The null hypothesis is that the sample is drawn from the reference distribution. Akaike's and Bayesian Information Criterion (AIC, BIC) are criterions for model selection among a finite set of models; the model with the lowest BIC/AIC is preferred. AIC and BIC are strongly related to each other.[6]

*2. Estimate distribution parameters*

Once a distribution has been chosen and the choice has been confirmed, the parameters of the distribution are estimated. For log-normal distributions, two parameters have to be estimated: meanlog (scale – median of the distribution) and sdlog (shape – standard deviation of the log of the distribution). These estimates are derived from the following formula:

$$N(lnx;\mu;\sigma) = \frac{1}{\mathrm{x}\sigma\sqrt{2\pi}} exp\left[-\frac{(lnx-\mu)^2}{2\sigma^2}\right]$$

*3. Estimation of population median*

Once the parameters of the distribution are estimated, the population parameters can be calculated through direct substitution. For example, for a meanlog of 4.054 and a sdlog of 0.804, we can plug it into our distribution formula and obtain a median of 57.6 kg per farm:

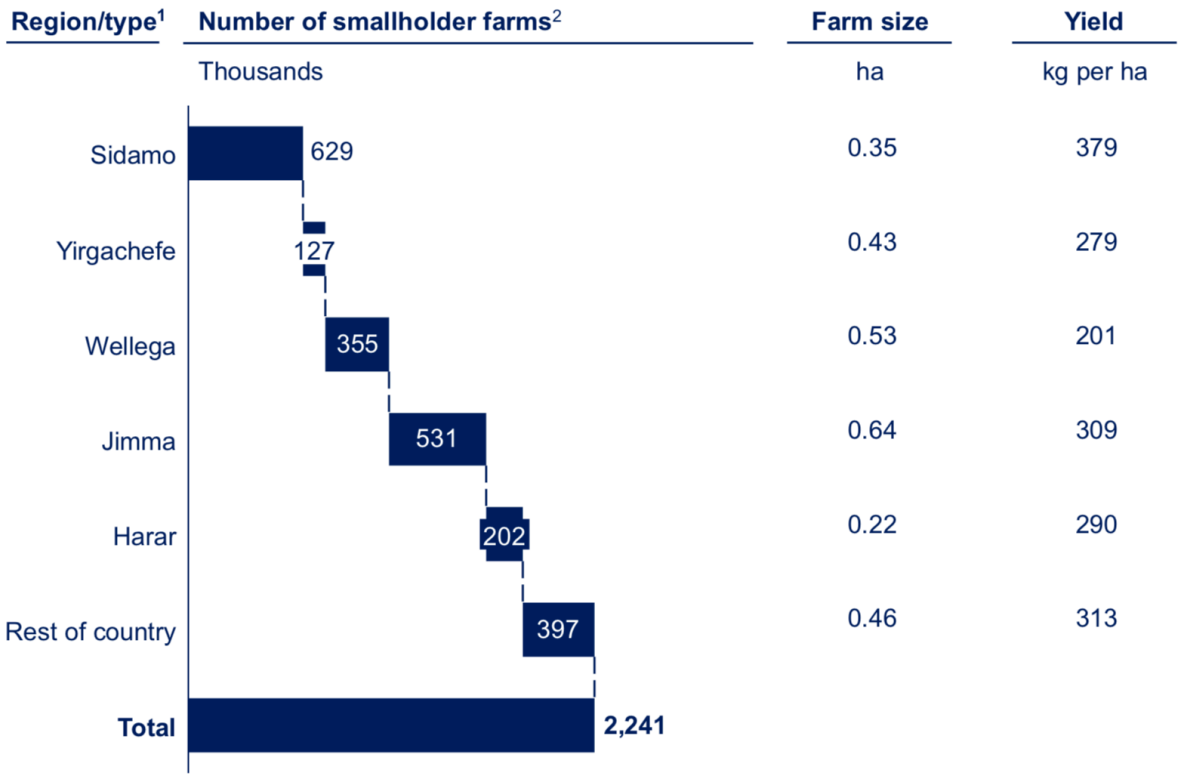
$$N(lnx;\mu;\sigma) = \frac{1}{0.804\sqrt{2\pi}} exp\left[-\frac{(lnx-4.054)^2}{2\cdot 0.804^2}\right]$$

[5] Delignette-Muller, Pouillot, and Denis. *Fitting parametric distributions using R: the fitdistrplus package.* 2009.
[6] Brewer, Butler, and Cooksley. *The relative performance of AIC, AICC and BIC in the presence of unobserved heterogeneity*. Methods in Ecology and Evolution, 2016.

*4. Application to estimate farmer populations across Ethiopia*

Through this methodology, we arrive at a total population of coffee farmers of 2.241 million across Ethiopia. The region/types of "Sidamo", "Yirgachefe", and "Jimma" represent 1.287 million farmers, or more than 50% of the country total (see Exhibit 1).

Exhibit 2. Distribution of smallholder coffee farm households across Ethiopia[7]




The assessment divided these regions into nine classifications based on geopolitical boundaries: Sidamo (Amaro, Guji, Sidama A, Sidama B, Sidama C, West Arsi), Jimma (Illu Ababour, Limmu), and Yirgachefe

*5. Actual sampling*

Enveritas had a net sample size of 13,204 households from the above regions.

[7] Browning, Burkiewicz, Cervone, von Heymman. *How many coffee farmers are there? Global coffee farm study.* Enveritas, 2018.

**Results**
**Section 1: correlations between poverty and other sustainability indicators**

The assessment looks for correlations across all of Enveritas' sustainability standards that apply to smallholder farmers in Ethiopia. These standards include:

- Social: no child labor, no forced labor, minimum wage, clean water, and worker health and safety
- Environmental: no deforestation, biodiversity protection, soil conservation water conservation, no banned pesticides, safe chemical handling, and pest and disease management
- Economic: transparent pricing, sustainable production, quality improvement, traceability, access to training, access to finance, and recordkeeping

In order to identify meaningful correlations, we have divided the farmer population into three groupings based on poverty levels: the poorest quartile (25%) of farmers, the wealthiest quartile (25%) of farmers, and the middle two quartiles (50%). The results that lead us to define different poverty probabilities are discussed in the next chapter.

As shown in Exhibit 3, wealthier farmers tend to have higher sustainability scores in general than poorer farmers. This finding is indicated most clearly by dots in the scatter plot that are above the trendline. On average, wealthier farmers have a 3% higher score across all relevant sustainability criteria.

Exhibit 3. Average sustainability scores for farmers based on poverty level

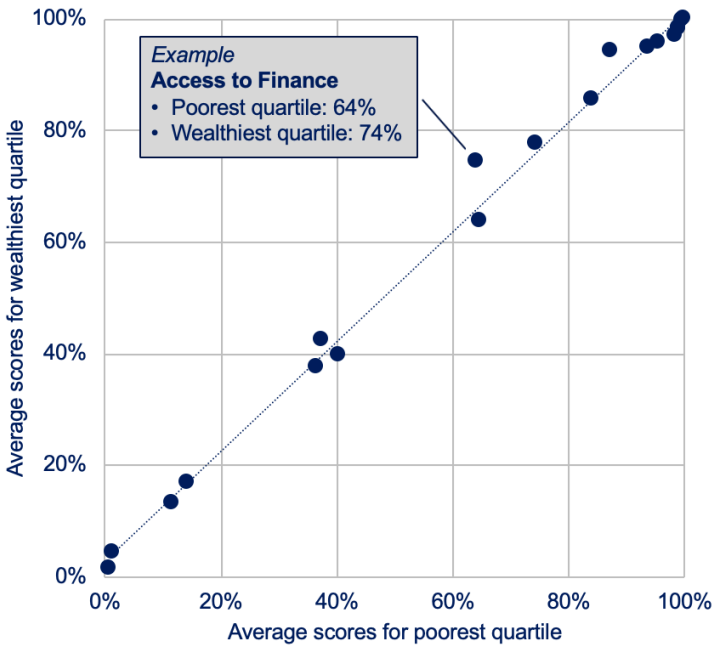


Exhibit 4. Differences in sustainability scores between wealthiest and poorest quartiles

| Pillar | Sustainability Standard | Difference between Wealthiest and Poorest Quartiles |
|---|---|---|
| Economic | Recordkeeping* | 242% |
| Economic | Access to Training | 83% |
| Social | Clean Water | 17% |
| Economic | Access to Finance | 16% |
| Economic | Sustainable Production | 14% |
| Economic | Transparent Pricing | 13% |
| Social | No Child Labor | 8% |
| Environmental | Biodiversity Protection | 5% |
| Environmental | Pest & Disease Management | 2% |
| Social | Workers' Health & Safety | 2% |
| Environmental | No Deforestation | 1% |
| Environmental | Water Conservation | 0% |
| Environmental | No Pollution | 0% |
| Environmental | No Banned Pesticides | 0% |
| Social | No Forced Labor | -1% |
| Social | Minimum Wage | -1% |
| Environmental | Soil Conservation | -1% |
| Environmental | Safe Chemical Handling | -1% |
| Economic | Quality Improvement | -2% |
| | **Total / All Standards** | **3%** |

* Note: Recordkeeping for both quartiles is low (1.2% in the poorest quartile vs 4.2% in the wealthiest quartile)

*Pillar A. Social standards*

For social standards, the strongest correlation with poverty levels is related to Clean Water access. Here, we see the wealthier quartile of farmers reporting 17% higher scores. The Clean Water standard captures both access to drinking water and access to sanitation for farm workers. In addition, we see improved scores for indicators related to Child Labor and Workers' Health and Safety. There are no major differences for other social indicators.

*Pillar 2. Environmental standards*

For environmental standards, the strongest correlation with poverty levels is related to Biodiversity Protection, specifically the use of shade trees on coffee farms. The wealthier quartile of farmers report 5% higher scores. There are no major differences for other environmental indicators. In general, Ethiopian farmers use little chemical inputs, water, and fertilizer, so this finding is not surprising.

*Pillar 3. Economic standards*

We found strong correlations for a number of economic indicators. The strongest correlations were for Recordkeeping (242% higher), Access to Training (83% higher), and Access to Finance (16%). We also found significant different for Sustainable Production (14% higher) and Transparent Pricing (13% higher). These findings strongly suggest that improve economic factors for coffee are related to lower poverty levels. This finding makes sense given the importance of coffee production to the economic livelihoods of most farmers in these regions. (It is the predominant source of cash income and agricultural income.)

**Results:**
**Section 2: contributing factors to rural poverty**

*Indicator 1. How many members does the household have?*

A large household is associated with a lower score and thus a higher probability that the household is living in poverty. From the survey results, we can see that the majority of households in all regions have at least five household members. The regions showing the largest household size response most often ("A. Seven or more") are Guji, West Arsi, and Yirgachefe. Table 2a summarizes the results by region.

After scoring each response (see Table 1), we are able to identify the areas where this indicator has the greatest influence on poverty levels. The regions with the *highest* scores are Limmu and Sidama B, which display less poverty related to the presence of this indicator. By contrast, the regions with the *lowest* scores are Guji and Yirgachefe, which display more poverty related to the presence of this indicator. Table 2b summarizes the scores for this indicator by region.

Table 2a. Responses to "How many members does the household have?"

| Region | Sample Size | A. Seven or more | B. Six | C. Five | D. Four | E. Three | F. Two | G. One |
|---|---|---|---|---|---|---|---|---|
| **Amaro** | 279 | 45.88 | 21.86 | 16.85 | 8.60 | 6.09 | 0.72 | 0.00 |
| **Guji** | 969 | 58.72 | 11.25 | 12.90 | 9.29 | 4.85 | 2.68 | 0.31 |
| **Illu Ababour** | 869 | 44.99 | 13.81 | 16.57 | 11.16 | 8.29 | 4.60 | 0.58 |
| **Limmu** | 3140 | 43.15 | 15.45 | 14.62 | 13.03 | 8.79 | 3.82 | 1.15 |
| **Sidama A** | 787 | 46.00 | 14.99 | 11.94 | 13.60 | 9.78 | 2.92 | 0.76 |
| **Sidama B** | 2392 | 37.63 | 19.27 | 17.02 | 14.21 | 9.53 | 2.05 | 0.29 |
| **Sidama C** | 2684 | 39.98 | 19.71 | 18.33 | 12.63 | 6.59 | 2.50 | 0.26 |
| **West Arsi** | 260 | 53.85 | 13.08 | 10.00 | 10.00 | 8.08 | 3.85 | 1.15 |
| **Yirgachefe** | 1824 | 52.36 | 15.24 | 14.14 | 10.96 | 5.59 | 1.21 | 0.49 |

Table 2b. Average scores for "How many members does the household have?" responses

| Region | Sample Size | Average Score | Comment |
|---|---|---|---|
| **Amaro** | 279 | 6.728 | |
| **Guji** | 969 | 6.256 | Lowest scores, more likely to be in poverty |
| **Illu Ababour** | 869 | 8.890 | |
| **Limmu** | 3140 | 9.222 | Highest scores, less likely to be in poverty |
| **Sidama A** | 787 | 8.726 | |
| **Sidama B** | 2392 | 9.078 | Highest scores, less likely to be in poverty |
| **Sidama C** | 2684 | 8.389 | |
| **West Arsi** | 260 | 7.838 | |
| **Yirgachefe** | 1824 | 6.685 | Lowest scores, more likely to be in poverty |

*Indicator 2. Can the male head/spouse read and write?*

A household with no male head/spouse, or one who cannot read and write, is associated with a lower score and thus a higher probability that the household is living in poverty. From the survey results, we can see that in eight out of nine regions the majority of respondents have a male household head who is literate. The regions showing the largest share of positive responses ("C. Yes") are Yirgachefe and Sidama B. Table 3a summarizes the results by region.

After scoring each response (see Table 1), we are able to identify the areas where this indicator has the greatest influence on poverty levels. The regions with the *highest* scores are Yirgachefe and Sidama B, which display less poverty related to the presence of this indicator. By contrast, the regions with the *lowest* scores are Sidama C and Limmu, which display more poverty related to the presence of this indicator. Table 3b summarizes the scores for this indicator by region.

Table 3a. Responses to "Can the male head/spouse read and write?"

| Region | Sample Size | A. No male head/spouse | B. No | C. Yes |
|---|---|---|---|---|
| **Amaro** | 279 | 2.51 | 31.54 | 65.95 |
| **Guji** | 969 | 4.23 | 30.65 | 65.12 |
| **Illu Ababour** | 869 | 5.29 | 37.86 | 56.85 |
| **Limmu** | 3140 | 6.02 | 42.58 | 51.40 |
| **Sidama A** | 787 | 4.96 | 28.21 | 66.84 |
| **Sidama B** | 2392 | 5.52 | 25.50 | 68.98 |
| **Sidama C** | 2684 | 12.52 | 42.06 | 45.42 |
| **West Arsi** | 260 | 5.00 | 36.15 | 58.85 |
| **Yirgachefe** | 1824 | 4.11 | 26.75 | 69.13 |

Table 3b. Average scores for "Can the male head/spouse read and write?" responses

| Region | Sample Size | Average Score | Comment |
|---|---|---|---|
| **Amaro** | 279 | 4.588 | |
| **Guji** | 969 | 4.520 | |
| **Illu Ababour** | 869 | 4.168 | |
| **Limmu** | 3140 | 3.936 | Lowest scores, more likely to be in poverty |
| **Sidama A** | 787 | 4.574 | |
| **Sidama B** | 2392 | 4.649 | Highest scores, less likely to be in poverty |
| **Sidama C** | 2684 | 3.566 | Lowest scores, more likely to be in poverty |
| **West Arsi** | 260 | 4.254 | |
| **Yirgachefe** | 1824 | 4.683 | Highest scores, less likely to be in poverty |

*Indicator 3. Can the (oldest) female head/spouse read and write?*

A household with no female head/spouse, or one who cannot read and write, is associated with a lower score and thus a higher probability that the household is living in poverty. From the survey results, we can see that in all regions the female head/spouse is unable to read and write. The regions showing the largest share of positive responses ("C. Yes") are Sidama B and Amaro. Table 4a summarizes the results by region.

After scoring each response (see Table 1), we are able to identify the areas where this indicator has the greatest influence on poverty levels. The regions with the *highest* scores are Limmu and Sidama B, which display less poverty related to the presence of this indicator. By contrast, the regions with the *lowest* scores are Guji and Yirgachefe, which display more poverty related to the presence of this indicator. Table 4b summarizes the scores for this indicator by region.

Table 4a. Responses to "Can the (oldest) female head/spouse read and write?"

| Region | Sample Size | A. No female head/spouse | B. No | C. Yes |
|---|---|---|---|---|
| **Amaro** | 279 | 0.36 | 61.65 | 37.99 |
| **Guji** | 969 | 0.93 | 75.03 | 24.05 |
| **Illu Ababour** | 869 | 2.88 | 71.58 | 25.55 |
| **Limmu** | 3140 | 3.95 | 72.52 | 23.54 |
| **Sidama A** | 787 | 3.05 | 64.68 | 32.27 |
| **Sidama B** | 2392 | 2.05 | 59.11 | 38.84 |
| **Sidama C** | 2684 | 1.34 | 75.78 | 22.88 |
| **West Arsi** | 260 | 1.54 | 73.46 | 25.00 |
| **Yirgachefe** | 1824 | 1.15 | 68.09 | 30.76 |

Table 4b. Average scores for "Can the (oldest) female head/spouse read and write?" responses

| Region | Sample Size | Average Score | Comment |
|---|---|---|---|
| **Amaro** | 279 | 7.642 | Highest scores, less likely to be in poverty |
| **Guji** | 969 | 6.637 | |
| **Illu Ababour** | 869 | 6.644 | |
| **Limmu** | 3140 | 6.450 | Lowest scores, more likely to be in poverty |
| **Sidama A** | 787 | 7.107 | |
| **Sidama B** | 2392 | 7.616 | Highest scores, less likely to be in poverty |
| **Sidama C** | 2684 | 6.534 | Lowest scores, more likely to be in poverty |
| **West Arsi** | 260 | 6.673 | |
| **Yirgachefe** | 1824 | 7.095 | |

*Indicator 4. What is the main source of energy for cooking?*

A household that relies on gathering fuel for energy is associated with a lower score and thus a higher probability that the household is living in poverty. The survey results show very little variance across all regions: virtually all respondents use firewood, charcoal, or crop residue/leaves as their main source of energy. The regions showing the low share of negative responses (not "A") are Limmu and West Arsi. Table 5a summarizes the results by region.

After scoring each response (see Table 1), we are able to identify the areas where this indicator has the greatest influence on poverty levels. The regions with the *highest* scores are Limmu and Illu Ababour, which display less poverty related to the presence of this indicator. By contrast, the regions with the *lowest* scores are Amaro and Yirgachefe, which display more poverty related to the presence of this indicator. However, these differences among regions are not significant. Table 5b summarizes the scores for this indicator by region.

Table 5a. Responses to "What is the main source of energy for cooking?"

| Region | Sample Size | A. Firewood, charcoal, or crop residue/leaves | B. Dung/manure | C. Saw dust, kerosene, butane gas, electricity, solar energy, biogas, none or other |
|---|---|---|---|---|
| **Amaro** | 279 | 100.00 | 0.00 | 0.00 |
| **Guji** | 969 | 99.79 | 0.00 | 0.21 |
| **Illu Ababour** | 869 | 99.65 | 0.00 | 0.35 |
| **Limmu** | 3140 | 99.17 | 0.06 | 0.76 |
| **Sidama A** | 787 | 99.75 | 0.13 | 0.13 |
| **Sidama B** | 2392 | 99.83 | 0.00 | 0.17 |
| **Sidama C** | 2684 | 99.81 | 0.07 | 0.11 |
| **West Arsi** | 260 | 99.62 | 0.38 | 0.00 |
| **Yirgachefe** | 1824 | 100.00 | 0.00 | 0.00 |

Table 5b. Average scores for "What is the main source of energy for cooking?" responses

| Region | Sample Size | Average Score | Comment |
|---|---|---|---|
| **Amaro** | 279 | 0.000 | Lowest scores, more likely to be in poverty |
| **Guji** | 969 | 0.019 | |
| **Illu Ababour** | 869 | 0.031 | Highest scores, less likely to be in poverty |
| **Limmu** | 3140 | 0.071 | Highest scores, less likely to be in poverty |
| **Sidama A** | 787 | 0.017 | |
| **Sidama B** | 2392 | 0.015 | |
| **Sidama C** | 2684 | 0.013 | |
| **West Arsi** | 260 | 0.015 | |
| **Yirgachefe** | 1824 | 0.000 | Lowest scores, more likely to be in poverty |

*Indicator 5. Does the household currently own any mattresses or beds?*

A household that has a mattress or bed is associated with a higher score and thus a lower probability that the household is living in poverty. The survey results shows interesting differences among regions: less than half of households in Amaro own a mattress or bed, whereas in Sidama A and Sidama B the share is greater than 80%. Table 6a summarizes the results by region.

After scoring each response (see Table 1), we are able to identify the areas where this indicator has the greatest influence on poverty levels. The regions with the *highest* scores are Sidama A and Sidama B, which display less poverty related to the presence of this indicator. By contrast, the regions with the *lowest* scores are Amaro and Yirgachefe, which display more poverty related to the presence of this indicator. Table 6b summarizes the scores for this indicator by region.

Table 6a. Responses to "Does the household currently own any mattresses or beds?"

| Region | Sample Size | A. No | B. Yes |
|---|---|---|---|
| **Amaro** | 279 | 56.99 | 43.01 |
| **Guji** | 969 | 32.20 | 67.80 |
| **Illu Ababour** | 869 | 22.55 | 77.45 |
| **Limmu** | 3140 | 22.26 | 77.74 |
| **Sidama A** | 787 | 17.41 | 82.59 |
| **Sidama B** | 2392 | 15.09 | 84.91 |
| **Sidama C** | 2684 | 32.38 | 67.62 |
| **West Arsi** | 260 | 25.00 | 75.00 |
| **Yirgachefe** | 1824 | 45.23 | 54.77 |

Table 6b. Average scores for "Does the household currently own any mattresses or beds?"

| Region | Sample Size | Average Score | Comment |
|---|---|---|---|
| **Amaro** | 279 | 2.151 | Lowest scores, more likely to be in poverty |
| **Guji** | 969 | 3.390 | |
| **Illu Ababour** | 869 | 3.872 | |
| **Limmu** | 3140 | 3.887 | |
| **Sidama A** | 787 | 4.130 | Highest scores, less likely to be in poverty |
| **Sidama B** | 2392 | 4.245 | Highest scores, less likely to be in poverty |
| **Sidama C** | 2684 | 3.381 | |
| **West Arsi** | 260 | 3.750 | |
| **Yirgachefe** | 1824 | 2.738 | Lowest scores, more likely to be in poverty |

*Indicator 6. Does the household currently own any radios/radio-and-tape players/tape players?*

A household that has some form of radio or tape player is associated with a higher score and thus a lower probability that the household is living in poverty. The survey results shows that in five out of the nine regions more than half of households have a radio or tape player. The highest ownership rate is in Illu Ababour (59.38%) and the lowest rate is in Sidama C (30.40%). Table 7a summarizes the results by region.

After scoring each response (see Table 1), we are able to identify the areas where this indicator has the greatest influence on poverty levels. The regions with the *highest* scores are Illu Ababour and Limmu, which display less poverty related to the presence of this indicator. By contrast, the regions with the *lowest* scores are Sidama C and Amaro, which display more poverty related to the presence of this indicator. Table 7b summarizes the scores for this indicator by region.

Table 7a. Responses to "Does the household currently own any radios/radio-and-tape players/tape players?"

| Region | Sample Size | A. No | B. Yes |
|---|---|---|---|
| **Amaro** | 279 | 54.48 | 45.52 |
| **Guji** | 969 | 42.21 | 57.79 |
| **Illu Ababour** | 869 | 40.62 | 59.38 |
| **Limmu** | 3140 | 41.66 | 58.34 |
| **Sidama A** | 787 | 60.61 | 39.39 |
| **Sidama B** | 2392 | 51.71 | 48.29 |
| **Sidama C** | 2684 | 69.60 | 30.40 |
| **West Arsi** | 260 | 43.46 | 56.54 |
| **Yirgachefe** | 1824 | 47.92 | 52.08 |

Table 7b. Average scores for "Does the household currently own any radios/radio-and-tape players/tape players?" responses

| Region | Sample Size | Average Score | Comment |
|---|---|---|---|
| **Amaro** | 279 | 3.186 | Lowest scores, more likely to be in poverty |
| **Guji** | 969 | 4.045 | |
| **Illu Ababour** | 869 | 4.157 | Highest scores, less likely to be in poverty |
| **Limmu** | 3140 | 4.084 | Highest scores, less likely to be in poverty |
| **Sidama A** | 787 | 2.757 | |
| **Sidama B** | 2392 | 3.380 | |
| **Sidama C** | 2684 | 2.128 | Lowest scores, more likely to be in poverty |
| **West Arsi** | 260 | 3.958 | |
| **Yirgachefe** | 1824 | 2.738 | Lowest scores, more likely to be in poverty |

*Indicator 7. How many gabi does the household currently own?*

A "gabi" is a heavy cotton shawl or blanket, woven locally across Ethiopia. A household that does has not any gabis is associated with a lower score and thus a higher probability that the household is living in poverty. The survey results show considerable variance across regions. The highest rate of gabi ownership is in Amaro, where 80% of households have two or more gabis. This may also reflect the fact that cotton is grown locally in the region. Limmu and Illu Ababour have the lowest gabi ownership. Table 8a summarizes the results by region.

After scoring each response (see Table 1), we are able to identify the areas where this indicator has the greatest influence on poverty levels. The regions with the *highest* scores are Amaro and Sidama A, which display less poverty related to the presence of this indicator. By contrast, the regions with the *lowest* scores are Limmu and Illu Ababour, which display more poverty related to the presence of this indicator. Table 8b summarizes the scores for this indicator by region.

Table 8a. Responses to "How many gabi does the household currently own?"

| Region | Sample Size | A. None | B. One | C. Two or more |
|---|---|---|---|---|
| **Amaro** | 279 | 3.94 | 16.13 | 79.93 |
| **Guji** | 969 | 49.23 | 40.87 | 9.91 |
| **Illu Ababour** | 869 | 55.93 | 27.50 | 16.57 |
| **Limmu** | 3140 | 59.11 | 24.68 | 16.21 |
| **Sidama A** | 787 | 23.00 | 47.52 | 29.48 |
| **Sidama B** | 2392 | 27.84 | 45.69 | 26.46 |
| **Sidama C** | 2684 | 36.70 | 46.39 | 16.92 |
| **West Arsi** | 260 | 43.46 | 31.15 | 25.38 |
| **Yirgachefe** | 1824 | 41.06 | 42.49 | 16.45 |

Table 8b. Average scores for "How many gabi does the household currently own?" responses

| Region | Sample Size | Average Score | Comment |
|---|---|---|---|
| **Amaro** | 279 | 5.280 | Highest scores, less likely to be in poverty |
| **Guji** | 969 | 1.820 | |
| **Illu Ababour** | 869 | 1.819 | Lowest scores, more likely to be in poverty |
| **Limmu** | 3140 | 1.713 | Lowest scores, more likely to be in poverty |
| **Sidama A** | 787 | 3.194 | Highest scores, less likely to be in poverty |
| **Sidama B** | 2392 | 2.959 | |
| **Sidama C** | 2684 | 2.406 | |
| **West Arsi** | 260 | 2.458 | |
| **Yirgachefe** | 1824 | 2.262 | |

*Indicator 8. If the household farms, then does it currently own any plows?*

The presence of a plow indicates the level of farming sophistication. A household that has a plow is associated with a higher score and thus a lower probability that the household is living in poverty. There were no cases of households who do not farm, which is expected given that this survey is targeted at coffee farming households. The highest rate of low ownership is in Limmu and Illu Ababour, where over 80% of households have a plow. These are important maize producing regions. West Arsi has the lowest plow ownership. Table 9a summarizes the results by region.

After scoring each response (see Table 1), we are able to identify the areas where this indicator has the greatest influence on poverty levels. The regions with the *highest* scores are Limmu and Illu Ababour, which display less poverty related to the presence of this indicator. By contrast, the regions with the *lowest* scores are West Arsi and Guji, which display more poverty related to the presence of this indicator. Table 9b summarizes the scores for this indicator by region.

Table 9a. Responses to "If the household farms, then does it currently own any plows?"

| Region | Sample Size | A. Does not farm | B. Farms, but does not have plows | C. Farms, and has plows |
|---|---|---|---|---|
| **Amaro** | 279 | 0.00 | 39.07 | 60.93 |
| **Guji** | 969 | 0.00 | 41.90 | 58.10 |
| **Illu Ababour** | 869 | 0.00 | 17.95 | 82.05 |
| **Limmu** | 3140 | 0.00 | 18.34 | 81.66 |
| **Sidama A** | 787 | 0.00 | 41.68 | 58.32 |
| **Sidama B** | 2392 | 0.00 | 29.14 | 70.86 |
| **Sidama C** | 2684 | 0.00 | 39.57 | 60.43 |
| **West Arsi** | 260 | 0.00 | 71.54 | 28.46 |
| **Yirgachefe** | 1824 | 0.00 | 48.14 | 51.86 |

Table 9b. Average scores for "If the household farms, then does it currently own any plows?"

| Region | Sample Size | Average Score | Comment |
|---|---|---|---|
| **Amaro** | 279 | 7.219 | |
| **Guji** | 969 | 7.162 | Lowest scores, more likely to be in poverty |
| **Illu Ababour** | 869 | 7.641 | Highest scores, less likely to be in poverty |
| **Limmu** | 3140 | 7.633 | Highest scores, less likely to be in poverty |
| **Sidama A** | 787 | 7.166 | |
| **Sidama B** | 2392 | 7.417 | |
| **Sidama C** | 2684 | 7.209 | |
| **West Arsi** | 260 | 6.569 | Lowest scores, more likely to be in poverty |
| **Yirgachefe** | 1824 | 7.037 | |

*Overall poverty likelihoods*

Schreiner also provides look-up tables to convert scores to poverty likelihoods from the scores (Table 10a). We will focus our analysis here on the $3.10 2011 PPP poverty line. Table 10b shows that lowest levels of poverty are expected in Sidama A and Sidama B and the highest levels of poverty are expected in Yirgachefe and Sidama C.

Table 10a. Look-up table to convert scores to poverty likelihoods

**International 2005 and 2011 PPP lines**

| | Poverty likelihood (%) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 2005 PPP poverty lines | | | | | | 2011 PPP poverty lines | | | |
| Score | $1.00 | $1.25 | $1.75 | $2.00 | $2.50 | $5.00 | $1.90 | $3.10 | $3.80 | $4.00 |
| 0–4 | 53.4 | 81.5 | 98.0 | 98.0 | 100.0 | 100.0 | 81.5 | 100.0 | 100.0 | 100.0 |
| 5–9 | 53.4 | 81.5 | 98.0 | 98.0 | 99.0 | 100.0 | 81.5 | 98.8 | 99.0 | 99.0 |
| 10–14 | 42.5 | 65.8 | 86.5 | 94.0 | 97.3 | 100.0 | 65.9 | 94.3 | 97.4 | 97.5 |
| 15–19 | 35.4 | 56.6 | 81.1 | 87.1 | 94.9 | 99.9 | 58.6 | 89.0 | 95.5 | 96.1 |
| 20–24 | 31.8 | 50.9 | 76.4 | 85.6 | 93.4 | 99.7 | 53.6 | 88.1 | 93.8 | 94.8 |
| 25–29 | 23.9 | 39.3 | 73.1 | 82.3 | 91.4 | 99.5 | 41.0 | 85.2 | 91.9 | 93.8 |
| 30–34 | 19.0 | 35.7 | 65.9 | 77.1 | 88.9 | 99.3 | 37.4 | 79.7 | 90.1 | 91.9 |
| 35–39 | 14.3 | 30.3 | 61.7 | 73.4 | 84.8 | 99.3 | 31.6 | 76.4 | 85.8 | 88.1 |
| 40–44 | 7.3 | 19.2 | 47.9 | 59.7 | 79.2 | 98.1 | 20.6 | 64.0 | 81.6 | 85.5 |
| 45–49 | 5.0 | 14.3 | 41.1 | 51.5 | 70.2 | 96.3 | 15.7 | 56.4 | 72.3 | 76.2 |
| 50–54 | 4.4 | 12.5 | 34.8 | 46.4 | 65.9 | 95.6 | 13.8 | 50.8 | 68.3 | 70.7 |
| 55–59 | 3.6 | 8.6 | 27.7 | 38.8 | 61.1 | 94.4 | 8.9 | 43.2 | 63.5 | 66.4 |
| 60–64 | 2.0 | 4.5 | 18.5 | 28.2 | 45.1 | 88.0 | 5.5 | 31.7 | 46.1 | 51.0 |
| 65–69 | 1.5 | 3.2 | 11.0 | 17.0 | 31.7 | 75.5 | 3.9 | 18.4 | 32.2 | 36.2 |
| 70–74 | 1.4 | 2.8 | 7.6 | 12.5 | 24.6 | 61.8 | 3.2 | 14.1 | 25.3 | 27.1 |
| 75–79 | 0.8 | 1.6 | 2.5 | 4.8 | 14.5 | 47.1 | 1.6 | 5.1 | 15.8 | 17.3 |
| 80–84 | 0.5 | 0.7 | 1.8 | 2.0 | 9.2 | 44.4 | 0.7 | 2.0 | 13.3 | 14.9 |
| 85–89 | 0.0 | 0.7 | 1.7 | 1.9 | 2.0 | 23.6 | 0.7 | 1.9 | 2.0 | 6.7 |
| 90–94 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| 95–100 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |

Table 10b. Overall estimates of poverty levels by region

| Region | Sample Size | % of farmers estimated to be above the $3.10 2011 PPP poverty line | Comment |
|---|---|---|---|
| **Amaro** | 279 | 32.66 | |
| **Guji** | 969 | 30.15 | |
| **Illu Ababour** | 869 | 33.54 | |
| **Limmu** | 3140 | 33.40 | |
| **Sidama A** | 787 | 33.79 | Highest scores, less likely to be in poverty |
| **Sidama B** | 2392 | 35.24 | Highest scores, less likely to be in poverty |
| **Sidama C** | 2684 | 29.98 | Lowest scores, more likely to be in poverty |
| **West Arsi** | 260 | 31.81 | |
| **Yirgachefe** | 1824 | 30.26 | Lowest scores, more likely to be in poverty |

*Conclusions*

Our analysis shows that poverty is widespread across the coffee farmer population of Ethiopia instead of being concentrated in a limited number of regions. There are, however, important regional differences in the factors that are correlated with poverty. Many of the notable differences among regions are linked to asset ownership, e.g., plows, radios, mattresses, *gabis*. This likely reflects the fact that discretionary income is scarce, and so families have prioritized their use of cash income differently in different regions. In addition, there are important differences in literacy rates and household sizes (fertility rates) across regions, which are issues that change over generations.

We also find that sustainability scores are generally correlated with poverty levels, though a strong correlation is only present for a select number of criteria. The strongest correlations are found for economic and social criteria, namely, Clean Water, Recordkeeping, Access to Training, and Access to Finance. This finding implies that increasing incomes alone may not be enough to see improvements in other measures of sustainability. It would also imply that efforts to increasing incomes taken alongside efforts to improve adoption of other sustainability practices may have most impact.

Finally, we recommend repeating this work on a recurring basis so that trends over time can be observed. For instance, coffee incomes are highly dependent on international coffee prices, and therefore it is important to normalize for changes in coffee income that result from external market fluctuations. Such work is critical to isolating and quantifying the impact of approaches aimed at reducing poverty and improving the overall sustainability of Ethiopia's coffee sector.