Guidance manual on calculating and visualizing the income gap to a Living Income Benchmark

Prepared for the Living Income Community of Practice

Acknowledgements

Contents

1   Preamble

The Living Income Community of Practice (LICoP) has identified the need for guidance to support researchers and practitioners in assessing the gap between actual farming household incomes and estimates of the Living Income Benchmark in a particular location.

ISEAL, on behalf of the LICoP, engaged KIT Royal Tropical Institute and Committee on Sustainability Assessment (COSA) to develop components of a guidance for how to calculate and report living income gaps using existing household income data and Living Income Benchmarks in a consistent manner, primarily for smallholder households in agricultural contexts.

While other work has covered how to conduct the measurement and calculations of total household income[1,2,3,4,5] and the calculations of Living Income[6], this Guidance Manual focuses on:

- **how to calculate and interpret key indicators of the gap** between actual income and a Living Income Benchmark
- **how to visualize key indicators of the gap** to a Living Income Benchmark.

This guidance assumes that a Living Income Benchmark and data on actual incomes to calculate the gap are already available. If income data is not available, please consult the *Guidance on calculating household income[7]*, which provides support on what to measure to calculate total net household income and on how to use a practical survey approach to capture that information. That guidance was developed in close connection to this document. Living Income benchmark data and reports can be found at www.living-income.com (see also Box 1).

In developing this guidance, we aimed at reaching a balance between academic rigor and pragmatism, with a strong element of practicality for applied researchers. In that sense, all calculations and visualizations presented are accompanied by reproducible examples supported by the *KIT-developed STATA[8] package* and a *Simplified Excel template*, both of which contain example data. These allow data specialists to directly apply the suggestions presented in this document without first needing to technically translate and interpret them. The test datasets

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[1] Reardon, T., Stamoulis, K., & Pingali, P. (2007). Rural non-farm employment in developing countries in an era of globalization. In K. Otsuka, & K. Kalirajan (Eds.), Contributions of agricultural economics to critical policy issues. Malden, MA: Blackwell.

[2] Haggblade, S., Hazell, P., & Reardon, T. (2010). The Rural Non-farm Economy: Prospects for Growth and Poverty Reduction. World Development, 38(10). doi:10.1016/j.worlddev.2009.06.008

[3] Huetz-Adams, F. (2018). Cocoa farming households: Compilation of data on household composition, agricultural resources, cost structures and income. The Suedwind Institute, Bonn

[4] Shipman, E., Soto, G., Mullen, J., Gonzalez, M., and Daniels, S. (2016). Measuring smallholder incomes: Towards better alignment and reporting of farm economic metrics. A joint guidance document of the Committee on Sustainability Assessment (COSA), the ISEAL Alliance, and the Sustainable Food Lab. Version 1.0.

[5] Grillo and Bush (2019). Applying the Household Economy Analysis to Measure and Address Income Gaps in Agriculture Supply Chains. Guidance Note for the Living Income Community of Practice

[6] Anker, R. and Anker, M. (2017). Living wages around the world: Manual for measurement. Edward Elgar, London: http://www.e-elgar.com/shop/living-wages-around-the-world

[7] Available at https://www.living-income.com/papersandreports (click here for direct access)

[8] STATA is widely used statistical and econometric software., with a larger user base. It is distributed commercially via www.stata.com

included have been made available based on previous work of KIT for the LICoP. Examples in this guidance manual can be reproduced using these test datasets.

A main objective of this guidance manual is to contribute to creating consistency of process and (visual) language in how income gaps are calculated and reported once income data is available. It intends to contribute to the discussion about standardized approaches. Prior to publication, this guidance manual was reviewed by the LiCoP Technical Committee, and the Committee's helpful comments were used to improve it. As an ever-evolving process, this guidance manual invites users to improve its content by directly contributing technical content improvements.

To help improve the _STATA package_, see detailed instructions in the Technical supplement. Other comments and suggestions can be directed to: livingincome@isealalliance.org or Marcelo Tyszler at m.tyszler@kit.nl. To contribute to the ongoing measurement discussions in the LiCoP, sign up for the LiCoP newsletter at www.living-income.com.

Living Income Benchmark and Actual Income

The Living Income Benchmark is the net income required for a basic, but decent, standard of living. The Benchmark is based on the costs of living, in line with the Living Wage methodology of Martha and Richard Anker.

The Living Income Story
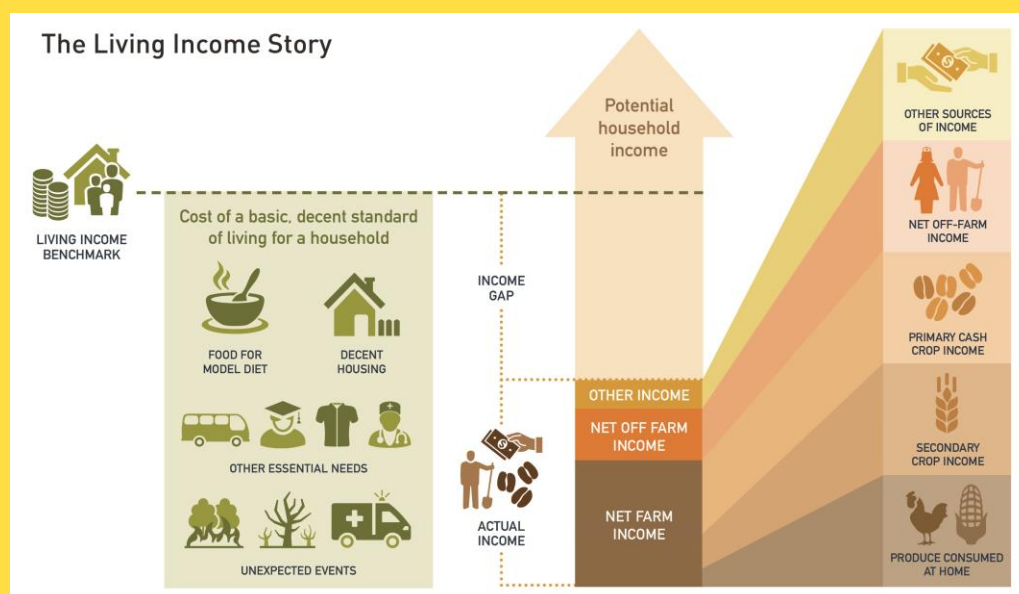
Living income reflects the needs of a household in a particular place to afford a decent standard of living for all members. It includes food, water, housing, education, healthcare, transport, clothing, and other essential needs, including provision for unexpected events.

Because of how it is composed, the moment in time, the geographical region and the family composition are key in defining the benchmark. Geographical region and moment in time determine prices and overall costs, while family composition has implications for housing space, education costs and food intake needs.

The actual household income is typically composed of net farm income (i.e. production and sales of crops and livestock products minus production costs), off-farm income (e.g., own businesses, laboring) and other income (e.g. remittances).

More details about living income, and how to measure living income benchmarks and actual incomes can be found at www.living-income.com

Box 1 Living Income Benchmark and Actual Income

2   Use cases

There are a variety of reasons why stakeholders will be interested in measuring the income gap, and from a variety of starting points. Different needs and different starting points will have implications for how to go about calculation and visualizing the gap. Use cases might include, for example:

- Measuring the gap to the Living Income Benchmark for a region, to understand the magnitude of the problem and/or inform price discussions/to shape development strategies;
- Measuring the gap to the Living Income Benchmark of specific segments/groups, in order to support comparisons, resource prioritizations and/or decision making;
- Measuring the gap to the Living Income Benchmark of farmers in a development or company program, to obtain insights into own improvement programs;
- Measuring the gap to the Living Income Benchmark of farmers in one location to compare it to other locations around the globe;
- Monitor progress towards closing the gap.

Starting points could be:

- Having (detailed) data available and wanting to calculate indicators and generate visualizations in a consistent and harmonized way;
- Having partial or only aggregated data available, and needing to identify how to make best use of the available data;
- Having no data available, but the capacity to collect primary data or find secondary data and wanting guidance on how to do it.

This guidance is primarily targeted at stakeholders who already have detailed or aggregated data available. Stakeholders with partial data available can benefit from this guidance, but these and stakeholders without data available will benefit more from first consulting the *Guidance on calculating household income[9]* and other forthcoming LiCoP guidance notes.

The focus is on calculating the gap comparisons within a single country, though reference is made to how to apply purchasing power parity and/or relative values (as share of the benchmark) for cross-country comparisons.

This guidance manual is principally applicable to farming households with a primary source of income from sales of a main crop. Other use cases are possible, but the stakeholder will need to assess its applicability.

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[9] Available at https://www.living-income.com/papersandreports (click here for direct access)

3 Data needs and ensuring comparability

3.1 Data needs

To calculate the gap to the Living Income Benchmark, two essential variables are required:

- Total household (net) income: (estimate of) the total household income, including all members of the household and all sources of income, net of agricultural production costs (inputs and paid labour)
- Living Income Benchmark value: this must be at a minimum a single value. It can be further detailed by groups or adjusted for each household.

A non-essential, but highly recommended variable is:

- Total household (net) income from the main income source: (estimate of) the total income from the main source, net of agricultural production costs (inputs and paid labour) if this is an agriculture related income source.

The LiCoP definition of total net household income includes the value of food produced by and consumed by the household. The reason is that producing your own food can be seen as either having more income to achieve a simple but decent standard of living or lowering the cost of it, since the Living Income Benchmark includes the cost of a (healthy) diet.

This guidance treats the estimated value of the food produced and consumed at home as a separate variable. This makes it possible to compute the living income gap by either accounting for the estimated value of the food produced and consumed at home (as would be recommended by the LiCoP approach) or without this information (as may be necessary if this information is not available). If the stakeholder would like to include this in the calculations of the living income gap, a variable containing this value is also required.

How to value the consumption of food produced at home is beyond the scope of this guidance, but a suggestion is to have it valued at local market values, since this is the cost that would be saved. A slightly more detailed discussion can be found at the KIT reports on the income gap[10,11]

Having estimates of the value of the food produced and consumed in the household is not necessary for the comparison of cash income to the Living Income Benchmark but does provide a better insight into the gap.

3.2 Data consistencies: ensuring comparability of data

To compute gaps of actual income to the Living Income Benchmark, data needs to be comparable. This means that the **timeframe, time period & currency, geographical region** and

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[10] Tyszler et al. (2018). Analysis of the Income Gap of Cocoa Producing Households in Côte d'Ivoire. Available at: https://www.kit.nl/wp-content/uploads/2019/01/Analysis-of-the-income.pdf

[11] Tyszler et al. (2018). Analysis of the Income Gap of Cocoa Producing Households Ghana. Available at: https://docs.wixstatic.com/ugd/0c5ab3_93560a9b816d40c3a28daaa686e972a5.pdf

household size referred to by both the Living Income Benchmark value and actual household income need to match.

Timeframe refers to whether the data reflects daily, monthly, half-yearly or yearly values. For farming households, we advise using yearly income, since this is more meaningful to account for the natural seasonality of agricultural production and cash flow inherent to farming households. Total household income data will typically be calculated yearly or by agricultural season. Living income benchmarks are typically reported monthly. It is therefore needed to multiply the monthly Living Income Benchmark by the number of months of the chosen timeframe.

Example of timeframe adjustment

The Living Income Benchmark for Côte d'Ivoire is CFA 262,056 per month.[12]
This is equivalent to (262,056 x 12 =) CFA 3,144,672 per year.

Box 2 Timeframe adjustment

Time period & currency is about the value of money over time. Actual income and the Living Income Benchmark need to be compared in the same currency, using the same exchange rate if conversions are needed. Even if all data is readily available in the same currency, it is important to understand that Living Income Benchmarks reflect the costs of a decent standard of living at a specific moment in time. Therefore, if the income data reflects a different moment in time than the Living Income Benchmark, one of them needs to be adjusted to correct for the purchasing power of money for the different moments. The further away the moments are, or the more inflation there is, the more important the adjustment becomes.

Adjustments can be done in a consistent manner using the Consumer Price Index (CPI)[13]. CPI is an index number that measures changes in prices of goods and services acquired by a family, representing a basket of goods[14]. Therefore, the change of CPI over time is the change in the local purchasing power of money.

Monthly, quarterly, and yearly CPIs are available from the International Monetary Fund data portal.[15] We suggest to use quarterly CPIs to avoid a particular oscillation from a given month (too narrow), and to prevent generalizing over a complete year (too broad), unless the income is regularly received across a full year.

Stakeholders can choose to adjust the value of the Living Income Benchmark to the timeframe of the income data or the other way around, according to their needs and which comparisons they are primarily interested in. CPI corrections need to be done in local currency unit, to avoid mixing changes in the local purchasing power of money correction with variations in the

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[12] Diarra & N'Guessan (2018). Living Income Report. Rural Côte d'Ivoire, Cocoa growing. Living Income Community of Practice,

[13] Dawani, K, Sayeed, A, Anker R and Anker M. (2019) Updating Anker Methodology Living Wage Estimates: Methodological Issues and Guidelines. Prepared for Global Living Income Coalition

[14] Consumer Price Index (CPI), International Monetary fund. Available at: http://data.imf.org/?sk=4FFB52B2-3653-409A-B471-D47B46D904B5

[15] The most up-to-date CPI data can be found online at: http://data.imf.org/regular.aspx?key=61545849.

international exchange rate. After CPI corrections are done in local currency, conversion to an international currency can be done.

It is important to emphasize that adjusting values using the CPI is not equivalent to predicting what the values would be in different time periods, for example if economic conditions would raise the cost of some specific item by much more than the average change in the consumer price index. In that sense it does not substitute the collection of new data and/or development of new Living Income Benchmarks. It is, though, the best accepted (simple) method to correct for the change in the purchasing power parity of money in the absence of new data.

If there is an interest in the comparison of values between countries and/or comparisons of values to other internationally set references, such as World Bank poverty lines, another adjustment needs to be done, using the Purchasing Power Parity (PPP) conversion factors.

The PPP conversion factor "is a spatial price deflator and currency converter that controls for price level differences between countries"[16]. For each country and year, the PPP conversion factor indicates the exchange rate in real values to the US$, i.e., how much of local currency is needed to buy locally the same that 1 US$ would buy in the United States. Latest values can be found at the World Bank Data Portal[16]. Notice that PPP conversion rates are typically different than market exchange rates, mainly because many (local) goods and (local) services cannot be traded internationally[17]. It is out of scope of this guidance, but stakeholders need to be aware that international references such as the World Bank Poverty Lines are also defined according to a value of a specific year. Therefore, before a comparison is made, a match of values across time is also needed. Chapter 12 of the KIT study[18] has an extensive discussion of PPP exchange rates, poverty lines and household size equivalency.

Alternatively, comparisons between countries can be made in terms of relative values (as shares), avoiding the need to use PPP exchange rates. This is discussed further in section 4.

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[16] https://data.worldbank.org/indicator/PA.NUS.PRVT.PP

[17] Ortiz-Ospina and Molteni (2017). What are PPP adjustments and why we need them? Available at
https://ourworldindata.org/what-are-ppps

[18] Bymolt, R., Laven, A., Tyszler, M. (2018). Demystifying the cocoa sector in Ghana and Côte d'Ivoire. The Royal Tropical Institute (KIT).. Chapter 12: available at: https://www.kit.nl/wp-content/uploads/2019/01/Demystifying-cocoa-sector-chapter12-household-income-poverty-wealth.pdf

Example of time period & currency adjustment

The Living Income Benchmark for Ghana has a reference March of 2018 (quarter 1) [19].
KIT data is about cocoa season 2015-2016[20], and farmers are primarily paid on the quarter 1 of 2016.

The CPI for Ghana in 2016, quarter 1 is 197.77.[15]
The CPI for Ghana, in 2018, quarter 1 is 247.06. [15]
This implies an inflation of (247.06/197.77)-1 = 0.25 or 25% in two years.

2016 (Q1) in 2018 (Q1) values
To adjust income data from 2016 (Q1) to 2018 (Q1) equivalent values, we apply the following adjustment:

$$GHS\ Values\ 2018, Q1 = GHS\ Values\ 2016, Q1 * \frac{CPI(2018, Q1)}{CPI(2016, Q1)}$$

This would imply multiplying the GHS values from the KIT data by 1.25

The Living Income Benchmark report uses an exchange rate of 1 US$ to 4.45 GHS (2018, Q1).

Therefore, after income data from 2016(Q1) has been adjusted to 2018 (Q1) values, all GHS values can be converted to US$ by dividing by 4.45.

2018 (Q1) in 2016 (Q1) values

Alternatively, to adjust the Living Income Benchmark value from 2018 (Q1) to 2016 (Q1) equivalent values, we apply the following adjustment:

$$GHS\ Values\ 2016, Q1 = GHS\ Values\ 2018, Q1 * \frac{CPI(2016, Q1)}{CPI(2018, Q1)}$$

This would imply dividing the GHS Living Income Benchmark values by 1.25

The KIT study uses an exchange rate of 0.26116 US$ to 1 GHS.

Therefore after the Living Income Benchmark value from 2018(Q1) has been adjusted to 2016 (Q1) equivalent values, all GHS values can be converted to US$ by multiplying by 0.26116.

Box 3 Time period & currency adjustment

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[19] Smith & Sarpong (2018). Living Income Report, Rural Ghana, Cocoa growing areas of Ashanti, Central, Eastern, and Western Regions. Living Income Community of Practice, Series 1.
[20] Bymolt, R. Laven, A., Tyszler, M. (2018) Demystifying the cocoa sector in Ghana and Côte d'Ivoire. Royal Tropical Institute (KIT), Amsterdam

Geographical region refers to whether the income data and the Living Income Benchmark are about the same or similar region. Stakeholders interested in calculating the gap to the Living Income Benchmark should search for the benchmark value available for their region of interest. If a benchmark of interest is not available, we advise reviewing the guidance provided by the LiCoP[21]. Stakeholders might consider approaching others who might also be interested in developing a benchmark for that particular region.

Because of the way Living Income Benchmarks are calculated, family composition plays a crucial role (see Box 1). Therefore, the typical **household size** and/or family composition used for income calculation and the reference household size and/or family compositions of the Living Income Benchmark need to match. If they are slightly different a simple linear approximation can be applied. A more sophisticated adjustment can be done using equivalence scales. Box 12.2 (Chapter 12) of the KIT study [18] presents a more extensive discussion of equivalence scales. For adjusting household sizes with the purpose of approximating the Living Income Benchmark value, we suggest using the OECD-modified scale[22], primarily because it differentiates between the household head, other adults and other children. This scale assigns a value of 1 to the household head, 0.5 to each additional adult member and 0.3 to each child. A more extended example is presented in the *Annex: Benchmark adjustments using adult equivalence scales*.

We advise, however, that if the household size and/or family composition differ too much (for example, more than 3 household members), adjustments should be made with caution. In such cases, stakeholders are advised to contact the Living Income Community of Practice to see if any additional guidance is available on how to handle this situation, or to consider calculating a new benchmark.

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Example of household size adjustment

The Living Income Benchmark for Côte d'Ivoire is for a typical family of 2 adults and 4 children[12].
A simple adjustment for a household of 2 adults and 3 children would imply dividing the benchmark value by 6 and multiplying by 5.

Using the OECD-modified scale, the typical family of 2 adults and 4 children has 2.7 adult equivalents (1 + 0.5 + 4*0.3 = 2.7) and the household with 2 adults and 3 children has 2.4 adult equivalents (1 + 0.5 + 3*0.3 = 2.4). Therefore, the approximation would imply dividing the benchmark by 2.7 and multiplying by 2.4

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Box 4 Household size adjustment

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[21] LiCoP (2020), 'Looking for a Living Income Benchmark?' v. 1.
[22] OECD. (2009). What are equivalence scales? OECD Project on Income Distribution and Poverty. Available at http://www.oecd.org/eco/growth/OECD-Note-EquivalenceScales.pdf

4   Calculation of key indicators

In this section we introduce four key indicators of the gap to the Living Income Benchmark:
1. Gap of the mean income
2. Gap of the median income
3. Share of those below the Living Income Benchmark
4. Foster-Greer-Thorbecke (FGT) index

Each of these indicators provide a particular insight into the gap.
- The **gap of the mean income** is a simple but powerful indicator, which allows one to quickly have an indication of the magnitude of the problem in a region.
- The **gap of the median income** is a slightly more sophisticated indicator, which allows a stakeholder to have a very good indication of the magnitude of the problem for a typical farming household.
- The **share of those below the Living Income Benchmark** provides insights in how many are directly affected by not earning minimally a living income.
- Finally, the **Foster-Greer-Thorbecke (FGT) index** sheds more light into the size of the problem among those below the Living Income Benchmark, and is particularly suitable for cases in which a meaningful share of the households are already above the line.

We strongly suggest researchers to minimally report, whenever possible, the gap of the median income (as share of the Living Income Benchmark) and the share of those below the Living Income Benchmark. Reporting these two relative indicators allows for comparability across time and locations.

Below we detail how to calculate each of those indicators, and we shed additional light on their usability and interpretation. At the end of this section, we explain how and why to make the calculations by (sub-) groups.

Please notice that all indicators outlined below are technically implemented in the _KIT-developed STATA package_ and in the _Simplified Excel Template_.

4.1   Indicator: Gap of the mean income to the Living Income benchmark

A key indicator is the gap of the mean income to the Living Income Benchmark. This simple but powerful indicator takes the mean of the total household income and compares to the (mean) Living Income Benchmark value[23].

The gap can be reported in level values or as a share of the Living Income Benchmark.

In mathematical terms it is, in level value:

$$Gap = mean(Living\ income\ Benchmark) - mean(total\ household\ income)$$

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[23] If a single value for the Living Income Benchmark is used, the mean Living Income Benchmark will be identical to that. If there is a per group or per household adjustment, the mean Living Income Benchmark will be the mean of these values

And as share:

$$Gap(\%) = \frac{mean(Living\ income\ Benchmark) - mean(total\ household\ income)}{mean(Living\ income\ Benchmark)} * 100$$

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Calculating the gap of the mean income to the Living Income Benchmark

Using the STATA KIT-developed function with all variables harmonized in line with section *3.2 Data consistencies: ensuring comparability of data,* type:

```
kitli_gap2bm benchmark, hh_income(total_hh_income_2018)
main_income(total_cocoa_income_2018)
```

and you will obtain:

```
Gap of the mean income to the (mean) Living Income Benchmark

n = 926

                                    USD/year/household
_____
        Income from main crop:      1601
                  Other income:      1125
Gap to the Living Income Benchmark:  1977
_____
        Living Income Benchmark     4704
```

For more options and detailed syntax see *KIT-developed STATA package*

For how to do these calculations in the Excel, see *Simplified Excel Template*

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Box 5 Calculating the gap of the mean income to the Living Income in STATA and in Excel

The main advantage of this indicator is its simplicity. It is very easy to calculate, communicate and explain, and allows for (easy) calculations even when only the (mean) income is known. Moreover, it tackles an important technical and conceptual consideration when comparing actual incomes to the Living Income Benchmark value. First notice that there is a conceptual difference between the "mean gap" and the "gap of the mean". The "gap of the mean" is calculated by first calculating the income of the mean household and then comparing to one Living Income Benchmark value. The "mean gap", on the other hand, is calculated by first calculating the gap to the Living Income Benchmark for each household and then taking its mean.[24] As indicated in section 3.2, family composition plays a crucial role in determining the Living Income Benchmark value. Because of this, calculating the "mean gap" would require a Living Income benchmark value adjusted per household. Therefore, calculating the "gap of the mean" instead, avoids these technical issues.

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[24] The gap of the mean income (as described above) is mathematically equal to the mean gap in level, but not conceptually equal. The gap of the mean as share is only mathematically equal to the average gap in share when the Living Income Benchmark value is the same for each and every observation.

There are a few aspects to consider, though, when interpreting this indicator. First of all, means are quite sensitive to outliers (i.e., extreme low or high values, which can be real or errors), therefore it is important to ensure that the underlying data is cleaned and checked. Second, it takes into account all incomes equally. This means that all households bring equal weight to the indicator, regardless of how far they are from the benchmark and households with higher incomes will raise the mean, especially if they are above the benchmark. Therefore, if a meaningful share of the households are above the benchmark or if high income values are present, the gap indicator can even become negative. In that sense, the indicator would be "hiding" the households more severely affected and below the benchmark, but is still a valid indicator of the gap of the mean household.

In cases where most of the observations are below the benchmark this issue is less important and this simple indicator is preferred. On the other hand, if many households are above the benchmark, there are high incomes present, and/or the researcher would prefer a more refined metric that treats separately those above and below the benchmark, other indicators can be more appropriate. One of these is discussed in section 4.4 Indicator: Foster–Greer–Thorbecke (FGT) index.

Alternatively, one could compute the value of the gap of the mean for those below the benchmark, along with the share of those below the benchmark.

As mentioned at the start of this section, this indicator can be calculated in level or as a share. The calculation of the gap as a share allows for broader comparison across time or across countries, since it would avoid the need to convert values of different locations and time periods to match each other.

4.2   Indicator: Gap of the median income to the Living Income benchmark

An indicator similar to the gap of the mean is the gap of the median income to the Living Income Benchmark. This, also simple but powerful, indicator takes the median total household income and compares it to the (median) Living Income Benchmark value[25]. The gap can be reported in level value or as a share of the Living Income Benchmark.

In mathematical terms it is, in level value:

$$Gap = Median(Living\ income\ Benchmark) - Median(total\ household\ income)$$

And as share:

$$Gap(\%) = \frac{Median(Living\ income\ Benchmark) - Median(total\ household\ income)}{Median(Living\ income\ Benchmark)} * 100$$

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[25]   If a single value for the Living Income Benchmark is used, the median Living Income Benchmark will be identical to that. If there is a per group or per household adjustment, the median Living Income Benchmark will be the median of these values

Box 6 Calculating the gap of the median income to the Living Income in STATA and in Excel

Like the gap of the mean, this indicator is also easy to communicate and explain. Contrary to means, medians are less sensitive to extreme values and therefore less affected by outliers. Most importantly, the median household is closer to the colloquial concept most people commonly have of what a "typical" household is. Because income distributions are typically skewed, the median income is typically smaller than the mean income and therefore the gap indicator would be larger. In the example dataset, the gap of the median is USD 2820 in contrast to the USD 1876 value of the gap of the mean.

In technical and conceptual terms, the gap of the median income also avoids the need for benchmark value per household, since the focus is on the composition and income of the median household. However, a check of whether the median household size and composition match the Living Income Benchmark reference family is also important. If they differ meaningfully, further adjustments to the Living Income Benchmark value are recommended, in line with what is described in section 3.2.

Even though a few (outlier) high income values are unlikely to increase the median income, if a high share of the households are above the benchmark, a similar issue as mentioned in section 4.1 might arise where the indicator might be "hiding" the existence of poor households. Again, this is still a valid indicator and if most households are below the benchmark value this is less likely to be an issue. If the gap of the mean and/or gap of the

median is zero or negative, this indicates progress and the debate should shift to the share of households below the benchmark line and how affected they are. A metric specifically designed for this scenario where a meaningful part of the households are above the living income threshold is presented in section 4.4.

Alternatively, one could also compute the value of the gap of the median for those below the benchmark, along with the share of those below the benchmark.

As mentioned at the start of this section, this indicator can also be calculated in level or as a share. The calculation of the gap as a share allows for broader comparison across time or across countries since it would avoid the need to convert values of different locations and time periods to match each other.

4.3 Indicator: Share of those below the Living Income benchmark

Another key indicator is the share of the households below the Living Income Benchmark. This simple but very informative indicator also reflects the size of the population of interest failing to reach a basic but decent standard of living. This is similar to a poverty headcount indicator and provides a first insight into how many households are earning less than what is considered decent.

The calculation is made by dividing the count of households below the benchmark value by the number of total households and multiplying by 100 to convert it to percentage. Alternatively, this can be calculated by creating an indicator variable which equals 1 if the household is below the benchmark value and 0 otherwise. The mean of the indicator variable multiplied by 100 is the percentage of households below the benchmark.

Calculating the share of those below the Living Income Benchmark

Using the STATA KIT-developed function with all variables harmonized in line with section *3.2 Data consistencies: ensuring comparability of data,* type:

```
kitli_compare2bm benchmark, hh_income(total_hh_income_2018)
```

and you will obtain:

```
Share of observations below the Living Income Benchmark

n = 934

Below the Living Income Benchmark:      83.4%
```

For more options and detailed syntax see *KIT-developed STATA package*

For how to do these calculations in the Excel, see *Simplified Excel Template*

Box 7 Calculating the share of those below the Living Income Benchmark in STATA and in Excel

This indicator can only be calculated if the total household income per observation is available, instead of only aggregated data. Because the comparison of total income to the Living Income Benchmark is done per observation, it requires a Living Income Benchmark value per household. As indicated in section 4, this requires either adapting the benchmark value per observation or using a common value of the benchmark per observation and assuming this is a valid indication/approximation. For a good estimation of the share of the population of interest below the benchmark, the use of a common benchmark value for all observations is not a problem as adjusting the benchmark value would only affect the classification of households very close to the benchmark line. If the mean income is far from the benchmark value, only a few households would be misclassified and the impact of making a more detailed calculation would be small. However, the simplification needs to be taken into account for interpretation purposes.

In reporting the share of households below the benchmark, it is recommended to indicate which approach to the benchmark value is used (gap to a common benchmark value or gap to a benchmark adjusted for each household).

4.4   Indicator: Foster–Greer–Thorbecke (FGT) index

As indicated in sections 4.1 and 4.2, the gap of the mean or median income to the Living Income Benchmark value has the limitation that it takes into account all incomes, potentially "hiding" households below the benchmark value if a higher share of the observations are above the benchmark value and/or if high income values are present.

To address these cases, a researcher can report the gap (mean or median) of those below the Living Income Benchmark value and the share of those below the Living Income Benchmark.

For a more sophisticated metric, we take a parallel from the poverty metrics literature. The Foster–Greer–Thorbecke (FGT) indices focuses on those below a poverty line, by assigning a gap value of 0 to those above the line. It provides an indication of the depth of the poverty among the poor.

Here we adapt the poverty gap metric by replacing the poverty line with the Living Income Benchmark. It takes the mean of the income gap per household, as a share, assigning a gap of 0 to those above the benchmark line. In mathematical terms it is:

$$FGT = Average \left(\frac{\max\left([Living\ income\ Benchmark\ -\ total\ household\ income], 0\right)}{Living\ income\ Benchmark} \right) * 100$$

Because the calculation of the gap is done per household, it is preferred to have Living Income Benchmark values adjusted per household, even though a common value will suffice. Notice that if all households are below the benchmark this indicator is very similar to the gap (as share) of the mean income and would be mathematically identical if, additionally, the Living Income Benchmark value is the same for all households.

<div style="background-color: #f5d836; padding: 20px;">

Calculating the FGT gap to the Living Income Benchmark

Using the STATA KIT-developed function with all variables harmonized in line with section *3.2 Data consistencies: ensuring comparability of data*, we use the same syntax as in Box 5 and add the option `metric(FGT)`, typing:

```
kitli_gap2bm benchmark, hh_income(total_hh_income_2018) metric(FGT)
```

You will obtain:

```
FGT gap to the Living Income Benchmark

n = 934

                                   Index value
_____
                    FGT index:        50%
_____
                             USD/year/household
         Living Income Benchmark      4707

```

For more options and detailed syntax see *KIT-developed STATA package*

For how to do these calculations in the Excel, see *Simplified Excel Template*

</div>

Box 8 Calculating the FGT gap to the Living Income in STATA and in Excel

The indicator can vary from 0% to 100%, where the higher the value, the higher the gap. Even though the FGT indicator focuses on those below the Living Income Benchmark line, its implementation and interpretation are a bit more difficult than the gap of the mean or median incomes. It can be thought of as combining the mean gap of those below the Living Income Benchmark with the share of those below the line. It will always be larger or equal to the mean gap per household. In the example dataset, the gap of the mean is 40% while the gap of the median is 59%. This suggests that some of the 16.6% of the observations above the benchmark somehow masks the size of the gap, which is also indicated by the difference between the gap of the median and gap of the mean.

Finally, since the calculations are done per household, it does require the assumption that the benchmark value used for each observation is its best approximation. Contrary to what was discussed in section 4.3, the gap as share per observation is directly affected by the value chosen for the benchmark, especially if adjusted per household.

4.5   Calculations including the intrinsic value of food produced and consumed at home (or other in-kind income)

As mentioned before, food costs are an import component of the Living Income Benchmark and the intrinsic value of food produced and consumed at home can be an import source of non-cash income. Including this in the calculation of the indicators above will reduce the gap.

To include this in the calculation they need to be added to the total net household income as any other source of income, respecting the harmonization guidelines outlined in *section 3.2 Data consistencies: ensuring comparability of data*.

We still advise, whenever possible, to report it also separately, to allow readers to understand what actual cash income and cash-valued income is.

Calculating the gap of the mean income to the Living Income Benchmark, including the intrinsic value of food produced and consumed at home

Using the STATA KIT-developed function with all variables harmonized in line with section *3.2 Data consistencies: ensuring comparability of data*, we use the same syntax as in Box 5 and add the `food_value(food_value),` typing:

```
kitli_gap2bm benchmark, hh_income(total_hh_income_2018) main_income(
total_cocoa_income_2018) food_value(food_value)
```

and you will obtain:

```
Gap of the mean income to the (mean) Living Income Benchmark

n = 926


                                      USD/year/household
_____

              Income from main crop:      1601
                       Other income:      1125
       Value of crops consumed at home:     450
Gap to the Living Income Benchmark:        1527
_____

           Living Income Benchmark        4704
```

For more options and detailed syntax see *KIT-developed STATA package*

For how to do these calculations in the Excel, see *Simplified Excel Template*

Box 9 Calculating the gap of the mean income to the Living Income in STATA and in Excel

4.6   Calculations per groups

As section 2 introduced, there might be use cases in which the stakeholder is interested in obtaining the indicators above per groups or segments of the studied population. This can be, for example, because they target specific groups, such as female-headed households, and/or want to compare between different groups. The groups can reflect different household compositions, participation in a (company) program, or be a result of a cluster analysis. How to define groups is out of scope of this guidance, but for an example of groups generated from a cluster analysis, please see the KIT reports on the income gap[10,11,].

When groups are created, the same data consistencies considerations outlined in section 3.2 apply. It is important, for example, to consider how different household compositions of the different groups affect the comparison with the benchmark.

To facilitate grouping or comparisons all *KIT-developed STATA package* allow the use of `if` operators, for filtering an**d** `grouping_var`, for comparisons. For an illustration, see Box 10.

Calculating the gap of the mean income to the Living Income Benchmark, per group

Using the STATA KIT-developed function, with all variables harmonized in line with section *3.2 Data consistencies: ensuring comparability of data*, we use the same syntax as in Box 5 and add the `grouping_var(grouping_alt)` option, where `grouping_alt` is the variable containing the group categories, typing:

```
kitli_gap2bm benchmark, hh_income(total_hh_income_2018) main_income(
total_cocoa_income_2018) grouping_var(grouping_alt)
```

You will obtain:

```
Gap of the mean income to the (mean) Living Income Benchmark

Female-headed
n = 144

                              USD/year/household
_____
        Income from main crop:      1045
                 Other income:       707
Gap to the Living Income Benchmark:  2249
_____
        Living Income Benchmark      4001

Male-headed, typical
n = 595

                              USD/year/household
_____
        Income from main crop:      1297
                 Other income:       990
Gap to the Living Income Benchmark:  2454
_____
        Living Income Benchmark      4742

Male-headed, large
n = 187

                              USD/year/household
_____
        Income from main crop:      2997
                 Other income:      1877
Gap to the Living Income Benchmark:   249
_____
        Living Income Benchmark      5123
```

For more options and detailed syntax see *KIT-developed STATA package*

For how to do these calculations in the Excel, see *Simplified Excel Template*

Box 10 Calculating the gap of the mean income to the Living Income in STATA, and in Excel per group

5   Visualizing key indicators

Data visualizations are key to complement the interpretation and communication of the indicators introduced in section 4: *Calculation of key indicators*. All indicators can be presented in tabular and graphical form, which cater to different audiences.

This section presents, for each indicator, suggestions on preferred graphical visualizations that will highlight the results, allowing for broader interpretability, communication, and comparability.

To facilitate the harmonization of communication, the *KIT-developed STATA package* includes creation of all graphs presented here. The *simplified Excel Template* includes most of the graphs, with the exception of the income distributions from section 5.4.

5.1   Indicator: Gap of the mean income to the Living Income benchmark

The gap of the mean income to the Living Income Benchmark is best visualized as a bar chart. Figure 1 shows and example with values in level, while Figure 2 shows the version as shares.

In Figure 1 each bar is a different height because a different living income benchmark value was calculated for each group. Household size of female-headed households was smaller, so the living income benchmark was lower.
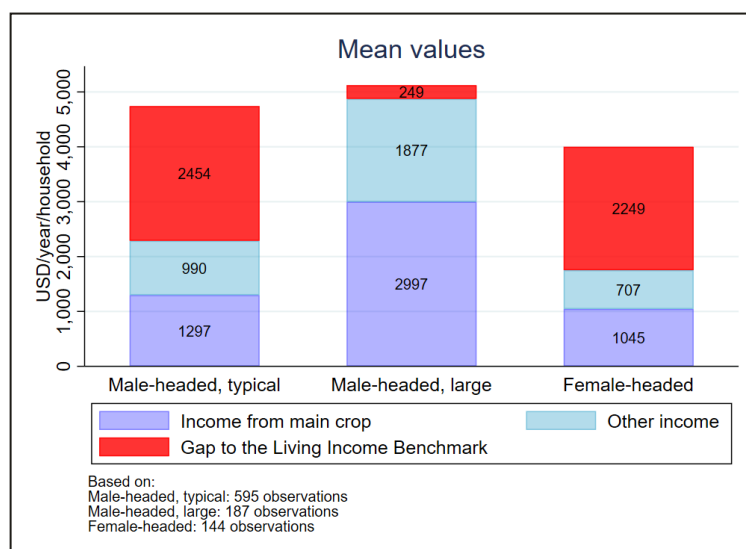

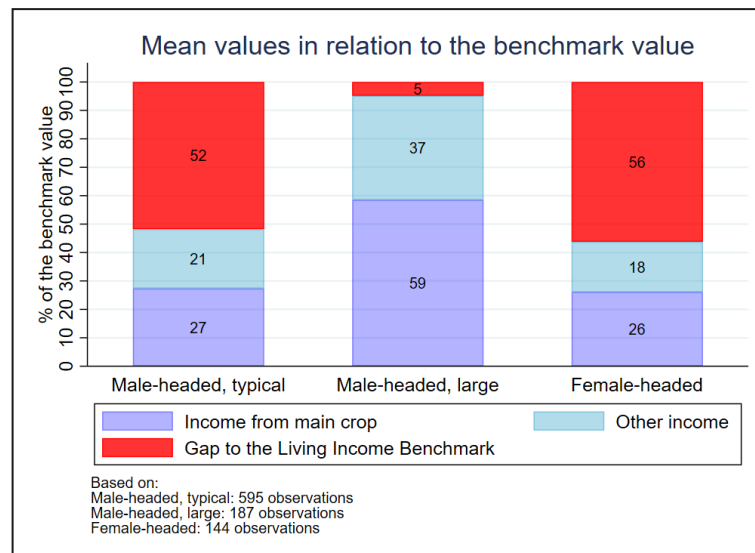*Figure 1 Example of visualizing the gap of the mean income*

Figure 2 Example of visualizing the gap of the mean income as share

The bar in level (Figure 1) has the level of the benchmark of each group. The purple part of the bar shows the main income source and the blue the remaining income. The red bar shows the difference between total income and the benchmark, i.e., the gap. This comparison is particularly strong to compare between groups within the same region, since the benchmark levels and size of the gap are both directly visible.

Note that if the value of consumed food produced at home were included in these graphs it would appear as a different color in the bar (see section 5.3).

Because interpreting level values require a further understanding of currencies and the context of the values, normalized bars (Figure 2) can be a more generic representation which focus on the relative shares. This interpretation is quite powerful, particularly to compare across regions or over time, when the levels might not be directly comparable.

Generating bar charts of the gap of the mean income to the benchmark

Using the STATA KIT-developed function, simply add the option `show_graph`, typing :

```
kitli_gap2bm benchmark, hh_income(total_hh_income_2018) main_income(
total_cocoa_income_2018) grouping_var(grouping) show_graph
```

For more options and detailed syntax see *KIT-developed STATA package*

For how to do generate these graphs in the Excel, see *Simplified Excel Template*

Box 11 Generating bar charts of the gap of the mean income to the benchmark in STATA and in Excel

For a more detailed plot where you can see the distribution of incomes and where the mean and median income stands, please see section 5.4 and Figure 9.

5.2 Indicator: Gap of the median income to the Living Income benchmark

Visualizing the gap of the median income to the Living Income Benchmark is similarly best visualized as a bar chart. Figure 3 shows and example with values in level, while Figure 4 shows the version as shares. The interpretation is similar as indicated in section 5.1, but now median values are used instead of means.
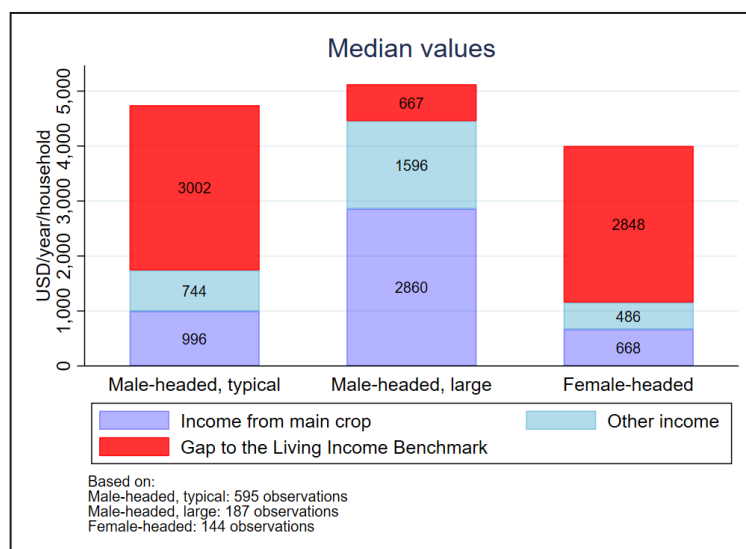

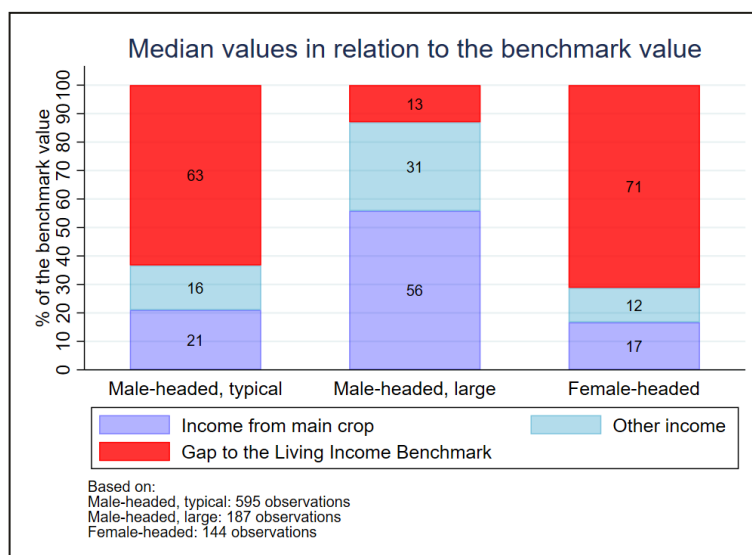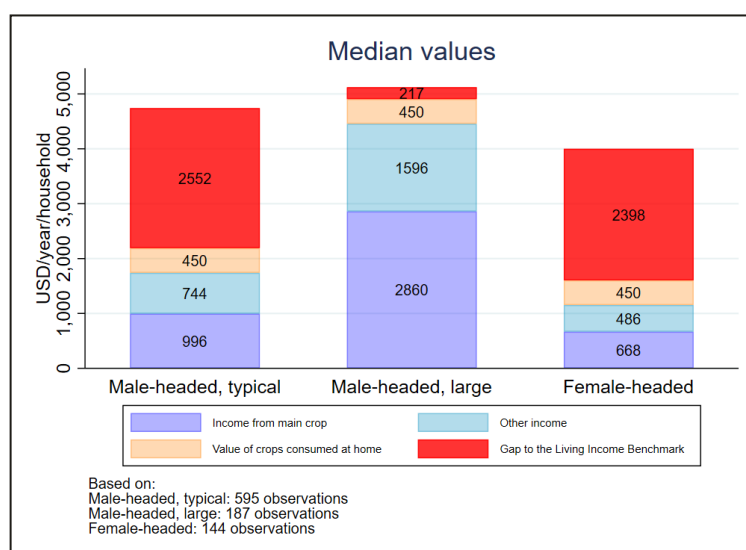*Figure 3 Example of visualizing the gap of the median income*

Figure 4 Example of visualizing the gap of the median income as share

For a more detailed plot where you can see the distribution of incomes and where the mean and median income stands, please see section 5.4 and Figure 9.

Note that if the value of consumed food produced at home were included in these graphs it would appear as a different color in the bar (see section 5.3)

Box 12 Generating bar charts of the gap of the median income to the benchmark in STATA and in Excel

5.3   Bar charts including the intrinsic value of food produced and consumed at home (or other in-kind income)

Visually highlighting the intrinsic value of food produced and consumed at home is an important way to show its importance relative to other sources. It also improves in the interpretation of its relevance.

A recommended way to do that is to include in the bar charts shown in sections 5.1 and 5.2. Figure 5 shows and example with values in level, while Figure 6 shows the version as shares.

Figure 5 Example of visualizing the gap of the median income, including the intrinsic value of food produced and consumed at home
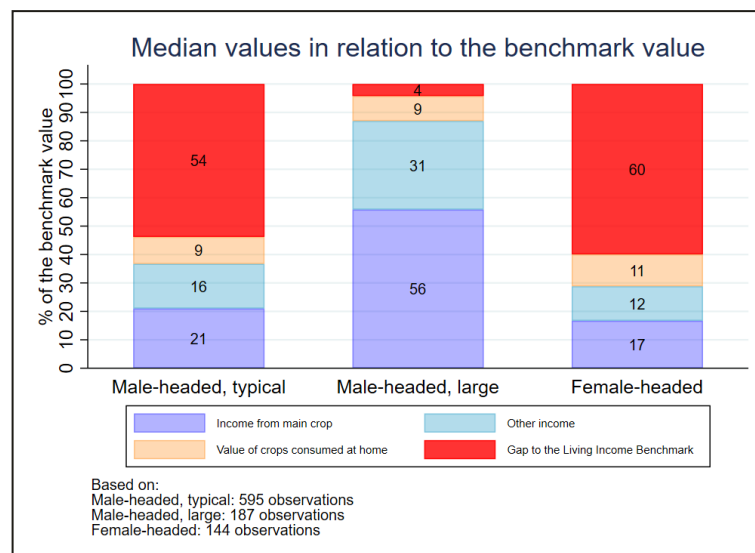
Figure 6 Example of visualizing the gap of the median income as share, including the intrinsic value of food

<div style="background-color: #FFD400; padding: 10px;">

Generating bar charts of the gap of the median income to the benchmark, including the intrinsic value of food produced and consumed at home

Using the STATA KIT-developed function add the same syntax shown in Box 12 and add the `food_value(food_value)`, typing:

```
kitli_gap2bm benchmark, hh_income(total_hh_income_2018)
main_income(total_cocoa_income_2018) grouping_var(grouping) show_graph
metric(median) food_value(food_value)
```

For more options and detailed syntax see *KIT-developed STATA package*

For how to do generate these graphs in the Excel, see *Simplified Excel Template*

</div>

Box 13 Generating bar charts of the gap of the median income to the benchmark in STATA and in Excel

5.4   Indicator: Share of those below the Living Income benchmark

The share of those below the Living Income Benchmark can also be shown as bar chart. Figure 7 shows and example. It is particularly powerful for comparisons, but also as a single bar it provides an easy to interpret indication of how many households are below the benchmark value.
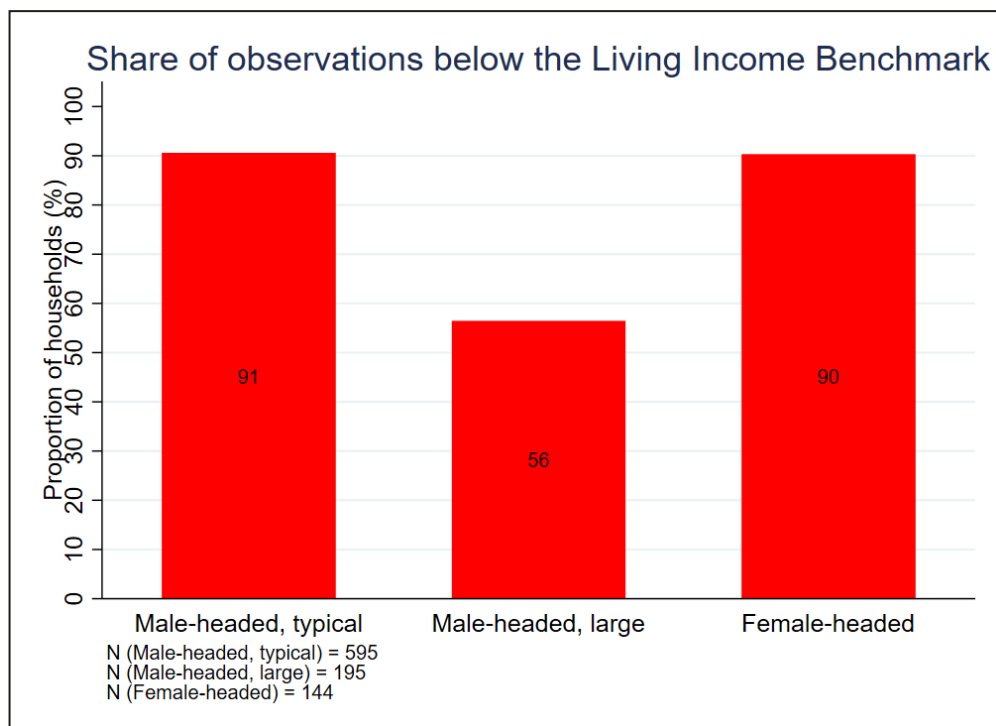
Figure 7 Example of visualizing the share of those below the benchmark with a bar chart

<div style="background-color:#f5c518">

Generating bar charts of the share of those below the benchmark

Using the STATA KIT-developed function add the options `show_bar_graph` to the example from Box 7, with the grouping option, typing:

```
kitli_compare2bm benchmark, hh_income(total_hh_income_2018)
show_bar_graph grouping_var(grouping)
```

For more options and detailed syntax see *KIT-developed STATA package*

For how to do generate these graphs in the Excel, see *Simplified Excel Template*

</div>

Box 14 Generating bar charts of share of those below the benchmark in STATA and in Excel

To communicate more details, the shares of those below the Living Income Benchmark can be visualized with distributional plots. Figure 8 shows and example with 3 groups.
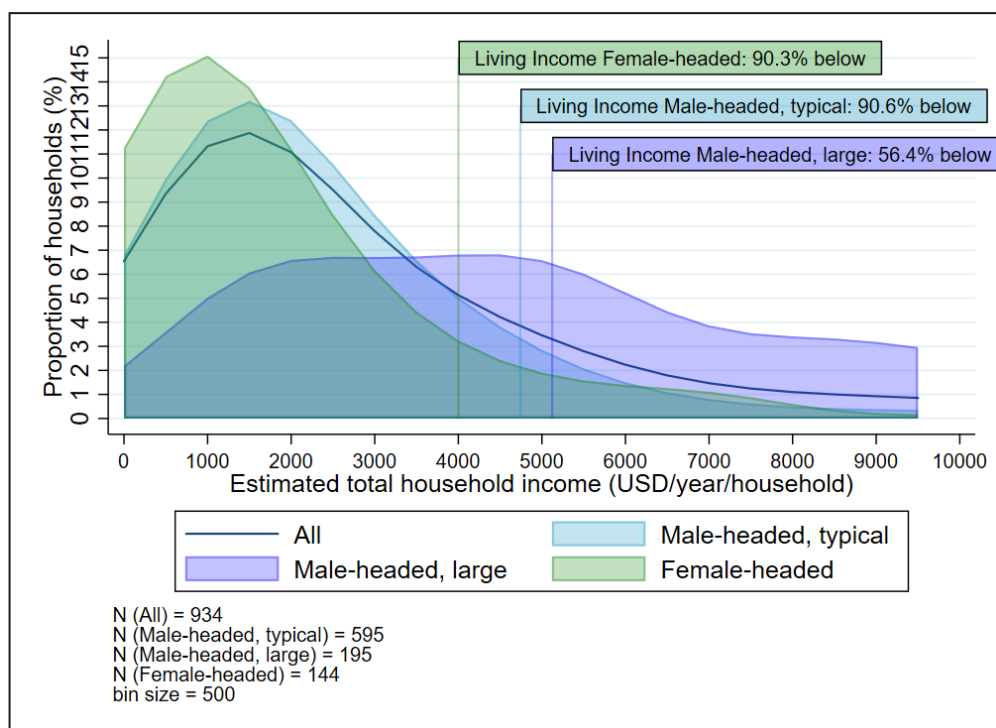
Figure 8 Example of visualizing the share of those below the benchmark with distributions

The distribution provides a strong insight on where incomes are concentrated. Figure 8 has a composition of four elements:

a. It shows per group a distribution curve (smoothed Gaussian kernel)[26] of the total household incomes
b. It shows a distribution curve (smoothed Gaussian kernel)[26] of all groups together
c. It marks for each group the benchmark line
d. It shows the share of those below the benchmark line.

With this such a figure it is possible to assess how the incomes are distributed, how concentrated they are and what the potential effect of are of the extremes of the distribution. This example graph, for example, shows that the income distribution between male and female headed household is quite similar, with the female-headed having a lower mean and median. It also shows that in both groups there are some high-performers, and even in the male-headed, large group there are some households quite far from the benchmark line.

Generating distributional charts of income to compare to the benchmark in STATA

Using the KIT-developed function add the options `show_distribution_graph` to the example from Box 7, with the grouping option

```
kitli_compare2bm benchmark, hh_income(total_hh_income_2018)
show_distribution_graph grouping_var(grouping) label_benchmark(Living
Income)
```

---

[26] The curve shown is a smoothed Gaussian kernel distribution. A Gaussian kernel distribution is an "smoothed" density distribution. It is like drawing an smooth curve (edges) around a histogram.

Box 15 Generating distributional charts of income to compare to the benchmark in STATA

It is also possible to generate a different detailed graph (per group) where the mean and
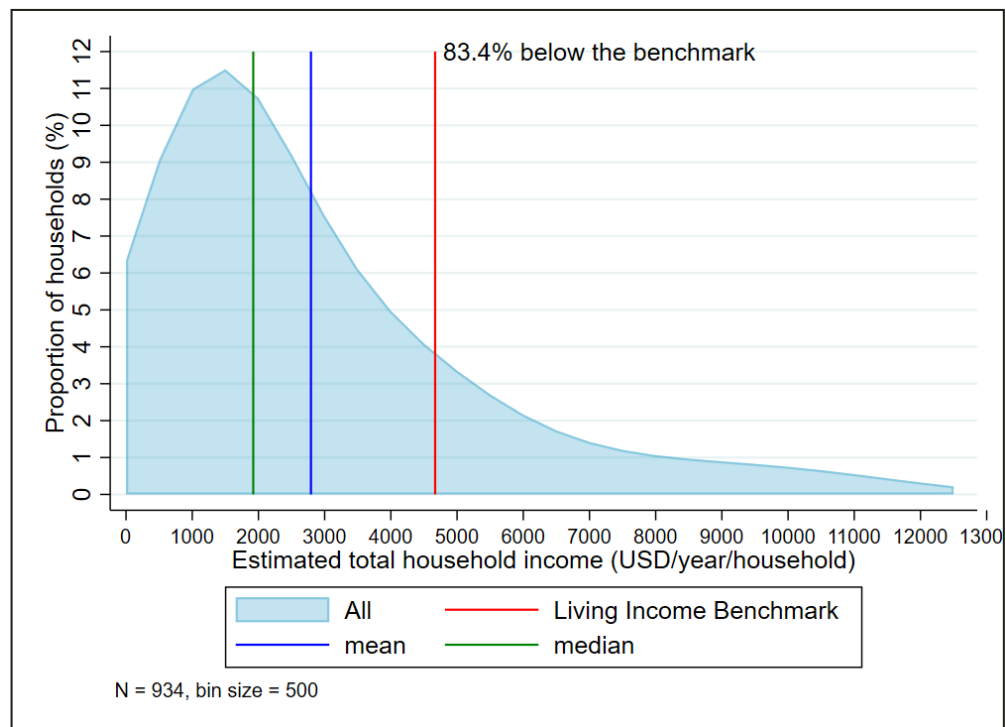median values of the gap are also visible. Figure 9 shows such an example.

Figure 9 Example of visualizing the share of those below the benchmark, with details

This figure can complement the visualizations introduced at sections 5.1 and 5.2.

*Box 16 Generating a distributional chart of income to compare to the benchmark in STATA, including mean and
median values*

5.5 Indicator: Foster–Greer–Thorbecke (FGT) index

Visualizing the FGT gap of to the Living Income is unfortunately not trivial. Because the computations assume a gap of zero to those above the benchmark, it is not possible to produced stacked bar charts as in Figure 2 and Figure 4. It is only possible to plot the value of the index.

For a single group the graph is not very insightful, since it would show a single bar. However, for a comparison of groups, across regions or time it is insightful. For example, Figure 10 shows that the value of the index is at its highest for female-headed. It also shows that the index is 26% even within the groups of male-headed, large farmers, who on average are just on the benchmark.
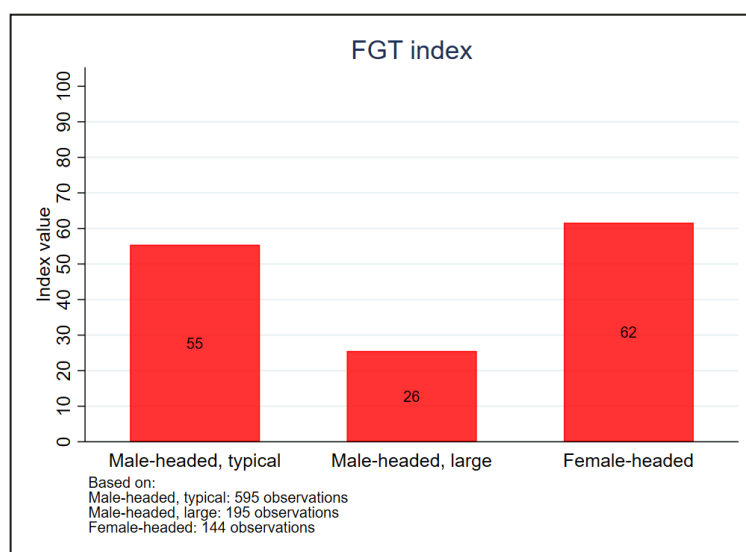

Figure 10 Example of visualizing the FGT gap of the benchmark

---

Generating bar charts of the FGT index

Using the STATA KIT-developed function presented in Box 8, add the option `show_graph`, typing:

```
kitli_gap2bm benchmark, hh_income(total_hh_income_2018)
grouping_var(grouping) metric(FGT) show_graph
```

For more options and detailed syntax see *KIT-developed STATA package*

For how to do generate these graphs in the Excel, see *Simplified Excel Template*

Box 17 Generating bar charts of the FGT to the benchmark in STATA

6   Technical supplement

6.1   KIT-developed STATA package

To supplement this guidance manual, KIT developed a STATA package that implements the calculations, tables and graphs outputs as presented in this guidance manual. The package also contains a test dataset (in stata format) that allows the reproduction of all tables and figures presented here, allowing any user to reproduce the tables and graphs as a reference for their own use of the package.

The package is maintained and updated at: https://github.com/mtyszler/KIT_LivingIncome/

6.1.1   Installing the KIT-developed STATA package

The package website contains detailed instructions on how to install the package and verifying the correct installation.

The preferred installation option is to type, within STATA:

```
net install github, from("https://haghish.github.io/github/")
github install mtyszler/KIT_LivingIncome
```

This will ensure that the latest release is installed locally. Additional installation options are described at: https://github.com/mtyszler/KIT_LivingIncome/

6.1.2   Using the KIT-developed STATA package

Please type, within STATA

```
help kitli_gap2bm
and
help kitli_compare2bm
```

For a detailed documentation, with full syntax, all options and examples

6.1.3   Improving the KIT-developed STATA package

KIT welcome users to propose suggestions and/or make new requests to the package. The package is maintained and updated at: https://github.com/mtyszler/KIT_LivingIncome/

Please register bugs and/or requests via
 https://github.com/mtyszler/KIT_LivingIncome/issues.

Alternatively, contact Marcelo Tyszler at m.tyszler@kit.nl

6.2　Simplified Excel Template

To further supplement this guidance manual, KIT also developed a *Simplified Excel Template* to report the indicators and produce some of the graphs. There is an indication on how to do the calculations, when applicable. The template contains an example dataset and all tables are graphs are pre-filled for illustration purposes.

The template can be accessed and downloaded at: https://drive.google.com/drive/folders/10f3vP7j2WFgNKm1t1s4PrwzpSwCHSlzn?usp=sharing

The Simplified excel template allows to make the following tables and graphs:
- Gap of the mean income
  - Gap of the mean income to the Living Income Benchmark: only total income
  - Gap of the mean income to the Living Income Benchmark: only total income, by groups
  - Gap of the mean income to the Living Income Benchmark: total income + value of food
  - Gap of the mean income to the Living Income Benchmark: total income + value of food, by groups
  - Gap of the mean income to the Living Income Benchmark: main income + other income
  - Gap of the mean income to the Living Income Benchmark: main income + other income, by groups
  - Gap of the mean income to the Living Income Benchmark: main income + other income + value of food
  - Gap of the mean income to the Living Income Benchmark: main income + other income + value of food, by groups

- Gap of the median income
  - Gap of the median income to the Living Income Benchmark: only total income
  - Gap of the median income to the Living Income Benchmark: only total income, by groups
  - Gap of the median income to the Living Income Benchmark: total income + value of food
  - Gap of the median income to the Living Income Benchmark: total income + value of food, by groups
  - Gap of the median income to the Living Income Benchmark: main income + other income
  - Gap of the median income to the Living Income Benchmark: main income + other income, by groups
  - Gap of the median income to the Living Income Benchmark: main income + other income + value of food
  - Gap of the median income to the Living Income Benchmark: main income + other income + value of food, by groups

- Share of those below the Living Income benchmark
  - Share of those below the Living Income benchmark
  - Share of those below the Living Income benchmark, by groups
  - Share of those below the Living Income benchmark (incl. value of food)

- o Share of those below the Living Income benchmark (incl. value of food), by groups
- FGT Index
  - o FGT Index
  - o FGT Index, by groups
  - o FGT Index, total income + value of food
  - o FGT Index, total income + value of food, by groups

7 Annex: Benchmark adjustments using adult equivalence scales

In section 3.2 Data consistencies: ensuring comparability of data, it is explained how the household composition can be used to inform adjustments on the Living Income Benchmark value.

To illustrate the effect of different choices, we use table 13 from the Living Income Report on Rural Ghana[19] . Table 1 has the value of the Living Income Benchmark adjusted for different household composition by the authors of the study, which can be seen as the best values. We than compare these to the values adjusted using a linear scale, OECD OLD Scale[27], OECD Modified Scale[28] and the Square Root scale

Table 1 Example of Adjustments to the Living Income Benchmark

Values in GHS/month	2 adults, 3 children	3 adults, 2 children	3.5 adults, 2.5 children	3.5 adults, 3 children
Base value (calculated by researchers)	1,464	1,484	1,758	1,900
Linear scaled from 2 adults, 3 children: Factor	5	5	6	6.5
Linear scaled from 2 adults, 3 children: value		1,464	1,757	1,903
OECD OLD scaled from 2 adults, 3 children: Factor	3.2	3.4	4.0	4.3
OECD OLD scaled from 2 adults, 3 children: Value		1,556	1,830	1,944
OECD MODIFIED scaled from 2 adults, 3 children: Factor	2.4	2.6	3.0	3.2
OECD MODIFIED scaled from 2 adults, 3 children: Value		1,586	1,830	1,922
SQUARE ROOT scaled from 2 adults, 3 children: Factor	2.2	2.2	2.4	2.5
SQUARE ROOT scaled from 2 adults, 3 children: Value		1,464	1,604	1,669

We can see that no adjustment matches the value calculated by the researchers, which justify a more expert analysis. The linear scale is not very far off in this case, but ignores the household composition (just as the square root scale). The OECD Modified scale (recommended) also provides a good approximation.

_____

[27] OECD Old scale: assigns a value of 1 to the first household member, 0.7 to each additional adult and 0.5 to each child.
[28] OECD Modified scale: assigns a value of 1 to the household head, 0.5 to each additional adult member and 0.3 to each child.