ANALYSIS AND REPORT

Baseline Study for a Living Income in Cashew and Cocoa Growing Regions of Ghana

Published by

Deutsche Gesellschaft
für Internationale
Zusammenarbeit (GIZ) GmbH

Analysis and Report of a Baseline Study for a Living Income (and Other Benchmarks) in Cashew- and Cocoa-Growing Regions of Ghana

for the GIZ Competitive Cashew Initiative (ComCashew) and the Sustainable Agricultural Supply Chain (INA) Project

By: Dr. Eberhard Krain, John Osei Gyimah, Ignatius Pumpuni, Nana Yaw Kwapong-Akuffo and Martin Kuntze-Fechner

Bremen and Accra, April 2021

List of Abbreviations and Acronyms

AE	Adult Equivalent
BMZ	German Federal Ministry of Economic Cooperation and Development
COCOBOD	Ghana Cocoa Board
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GLWC	Global Living Wage Coalition
GM, GMA	Gross Margin; Gross Margin Analysis
GAP	Good Agricultural Practice
GDP	Gross Domestic Product
GH	Ghana
GHS	Ghana Cedi
GSS	Ghana Statistical Services
Ha	Hectare
FTE	Full Time Equivalent
GLSS	Ghana Living Standards Survey
HH	Household
IPL	International Poverty Line
LFPR	Labour Force Participation Rate
LI	Living Income
LIC	Low Income Country
LI CoP	Living Income Community of Practice
lNPL	Lower National Poverty Line
LMIC	Lower Middle Income Country
MOFA	Ministry of Food and Agriculture Ghana
MW	Minimum Wage
NPL	National Poverty Line
PPP	Purchasing Power Parity
RCN	Raw Cashew Nut
SHF	Smallholder Farmer
uNPL	Upper National Poverty Line
USD	US Dollar
USD PPP	US Dollar Purchasing Power Parity
WB	World Bank

List of Tables

List of Graphs

List of Formulas

TABLE OF CONTENTS

Executive summary

EXECUTIVE SUMMARY

0.1 INTRODUCTION AND METHODOLOGY

Background

Smallholder farmers and rural workers are the main source of some of the most important globally traded agricultural products (e.g. coffee, cocoa, tea) and provide the backbone of these sectors. Yet they are notoriously poorly paid, and this is despite the fact that they grow and sometimes pre-process these agricultural products by making full use of their labour. This contrasts strongly with Article 23(3) of the Universal Declaration of Human Rights which stipulates that

> *"Everyone who works has the right to just and favourable remuneration ensuring for himself [/herself] and his [/her] family an existence worthy of human dignity".*

The Competitive Cashew Initiative (ComCashew) and the Sustainable Agricultural Supply Chain Initiative (INA) – both projects commissioned by the German Federal Ministry of Economic Cooperation and Development (BMZ) and implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) – have recently started to work jointly on the topic of Living Income with partner organizations, the Ministry of Food and Agriculture (MOFA), Ghana, and the Ghana Cocoa Board (COCOBOD), in the tree crop sector to implement measures aimed at bridging the gap towards a decent income among smallholder farmers in Ghana and Côte d'Ivoire. A key focus of this cooperation has been to determine the living and prevailing incomes of smallholder cashew and cocoa farmers and to plan and implement activities to close the gap. This report shall establish a baseline for future work.

The objective of this work is thus to determine how much smallholder cashew and cocoa farmers in Ghana currently earn from cashew, cocoa and other main agricultural products ("actual income") and how their income compares to benchmarks which indicate attainment of an income that allows survival (above poverty lines) or even a life in dignity in accordance with human rights (a living income). This is examined under two scenarios: first, under crop production practices that are currently most widespread ("current production") and second, under improved and good agricultural practices ("improved production"). This allows a judgement as to whether incomes under current or improved practices are high enough for survival or a decent life, or whether they need to be increased, and if the latter is the case, an increase to which commodity price *exactly* and what might be the gap, the *"differential"*, between the actual and benchmark price. The work shall inform stakeholders and policymakers in designing appropriate strategies and action plans to help farmers achieve higher incomes at least in accordance with human rights and also to provide information for price negotiations of organizations that work on behalf of producers and buyers.

Methodology

The work is based on available secondary information and primary survey data collected by the project. In terms of primary data, the project conducted a survey between April and August 2020 among 12 cooperatives with 371 cashew and 153 cocoa smallholder households. On a secondary data level, gross margin / crop budget data was available from Farmer Business School material on cocoa, cashew and key crops grown as intercrops or in conjunction with the focus crops. This data was verified in four focus group meetings with farmers and crop experts from December 2020 to January 2021 enabling the team to adjust gross margin figures to the situation in the field as far as possible. This provided the basis for modelling a typical cashew and cocoa smallholder farm household and performing the various income calculations along the different scenarios. Secondary data was also collected from the website of Ghana Statistical Services (GSS) including information on rural population characteristics, but also on the consumer price index, inflation and the like. Finally, it should be mentioned that, especially for the living income benchmark, the websites of the Global Living Wage Coalition and the Living Income Community of Practice were consulted.

Due to the Coronavirus pandemic and for other reasons, the research work was hampered to some extent, but could eventually be completed successfully.

Some further limitations were encountered as well. Most notably, much of the work is based on recall data from farmers, which is often not reliable. Labour input data, especially concerning household labour, is particularly difficult to recall. Thus, the base data may be less than robust.

0.2 RESULTS

Ghana, the Country: Economy, Agriculture, Cocoa and Cashew

Ghana, the "Land of Gold", as it has been called since ancient times because of its gold deposits, is a country along the Gulf of Guinea and the Atlantic Ocean, in the subregion of West Africa, just north of the equator. The climate is tropical, and there are two main seasons – a wet and a dry season. The eastern coastal belt is warm and comparatively dry, the south-west corner of Ghana is hot and humid, and the north of Ghana is hot and dry. The country has a population slightly above 30 million people. Around 29% of the population is under the age of 15, while those aged 15 to 64 make up 57.8%. Ghana is well endowed with natural resources such as industrial minerals, hydrocarbons and precious metals. Especially due to crude oil revenues, in 2011 Ghana managed to advance from a low-income country to a lower-middle income country (GLSS7, 2018). Despite Ghana having undoubtedly made quite a number of advances in recent decades, large parts of the population, especially in rural areas that rely on agriculture have remained poor. In 2016, the poverty rate of people living below US$ PPP 1.90 was 13% and in 2017, about 2.4 million people were still living in poverty according to GLSS7 (2018).

Agriculture in Ghana consists of a variety of agricultural products and is a key sector in the country's economy. It is the largest employer on a formal and informal basis with 53.6% of the total labour force working in agriculture in 2013. Agricultural crops, including yams, grains, cocoa, oil palms, kola nuts and timber, underpin Ghana's agricultural economy. Livestock keeping plays a less important role. The main "cash cow" of the country coming from agriculture is cocoa, with Ghana being the second most important cocoa producer in the world after Côte d'Ivoire. As far as cashew is concerned, this is an up-and-coming crop in Ghana. At the moment, Ghana ranks 15th in cashew production in the world with a strong upward trend.

Highlights from the Surveys among Cashew and Cocoa Smallholder Households

The project conducted two surveys, one in a typical cashew area (Bono, Bono East and Savannah Regions) sampling 371 households, and the other in an area dominated by cocoa cultivation (Western and Eastern Regions) sampling 153 households (Graph 2, p. 32). Cashew households comprise six persons (median) and are bigger by about one person than cocoa households (Table 6, p. 34). This means that livelihood needs are slightly higher for the former household type. The median age of heads of household is 54 and 52 years for cashew and cocoa households, respectively (Table 8, p. 35). This appears a little old, but not by any significant degree. In most cases, cashew and cocoa smallholder households produce – apart from cashew nuts or cocoa beans for cash income – the majority of their food themselves. Cashew households produce 60% and cocoa households 80% of their food (Table 9, p. 36). The main food crops grown and consumed by both household types are rather similar: yams, maize, cassava, rice and plantain (Graph 7, p. 37). In accordance with cocoa households producing more food for own consumption, they also spend 30% of their money on buying food, which is less than cashew smallholder households who spend 50% (Table 10, p. 38). More than 80% of the land that is used for agriculture by both household types is owned by them while less than 20% is tenanted (Table 11, p. 39). The farm size of cashew smallholder households stands at 4 ha, which is bigger by about 0.5 ha than for cocoa farmers (Table 12, p. 40). The age of cashew and cocoa farms shows that cashew is an up-and-coming crop with most cashew-farming operations being under 10 years old, while most cocoa farms span a central age range

(Graph 12, p. 41). Both, cashew and cocoa trees are usually intercropped during their juvenile phase. Once canopies become too dense, this stops. The five most important intercrops for both types of household are maize, yams, cassava, cocoyam and plantain (Graph 13, p. 42). The median yield of the focus crops is fairly low at 247 kg/ha for cashew and 362 kg/ha for cocoa (Table 17, p. 43). Median cash income from the focus crops was substantially lower for cashew smallholder households at GHS 4,200 compared to cocoa households at GHS 8,240 (Table 18, p. 44). The gross income per hectare stood at GHS 1,050 for cashew and GHS 2,289 for cocoa (Table 19, p. 44). Non-cashew or cocoa income sources do not play a role in cashew smallholder households and only a small role in cocoa smallholder households (Table 20, p. 45).

Some comparisons were also made with respect to female- versus male-headed households. The household size is less by about one person for female-headed households. Female-headed households also occupy smaller farms by about at least one hectare. Their gross income is also smaller (Table 22, p. 47). Because of the smaller number of household members, their needs are also less. Thus, it is difficult to conclude if female-headed households are worse (or better) off than male-headed households. We are neither able to confirm or reject the statement made by GLSS7 (2018) that female-headed households appear to be better off than male-headed households in terms of poverty incidence by our data.

Modelling Typical Cashew and Cocoa Smallholder Households

In the household modelling process, the typical size of a cashew and cocoa smallholder household was set at 6 and 5 persons, respectively, based on the data from the two above-mentioned surveys. Some data was also available on the age structure of the households (Table 23, p. 48) but none on the sex structure. However, in order to work out how these figures relate to Ghanaian poverty lines, which are established using an adult equivalency scale based on age and sex, this data had to be combined with rural population data from GSS (see Table 24, p. 49, to Table 26, p. 50 and Annex 2b).

In order to work out the labour resources of the household types we would usually take the labour force participation rate provided by statistical offices. However, this data appeared inconsistent. Therefore, we took the labour rate as set by SMITH and SARPONG (2020) for cocoa smallholder households at 1.56 full-time equivalents for a 5-person household and adjusted this because of the bigger household size to 1.87 full-time equivalents for a 6-person cashew household. To determine the total available labour force we estimated that a person working full time would work for 275 days a year for about 4 to 6 hours a day. The length of a workday may appear a little low, but is reasonable considering the hot and humid tropical working conditions. On the other hand, the number of 275 workdays a year appears high.

Determining Benchmarks

Six benchmarks were identified to be used as reference points for crop and household incomes (in descending order starting with the highest and ending with the lowest benchmark):

- the Living Income
- the World Bank International Poverty Line for lower-middle income countries
- the Ghana Upper Poverty Line
- the World Bank International Poverty Line for low-income countries
- the Ghana Minimum Wage
- the Ghana Lower Poverty Line

These benchmarks have different backgrounds, different reference points in terms of when they were set and how they were set. They may be set per person ("head count") per day, as is the case for the World Bank poverty lines, or per adult (male) equivalent per day, as is the case for the Ghana poverty lines, or as income to be earned per workday, as is the case for the

Ghana minimum wage, or as income per year or per month per family, as is the case for a living income. All these benchmarks had to be aligned to each other and to a specific time, in our case January 2020, in order to make them comparable. They have also been calculated in three different dimensions, i.e.

- an income to be earned per workforce member and workday of a household
- a total income per year according to two different household sizes (of cashew and cocoa smallholder households)
- and available income per person per day.

This is outlined in Table 28, p. 58, for all categories and Graph 18, p. 59, for the "wage ladder". In order to align all the figures, substantial conversions needed to be done using, for example, inflation rates / consumer price indices and currency conversion rates.

Modelling Incomes of Typical Cashew and Cocoa Smallholder Farms

In order to model a typical smallholder farm, the farm sizes for cashew and cocoa smallholder households were taken from survey data at 4 and 3.6 ha for cashew and cocoa smallholders, respectively, as per Table 19, p. 44. We assumed that 80% of the area would be cultivated with the focus crops, i.e. with cashew and cocoa, respectively, and the remaining 20% with the key intercrops which are maize and groundnut for cashew, and plantain and cassava for cocoa farms. Additionally, 15% of the 80% were assumed to be grown with intercrops, since this is possibly still an area with young trees allowing intercropping. Some of the intercrops can be grown twice a year (e.g. maize and groundnut), others only once per year (cassava and plantain). Adding all these areas together one arrives at a "virtual farm area" of 5.76 and 3.6 ha for cashew and cocoa farms, see Table 29, p. 60.

For the different crops we worked out gross margins / crop budgets for two production systems: "current production" reflecting the production level of ordinary farmers, and "improved production", a production level of better farmers, showing cost of production, labour input, yield, revenues and income per enterprise (economic gross margin), per household (financial gross margin) and income earned per workday, see Table 30, p. 62, and Table 31, p. 64. Multiplying the area that is occupied by focus and key crops, we arrived at total farm incomes for cashew and cocoa smallholder farms. Accordingly, we get an annual income of GHS 4,888 and GHS 13,041 for cashew and cocoa farms under the current production scenario, respectively, and GHS 11,268 and GHS 20,869 under improved production, see Table 32, p. 65. It can thus be clearly seen that cocoa farms have a substantially higher income from crop farming despite the fact that they have a smaller farm area.

We also calculated the labour demand in total workdays per type of farm and found out that cashew farms required 55.7% of their total labour for their crop farming under the current production scenario, while cocoa farmers needed 86.5%. For improved production the figures were 94.3% and 111.6%, see Table 33, p. 66, which means that this production system exhausts nearly all (cashew farms) and more than is available (cocoa farms) of their household labour force and therefore, cocoa farms have to hire 11.6% of their labour force from outside the household.

Assuming that the unemployed labour force can seek employment as hired labour in the neighbourhood, and then earns a proportional opportunity income, one can also make an extrapolation towards a total household income. In the case of cocoa farms and improved production, the income will be reduced accordingly since they have to hire labour. Overall, the picture is then as follows: Under the current production scenario, cashew farms earn a total household income per year of GHS 8,538 and cocoa farms GHS 14,782, while the figures are GHS 11,739 and GHS 19,371 for improved production, respectively, see Table 34, p. 67. Again, we can see here that cocoa smallholder households are substantially better off compared to cashew smallholder households.

How do these total household incomes relate to the benchmarks?

This is outlined in Table 1 below, which is a repetition of Table 35, p. 68, in the main text because of its importance.

Table 1: The "Income Ladder": Total Annual Household Income Compared to Benchmarks and Gap Against a Living Income in Cashew and Cocoa Smallholder Households

Total Household Income Compared to Benchmarks and Gap Against a Living Income		Unit	Cashew Smallholder Households		Cocoa Smallholder Households	
	Production System		Cur.Prod.	Impr.Prod.	Cur.Prod.	Impr.Prod.
Row	Column		1	2	3	4
	Annual Income Benchmarks					
1	Living Income	GHS	23,591.79	23,591.79	19,659.82	19,659.82
2	World Bank LMIC Poverty Line	GHS	14,125.75	14,125.75	11,771.45	11,771.45
3	Upper GH Poverty Line	GHS	10,543.27	10,543.27	8,672.94	8,672.94
4	World Bank LIC Poverty Line	GHS	8,387.16	8,387.16	6,989.30	6,989.30
5	GH Minimum Wage	GHS	6,084.94	6,084.94	5,070.78	5,070.78
6	Lower GH Poverty Line	GHS	5,881.19	5,881.19	4,837.89	4,837.89
7	Total (exptrapolated) Actual Annual Income	GHS	8,538.13	11,738.93	14,781.72	19,371.24
8	Gap Against a Living Income	%	63.81	50.24	24.81	1.47

Source: own source, repetition of Table 35

In Row 7 we can see in blue figures the actual annual total (extrapolated) household income by production system, i.e. current production and improved production. In Rows 1 to 6 the six benchmarks are shown with the Living Income as the highest benchmark in green figures indicating the annual living income for the respective household type. One notes that the same benchmarks are lower for cocoa smallholder households compared to cashew smallholder households. This is because cocoa households have fewer household members and, thus, lower needs. The figures in red show which benchmarks are exceeded by the respective actual income. We can see that cashew smallholder households exceed a level equivalent to the World Bank Poverty Line for low-income countries at current production and a level further up, the upper Ghana Poverty Line, for improved production. Thus, the latter is one step higher on the "ladder" to a living income. One or two steps further up are the incomes of cocoa smallholder households. Both reach the level of the World Bank Poverty Line for low-middle income countries. While none of the household types in all of the production levels reaches a living income, the cocoa smallholder households with improved production achieve an annual income of GHS 19,371 which is quite close to a living income of GHS 19,660 and not further away than 1.47% as shown in Row 8, Column 4. The generally higher income of cocoa households compared to cashew households is most likely the result of better rainfall in the southern zone of Ghana where cocoa is grown compared to the drier areas of the northern zone where cashew trees are cultivated and where production levels are therefore generally lower.

Living Income and Other Benchmark Reference Prices

First the "Linnert Steffens Formula", a reference price formula is introduced, see Formula 1, p. 69.

This formula enables calculation of a benchmark reference price once a benchmark income is known and a gross margin analysis provides yield, labour input data and cost of production. For all crops and production levels, i.e. current and improved production, benchmark prices are calculated, see Table 36, p. 71. For the focus crops, cashew and cocoa, the actual and living income reference prices are also captured in the following table.

Table 2: Actual and Living Income Reference Prices of Cashew and Cocoa by Production Level

Focus crop and Production Level	Actual Price in GHS/kg	Living Income Reference Price	
		in GHS/kg	in US$/kg
Cashew, current production	4.00	6.59	1.19
Cashew, improved production	4.00	6.25	1.13
Cocoa, current production	10.00	12.55	2.27
Cocoa, improved production	10.00	10.48	1.89

Source: own source, based on Table 36

It should be noted that living income reference prices for the improved production level are smaller than for current production. This is the case because more income per workday is generated at the higher production level.

Living Income and Other Benchmark Differentials

In a next step, formulas are introduced for calculating nominal and relative differences between reference prices and actual prices, see Formula 3, p. 73, and Formula 5, p. 74. These are then applied to calculate nominal and relative price differentials. The results are provided in Table 37, p. 75 and Table 38, p. 76.

The Living Income Differential for Cashew and Cocoa at the Current Production Level

Converting the just calculated figures to a ton and into US$ at January 2020 exchange rates we arrive at living income differentials of US$ 467 and US$ 460 per ton of cashew and cocoa, respectively, see Table 39, p.77. At this point we would like to stress that our data, although having tried our level best, still lacks robustness, as will be explained in more detail in chapter 2.2 Limitations. Our calculation depends heavily on labour input data which is notoriously difficult to obtain. And the calculation of benchmark differentials is highly sensitive. A small increase or decrease in labour input causes a much higher increase or decrease in the differential.

0.3 CONCLUSIONS AND RECOMMENDATIONS

Description of Baseline Situation

One important objective of this report and the collecting of data that preceded it was to ensure that analysis of the situation surrounding cashew and cocoa smallholder households was as thorough as possible. We think that this has been achieved. Especially yield data for cashew and cocoa generated through the two project surveys and the gross margin tables / crop budgets for cashew, cocoa and key crops grown as intercrops or alongside these focus crops can be used for future targeting. If regularly updated they also provide information on incomes. After aggregations, the level of total household incomes for cashew and cocoa smallholder households can also be seen. We would suggest that the core figures from our model of cashew and cocoa households (number of persons per household, number of full-time labour equivalents, farm size, yields) be used for future assessments. Of course, these models may change if more and better data becomes available.

Using Gross Margin Analysis / Crop Budgets for Comparisons with Income Benchmarks

We also think we have been able to show the usefulness of income benchmarks and that it is not only one benchmark that is important. The living income benchmark is certainly very important because it is only at that level that a life in dignity, in accordance with human rights, is possible. However, there are other benchmarks which indicate certain survival levels (minimum wage, poverty lines). If arranged along a sequence from lowest to highest we are able to judge where we are in a specific subsector and region, how critical a situation may be, and when observed over a period of time, whether progress has been made through interventions or not.

Consolidating and Updating Gross Margin / Crop Budget Data

We have also shown how useful gross margin / crop budget data is in order to work out cost of production, production levels, revenues and incomes in various categories (especially per household per ha, and per workday). However, in the case of perennials in the Farmer Business School material, only gross margins have been provided to date that illustrate the situation in the full production phase. This may be appropriate for didactical reasons, but for a full assessment of a crop budget one needs to include the establishment costs of the crop (year of planting) and also the juvenile phase (years with no or little yield, but with maintenance costs). These need to be included, otherwise an overly positive depiction of the economic situation of a perennial crop is given. Thus, it should be standard to include these phases in the preparation of gross margins /crop budgets. It has also been shown how this can be done without involving over-complicated calculations.

We further suggest that gross margin / crop budgets be updated regularly. Every two years would be adequate, but once a year would be better. This should be done in connection with focus group discussions with farmers (as we did) and include crop specialists. As much of the current data lacks reliability, we would also suggest that the project, MOFA and COCOBOD work in connection with a group of farmers in at least one typical area of cashew and cocoa and encourage them, train them and support them in recording data and suggest that crop-cuts are taken. We need robust evidence and only in this way can we obtain data in which we have full confidence.

Using Gross Margin Tables / Crop Budgets for Other Crops and Agricultural Activities

Similar efforts on working out gross margin tables / crop budgets might be important for other crops and livestock keeping, which we have not examined here. In this respect, we would encourage MOFA to work more systematically on this subject, possibly together with a reputable research organization specialized in smallholder socio-economics that would coordinate or at least scientifically accompany the work.

Income Increases by Intensification of Production and Price Advocacy to Go Hand in Hand

Based on field data, we have been able to show that improved production leads to improved incomes. Improved production may not close the gap to a living income completely and in all cases, but at least it would solve some of the problem of low incomes among smallholder farmers. This area of intervention therefore remains paramount for projects, ministries, the private sector and others who support smallholder farming.

Quite a lot must be done on improving prices for agricultural produce, too. Pressure needs to be increased e.g. through advocacy organizations and public authorities to make buyers and consumers aware that it is a human right to receive prices that adequately remunerate labour in agricultural production in the countries of origin. A living income differential (LID) is certainly an important tool to show how large the disparity is in accordance with human rights. This tool is, of course, all the more powerful if the calculation of an LID is based on solid data and on a transparent mechanism for performing calculations.

Need for Further Research on Living Income Reference Price Methodologies

We cross-checked how our cocoa living income reference prices compare to living income prices calculated by others. While there are no comparisons yet with respect to cashew, some work has already been done by several other organizations on cocoa. Our cocoa living income reference prices of GHS 12.55/kg and GHS 10.48/kg at current and improved production levels, see Table 36, p. 71, translate to US$ 2.27/kg and US$ 1.89/kg at January 2020 exchange rates. Fairtrade[1] set a cocoa living income price for Ghana at US$ 2.30/kg, Tony's Chocolonely[2] at US$ 2.10/kg and Oxfam Fair Trade at US$ 2.67/kg[3]. Our living income reference price therefore appears to be in the same range, as far as the current production level is concerned, compared to these organizations. However, FOUNTAIN and HÜTZ-ADAMS (2019) provide another calculation, arriving at a significantly higher living income reference price of US$ 3.17/kg, which is again adjusted upwards to US$ 3.53/kg by BRONKHORST (2020). While some of the differences may be attributed to different conditions in different parts of the country affecting yields, cost of production and labour input, and possible deficiencies in the robustness of the data, there is certainly a strong need to undertake further research into methodologies and exchange of experience to develop methodologies that provide similar results.

Final Insights

Cashew and cocoa smallholder households in Ghana earn less than a living income. This is the case on a household level, but also when looking at proportional contributions to household income of cashew and cocoa as focus crops. The situation looks better for cocoa households: They exceed the survival benchmark of the World Bank poverty line for lower-middle income countries, while cashew smallholder households just manage to pass the World Bank poverty line for low-income countries (the "extreme poverty line") for "current production" and the upper Ghana poverty line for "improved production". One also notes that quite an improvement in income can be made when farmers manage to move from "current production" to "improved production". This is also an important message for capacity building programmes. Training programmes for farmers are still the main "weapon" to "combat" poverty, notwithstanding the importance of other measures (improving access to finance; supporting farmer organizations, etc.). An important gap nevertheless remains which needs to be closed by higher prices.

1 Cocoa farmers to earn more through a higher Fairtrade Minimum Price | Fairtrade Foundation
2 Ein Blick auf LIRP – Tony's Chocolonely
3 Quoted by FOUNTAIN and HÜTZ-ADAMS (2019)

1

Introduction

1 INTRODUCTION

Smallholder farmers and rural workers are the main source of some of the most important globally traded products (e.g. coffee, cocoa, tea) and provide the backbone of these sectors. Yet they are notoriously poorly paid, and this is despite the fact that they grow and sometimes pre-process these agricultural products by making full use of their labour. This contrasts strongly with Article 23(3) of the Universal Declaration of Human Rights which stipulates that

"Everyone who works has the right to just and favourable remuneration ensuring for himself [/herself] and his [/her] family an existence worthy of human dignity".

The Competitive Cashew Initiative – ComCashew (formerly African Cashew initiative, ACi) – was launched in 2009, commissioned by the German Federal Ministry of Economic Cooperation and Development (BMZ) and implemented by the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ). The project supports smallholders in six Sub-Saharan countries. Currently in its third phase, ComCashew focuses on building a sustainable cashew value chain. The project's main objective is to increase the competitiveness of African cashew smallholders, processors and other actors in the value chain to reduce poverty for the long term. By constituting a new era of multi-stakeholder partnership in development cooperation, ComCashew aims to increase the income of cashew farmers, create new jobs and increase the rate of processed raw cashew nuts in the project countries.

Recently, ComCashew started to work jointly with the GIZ Initiative for Sustainable Agricultural Supply Chains (INA) on the topic of Living Income in the tree crop sector to implement measures aimed at bridging the gap towards a decent income among smallholder farmers in Ghana and Cote d'Ivoire. A key focus of this cooperation has been to determine the living and prevailing incomes of smallholder cashew and cocoa farmers and to plan and implement activities to close the gap. This report shall establish a baseline. Pioneering work on determining living and prevailing income within GIZ was first undertaken in Malawi in the tea sector between 2015 and 2018 (see BRILL and KRAIN, 2017; CHIWAULA et al., 2017a; CHIWAULA et al., 2017b, CHIWAULA, 2018; and KRAIN et al., 2017) and then followed in 2019 for Rwanda in the tea sector (KRAIN and AFRIKA, 2021).

The objective of this work is thus to determine how much smallholder cashew and cocoa farmers in Ghana currently earn from cashew, cocoa and other main agricultural products and how their income compares to benchmarks which indicate attainment of an income that allows survival (above poverty lines) or even a life in dignity in accordance with human rights (a living income). This is examined under two scenarios: First, under crop production practices that are currently most widespread ("current production") and second, under improved and good agricultural practices ("improved production"). This allows a judgement as to whether incomes under current or improved practices are high enough for survival or a decent life, or whether they need to be increased, and if the latter is the case, an increase to which commodity price *exactly*. The findings will also help us understand how far capacity development activities (training of farmers) may place farmers in a position to increase incomes and improve livelihoods. Since intensification usually means more labour input, it will also enable us to calculate potential employment effects. Finally, this work will inform stakeholders and policymakers in designing appropriate strategies and action plans.

One of the possible outcomes may be simply to recommend commodity price increases. And by working out living income and other benchmark reference prices we shall provide concrete information on prices that achieve certain benchmark levels. We anticipate, however, that it will often not be possible to increase prices to the desired level. This is because agricultural commodities are part of more or less liberal trade regimes, often imperfect markets, national, regional and international demand and supply, and fierce competition. Nevertheless, knowledge about prices and where they should be, will be valuable information for negotiations between produce-buying companies and produce-selling

smallholders or organizations acting on smallholders' behalf, such as state authorities (e.g. COCOBOD), cooperatives, smallholder associations or also non-governmental advocacy organizations in both the countries of origin and consumption. Such information is certainly valuable for state organizations that regulate trade and markets. Companies with explicit social corporate responsibilities will additionally obtain more clarity about where a decent price should be, which might motivate them to communicate this to consumers who feel a social responsibility vis-à-vis a decent life of smallholder producers. And it is also important for companies with less social corporate responsibility because governments in many countries of the global north are about to implement or have already implemented supply chain regulations to ensure that companies source their produce in accordance with human rights.

To follow a methodological process, this working paper establishes models of typical cashew and cocoa smallholder households in Ghana to determine their income in comparison to income benchmarks. This is done based on primary and secondary information. Primary information comes from two surveys: Firstly, a survey conducted by the project among cashew and cocoa smallholder farmers in 2020. Secondly, gross margin /crop budget data that was collected from 2015 to 2020 to prepare Farmer Business School materials to train cashew and cocoa farmers. Furthermore, the collecting of primary data to verify gross margin / crop budget data was carried out during four focus group discussions with cashew and cocoa farmers from December 2020 to January 2021. Additionally, secondary information was collected from various reputable sources, e.g. from the Ghana Statistical Services (GSS), the World Bank, the Cocoa Barometer, the Global Living Wage Coalition, the Living Income Community of Practice and research work that had previously been undertaken, most notably the survey work by BYMOLT et al. (2018) among 1,500 cocoa smallholders. This information is used to understand the context in which cashew and cocoa are produced and marketed.

The modelling of smallholder households comprises the following steps:

In a first step, structural household data (household size, composition in terms of sex and age) is collated to enable the estimation of household needs (food, housing, clothes, educational and health needs, etc.), and to calculate monetary livelihood benchmarks using reference values provided by others, e.g. the Ankers Living Wage/Living Income, the World Bank poverty line, the national poverty lines of Ghana and the minimum wage in Ghana. The prevailing wage level of hired agricultural workers in cashew and cocoa regions provides a guide as to what a cashew or cocoa smallholder household earns in relation to other reference values and how far below or above an income they are that allows a decent life (living income) or at least a survival life (above a poverty line or an extreme poverty line or above a minimum wage).

In a second step, the typical farm size and composition of agricultural activities of a cashew and a cocoa smallholder household are modelled and connected with crop budget data (gross margin tables) for cashew, cocoa and other important secondary crops to estimate what a typical household actually earns on a yearly basis and how this relates to the benchmarks mentioned in the first step. Since this only constitutes partial total household income, additionally an attempt is made to estimate total household income by adding potential wage income from still available (calculatory unemployed) household labour.

In a third step, comparisons between actual and benchmark incomes are performed. Furthermore, commodity prices are determined that are referenced against benchmarks. And finally, price differentials are calculated between actual and benchmark prices.

A final chapter presents conclusions and offers recommendations.

2 Methodology

2 METHODOLOGY

In this chapter we shall first elaborate on the approach we took, the base data and sources of data, and the process used to work out actual and target incomes as well as reference prices and income differentials. No work is perfect and therefore we shall also look into possible shortcomings of our work.

2.1 THE APPROACH

The work relies on available secondary information and primary survey data collected by the project. In terms of primary data, the project conducted a survey among 12 cooperatives with 371 cashew and 153 cocoa smallholder households. This data is analysed with respect to the key figures needed for the household (size, sex and age composition) and farm features (land size, production parameters of focus and key crops).

On a secondary data level, gross margin / crop budget data is available from Farmer Business School material on cocoa, cashew and key crops grown as intercrops or in conjunction with the focus crops. Gross margin tables are ideal for working out crop incomes that can then be aggregated to total or partial total incomes. Since gross margin tables from the Farmer Business School material had possibly been modified, simplified and altered in a way to facilitate learning, we verified the data in four focus group meetings with farmers and crop experts from December 2020 to January 2021, enabling us to adjust the figures to the situation in the field as far as possible.

Gross margin tables / crop budgets are developed for two scenarios: One employing current production practices and the other improved production. This follows the methodology of the Farmer Business School. The current level is worked out using the survey data and applying mean or median yield levels for the focus and key crops. For the improved version, those households whose yields fall into the third quartile (at about 75% of the distribution of yield data sorted from smallest to highest per ha of surveyed farms) shall serve as a guide. The guiding principle is not to take a maximum yield level, but a level that is (well) attainable by ordinary farmers who are trained and connected to schemes that promote good agricultural practices. This scenario also helps us to assess the extent to which farm households are in a position to improve their economic situation by adopting improved agricultural practices. The hypothesis is that this will improve actual incomes and close the gap between the actual and a living income and reduce the living income differential. For our approach therefore, apart from the above-mentioned survey data, the preparation and verification of gross margin tables for focus and key crops has been of paramount importance.

For modelling purposes, further secondary information is utilized. For cocoa, there is already quite some material available, e.g. the study by BYMOLT et al. (2018), the study undertaken by WEINRAUTNER 2020 and the Manual for Cocoa Extension in Ghana by CHED (2016). For cashew, we are a little short of information from Ghana with the exception of the highly informative study by WIDMER and MINTAH (2016). We also have some pertinent documents from Côte d'Ivoire where similar conditions of cashew cultivation and smallholder livelihoods may prevail, e.g. the report by ARNOLDUS and CLAUSEN (2020), or by PINHEIRO (2018). Finally, we would like to highlight the cashew and cocoa Farmer Business School training books (FBS CASHEW, 2020; and FBS COCOA, 2015).

Ghanaian statistics are also very relevant, e.g. for knowing inflation rates and connecting them to our data for different points in time, for rural household and labour statistics, such as e.g. consumer price indices available from the website of the Ghanaian Statistical Services (GSS) and various reports from key household surveys, e.g. GLSS7 (2018) and the Ghana Labour Force Survey 2015 (GSS, 2016). This data is needed to make alignments with our core and supplementary models which assume monetary values as at January 2020.

Secondary data on the living income benchmark is taken from the Living Income Community of Practice website, on the world bank poverty line for Ghana from the World Bank website and the upper and lower poverty line for Ghana from the already mentioned GLSS7 (2018) report of the Ghanaian Statistical Services (GSS).

On the basis of this data (survey data, focus group discussions, gross margin tables, statistical data) farm household models are constructed featuring typical household sizes and composition as well as farm size and sub-farm sizes for cashew, cocoa and key crops with actual incomes for the two scenarios: i) current production system and ii) improved production system. The final aggregated figures provide data on partial annual household incomes, the amount of income available per household member per day and how much needs to be earned per workforce member (full-time labour equivalent) per workday under the two production scenarios. On the basis of labour input data, a living income and other benchmarks (poverty lines, minimum and sector wages, etc.), reference prices **(LIRP)** for focus and key crops are calculated. This is the basis for calculating the differences between a living income (and other benchmarks) and actual incomes and for providing living income (and other benchmark) differentials **(LID)**.

The work has been carried out by a team of three consultants and a focal person for the project as well as an additional project member. The team was led by the consultant operating from Germany because of the Coronavirus pandemic. Two Ghanaian consultants are involved as agro-economic crop specialists for the focus crops and key secondary crops. The team has been holding regular meetings online.

After data compilation and internal checking, findings were presented in an online meeting on 22 March 2021, attended by about 25 practitioners from four countries (see Annex 5). In parallel and thereafter, the report was circulated to project management, interested colleagues at GIZ, Ghanaian authorities, and other bodies to collect further comments which were incorporated into the final report version.

2.2 LIMITATIONS

It is better to be roughly right than precisely wrong *(John Maynard Keynes)*

Modelling households and calculating actual income, living income and incomes according to other benchmarks relies on a multitude of different data from primary and secondary sources. Some of the data appears fairly straightforward and theoretically easy (such as e.g. farm size), but even this might be quite unreliable. This is because farmers – even if

being very honest and trying to respond as best they can in interviews – may never have taken measurements or may have little idea of certain units of measurement. This is further complicated by the fact that some data is indeed very difficult to estimate. A case in point where it has also been very difficult for us to determine data as well, is the labour input required to produce a certain crop, e.g. cashew nuts or cocoa beans. Farmers may recall, for example, how much they spent on hired labour because they had to pay for it and thus may remember, but how much labour input has actually been "spent" by own household members who are normally not paid, often remains unknown. Household labour is employed in a highly irregular fashion over different fields of a farm, on some days not at all, on others a few hours, in further cases for many hours, and crops are often grown together in intercropping systems. As a result, it is difficult to single out labour allocated to specific crops and specific agricultural activities, etc. It is therefore not surprising that in many cases there is only a vague idea of such data.

However, we are not alone in having this problem. The authors of the COCOA BAROMETER (2020) are highly critical of this situation and it is worth reading their impressive statement on page 44:

"Although availability and costs of ***labour is a crucial parameter in the debate about income of farmers,*** *there is* ***almost no data available, let alone reliable data.*** *Very few companies provided figures in reply to our questionnaire; most said that they have no available figures. The few data points given estimate between* ***32 and 65 labour days*** *[for cocoa] are used per hectare per year in low productivity farming systems. When Good Agricultural Practices (GAP) are applied, the estimates vary from* ***40 to 211 days per hectare per year - a striking range,*** *leading to questions about the reliability of the outlier data.* *(bold added by us)*

In our focus group discussions, we sometimes had the impression that farmers overestimated yield, and that they generally underestimated household labour input.

BYMOLT et al. (2018, p. 158) quote a study commissioned by the International Cocoa Initiative (ICI) reporting that households use an average of 120 labour days per hectare of cocoa, including household, hired and communal labour. BYMOLT et al. (2018) who made a great effort to interview 1,500 cocoa households in Ghana, report for their own sample a much lower figure of 53 labour days per hectare on average (BYMOLT et al. 2018, Table 8.6, p. 160) and 79 labour days per hectare as a median total (BYMOLT et al. 2018, Table 8.8, p. 162). However, the authors did not include on-farm processing of cocoa (fermentation and drying) which is, in our opinion, a serious omission.

Our own data in the gross margin tables, see Annex 3c and 3d, shows for cocoa a weighted average of 110 and 143 workdays per year for "current" and "improved production", respectively, over all production phases from planting, juvenile phase, full production to declining production. If we increase the labour input in each of the two systems by just 10%, keeping all other variables the same, our Living Income Differential increases by 47% and 289% for current and improved production, respectively. This shows how sensitive the Living Income Differential is to the labour input. It is therefore crucial to have fairly reliable data including labour data. We carried out a lot of checking and verification, but believe we have just scratched the surface. We would therefore like to caution the reader about our results and to

encourage authorities (COCOBOD) and companies alike to collect data themselves, including labour data, and to encourage farmers to record data and to eventually work out a more solid basis. An excellent example of how data can be recorded in cocoa cultivation is provided in chapter 6.4 "Record Keeping and Types of Farm Records" of the New Cocoa Manual by CHED (2016).

With respect to cashew, information on labour inputs from secondary sources is even worse. With the exception of the Farmer Business School material on cashew, we only found one source. VARANASHI et al. (2007) report labour input data from the first year of planting until the tenth year. They report 105 WDs for the year of planting, 54 WDs for the second year and between 42 and 45 WDs in the following years up to year 10 per hectare, and no data beyond 10 years. However, this compilation is based on experience from India and it was for organic cashew cultivation, thus data may be different among Ghanaian farmers cultivating conventional cashew. For our crop budgets, we worked out a weighted average of 34.6 and 66.7 workdays per hectare for cashew over all production phases for current and improved production, respectively, see Annex 3a and b.

Reliability of data, especially labour data, is therefore an issue in our report, but also a veritable challenge facing all socio-economists working in the smallholder agricultural sector.

3 Results

3.1 GHANA, THE COUNTRY CONTEXT, AGRICULTURE, CASHEW AND COCOA

3.1.1 Country Context

Ghana, known as the "Land of Gold" since ancient times because of being a continued source of gold in Trans-Saharan trade, is a country along the Gulf of Guinea and the Atlantic Ocean, in the subregion of West Africa. It is bordered by Côte d'Ivoire to the west, Burkina Faso to the north and Togo to the east. Ghana covers an area of 238,535 km² having a size about two thirds of Germany. It is close to the equator and lies between latitudes 4°45'N and 11°N, and longitudes 1°15'E and 3°14'W (WIKIPEDIA, 2020).

Graph 1: Ghana, the "Land of Gold"

Source: modified after: Ghana map Africa – Bing images

Grasslands mixed with south coastal shrublands and forests dominate Ghana. Ghana is home to five terrestrial ecoregions. The country encompasses plains, waterfalls, low hills, rivers and Lake Volta, the world's largest artificial lake (WIKIPEDIA, 2020).

The climate of Ghana is tropical, and there are two main seasons, a wet and a dry season. The eastern coastal belt is warm and comparatively dry, the south-west corner of Ghana is hot and humid, and the north of Ghana is hot and dry. The tropical climate of Ghana is relatively mild for its latitude. The harmattan, a dry desert wind, blows in north-east Ghana from December to March. Average daily temperatures range from 30°C during the day to 24°C at night with a relative humidity between 77% and 85%. In the southern part of Ghana, there is a bi-modal rainy season, April to June and September to November. Rainfall ranges from 780 to 2,160 mm per year (WIKIPEDIA, 2020).

Climate change is impacting the people in Ghana. There are changes in weather conditions, the amount of rainfall and rainfall patterns with droughts and inundations, and sea-level rise affecting the salinity of coastal waters. This negatively affects especially both farming and fisheries (WIKIPEDIA, 2020).

Ghana has a population slightly above 30 million people. Around 29% of the population is under the age of 15, while those aged 15 to 64 make up 57.8%. Ghana is well endowed with natural resources. It possesses industrial minerals, hydrocarbons and precious metals. It is an emerging designated digital economic market. Ghana has an economic plan

known as the "Ghana Vision 2020". This plan envisions Ghana besides South Africa as the first African country to become a developed country between 2020 and 2029 (WIKIPEDIA, 2020).

Between 2014 and 2017 Ghana's average annual growth rate of the GDP in constant prices and per capita income was 5% (GLSS7, 2018). In 2016 it had a GDP of 67.34 billion US$ / 175.64 billion US$ PPP, a GDP per person of 2,188 US$ / 5,707 US$ PPP[4]. Especially due to crude oil exports, in 2011 Ghana managed to advance from a low-income country to a lower-middle income country (GLSS7, 2018).

A number of development indicators are quite telling about the advances Ghana has made during the last 20 to 30 years. Ghana is a fairly peaceful country within an otherwise highly volatile region. In 2020, it ranked 108th of 178 countries in the Fragile State Index (the higher the number the less stable) making it the 4th least fragile state in Sub-Saharan Africa after Mauritius, 153rd, Seychelles, 126th, and Botswana, 121st[5]. The Gini coefficient of Ghana, a coefficient that works out the income inequality within a nation is at 38.30 (2018)[6], with Ghana ranking 48th out of 107 nations. Also, its position in the human development index is moderate (the human development index measuring average achievement in three dimensions of human development: a long and healthy life, knowledge and a decent standard of living). Ghana scores 0.61 (2019). It increased from 0.48 in 1999 to 0.6 in 2018 growing at an average annual rate of 1.16%. It ranks 137th out of 188 (a score of 1 being the best)[7]. Ghana has also made some advances in combatting hunger. In the Global Hunger Index it ranks 63rd out of 107 countries, and is 2nd after South Africa, which ranks 60th, in Sub-Saharan Africa. It has constantly improved its index from 28.5 in 2000 to 15.2 in 2020 (the lower the score the better)[8]. Education is free at elementary school (primary school) level and most Ghanaians have relatively easy access to high school education. With over 95% of children in school, Ghana currently has one of the highest school enrolment rates in all of Africa (WIKIPEDIA, 2020). On Transparency International's corruption perception index Ghana ranks as the 75th least corrupt out of 180 countries in 2020[9].

Clearly, there have been a number of positive developments. However, large parts of the population, especially in rural areas relying on agriculture, have remained poor. In 2016, the poverty rate of people living below US$ PPP 1.90 was 13%. Though Ghana's poverty rate has fluctuated substantially, it tended to decrease through the 1987-2016 period[10].

From 2005/06 to 2012/13 a decline in the poverty headcount of 7.7% was recorded. The decline in poverty between 2012/13 and 2016/17 was, however, very small at 0.8%. According to GLSS7 (2018) much needs to be done if the country is to achieve the Sustainable Development Goal (SDG) of ending poverty by 2030. Extreme poverty (people unable to meet their basic food needs) declined from 8.4% in 2012/2013 to 8.2% in 2016/17. In absolute terms, more Ghanaians are living in extreme poverty: The number of people living in extreme poverty increased from 2.2 million in 2013 to 2.4 million in 2017. GLSS7 (2018) states that the economic growth between 2012/13 and 2016/17 has not been pro-poor, the middle class benefitted from growth, while those at the bottom end, especially the very poor, experienced a decline in consumption per adult equivalent. The welfare over the period has been highly disproportionate in favour of the non-poor. Especially the northern sector regions, the Upper West Region, the Northern Region, North East Region, Savannah Region and the Upper East Region are being left behind.

It appears that farmers are not only the poorest in Ghana but also contribute the most to Ghana's poverty. Households engaged as private employees or who are self-employed in non-agricultural sectors are less likely to be poor compared to those engaged in the agricultural sector. Interestingly, in general, female-headed households appear to be better-off than male-headed households in terms of poverty incidence (GLSS7, 2018).

4 see, Ghana Poverty rate, 1974-2020 - knoema.com
5 see, Fragile States Index 2020 – Annual Report | Fragile States Index
6 see, Gini-Koeffizient - Ranking, 2020 - knoema.com
7 see, Human development index by country, 2020 - knoema.com
8 see, Global Hunger Index Scores by 2020 GHI Rank - Global Hunger Index (GHI) - peer-reviewed annual publication designed to comprehensively measure and track hunger at the global, regional, and country levels, the severity scale of the hunger index is as follows: i) low: 0-9.9; ii) moderate: 10.0-19.9; iii) serious: 20.0-34.9; iv) alarming: 35.0-49.9; extremely alarming: >50.0
9 see, Ghana - Transparency.org
10 see, Ghana Poverty rate, 1974-2020 - knoema.com

3.1.2 Agriculture, Cocoa and Cashew in Ghana

Agriculture in Ghana consists of a variety of agricultural products and is a key sector in the country's economy. It provides employment on a formal and informal basis. Ghana produces a variety of crops in various climatic zones which range from dry savanna to wet forest and which run in east-west bands across the country. Agricultural crops, including yams, grains, cocoa, oil palms, kola nuts and timber, underpin Ghana's agricultural economy. In 2013 agriculture employed 53.6% of the total labour force in Ghana (WIKIPEDIA, 2020b). Livestock keeping plays a lesser role: zebu cattle, poultry, small ruminates, donkeys and pigs are kept by some farmers.

Table 3: Major Agricultural Crops Produced in Ghana

Crop	Volume (in tons)	Remark
Cassava	20,800,000	4th largest producer in the world, in Africa second after Nigeria
Yam	7,800,000	2nd largest producer in the world after Nigeria
Plantain	4,100,000	2nd largest producer in the world, just behind Congo
Palm oil	2,600,000	8th largest producer in the world
Maize	2,300,000	
Cocoa	947,000	2nd largest producer in the world after Côte d'Ivoire
Rice	769,000	
Orange	753,000	19th largest producer in the world
Pineapple	713,000	11th largest producer in the world

Source: WIKIPEDIA (2020b)

3.1.2.1 Cocoa

Cocoa is the dried and fermented seed of the fruit of the cocoa tree, *Theobroma cacao*, from which cocoa solids (a mixture of non-fat substances) and cocoa butter (the fat) can be extracted. Cocoa beans are the basis of chocolate (WIKIPEDIA, 2021). Although the cocoa plant is native to the Amazon region of South America, world production is dominated by West Africa. During the last thirty years, global production of cocoa has doubled (COCOA BAROMETER, 2020), almost all of this coming from four West African countries (Côte d'Ivoire, Ghana, Cameroon and Nigeria), where about two thirds of world production originates, see Table 4.

Table 4: World Production of Cocoa in 2019 (in Tons and Percentage)

	Country	Volume	%
1	Côte d'Ivoire	2,180,000	38.95
2	Ghana	811,700	14.50
3	Indonesia	783,978	14.01
4	Nigeria	350,146	6.26
5	Ecuador	283,680	5.07
6	Cameroon	280,000	5.00
7	Brazil	259,425	4.64
8	Other countries	647,468	11.57
	Total	**5,596,397**	**100.00**

Source: own calculations based on data from FAOSTAT, Cocoa for 2019

3 RESULTS

One of the most significant developments in cocoa production in recent years has been the Ghanaian-Ivorian partnership on cocoa. The two largest cocoa-producing nations aligned their internal and external cocoa policies. In the third quarter of 2019, the Ivorian Conseil du Cafe-Cacao (CCC) and the Ghana Cocoa Board (Cocobod) started charging the so-called Living Income Differential (LID), an extra fee of $400 per ton of cocoa on top of forward sales for the 2020/21 main crop. Subsequently, in October 2020, Ghana increased the guaranteed cocoa farm gate price for the 2020/2021 season by 28% to $1,837 per ton, and Côte d'Ivoire by 21% to $1,840 (COCOA BAROMETER, 2020). The Cocoa Barometer (2020) rightly called this a "historic initiative" being an "important and necessary step". As can be expected, this is a highly disputed matter.

Cocoa production occurs in the formerly forested areas of Ghana: Ashanti Region, Bono Region, Bono East Region, Central Region, Eastern Region, Western Region and Volta Region. The crop year begins in October while the smaller mid-crop cycle starts in July. All cocoa, except that which is smuggled out of the country, is sold at fixed prices. Most cocoa production is carried out by peasant farmers. The government controls the industry through the Ghana Cocoa Board (COCOBOD). As of 2010, Ghana's cocoa exports were valued at US$ 2,219.5 million (WIKIPEDIA, 2020b).

Cocoa is mostly produced by smallholder farmers. Their socio-economic situation has been the object of much research work, one of the most recent and most detailed studies being that by BYMOLT et al. (2018). In their study based on a sample of 1,500 smallholders in Ghana, the land size of cocoa farming households was on average 4.93 ha (median near to 4 ha) with on average 3.65 ha in cocoa (median around 3.5 ha) (p. 112, 120). Cocoa contributes to a good income. In fact, most interviewees identified cocoa as the crop that earns their household the highest income (p. 140). The authors found that cocoa households derive, on average, 61% of their income from cocoa, with a further 20% coming from the sale of other crops (p. 244). On average, according to the study, a cocoa household in Ghana generates a cocoa net income of US$ 1,510 from cocoa alone (p. 244) and earns an average of US$ 2,487 per annum from all income sources (p. 245, 252).

Although cocoa as a cash crop strongly dominates smallholder agriculture, there is no negative effect on food consumption though there may be periods of relative food insecurity BYMOLT et al. (2018, p. 302-303). Cocoa, especially during the first years of a cocoa plantation, is mostly intercropped with food crops such as cassava and plantain (p. 93).

Cocoa is perceived as a crop with lower labour demand than other crops e.g. coffee (BYMOLT et al. 2018, p. 138). Including all types of labour, the crop demands about 120 workdays/ha (according to the International Cocoa Initiative quoted by BYMOLT et al. (2018, p. 158)). Their own data shows a much lower labour requirement of 53.17 workdays (p. 160), however, without including labour for fermentation and drying of cocoa beans.

BYMOLT et al. (2018) also looked specifically at female-headed versus male-headed households and at gender. Female-headed households typically will have no husband and will have a smaller household size. These heads of household are single, divorced or widowed (p. 278). Both household types (female- and male-headed) prioritize cocoa similarly (p. 279). Female-headed households hire more labour than male-headed, the latter participate more in training, producer groups, certification and credit (p. 281). Female-headed households usually earn less net income from cocoa, typically around US$ 1,275 (p. 283). Women are thought to be more knowledgeable on how to produce and trade food crops and ensure a "good bargain for a good price" (p. 290). In food crop production, in general, men do the physically more demanding work, such as preparing the land for food production and harvesting, while women are more involved in planting and weeding. Women tend also to be more involved in selling the crops at markets and/or local processing of the food crops, which gives them more control over income (p. 296).

3.1.2.2 Cashew

While cocoa can be called a traditional crop in Ghana and – apart from the revenues of crude oil and natural gas – *the* cash cow of the economy, cashew is a rather new and emerging crop. World production is dominated by Côte d'Ivoire and India, while Ghana contributes 85,962 tons per year placing the country in 15th position, see Table 5.

Table 5: World Production of Cashew in 2019 (in Tons and Percentage)

Rank	Country	Volume	%
1	Côte d'Ivoire	792,678	20.01
2	India	743,000	18.76
3	Burundi	283,328	7.15
4	Vietnam	283,328	7.15
5	Philippines	242,329	6.12
6	United Republic of Tanzania	225,106	5.68
7	Benin	204,302	5.16
	Other countries	1,100,796	27.79
15	Ghana (no. 15)	85,962	2.17
	Total	**3,960,829**	**100.00**

Source: own calculations based on data from FAOSTAT, Cashew for 2019

Like cocoa, cashew *(Anacardium occidentale)* is a native to Latin America (WIKIPEDIA, 2021b). It is a perennial, a tree crop. It needs less rainfall than cocoa and is quite resilient to drier weather conditions. While cocoa is cultivated in the south to the middle of Ghana, cashew starts in the middle of the country where rainfall starts to get less reliable and moves towards the north, the savanna region of the country. The Bono East region is currently the main cashew production area, but the Northern Region and Savannah Region have the biggest potential. Tamale and Wa in the north of Ghana are both on the northern edge of cashew cultivation because of lack of rainfall (ARNOLDUS and CLAUSEN (2020).

The historical development of cashew in Ghana in comparison to Côte d'Ivoire is quite interesting, as explained by ARNOLDUS and CLAUSEN (2020) in some detail. In Côte d'Ivoire, cashew has been grown for many years and was originally introduced as a tree crop to fend off desertification. It was not so much intended to be a cash crop, so making cash with cashew and cashew nuts has therefore rather been a side business. In Ghana, the crop was only recently introduced and then with the primary intention to make money with it. Thus, improved varieties were introduced, e.g. from Brazil, and capacity building measures were implemented to improve agricultural practices. There are certified budwood private nurseries selling grafted cashew seedlings in Ghana. ARNOLDUS and CLAUSEN (2020) estimate that while 33% of farms in Ghana use grafted seedlings, there are practically none in Côte d'Ivoire.

Still, the area and overall production in Côte d'Ivoire is much bigger than in Ghana, but while area and production is stagnating in Côte d'Ivoire, it is on the rise in Ghana (ARNOLDUS and CLAUSEN, 2020). We also observed in our cashew smallholder survey that most cashew plantations are still at a young age, see Graph 11, and larger-scale production can therefore be expected in the coming years. Another reason why cashew is less attractive in Côte d'Ivoire is that there is a heavy levy on cashew nuts, while this is not the case in Ghana (ARNOLDUS and CLAUSEN, 2020).

While the cashew sector is heavily regulated in Côte d'Ivoire, it is largely unstructured and unburdened by export tariffs in Ghana, as ARNOLDUS and CLAUSEN (2020) put it. However, the authors are highly critical of the fact that there is no functioning processing sector. Only 2-5 of 15 cashew processors in Ghana are in operation. Several structural issues make processing in West Africa challenging: lack of working capital to purchase raw cashew nuts (RCN); shortage and high cost of skilled labour; lower labour productivity; unreliable electricity and water; lack of affordable equipment; no local market for broken nuts; and transport costs of RCN from Africa to Asia are cheap (because many containers go back empty to Asia).

ARNOLDUS and CLAUSEN (2020) state that cashew can be very profitable to farmers, but that this would require yields of 500 to 1,000 kg/ha, the break-even point in Ghana being at about 150 to 200 kg RCN/ha which most farmers would achieve, and for low performing farmers only about 60kg/ha. They also mention that quite a few farmers report yields above 2,000 kg/ha. In fact, in our survey we found yields of about 250 kg as the median and 475 at the 75% quantile, see Table 17, and used, in our typical smallholder model farm, about 300 and 600 kg/ha for the "current" and "improved production" scenarios, see Table 30.

WIDMER and MINTAH (2016) looked specifically into the socio-economic aspects of cashew production. They report that in recent years, cashew has become a "driving factor" for an upward socio-economic movement, especially in the sub-humid areas of the country. There, the cultivation of cashew is viewed as a "vehicle to escape poverty". Their overall perception is that cashew cultivation is becoming more and more economically attractive and as a result, cashew farmers are employing more labourers. Cashew fits very well into the annual lean period, the so-called "hungry season" when it can be harvested and provide some income and bridge the time until the main harvest is due. Thus, cashew is a pro-poor crop. Like cocoa, cashew also helps to secure land tenure, the occupancy rights on land cultivated with tree crops are much stronger than on land with only seasonal crops which was also observed by BYMOLT et al. (2018, p. 97) for cocoa.

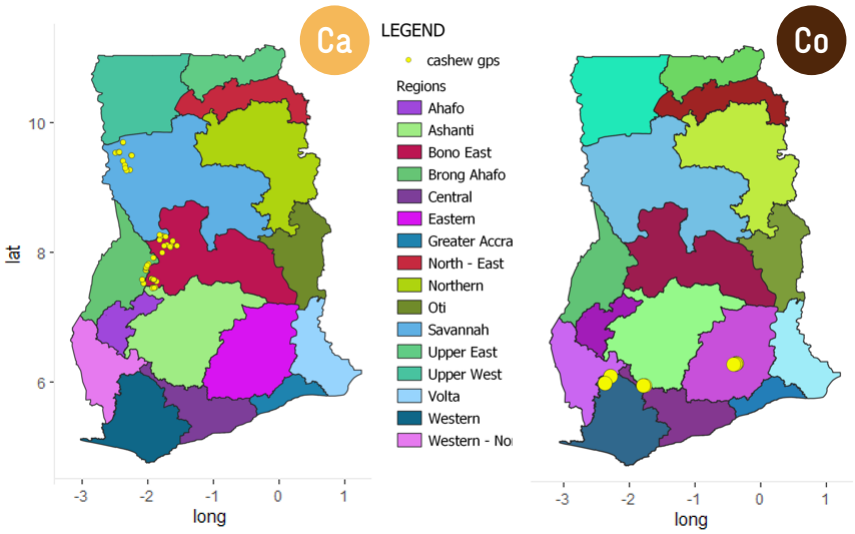
WIDMER and MINTAH (2016) observed that in the transition zone between cocoa and cashew, where climate change is felt first, more and more farmers are shifting to cashew. The authors also learned that in all communities which they visited, cashew production allowed women to increase their individual income, which they use to fulfil basic needs of their families and social obligations. Cashew nuts were also stored to serve as an insurance system in case of emergencies. Women favour cashew production because it is less labour intensive than the cultivation of other crops.

WIDMER and MINTAH (2016) confirm there is child labour for children and youths. Children and youths carry out their tasks on the farm after school or during weekends and school holidays. Their tasks on the farm mostly consist of weeding, sweeping and clearing the farm before harvest, and picking nuts during harvest. The authors state that there is high engagement by children and youth going beyond the cashew plantation and showing negative effects upon academic achievements (WIDMER and MINTAH, 2016).

3.2 SITUATION ANALYSIS OF CASHEW AND COCOA SMALLHOLDER FARM HOUSEHOLDS SUPPORTED BY COMCASHEW

3.2.1 Survey Characteristics

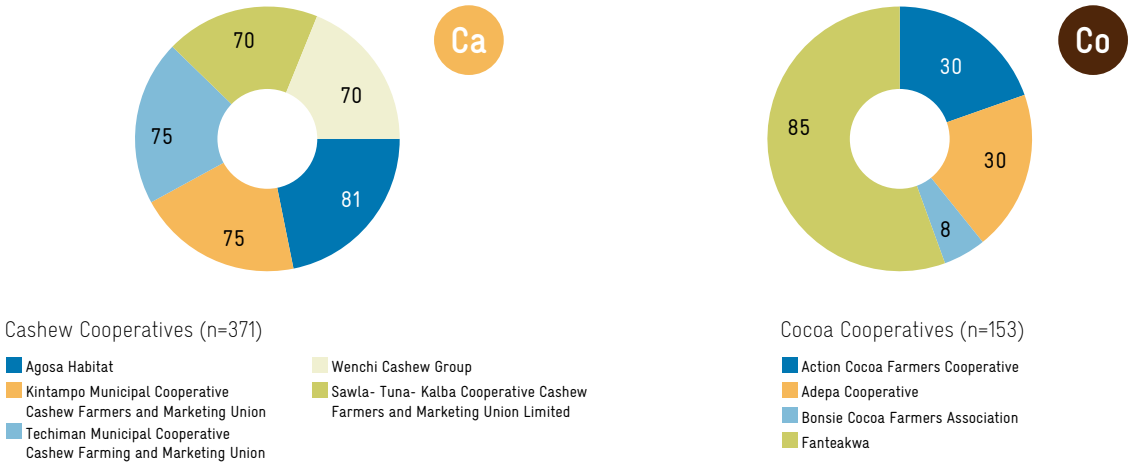
Graph 2: Location of Sampled Cashew and Cocoa Farm Households in Ghana



Source: own source, slide 85

From April to August 2020, the project conducted a baseline survey in smallholder households growing as a main cash crop either cashew (Ca) or cocoa (Co). The cashew households are located in two clusters, one in the regions of Bono and Bono East and the other stretches over the Northern, Savannah and Upper West Regions. The cocoa households belong to cooperatives that operate in the Western, Central and Eastern Regions. Moving from south to north rainfall and humidity reduces and the climate is less suitable for cocoa. Bono and Bono East are still transitory regions where both cocoa and cashew are cultivated, while the climate of the Northern and Savannah Regions is unsuitable for cocoa, but well suitable for cashew.

Graph 3: Sampled Smallholder Households from Cashew and Cocoa Cooperatives

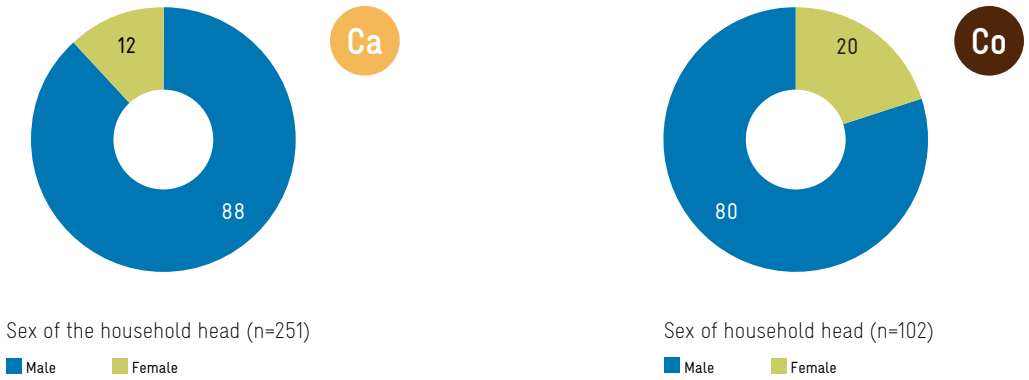


Source: own source, slide 3

Households were sampled randomly from communities where cooperatives were located, the number of households sampled being approximately in relation to the size of the communities. 371 and 153 households were interviewed for cashew and cocoa smallholder farming, respectively. The number of households sampled in the cocoa area was smaller because data was collected a little later, then coinciding with Covid measures for which staff were needed. The interviews were conducted by technical staff of partner organizations, i.e. the Ministry of Food and Agriculture with its departments, the Directorate of Crops Services (DCS) and the Cocoa Health and Extension Division (CHED) of the Ghana Cocoa Board (COCOBOD).

In most instances, i.e. in 67% of cases for cashew as well as for cocoa households, the interviewee was the head of the household, in 23% and 16% of cases it was the spouse for the cashew and cocoa household, respectively, while in the remainder of cases another household member stepped in for the head of the household.

Graph 4: Sex of Head of Household



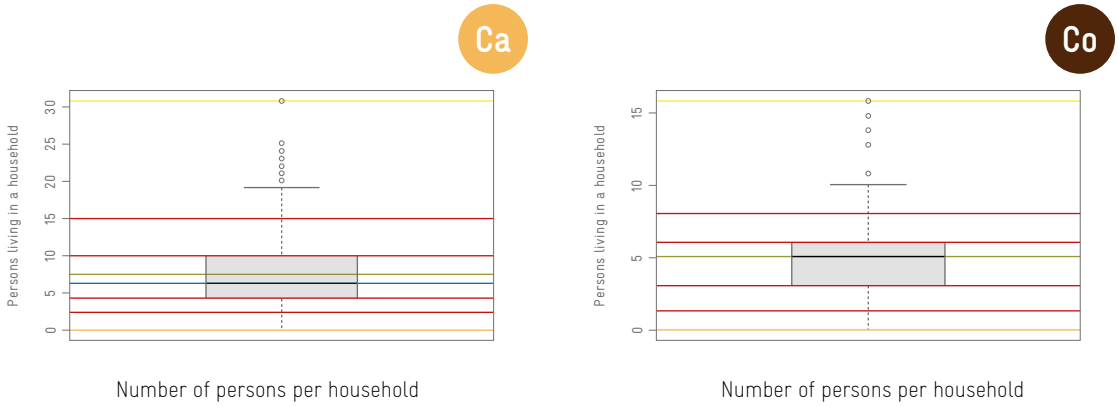
Source: own source, slide 7

With respect to cashew households, a woman was the head of the household in 12% out of 251 cases, while for cocoa the percentage was higher with 20% female-headed households out of 102 cases.

3.2.2 Household Characteristics (Number, Composition, Age Structure of Household Members)

A household has two main features: On the one hand, it is a consumption unit and on the other, a resource unit. As regards physical consumption, household members are in need of food, housing, clothes, health services and education, and at the same time, the household has disposal of a workforce, the main important resource to fulfil consumption needs. Both consumption unit and workforce disposal depend considerably on the number of household members and its composition by age and sex.

Graph 5: Number of Persons in the Household



Lines: orange = minimum, red = quantiles (10%, 25%, 75%, 90%), blue = median, green = mean, yellow = maximum
Source: own source, slide 47

Table 6: Household Composition of Cashew and Cocoa Smallholder Households

	Cashew HHs (n = 372)				Cocoa HHs (n = 153)			
	25% Q.	Median	Mean	75% Q.	25% Q.	Median	Mean	75% Q.
Children	2.0	3.5	**3.8**	5.0	0.0	3.0	**2.5**	4.0
Adults	0.0	2.0	**3.0**	4.0	2.0	2.0	**2.5**	4.0
Elderly	0.0	0.0	**0.6**	1.0	0.0	0.0	**0.1**	0.0
Number of persons per HH	3.0	6.0	**7.4**	10.0	3.0	5.0	**5.1**	6.0

Source: own source, slides 48, 51, 54, 57

Cashew smallholder households, having 6.0 and 7.4 persons for median and mean, respectively, appear to be markedly larger than cocoa smallholder households having 5.0 and 5.1 household members. This is the case throughout all age categories from children (persons below 15 years) through to adults from 15 to 55 years and elderly persons (above 55 years). The range is provided by figures starting with the 25th quantile (all sorted values from smallest to largest starting from the value of the first quarter of all values) and ending with the 75th quantile (concluding with the last value of the third quarter of all values). The distribution of the total number of household members is also reflected in the box plot, see Graph 5, all values within the 25th and 75th quantile being within the box and all the others outside the box.

From Table 6 it follows that there are higher consumption needs and thus higher living costs must be expected in cashew smallholder households compared to cocoa smallholder households. The higher living costs are partly compensated because staple crops (cereals) are cheaper in the northern sector where the cashew smallholders are located compared to the southern sector where the cocoa households are located. However, manufactured goods must come from the south and therefore these goods are more expensive in the north than in the south. There is definitely no full compensation for the lower income of cashew smallholder households. However, because of the bigger household size, they also have a larger labour force.

Unfortunately, no further breakdown regarding age groups or sex was made in the inquiry. To be able to make further conclusions during modelling on e.g. the exact consumption needs and labour force, this data needs to be combined with data of the Ghana Statistical Services for the population living in rural areas of Ghana.

Table 7: Household Size by Female- and Male-Headed Households (in No.)

	Cashew Households					Cocoa Households				
	n	25% Q.	Median	Mean	75% Q.	n	25% Q.	Median	Mean	75% Q.
Female-headed HHs	31	3.5	6.0	**6.1**	8.5	20	4.0	5.0	**5.7**	11.0
Male-headed HHs	220	5.0	7.0	**8.7**	11.0	82	4.0	5.5	**7.0**	16.0
All HHs	372	3.0	6.0	**7.4**	10.0	153	3.0	5.0	**5.1**	6.0

Source: own source, slide 48, 73, 79

When distinguishing between male- and female-headed households, one notes that the former are larger by roughly one person. Often female-headed households are headed by a woman because of being a widow.

Table 8: Age (in years) by Sex of Head of Household

	Cashew Households					Cocoa Households				
	n	25% Q.	Median	Mean	75% Q.	n	25% Q.	Median	Mean	75% Q.
Male-headed HHs	220	44.0	53.5	**53.1**	61.0	82	40.3	49.5	**49.3**	58.0
Female-headed HHs	31	54.0	60.0	**60.0**	65.0	20	50.0	58.0	**57.3**	62.5
All HHs	251	45.0	54.0	**53.9**	63.0	102	41.2	52.0	**50.9**	61.5

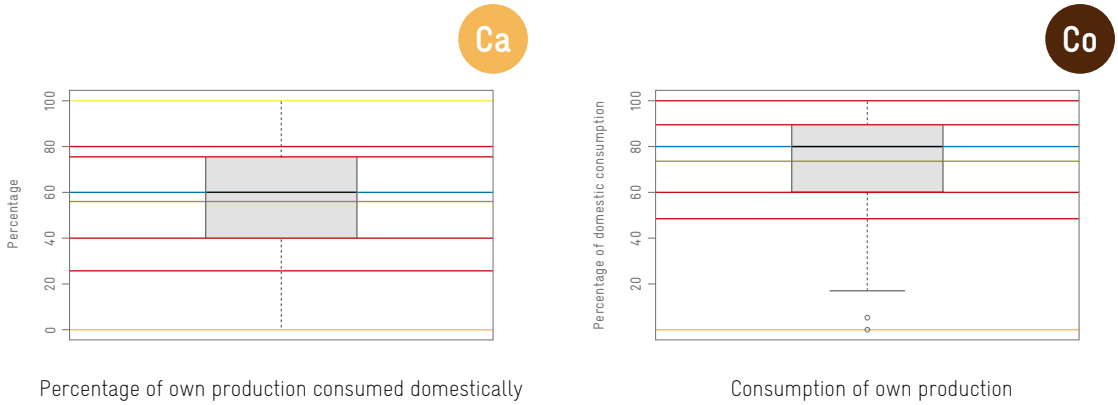
Source: own source, slide 10

From Table 8 we may draw two conclusions. First of all, it appears that the age of the head of cashew households tends to be slightly older than for cocoa households (mean and median at 53.9 and 54 years for cashew households compared to 50.9 and 52 years for cocoa households) and that this is also the case for both subcategories, i.e. male- and female-headed households. Secondly, it seems that female heads of household are, by more than five years, older than male-headed households. In couples, women are usually younger than men. In our case of female-headed households many of the female heads may therefore be widows.

3.2.3 Household Food Consumption Patterns and Expenditures

A large part of food is usually produced by smallholder households themselves as can also be seen in the following graph and table. 60 and 80% (median) of the food needed is produced by cashew and cocoa households themselves, respectively, as shown in the graph below.

Graph 6: Domestic Household Consumption of Own Food Produced (in %)



Lines: orange = minimum, red = quantiles (10%, 25%, 75%, 90%), blue = median, green = mean, yellow = maximum
Source: own source, slide 59

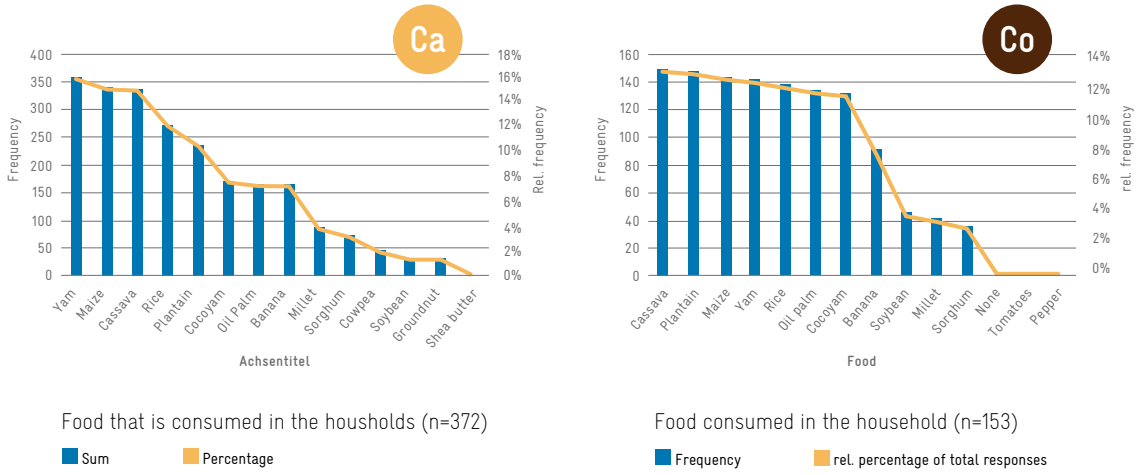
Table 9: Household Consumption of Own Food Produced (in %)

	Cashew Households					Cocoa Households				
	n	25% Q.	Median	Mean	75% Q.	n	25% Q.	Median	Mean	75% Q.
Female-headed HHs	31	50.0	**60.0**	**61.7**	80.0	20	57.6	**82.5**	**77.8**	100.0
Male-headed HHs	220	41.5	**60.0**	**57.2**	75.0	82	60.0	**75.0**	**74.6**	97.5
All HHs	372	40.0	**60.0**	**55.9**	75.0	153	60.0	**80.0**	**74.5**	90.0

Source: own source, slide 60, 77, 83

According to Table 9, cocoa smallholder households produce a markedly higher percentage of food compared to cashew smallholder households (80 and 74.5% for median and mean, respectively, against 60 and 55.9%) which also means that a higher percentage of food needs to be bought by cashew smallholder households. No striking difference can be seen when comparing female- versus male-headed households, perhaps because cocoa households headed by women tend to produce a little more food from own production.

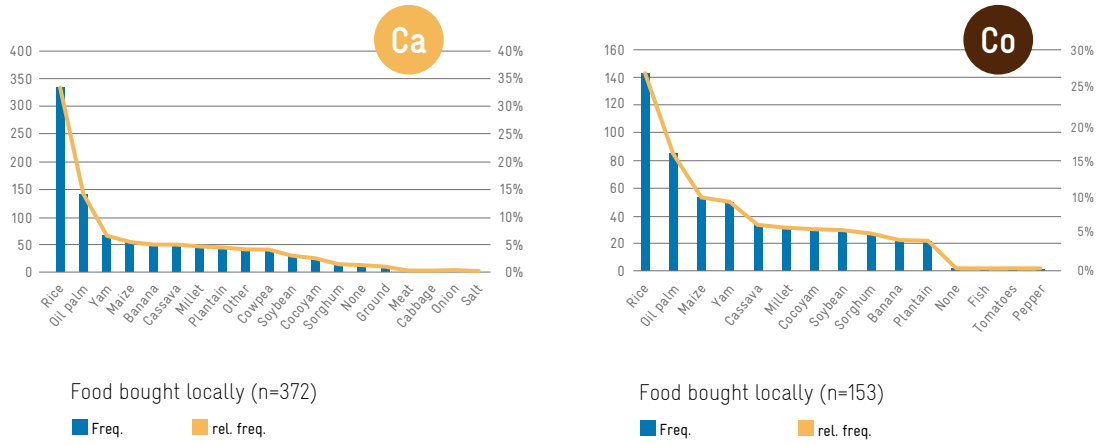
Graph 7: Types of Food Produced by Cashew and Cocoa Smallholder Households



Source: own source, multiple responses possible, slide 61

The main food crops grown and consumed by both household types are rather similar: yams, maize, cassava, rice and plantain. These are mentioned by both household types with more than 10% relative frequency. Cocoyam and oil palm tend to play a larger role in cocoa smallholder households. This is, at the same time, an area with more rainfall and thus is more suitable for these crops which can be grown more successfully.

Graph 8: Food Bought in by Cashew and Cocoa Smallholder Households

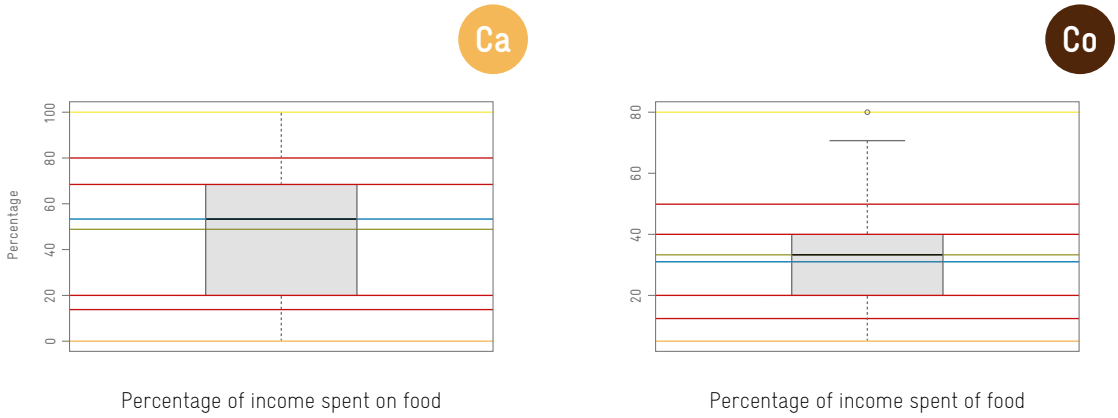


Source: own source, multiple answers possible, slide 65

According to the graphs above the most often mentioned foodstuffs bought by both household types are the same for the five most important food crops: rice, oil from oil palm, yam, maize, cassava and millet. Since the five food crops mentioned are also grown by the same households themselves, this suggests that households sometimes go short of these foodstuffs and then buy them. Rice and oil from oil palms do, however, stand out. Here, we assume that farmers

would like to grow them more often themselves but are unable to do so because of climatic conditions (oil palms need substantial rainfall) or unavailability of suitable terrain (valley-bottom land for rice production). These two crops are therefore more often in shortage in more households and then need to be bought.

Graph 9: Percentage of Income Spent on Food by Cashew and Cocoa Smallholder Households



Lines: orange = minimum, red = quantiles (10%, 25%, 75%, 90%), blue = median, green = mean, yellow = maximum
Source: own source, slide 63

Table 10: Percentage of Income Spent on Food by Cashew and Cocoa Smallholder Households

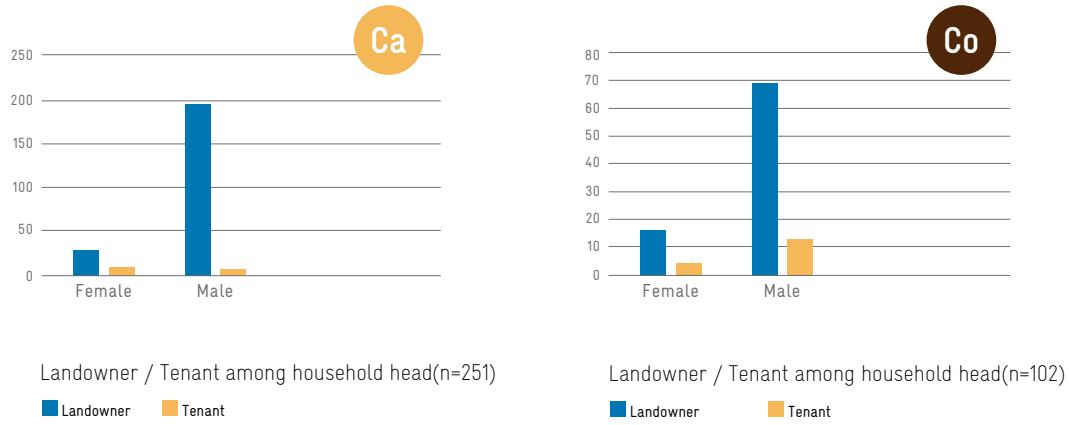
	Cashew Households					Cocoa Households				
	n	25% Q.	Median	Mean	75% Q.	n	25% Q.	Median	Mean	75% Q.
Female-headed HHs	31	19.0	**25.0**	**35.74**	60.0	20	30.0	**40.0**	**39.6**	50.0
Male-headed HHs	220	20.0	**50.0**	**44.26**	70.0	82	18.0	**30.0**	**31.3**	40.0
All HHs	372	20.8	**50.0**	**45.80**	68.5	153	20.0	**30.0**	**32.1**	40.0

Source: own source, slides 64, 78, 84

Cashew smallholder households spend a higher percentage of their income on food that needs to be bought in than cocoa smallholder households comparing median and mean, at 50 and 45.8%, respectively, against 30 and 32.1%. The situation with respect to female- and male-headed households is less clear. One is tempted to conclude that female-headed households spend relatively less income on food than male-headed households, however, this appears to be the reverse for cocoa households.

3.2.4 Cashew and Cocoa Farming

Graph 10: Land ownership/Tenancy of Farms by Cashew and Cocoa Smallholder Households



Source: own source, slide 14

Table 11: Land Ownership/Tenancy by Sex of Head of Household and Type of Smallholder Farms

	Cashew Smallholder Farms				Cocoa Smallholder Farms			
	n	Landowner	Tenant	Total	n	Landowner	Tenant	Total
Female-headed HHs	31	83.9	16.1	100.0	20	80.0	20.0	100.0
Male-headed HHs	220	89.5	10.5	100.0	82	84.1	15.9	100.0
Total HHs	251	88.8	11.2	100.0	102	83.3	16.7	100.0

Source: own source, slide 15

As can be seen in Graph 10 and Table 11 above, the majority of households own their land. Between 11.2% for cashew and 16.7% for cocoa smallholder households occupy their land as tenants. Tenancy is a little higher among cocoa smallholder farmers. Tenancy also tends to be more frequent for female-headed households than male-headed households.

Table 12: Farm Size of Cashew and Cocoa Smallholders (in ha)

	Cashew Smallholder Farms					Cocoa Smallholder Farms				
	n	25% Q.	Median	Mean	75% Q.	n	25% Q.	Median	Mean	75% Q.
Female-headed HHs	31	1.6	**2.4**	**3.3**	4.0	20	1.5	**2.0**	**2.7**	3.2
Male-headed HHs	220	2.4	**4.0**	**6.0**	7.3	82	2.8	**4.0**	**5.0**	6.1
Total	251	2.1	**4.0**	**5.6**	6.7	102	2.3	**3.6**	**4.5**	5.6

Source: own source, slides 43, 45, 74, 80

Farms of cashew smallholders tend to be larger by about 0.5 to 1 ha than farms of cocoa smallholders, when comparing median and mean, namely 4.0 and 5.6 ha for cashew farms with 3.6 and 4.5 ha for cocoa farms.

A more pronounced difference in farm size can be detected when households headed by women and men are compared. Households headed by men have a markedly larger farm size of well above 1 ha than female-headed households, namely 4 and 6 ha against 2.4 and 3.3 ha for median and mean, respectively, for cashew farmers and 4 and 5 ha against 2 and 2.7 ha for median and mean respectively, for cocoa farmers.

Table 13: Number of Plots per Farm by Cashew and Cocoa Smallholder Farms

Cashew Smallholder Farms					Cocoa Smallholder Farms				
n	25% Q.	Median	Mean	75% Q.	n	25% Q.	Median	Mean	75% Q.
372	3.0	**6.0**	**11.2**	12.3	153	2.0	**3.0**	**2.9**	5.0

Source: own source, slide 16

Cashew smallholder farms have more plots than cocoa smallholder farmers, when comparing median and mean at 6 and 11.2 plots, respectively, for cashew smallholder farms against 3 and 2.9 plots for cocoa smallholder farms.

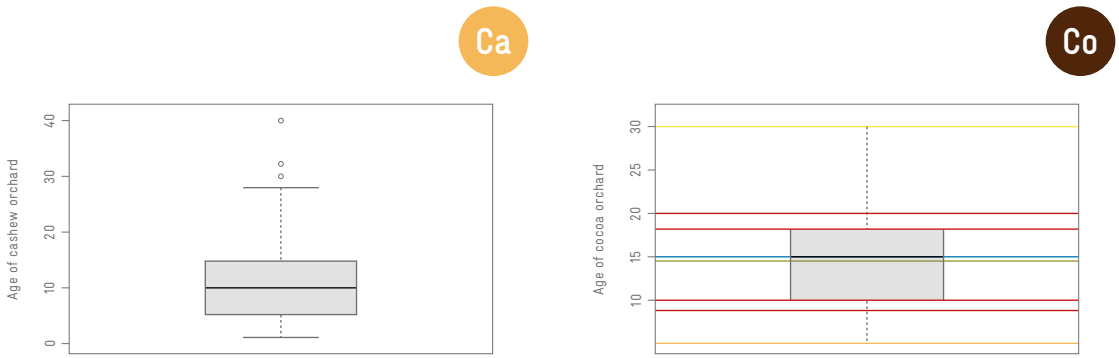
Table 14: Density of Cashew and Cocoa Trees by Cashew and Cocoa Smallholder Farms (in no. of trees per ha)

Cashew Smallholder Farms					Cocoa Smallholder Farms				
n	25% Q.	Median	Mean	75% Q.	n	25% Q.	Median	Mean	75% Q.
372	102.9	**123.6**	**141.3**	173.0	153	1,107.0	**1,161.4**	**1,164.3**	1,235.5

Source: own source, slide 22

The density of cashew trees, at 123.6 and 141.3 for median and mean, is substantially higher than the 100 trees per ha at a spacing of 10 m x 10 m recommended, while the number of cocoa trees per ha is, at 1,161.4 and 1,164.3 for median and mean, respectively, very near to the recommended planting density of 1,111 trees at a 3 m x 3 m spacing.

Graph 11: Age of Cashew and Cocoa Orchards (in years)

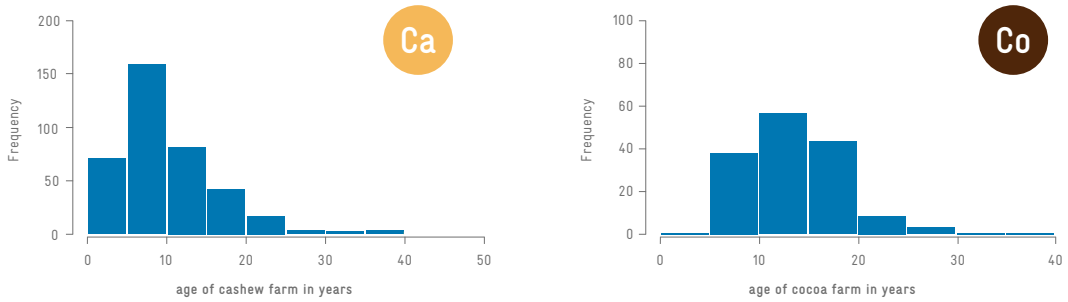


Boxplot age of cashew orchard (n=372)

Age of cocoa orchard (n=153)

Lines: orange = minimum, red = quantiles (10%, 25%, 75%, 90%), blue = median, green = mean, yellow = maximum
Source: own source, slide 23

Graph 12: Histogram for Age of Cashew and Cocoa Orchards (in years)



Histogram for age of cashew farm (n=372)

Histogram for age of cocoa farm (n=153)

Source: own source, slide 25

Table 15: Age of Cashew and Cocoa Orchards (in years)

Cashew Orchards					Cocoa Orchards				
n	25% Q.	Median	Mean	75% Q.	n	25% Q.	Median	Mean	75% Q.
372	6.0	**10.7**	**10.0**	15.0	153	10.0	**14.6**	**15.0**	18.0

Source: own source, slide 24

Assuming an economic lifespan of 30 to 40 years for cashew and cocoa orchards, the average age of an orchard would be between 15 and 20 years. Thus, one can conclude from Table 15 that cashew orchards are, in median and average terms, quite young and that one can expect a strong increase of cashew production in the coming years in the sampled area. This is also supported by Graph 11 showing that the majority of cashew trees are in the age category of 5 to 10 years.

In median and average terms, cocoa orchards are older by about 5 years. However, they are still well within a normal growing period and not too old. Within the farms of the sample area one can thus expect stable cocoa production in the coming years.

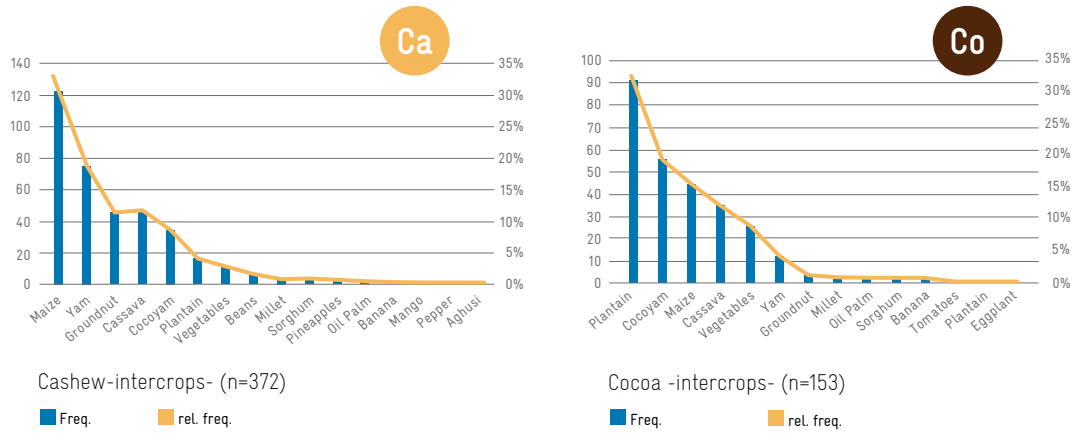
Table 16: Cultivation of Cashew/Cocoa Trees with Other Crops

	Cashew Farms		Cocoa Farms	
	n	%	n	%
None	190	51.1	17	10.1
Intercrop	168	45.2	104	61.9
Side crop	12	3.2	5	3.0
Shade tree	2	0.5	42	25.0
Total	372	100.0	168	100.0

Source: own source, slide 28

When tree crops are planted, growing intercrops and/or side crops is recommended[11]. During this time, the tree crop only covers a small portion of the field. Considerable space between where trees have been planted can therefore be used for food crops or cash crops. Thus, the labour needed for clearing and land preparation as well as the space can be used much more efficiently. Additionally, young cocoa seedlings need shade, they suffer from sunlight. Growing them under plants which give shade is therefore recommended, ideally under plantain (cooking banana) which is an important food crop at the same time. It is therefore not surprising that many farmers, especially cocoa farmers, stated that they grow intercrops. Once the canopy has completely closed, hardly any intercrops can be grown with the exception of some crops that are shade tolerant (e.g. cocoyams or yams). Cocoa also loves to have some shade even if the orchard is already older and well into the production phase. It is therefore not surprising that the percentage of cocoa under shade trees is much higher (25%) than for cashew (0.5%), the latter in fact suffering from shade.

Graph 13: Frequency of Intercrops Cultivated in Cashew and Cocoa Farms



Source: own source, slide 29

The five most important intercrops for both types of smallholder farmers are maize, yam, cassava, cocoyam and plantain. Plantain plays a much bigger role in cocoa orchards because it is also an important shade plant for cocoa seedlings and young cocoa plants. Plantain is practically a dual-purpose crop: It provides necessary shade for young cocoa trees and it provides food for the smallholder household.

11 The term sidecrop is rather fuzzy. It was to mean a crop that is not grown in between cashew or cocoa trees but alongside. However, in hindsight, we think it did not make much sense.

Groundnuts are especially to be mentioned for cashew orchards where they are an important cash crop. However, in both cases one should note that other leguminous crops (e.g. beans) do not play a major role; one may even say, they play a very minor role. This poses the question as to how households satisfy their nutritional need for protein. We may conclude that the need for protein may not be covered adequately.

3.2.5 Yield and Gross Income from Cashew and Cocoa Farming

Table 17: Tree Crop Yields in Cashew and Cocoa Smallholder Farms (in kg per ha)

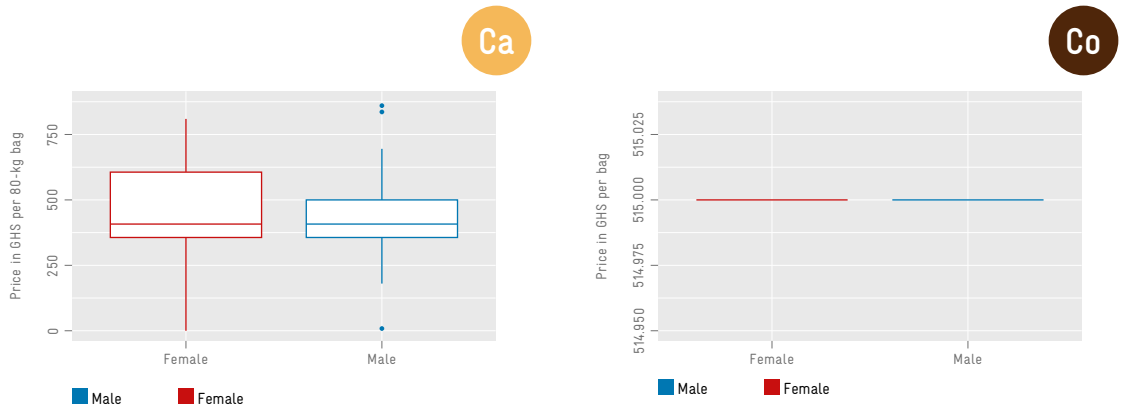
Raw Cashew Nut Yield in Cashew Farms					Cocoa Yield in Cocoa Farms				
n	25% Q.	Median	Mean	75% Q.	n	25% Q.	Median	Mean	75% Q.
372	127.8	**247.1**	**420.2**	474.4	153	195.7	**362.4**	**402.0**	546.3

Source: own source, slide 36

The median and average yield of cashew, at 247 and 420 kg, remain well below what experts would expect as a yield per ha by an ordinary farmer, which would come to around 600 kg RCN per ha. As we noted above, cashew orchards are by and large quite young, so perhaps this is some of the explanation.

The yield of cocoa per ha, at 362 and 402 kg/ha, also falls short of 450 kg/ha, which is believed by experts to be an average yield of a smallholder farmer's cocoa harvest per ha.

Graph 14: Median Price per Bag of RCN or Cocoa in Cashew and Cocoa Smallholder Farms by Female- and Male-Households (in GHS)

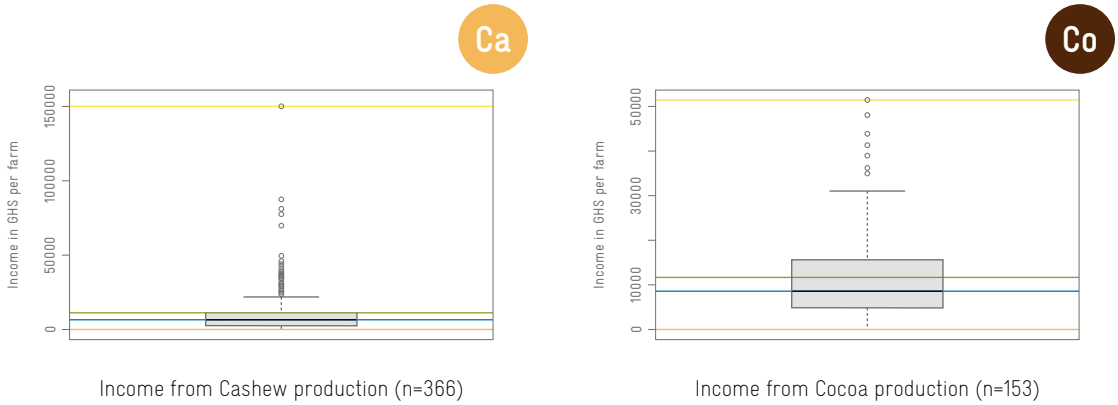


Source: own source, slide 37

Since the price for cocoa is fixed, it is not surprising that only one bar appears at a price of 515 GHS per 66 kg standard bag during the 2019/20 season and that this is the same for male- as well as female-headed households (see right-hand box of Graph 14).

For cashew there is considerable spread, as the boxes of the box plot show, but the median and mean price of 400 and 412 GHS/80kg bag (5 and 5.15 GHS/kg) are also almost the same.

Graph 15: Gross Income from Cashew and Cocoa in Cashew and Cocoa Smallholder Farms (in GHS per household and year)



Lines: orange = minimum, blue = median, green = mean, yellow = maximum
Source: own source, slide 37

Table 18: Gross Income from Cashew and Cocoa by Cashew and Cocoa Smallholder Farms and by Male- and Female-Headed Households (in GHS per household and year)

	Cashew Smallholder Farms					Cocoa Smallholder Farms				
	n	25% Q.	Median	Mean	75% Q.	n	25% Q.	Median	Mean	75% Q.
Female-headed HHs	31	1,860	**3,200**	**8,986**	7,200	20	3,090	**4,635**	**6,334**	7,725
Male-headed HHs	220	2,595	**6,000**	**12,648**	12,800	82	7,725	**12,360**	**14,960**	18,025
Total	366	1,630	**4,200**	**8,471**	9,000	153	4,120	**8,240**	**11,505**	15,450

Source: own source, slides 38, 75, 81

Cocoa households have a markedly higher income from cocoa than cashew households from cashew, see Table 18. The median value of the gross income of cocoa farms is nearly double (GHS 8,240) that of cashew farms (GHS 4,200). With respect to the mean gross income of cocoa smallholder households, one notices that this is about 36% higher (GHS 11,505) than the gross income (GHS 8,471) of cashew households.

It should also be noted that female-headed households have a substantially lower gross income than male-headed households and this is the case for both cashew and cocoa smallholder households.

Table 19: Gross Income from Cashew and Cocoa in Cashew and Cocoa Smallholder Households per Year and ha

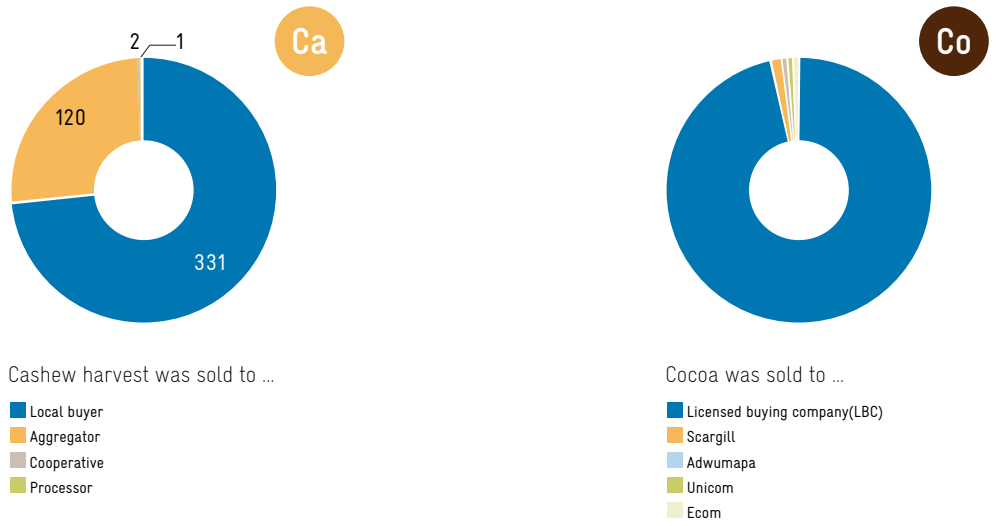
	Cashew Smallholder Farms		Cocoa Smallholder Farms	
	Median	75% Quartile	Median	75% Quartile
Gross Income	4,200.00	9,000.00	8,240.00	15,450.00
Ha	4.0	6.7	3.6	5.6
Gross Income/ha	1,050.00	1,343.28	2,288.89	2,758.93

Source: own calculations based on data of Table 12 and Table 18

Combining the data of Table 12 and Table 18 gives us an idea of the gross income (production costs are not yet deducted) from the focus crop per ha. We also added the figures for the 75% quartile to show the potential that may well be possible for many farmers. To calculate total household (net) income, however, one has to deduct production costs and add income from other crops, livestock and off-farm income-generating activities.

3.2.6 Marketing of Cashew and Cocoa Produce

Graph 16: 2018/2019 Harvest was Sold to ...



Source: own source, slide 40

In 73% of cases, RCN are sold to local buyers and in 26% of cases to aggregators (out of a total number of 454 cases, multiple answers possible). Only in 2 cases was the produce sold to a cooperative and in one case directly to a processor.

With respect to cocoa, the produce is sold to a licensed buying company in 97% of 156 cases.

3.2.7 Non-Cashew and Non-Cocoa Income Sources and Gross Income Source

Apart from the main crop, there might be other important income sources. Livestock may play a role in some of the households. In fact, in 65.1% and 51.6% of 371 and 153 cases of cashew and cocoa smallholder households, respectively, livestock played a role (slide 41). Unfortunately, no questions were asked as to which type of livestock was kept and how much income was generated from livestock keeping. However, from our own observations we can assume that, in the vast majority of cases, income from livestock plays only a minor role.

Off-farm income sources are of quite some importance. Cashew-farming households mentioned in 26.9% out of 372 cases that they have off-farm income sources – a little over a quarter of the sample – while the percentage was higher for cocoa farming households, at 53.6% out of 153 cases, representing more than half of the sample (slide 67).

Table 20: Off-farm Income by Cashew and Cocoa Smallholder Households and by Female- versus Male-Headed Households (in GHS per year)

	Cashew Smallholder Farms					Cocoa Smallholder Farms				
	n	25% Q.	Median	Mean	75% Q.	n	25% Q.	Median	Mean	75% Q.
Female-headed HHs	31	0	**0**	**171**	0	20	0	**0**	**236**	500
Male-headed HHs	220	9	**9**	**1,366**	0	82	0	**550**	**1,986**	2,000
Total	100	0	**0**	**1,293**	213	82	500	**1,350**	**3,893**	3,000

Source: own source, slides 69, 75, 81

Cocoa smallholder households involve themselves substantially more in off-farm income-generating activities than cashew smallholder households. The median off-farm income is 0 for cashew smallholder households, compared to GHS 1,350 for cocoa smallholders. Also, at GHS 3,893, the mean value is about three times higher for cocoa households than for cashew smallholder households, at GHS 1,293.

The situation for female-headed against male-headed households shows that the former earn less off-farm income than the latter.

3.2.8 Concluding Remarks on chapter 3.2

3.2.8.1 Comparing Cashew and Cocoa Smallholder Households

Table 21 summarizes the main findings from the previous subchapters and presents them here as median and mean values for cashew and cocoa smallholder households.

Table 21: Main Household and Farm Characteristics of Cashew and Cocoa Smallholder Households

Main Household and Farm Characteristics		Cashew Smallholder Households		Cocoa Smallholder Households	
		Median	Mean	Median	Mean
1	HH size in no. of persons	6.0	7.4	5.0	5.1
2	Farm size in ha	4.0	5.6	3.6	4.5
3	Gross income from focus crop in GHS	4,200	8,471	8,240	11,505
4	Off-farm income	0	1,293	1,350	3,893
5	Consumption of own produced food in %	60.0	55.9	80.0	74.5
6	Income spent on food to be bought in %	50.0	45.8	30.0	32.1

Source: own source, slides 38, 43, 45, 48, 60, 64, 69

The household size of typical cashew households is larger by at least one person (Row 1). This means that the cost of living will be higher for this type of household, since more food, clothes, shelter, education and health services are needed. However, this is partly compensated by having a larger labour force and the potential to generate income. Also, the farm size is larger by about half to one ha (Row 2) when comparing cashew with cocoa smallholders. This means that the land resource base is slightly larger for cashew smallholder households.

When looking at the gross income from cashew and cocoa, cocoa smallholder households have a much higher income (Row 3). This contrasts with the fact that the need to cover living costs is higher for cashew smallholder households because of the higher number of household members (Row 1). Also, this difference is clearly not covered by off-farm income as Row 4 shows. It is rather the opposite. Cashew smallholder households that lie in the northern sector have less access to off-farm income-generating activities. Many of them even migrate to the southern sector to find better paid work. The same "inverse pattern" is also shown in Rows 5 and 6. While one would have expected cashew smallholder households to grow more food crops for subsistence needs, it is the reverse. 80% (median) of food crops needed for own consumption are produced by cocoa smallholders, while this is only 60% for cashew smallholders (Row 5).

Thus, not surprisingly, the amount of income needed to buy food is substantially higher at 50% (median) for cashew smallholder households compared to cocoa smallholder households at 30% (median) (Row 6).

The overall conclusion is that the total household income of a typical cashew smallholder household is considerably lower than that of a cocoa smallholder household.

3.2.8.2 Comparing Female- versus Male-Headed Households Among Cashew and Cocoa Smallholder Households

Table 22: Comparing Female- and Male-Headed Households of Cashew and Cocoa Smallholdings (Median)

Main Household and Farm Characteristics		Cashew Smallholder Households		Cocoa Smallholder Households	
		Female-Headed	Male-Headed	Female-Headed	Male-Headed
1	HH size in no. of persons	6.0	7.0	5.0	5.5
2	Farm size in ha	2.4	4.0	2.0	4.0
3	Gross income from focus crop in GHS	3,200	6,000	4,635	12,360
4	Off-farm income	0	9	550	1,350
5	Consumption of own produced food in %	60.0	60.0	82.5	75.0
6	Income spent on food to be bought in %	25.0	50.0	40.0	30.0

Source: own source, Table 7, Table 9, Table 10, Table 12, Table 18, and Table 20

Looking at Table 22, the situation is pretty clear from Rows 1 to 3. Female-headed households have fewer household members but also their farm size is smaller. Their gross income from the focus crops is also substantially lower. In terms of off-farm income, a slight difference can be noticed. In general, however, off-farm income does not play a major role, especially not among cashew households. The differences in Rows 5 and 6 are zero or inconclusive.

In general, female-headed households have fewer household members and therefore lower livelihood needs but they also have a smaller resource base in terms of farm land. They certainly also have a smaller resource base with respect to labour force because this is calculated on the basis of the size of the household (which is smaller for female-headed households). From our data it is not particularly clear whether female-headed households are worse off or better off, i.e. how much a smaller resource base is compensated by lower needs. From our data, we can neither confirm nor reject the statement made by GLSS7 (2018, p. xi, p. 33, Figure 4.9, and p. 35) that female-headed households appear to be better off than male-headed households in terms of poverty incidence.

3.3 MODELLING A TYPICAL CASHEW AND COCOA SMALLHOLDER HOUSEHOLD AND FARM

3.3.1 Modelling the Household

The household model relies on inputs from various sources. Firstly, our own survey among cashew and cocoa smallholder households (chapter 3.2). Secondly, this is triangulated against other sources of secondary material, and finally a conclusion is drawn on the parameters for the model households. In a first step, we shall provide an estimate of the household size and its age and sex composition. In a second step, on the basis of the estimate from the first step, we shall work out the workforce availability of the household.

3.3.1.1 Size of Households, Age and Sex Composition, Adult Equivalency

Our survey concerning the number of household members and age composition resulted in the figures given in Table 6, chapter 3.2.2. Parts of this shall be repeated here in Table 23. However, we shall add the percentages for the mean (median values usually do not add up to 100%). The breakdown was made into children (0-14 years), adults (15-55 years) and elderly persons (>55 years). Unfortunately, no further breakdown regarding age and sex was made because such data was not included in the survey.

Table 23: Household Composition of Cashew and Cocoa Smallholder Households in Number of Persons and Percentage per Household

	Cashew HHs (n = 372)			Cocoa HHs (n = 153)		
	Median	Mean	% Mean	Median	Mean	% Mean
Children, 0-14 yrs	3.5	3.8	51.4	3.0	2.5	49.0
Adults, 15-55 yrs	2.0	3.0	40.5	2.0	2.5	49.0
Elderly, >55 yrs	0.0	0.6	8.1	0.0	0.1	2.0
Number of persons per HH	6.0	7.4	100.0	5.0	5.1	100.0

Source: own source

BYMOLT et al. (2018) conducted a large survey in cocoa-growing areas of Côte d'Ivoire and Ghana. In Ghana they established a mean and median household size of 5.77 and 6 members, respectively. This is a considerably higher figure for cocoa households than ours. They counted as household members all individuals who usually live in the house or compound of the head of household, therefore factoring out individuals far from the household but still dependent on the household (BYMOLT et al. 2018, p. 47, 48). Bymolt's figures for smallholder households in cocoa-growing areas are larger by 0.67 and 1 person for mean and median respectively compared to our survey among cocoa smallholders. However, SMITH and SARPONG (2020, p. 48) quote a number of studies, such as HAINMUELLER et al. (2011) with a median household size of 5 among 3,000 cocoa farming households across five regions of Ghana, typically 2 adults and 3 children; KOLAVALLI and VIGNERI (2017) with a mean household size of 5 people among 702 cocoa-farming households in three regions, based on a 2010 survey; and VIGNERI and SERRA (2016) with a mean household size of 4.4 among 900 cocoa-farming households in two regions. These are all in the range of 5 people per cocoa household and below the figures of BYMOLT et al. (2018). SMITH and SARPONG (2020, p. 48) also quote a study by ASAMOAH et al. (2017) who report larger household sizes than other surveys of cocoa-farming households, with 22% of their 1,761 households having between 2 and 4 members, 42% having 5-7 members, and 29% having 8-12 members.

Overall, our conclusion is to remain with a household size of 5 persons per cocoa household for modelling. This still appears realistic.

For cashew households we do not have any other comparison and therefore remain with the median value of 6 persons per household.

We should also mention that the household size has been shrinking in Ghana, from 4.4 in the 2010 Population and Housing Census to 3.2 in the 2015 Labour Force Survey (GSS, 2016). Admittedly, all kinds of non-agricultural households fell into the general survey which may be substantially smaller.

However, we believe that our breakdown regarding age was insufficient and especially lacked a breakdown regarding sex. We are therefore taking average percentage figures from GSS (2016) with respect to the age and sex breakdown for rural areas in Ghana, see Table 24. This shall then also help us in working out the adult equivalency of our typical cashew and cocoa households.

Table 24: Distribution of Rural Population by Age and Sex (in %)

Line	Age Group	Male	Female	Total
1	0-14	22.9	21.2	44.1
2	15-64	23.3	27.2	50.5
3	65+	2.6	2.8	5.4
Total		48.8	51.2	100.0

Source: GSS (2016, p. 12, Table 2.2)

Comparing Table 23 with Table 24 we can see slight differences with respect to percentages for mean values. The category of children in Table 23 is higher by about 5%. We consider the fit to still be reasonable, however.

Based on the median values of Table 23 and the percentage values for age and sex categories in rural areas of Table 24, we come to the following number of persons by category per cashew and cocoa smallholder households.

Table 25: Major Age and Sex Categories of Members of Cashew and Cocoa Smallholder Households in Number of Persons

Age Group	Cashew Smallholder HHs 6 Persons			Cocoa Smallholder HHs 5 Persons		
	Male	Female	Total	Male	Female	Total
0-14	1.4	1.3	2.6	1.1	1.1	2.2
15-64	1.4	1.6	3.0	1.2	1.4	2.5
65+	0.2	0.2	0.3	0.1	0.1	0.3
Total	2.9	3.1	**6.0**	2.4	2.6	**5.0**

Source: own calculations based on Table 21 and Table 23

To be able to subsequently consider the income situation of households in relation to national poverty lines we need to convert the number of persons per household into adult equivalents, because the Ghana national poverty lines are given per adult equivalent.

Table 26: Major Age Categories and Sex of Members of Cashew and Cocoa Smallholder Households in Number of Adult Equivalents per Household

Age Group	Cashew Smallholder HHs, 6 Persons, 4.61 Adult Equivalents			Cocoa Smallholder HHs, 5 persons, 3.79 Adult Equivalents		
	Male	Female	Total	Male	Female	Total
0-14	0.95	0.82	1.77	0.75	0.69	1.44
15-64	1.36	1.19	2.55	1.17	1.04	2.21
65+	0.16	0.13	0.29	0.08	0.07	0.15
Total	2.47	2.14	**4.61**	1.99	1.80	**3.79**

Source: own calculations based on Table 25 and Annex 2a and Annex 2b with data provided by GLSS7 (2018, p. 106) and GLSS7 (2018, p. 106)

3.3.1.2 Labour Resources in Cashew and Cocoa Households

The labour force participation rate (LFPR) can usually be used to calculate the labour force resource potentially available in households. We wanted to determine this for cashew and cocoa smallholder households. However, the respective statistics concerning the LFPR in the Labour Force Survey 2016, (GSS, 2016, p. 23) appear to be flawed and inconsistent. The inconsistencies are further explained in Annex 2a.

SMITH and SARPONG (2020, p. 57) who worked with the previous labour force report of 2014 had already observed that labour force participation rates appeared to be too high for the age group 25 to 59 years and therefore made their own calculations (according to the Ankers methodology the age group 15-24 is not factored in for work, since this age group is assumed to still be in education). SMITH and SARPONG (2020) calculated full-time equivalent employment of 0.78 per adult person for adults aged 25 to 59 years which results in a figure of 2 * 0.78 = 1.56 full-time labour equivalents per household of 5 with two adults and three children.

We should also be aware that if one assumes a family of 5 with two adults and three children, substantial time needs to be given over to the care of children and housekeeping. Thus, we follow SMITH and SARPONG (2020, p. 57) with their estimation of 1.56 full-time labour equivalents, although some resource for labour will be available from children above 15. For comparison: In previous work by the main author, labour participation rates ranged from 1.59 to 1.70 per household of 5 persons in Malawi (KRAIN et al., 2017) and Rwanda (KRAIN and AFRIKA, in preparation), respectively.

Table 27: Labour Resources in Cashew and Cocoa Smallholder Households

	Cashew Smallholder HHs	Cocoa Smallholder HHs
No. of persons per HH	6	5
No. of full-time labour equivalents (FTEs) per HH	1.87	1.56
No. of workdays per HH	515	429

Source: own calculations based on FTEs for cocoa households provided by SMITH and SARPONG (2018)

In our discussions with agriculture experts it transpired that hired agricultural labourers only work for 4 hours a day, usually from 8.30 to 12.30, and that permanent agricultural workers work between 4 and 6 hours. This can also be well understood, since under high tropical temperatures and humid conditions it is hardly possible to work for more than 4-6 hours a day. The Labour Force Report shows that most people working in agriculture, forestry and fishery work significantly fewer hours than other workers. The majority work just 20 – 29 hours a week (GSS, 2016, Table 4.7, p. 41). However, farmers usually work 6 days a week. Subtracting all Sundays from 365 days, as well as about one month for attending communal or social obligations (e.g. funerals) and making an allowance of 10 days for sickness, one may come to approximately 365 – 52 – 30 – 10 = 273 available workdays. In the European Union, calculations are usually based on 225 effective workdays and the range may well be from 225 to 275 days for most countries, which is also the case in KRAIN and STEFFENS (2019), who recommend using 250 workdays per year for a full-time equivalent if no better estimate is suggested by further data. In our case, the number of hours worked per workday, namely 4-6 hours per day, appears quite small. We have therefore opted for roughly the maximum number of workdays per year, thus compensating for the fewer hours a day. This also makes sense so as to stretch hard physical work under tropical conditions over a longer time. We, therefore, arrive at an estimate of 275 workdays per full-time labour equivalent.

This would give 275 workdays x 1.56 labour equivalents = 429 workdays a year per household of 5 persons for cocoa smallholders and 1.56 / 5 x 6 x 275 = 515 workdays a year per household of 6 persons for cashew smallholders.

3.3.2 Determining Living Income and Other Benchmarks for a Model Cashew and Cocoa Smallholder Household[12]

We believe that attainment of sufficient income in cash or in kind to cover the cost of living is one important criterion for sustainability. This falls under the economic and surely also the social dimension of the three dimensions of sustainability: the social, economic and ecological dimensions. That income has not only an economic but also a social dimension becomes clear when quoting Amartya Sen who conceives poverty as the lack of those elements that allow individuals to function successfully in society which includes money, of course, but also such things as good health, literacy, self-confidence, adequate housing, and the ability to connect with others. (NISR, 2018).

However, one important question is, how exactly do we approach and measure sufficient income: sufficient for what? Is it merely income needed to survive and cover basic needs, or income to provide a comfortable, prosperous or even a wealthy life? What should be our guide?

Below, the living income benchmark shall be presented as a benchmark for a decent but basic life and the various poverty lines as benchmarks for physical survival. We start with the poverty lines.

12 Much of this subchapter has been taken from a similar subchapter by KRAIN and AFRIKA (2021) and then adapted to the current work in Ghana

3.3.2.1 Poverty Lines

International Poverty Lines

Poverty lines on an international level, such as the World Bank International Poverty Line (IPL) updated in 2015 to 1.90 USD PPP, and national poverty lines have been used for about two decades, to categorize people into types of poverty or above poverty levels and to determine whether policies and measures put in place effectively reduce poverty in the years that follow and to possibly redirect policies and measures in such a way that poverty is more effectively addressed.

The 1.90 USD PPP line has been a commonly used poverty line especially for developing countries. It is the simple average of national poverty lines from the 15 poorest countries from a sample of 74 national poverty lines constructed by RAVALLION, CHEN and SANGRAULA (RCS, 2009) (quoted by FERREIRA et al., 2016; JOLLIFFE and PRYDZ, 2016). 5 of the 15 poverty lines used to define the IPL are expressed in terms of adult equivalents, while the remaining 10 lines are expressed in terms of the average person (JOLLIFFE and PRYDZ, 2016).

The World Bank International Poverty Line has one big advantage: It is expressed in USD Purchasing Power Parity (PPP). The purchasing power parity is an exchange rate, which is calculated to offset price level differences between countries. It defines a value that allows buying about the same basket of goods in different countries. Thus, the PPP dollar does not compare the nominal value of currencies but their purchasing powers. And this makes a big difference. PPP values for a particular country in the currency of the respective country are provided yearly by the World Bank for the previous years and can be consulted using the World Bank dataset (see https://data.worldbank.org/indicator/PA.NUS.PRVT.PP).

The International Poverty Line (IPL) at 1.90 USD PPP per person per day is often also called the "extreme international poverty line". When the IPL was set up, 60% of the world population lived in low-income countries. As of 2017, only 9% do so, while 41% of people live in lower-middle income countries (including Ghana) and 35% in upper-middle income countries. Therefore, the World Bank constructed two additional poverty lines in 2018 (World Bank, 2020, p. 3, 29). Thus, as of now there are three World Bank poverty lines.

World Bank Poverty Lines

- USD PPP 1.90 per person per day for low-income countries (extreme international poverty line)
- USD PPP 3.20 per person per day for lower-middle income countries
- USD PPP 5.50 per person per day for upper-middle income countries

For our modelling purposes, we shall use the first two poverty lines as benchmarks since Ghana belongs to the group of lower-middle income countries.

The International Poverty Line has, however, one disadvantage. It is given for a whole country, while there are different purchasing powers in different parts of the same country. This poses two problems: One, if the country is very large, e.g. India, purchasing powers may differ sharply in different parts of the country. This is less of a problem in a smaller country and may still be tolerable in a mid-sized country like Ghana. And two, urban areas usually have a lower purchasing power than rural areas because especially housing and basic foodstuffs are more expansive in cities and large towns than in rural areas. It follows from this that urban incomes (wages and salaries) are usually overvalued while rural incomes (rural workers, small-scale entrepreneurs and smallholder farmers) are undervalued. As we are largely dealing with rural incomes, we have less of an issue with this problem because purchasing power tends to be undervalued.

National Poverty Lines

As said above, the World Bank International Poverty Line of USD PPP 1.90 per person per day is the simple average of 15 national poverty lines. Thus, it may well be possible that the national situation of a country is not well reflected by an international poverty line. This may be one of the important reasons that many countries developed their own poverty lines, as Ghana did.

In Ghana, the poor are defined as those who lack command over basic consumption needs, including food and non-food components. Poor and non-poor are identified over the cost of a minimum consumption basket. Two poverty lines have been developed in Ghana, the **upper (national) poverty line** which is referred to as the **(national) poverty line** and the **lower (national) poverty line** which is referred to the **extreme (national) poverty line** (GLSS7, 2018, p. 5). The **extreme (national) poverty line** is also called the **food poverty line** because it only covers expenditures on food items up to 2,900 calories per adult equivalent (GLSS7, 2018, p. 8) per day and does not cover any non-food items.

The poverty line is not calculated per person (as is the case with the World Bank international poverty line) but on the basis of a certain expenditure for the consumption basket per adult equivalent. The adult equivalent scale that was used for this purpose is outlined in Annex 2b).

The latest update of poverty lines for Ghana was given **in prices of 2016/2017** and is as follows (GLSS7, 2018, p. 9):

- **GHS 982.2 per adult equivalent per year** for the **lower national poverty line, the extreme national poverty line**
- **GHS 1,760.8 per adult equivalent per year** for the upper **national poverty line**

Statistics tell us that poverty in Ghana is an agricultural, rural and particularly a rural savannah phenomenon (the northern part of Ghana). In 2016/17, the poverty incidence was highest at 42.7% among households whose heads were self-employed in the agricultural sector (GLSS7 2018, p. 32).

In our view, a national poverty line and particularly an extreme national poverty line should not be undercut, for example, by paying producers prices that make the extreme national poverty line unattainable for a farmer (with enough land to be at full employment). An income situation below a national poverty line – in the absence of particular reasons beyond the control of those affected, such as severe weather, pest and disease calamities – should never be acceptable. This is the sort of moral income bottom line equivalent to undercutting a minimum wage set by a country.

3.3.2.2. The Ghana Minimum Wage

Another important benchmark is a minimum wage that is legislated by government and has to be paid by an employer to a worker.

According to WAGE INDICATOR (2021), Ghana has had a minimum wage of GHS 11.82 per day since 1 January 2020. GHANA STUDENTS (2021) commented that this has made Ghana a high minimum wage country. We do not share this opinion, since the wage for spot-market / casual agricultural labour in Ghana is already in the range of 15-20 GHS per workday. Also, minimum wages in Ghana are based on 27 workdays per month which would result in a monthly wage of GHS 319.14 which is very low. SMITH and SARPONG (2018, p. 57) rightly criticize this assumption of workdays per month as being much too high. It would mean not only working on Saturdays but also on one or two Sundays per month. These few observations already point to the need for the minimum wage in Ghana to be overhauled.

3.3.2.3 A Living Wage / Living Income as a Threshold for a Decent Life

While the poverty lines discussed above merely indicate a threshold for survival – and in the case of the Ghanaian extreme national poverty line merely what the human body needs as calorific intake – the more relevant question is what is the income threshold that needs to be passed in order to lead a decent life in accordance with the human right stipulated in Article 23(3) which states: "Everyone who works has the right to just and favourable remuneration ensuring for himself [/herself] and his [/her] family an existence worthy of human dignity".

To our knowledge, the most serious and convincing attempt over the last ten or so years has been made in this respect by Richard and Martha Anker (ANKER and ANKER, 2017). Their work, which centres on wages of workers and a decent remuneration, is based on serious conceptional work dating back more than 100 years (see e.g. RYAN, 1912). However, a similar attempt has – to our knowledge – not yet been tried for own-account workers, smallholder farmers and small-scale entrepreneurs who often live in similar dire conditions.

Richard and Martha Anker developed their thoughts along the question of how high a wage for a labourer should be in order to be just sufficient for a decent life ("basic but decent") and – this is perhaps their greatest contribution – not to speculate on this in philosophical terms, but to give clear and precise guidelines and tools on how to measure this. They tested and further developed their methodology in many real cases in developed and developing countries (ANKER and ANKER, 2017) so that their methodology has reached an outstanding level of maturity. Richard Anker was a former employee of the International Labour Organization (ILO). Some of his enthusiasm in tackling the methodology for working out a living wage was certainly spurred on by his frustration that the minimum wages the ILO had been advocating all along did not really determine a wage that provides for a decent life. This may sound surprising but it is, indeed, the case. A minimum wage is usually set by a tripartite system consisting of workers (represented by unions), employers (represented by their associations) and state organizations and is a political result that is finally put into law by the respective country. Apart from what a labourer would need for his or her life and family, the competitive situation of the sector is factored into the determination of a minimum wage. Thus, if a living wage would be too high for competitive reasons, the sector linked to the wage may ultimately loose out (also to the detriment of the workers) and therefore a minimum wage may be set at a lower level than would be needed for decency. However, our opinion on this issue is that, while we think it is understandable for a minimum wage to be set lower taking into consideration the competitiveness of a sector, one should also include a transparent calculation of what a decent wage should be, even if it cannot be implemented at that point in time.

When we looked at incomes of smallholder farmers, we realized that they often live in similarly miserable conditions as workers. We studied the approach of the Ankers and were convinced that it could also be utilized for smallholder farmers and other rural small-scale entrepreneurs. The common denominator which we discovered was the income created per labour input. In order to test our hypothesis about similarities and possible differences we chose the tea sector to work this out between 2015 and 2021. We chose the tea sector for two reasons: First, an important study was conducted in 2013 comparing low wages among tea workers' in India and Indonesia and Malawi (ETHICAL TEA PARTNERSHIP and OXFAM, 2013). Second, the tea sector consists not only of hundreds of thousands of tea workers who are employed by estates, but also of thousands of smallholder farmers who cultivate tea. Often smallholder farmers with too little land are part-time farmers and work at the same time as tea workers in tea estates. Thus, they mostly live in very similar conditions as tea workers. Together with the Ankers and a team of researchers of the University of Malawi we looked at this in-depth in Malawi and established that the living wage concept can in fact be extended to smallholder farmers (see BRILL and KRAIN, 2017; CHIWAULA et al., 2017a; CHIWAULA et al., 2017b, CHIWAULA, 2018; and KRAIN et al., 2017). This approach was then extended and complemented by calculating living income reference prices for tea smallholder farmers in Rwanda (KRAIN and AFRIKA, 2021).

Since smallholder farmers do not get a wage – they are self-employed – we called it a "Living Income". Despite this difference in nomenclature, the Ankers' methodology can be used for both a living wage and a living income as they emphasize in their seminal book in chapter 1.14: *"[The] measurement of living income and living wage have in common the need to know the cost of a basic but acceptable living standard for a family. Since this cost is the same for all families in a location regardless of employment status, living wage studies based on our methodology can be used by living income studies"* (ANKER and ANKER, 2017).

Around the theme of Living Wage and Living Income, two communities have been formed in recent years, i.e. the Global Living Wage Coalition and the Community of Practice on Living Income. These communities have been instrumental in sharing experience and giving advice in the methodologies of determining living wages and living income.

Based on the Ankers' thinking they defined Living Wage and Living Income[13] as follows:

- A **living wage** is the remuneration received for a standard work week by a worker in a particular place sufficient to afford a decent standard of living.
- A **living income** is the net annual income required for a household in a particular place to afford a decent standard of living for all members of that household.
- Elements of a **decent standard of living** include food, water, housing, education, healthcare, transport, clothing and other essential needs including provision for unexpected events.

(https://www.globallivingwage.org/ and https://www.living-income.com/).

3.3.2.4 A Fair Price

Even if a living income benchmark may sometimes seem high compared to actual income, it merely reflects the minimum threshold for an income to ensure a life in dignity, i.e. a life in accordance with human rights. Anthony Fountain, managing director of the Voice Network and one of the two main authors of several issues of the respected Cocoa Barometer said during the international conference "The Only Way Is Up!" in Rotterdam, Netherlands, on the podium on 5 November 2019 in his key-note address that *"a living income is a sh…"*. He wanted to express that a living income is still a low bar income not yet providing a comfortable life to farmers and he was advocating much higher incomes.

But this now raises the question of how high such an income should be and what the respective price of the commodity should be. We should also bear in mind that, in the end, consumers have to pay for it. An astronomically high price would certainly not be fair to them. So then, what would be a "fair price"?

Ruud Bronkhorst has worked on the concept of a fair price philosophically and practically over a number of years. Recently he published a book with the title "The Economics of Human Rights, Using the Living Income / Fair Price Approach to Combat Poverty" (BRONKHORST, 2020) which is well worth reading. However, the book does not clearly stipulate where such a fair price should be exactly. The author states that such a price would need to be at least as high as a living income, but could be higher depending on negotiations between producers and buyers assuming that both parties would be in a fairly equal negotiation position.

Since Bronkhorst does not offer a concrete methodology for calculating a fair price, we did not take this up for benchmarking in our work in Ghana. We wanted to mention his work, however, because perhaps in the coming years he or other people may come up with a clever way of making this interesting concept operational.

13 Living wage and living income is often translated as "existenzsichernde Löhne und Einkommen" in German. However, the literal translation, i.e. "wages and incomes ensuring existence" does not make the difference clear between survival and a life in dignity or in accordance with human rights. The explanation / definition given by TRANSFAIR 2021 has, however, been helpful: Als existenzsichernd gilt ein Lohn oder Einkommen erst dann, wenn mit dem Geld nicht nur die Kosten für Lebensmittel und Wohnen gedeckt werden können, sondern auch Investitionen in Gesundheit und Bildung sowie Rücklagen für Notsituationen möglich sind (A wage or income only ensures existence, if the income does not only cover the costs for nutrition and housing but also investments in health, education as well as a provision for unexpected events (own translation)).

3.3.2.5 Living Income Reference Price Methods

Since smallholder farmers and other own-account workers do not get a wage, they need a price for the products they produce that is sufficiently high for them to attain a living income and therefore can be called a *living income reference price.* The first organization to come up with a thorough and plausible methodology for a living income reference price was Fairtrade (FAIRTRADE, 2019)[14] working on their Fairtrade Living Income Reference Price Model since about 2018, see Annex 4. GIZ came up with a rather similar approach in 2019 that was described by KRAIN and STEFFENS (2019). This not only develops a method for working out a living income price, but a more general method that allows the setting of prices against any benchmark including, for example, poverty lines. The underlying logic of the two methods is, in principle, the same. The Fairtrade Model departs from a "cost of a decent life" of a farming household and adds the "costs of sustainable production" assuming a viable farming area and divides these by the sustainable yield of the focus crop (the crop for which the price should be set). While the price setting of the methodology developed by KRAIN and STEFFENS (2019) will be explained in detail in chapter 3.3.6.1 it is sufficient to say at this point that the major difference lies not only in the fact that the methodology of KRAIN and STEFFENS (2019) expands the price setting to various benchmarks, it is also – in addition to the focus crop – specific in working out benchmark prices for secondary crops or potentially[15] livestock products. It can also be expanded to include environmental costs and can thus set so called "true prices" (see chapter 3.3.6.2). The Fairtrade method, for example, may[16] subsidize the auto-consumed crops (which are deducted from the cost of a decent life) by means of the focus crop, while this is not the case with the KRAIN and STEFFENS (2019) method. The method by KRAIN and STEFFENS (2019) is therefore more precise in working out a living income reference price. Both methods have their challenges: The GIZ model needs fairly reliable gross margin data and especially labour input data which is notoriously difficult to obtain; the Fairtrade model needs to work out a viable farm size with all household labour to be fully employed which is also difficult to find out. As said, both models are, in principle, sound and time may show which one is more practical and less challenging. There are possibly more methods in use (see e.g. Tony's Chocolonely, https://tonyschocolonely.com/uk/en/our-mission), however, we have not specifically looked at these.

The Living Income Benchmark for Cocoa Smallholder Families in Ghana

As the basis for a living income, we take the recent updated Living Income value for cocoa smallholder families from ANKER and ANKER (2020) which is based on the work by SMITH and SARPONG (2018).

According to ANKER and ANKER (2020), the living income stands at **GHS 1,683 or USD 312 per month** as per **March 2020.** It is set for cocoa-growing regions in Ashanti, the Eastern, Western and Central Regions of Ghana. Since the update merely involved inflation, no changes are reported with respect to household size and labour force. We thus continue to use these figures from the report by SMITH and SARPONG (2018, p. 48 and p. 57 respectively) taking a household size of five persons (two adults and three children) and a full-time equivalent labour force of 1.58 persons and will adjust them to cashew and cocoa smallholder households described in chapter 3.2.

14 Much inspired by our living wage / living income work in tea in Rwanda (CARLA VELDHUYZEN, Fairtrade International, personal communication)
15 Potentially, because we have not yet tested the price setting with produce coming from animal production.
16 "may" because this is only the case if the secondary crop has a price that is also below a living income reference price (which, however, is usually the case)

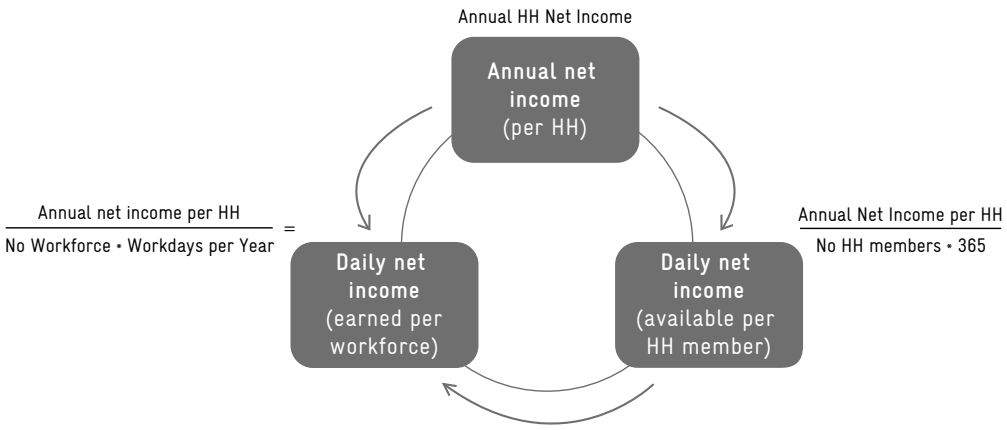
3.3.3 Adjusting and Aligning Benchmarks to Enable Comparisons with One Another and with Actual Incomes

Only major benchmarks, such as the World Bank poverty lines, the national poverty lines of Ghana, a minimum wage and the Living Income have been discussed here. We may also choose additional benchmarks such as e.g. the average of a sector wage. In order to make benchmarks operational and comparable with one another and with actual incomes we need to align and adjust them.

3.3.3.1 The Concept of the Household Triangle

Benchmarks may be set to different points in time, different sizes of households, different types of persons (just an average person or an adult equivalent person), different currencies or other characteristics (available income per person per household, or income to be earned per workforce). Including inflation is therefore an important matter to be taken into consideration. Other important points are the relationship between income earners in a household and dependants and whether we are talking about a daily, weekly, monthly or annual perspective. For the consideration of relationships in smallholder households we have developed the concept of a *household income triangle,* see Graph 17.

Graph 17: The Household Income Triangle



Source: KRAIN and STEFFENS (2019)

Annual household income sits at the top of the triangle. This may be actual income or benchmark income. How much is available e.g. per day and per household member can easily be calculated. We just take the total amount and divide this by the number of persons living in the household and by 365 days of a year and thus arrive at the right-hand corner of the triangle, the income per household member.

We may, however, also make the opposite calculation and start from a benchmark that tells us how much income should be available per person per day, as is the case of the World Bank poverty line. This means we start from the right-hand corner of the triangle, from the available income per household member per day. We take the famous USD PPP 1.90 per day and multiply this with the number of persons of the household and 365 days of a year and arrive at the top of the triangle, the annual household income.

In the case of wages, we may be given a living wage and thus start at the left-hand corner of the triangle with the income per workforce to be earned per work unit (per day, per week or per month). Here we have to multiply the wage – if it is given per month, by twelve months, or if it is given per day by 275 days for our case of Ghana – by the number of full-time equivalent workers of the household and we receive the annual household income thus arriving again at the top of the triangle.

We can also make the calculation the other way round, starting from the top towards the left-hand corner. Once we know the total annual household income, we divide the income by the number of full-time equivalent workers and the number of days worked per worker and find out how much one full-time equivalent worker has earned per work unit, which is the income per workforce earned.

Additionally, we must take into account the fact that the benchmarks we are using have to be adjusted to prices from the month of January 2020, a household size of 6 persons for a cashew smallholder household and 5 persons for a cocoa smallholder households. Since the national poverty lines in Ghana are given per adult equivalent, this is again, another characteristic that has to be factored in.

Thus, there are three types of income/income benchmarks according to our concept that appear in the household triangle and that we use for alignment and adjustment:

- Income per household (per year)
- Income per household member (per day)
- Income to be earned per workforce of the household (per day)

3.3.3.2 Aligning and Adjusting Benchmarks

In order to align and adjust benchmarks for our case we first converted all the benchmarks to GHS as the local currency (see currency conversion rates in Annex 2d) and, secondly, adjusted the values to January 2020 as the middle value of 2019/2020 because our surveys in cashew and cocoa households enquired about household income of 2019/2020. Thus, inflation and deflation had to be taken into account which we calculated on the basis of consumer price index information provided by GSS, Consumer Price Index Newsletter December 2020, June 2019 and January 2017.

The following is the result of benchmark alignments and adjustments.

Table 28: Aligned and Adjusted Benchmarks for Income to Be Earned per Workday, per Household per Year and Income Available per Household Member per Day in Cashew and Cocoa Smallholder Households in Ghana (in GHS)

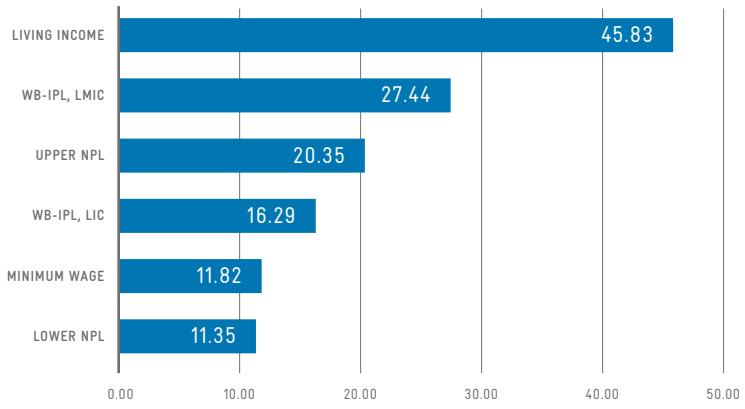
	Benchmarks		Income to be Earned per WD in GHS	Yearly Income, Cashew HH in GHS	Yearly Income, Cocoa HH in GHS	Income Available per HH per Person per Day in GHS
	Column		1	2	3	4
1	WB-IPL, LIC	World Bank, International Poverty Line for Low-Income Countries	16.29	8,387	6,989	3.83
2	WB-IPL, LMIC	World Bank, International Poverty Line for Lower-Middle Income Countries	27.44	14,126	11,771	6.45
3	GH-lNPL	Ghana, Lower National Poverty Line	11.35	5,881	4,838	2.67
4	GH-uNPL	Ghana, Upper National Poverty Line	20.35	10,543	8,673	4.78
5	MW	Minimum Wage	11.82	6,085	5,071	2.78
6	LI	Living Income	45.83	23,592	19,660	10.77

Source: own calculations, more detailed calculations are provided in Annex 3

Before comparing the benchmarks further below a few more words on how the calculations are to be understood, taking the example of the World Bank International Poverty Line for Low-Income Countries which stands at USD PPP 1.90. USD PPP 1.90 is converted to GHS 1.94 per USD PPP 1 for 2019. Considering inflation, this converts to GHS 2.02 for January 2020. USD PPP 1.90 x 2.02 GHS gives GHS 3.83, see Row 1, Column 4 (there might be some slight differences with the figures using a pocket calculator, since the number of decimal places in the computer is higher). Considering 6 and 5 persons per cashew and cocoa household, respectively, we arrive at an annual income benchmark of 6 persons x 365 days per year x 3.83 GHS per person per day = GHS 8,387, and 5 x 365 x 3.83 = GHS 6,989, respectively, see Row 1, Columns 2 and 3. In order to calculate how much needs to be earned per workday, one takes the annual income and divides this by the number of full-time workforce equivalents per household type and the number of workdays per year: 8,387 annual income / 1.87 full-time work equivalent / 275 workdays = 16.29 GHS/workday for cashew households and 6,989 / 1.56 / 275 = 16.29 for cocoa households, see Row 1, Column 1. The same approach is used for the other rows, but the entry point may differ. While for Row 1 our calculations started from Column 4, for a Living Income one starts calculations with the annual income (Column 2 and 3, respectively), for the minimum wage one starts from the income to be earned per day (Column 1). All this is done based on the relationship outlined in Graph 17 above.

Now, let's analyse the benchmarks. To better visualize the category of income to be earned per workday (Column 1), we sorted the figures of Table 28, Column 1, from highest to lowest and put them into the following Graph 18. We are only looking at the figures of Column 1 since they will tell us how much needs to be earned per workday to reach a certain level of income per year for the household (Columns 2 and 3) and also how much is available per household member per day (Column 4). The value of income to be earned per day is analogous to what is also known as a "wage ladder" when comparisons are done with a "living wage".

Graph 18: Benchmarks for Income to be Earned per Workday in GHS ("Wage Ladder")



Source: own calculations

We can see that in order to attain a living income a person working full time, that is for 275 workdays a year and 4-6 hours per workday, would need to earn GHS 45.83 per workday. This is the highest rung of our wage ladder and four times higher than the national minimum wage in Ghana. The lowest rungs are the rungs for lower national poverty line (Lower NPL) and the minimum wage (MW). In fact, they both have rather similar values. It is quite possible that the minimum wage has been constructed on the basis of the food needs basket for one adult (male) equivalent and that they should be the same. Our values may differ slightly because the original value for the lower NPL is back in 2016/17 and has been adjusted by us to January 2020 and there might be some adjustment differences at our end. The upper national poverty line (Upper NPL) is higher than the World Bank poverty line for low-income countries (the latter

often also called extreme international poverty line). For Ghana, the World Bank international poverty line for lower-middle income countries (LMIC), here shown at GHS 27.44 per workday, should be the benchmark for orientation for the poverty level in Ghana (apart from the national poverty lines).

3.3.4 Modelling the Cashew or Cocoa Farm with Respect to Farm Size and Area Dedicated to Focus Crops and Intercrops

In order to model the typical smallholder cashew and cocoa farm, respectively, we rely to a great extent on our own survey data, on focus group discussions we had with farmers in four villages and finally on our own judgement.

As farm sizes we take the medians from Table 12 which are 4 and 3.6 ha for a cashew and cocoa farm, respectively. Unfortunately, we do not have any data on the sub-farm sizes of other crops, nor on livestock. Thus, we need to make certain assumptions. As regards other crops, we at least know which ones are the most important. We can also assume that 80% of the total size of cashew and cocoa farms is cultivated with cashew and cocoa. The remaining 20% we assume for secondary crops. We can also assume that there is a portion of newly planted focus crop, a portion that is still in the juvenile phase, a further portion that is in full production and a final portion that is phasing out of production and needs to be renewed or newly planted. Here we can assume that 15% of the area cultivated with cashew and cocoa is thus available for intercropping because there is enough light, since newly planted or young cashew and cocoa trees leave enough space and sunshine to allow intercropping. For the planting of cocoa, plantain, banana or shade trees are also needed as shade crops, since young cocoa trees need shade to grow well. Thus, our model farms look as follows with respect to farm size and area for focus crops and intercrops, see Table 29.

Table 29: Model Farm and Sub-Farm Size for Focus Crop and Intercrops in Cashew and Cocoa Smallholdings

Area		Cashew SH Farm Model	Cocoa SH Farm Model
Farm Size	ha	4.00	3.60
80% Area of Focus Crop	ha	3.20 (cashew)	2.88 (cocoa)
Area for Intercrops	ha	2.56 (maize and groundnut)	0.72 (plantain and cassava)
Total Virtual Area	ha	5.76	3.60

Source: own source

The farm sizes are 4 and 3.6 ha for cashew and cocoa model farms, respectively. The virtual area to be counted as area that is cultivated may, however, be larger. In our two models, this is the case for cashew farms, since maize and groundnuts can be cropped and harvested twice a year. Therefore the "total virtual area" per year is larger than the farm size. Plantain and cassava, however, can only be harvested once a year. In the case of the cocoa farm model, the virtual area is therefore the same as the farm size.

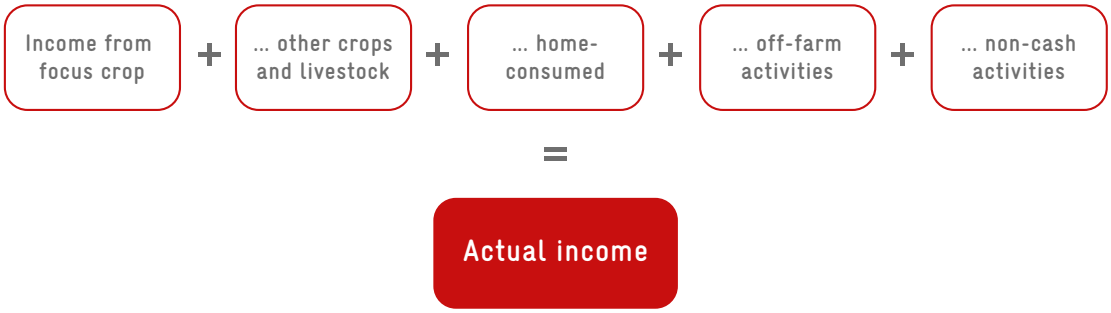
3.3.5 Actual Income of a Model Cashew and Cocoa Smallholder Farm

In this chapter we shall first provide an overview of the important income streams of a smallholder household. Then we shall focus in on the income streams for crop production, specifically the focus crops and key intercrops. These specific income streams are based on gross margin / crop budget tables. Then we shall aggregate the incomes of the gross margin tables in proportion to their cultivated area to arrive at a partial household income. In order to get from a partial to a total household income we shall perform some extrapolation on the basis of still unemployed household labour for which we assume an opportunity to earn additional income as hired agricultural labour.

3.3.5.1 Overview of Income Streams

A smallholder household usually has different income streams. Three major income streams can be differentiated: crop production, livestock husbandry and off-farm income-generating activities, where income is the sale of agricultural produce minus the cost of its production, as well as the value of production minus cost of production of produce consumed by the household. Additionally, remittances from a household member in town or cash transfers for poor households from state organizations may further bolster household income, see Graph 19.

Graph 19: Components of the Actual Income of Smallholder Households



Source: KRAIN and STEFFENS (2019)

To simplify matters we have organized our household income model into income streams from focus crops (cashew and cocoa for cashew and cocoa smallholder households, respectively) and two typical key crops (groundnut, maize and cassava, plantain for cashew and cocoa smallholder households, respectively) and no other income stream. Thus, with respect to the model, we arrive at a partial household income. First, we shall add all the incomes which we were able to calculate from gross margin analysis of our focus crops and key intercrops. For total household income we shall later make extrapolations to provide an idea as to where total household incomes might lie for cashew and cocoa smallholder households.

Gross margin tables are detailed crop budgets which provide input-output data and form the backbone of our calculations to arrive at (partial) household incomes. We use gross margin tables provided by two Farmer Business School (FBS) books, one for cashew (FBS CASHEW, 2020) and the other for cocoa (FBS COCOA, 2015). Both FBS books provide gross margin data per crop, FBS CASHEW (2020) for cashew, maize and groundnut, and FBS COCOA (2015) for cocoa, maize and cassava. We verified the data with our own knowledge from one crop specialist each for cashew and cocoa. Secondly, we conducted focus group discussions with farmers in four different villages, working out crop budgets with the same crops or other crops that are important intercrops. The cashew farmers stuck to maize and groundnut as key intercrops, but cocoa farmers also worked on plantain and banana in addition to maize as an intercrop. Finally, we compared all data and decided which crops and data to take or to modify. We discarded, for example banana, because this was a special case for one village with excellent access to a nearby market, but we kept plantain, because this is indeed

an important intercrop widely grown by cocoa farmers, more so, since cocoa develops very well in the juvenile phase because cocoa trees need shade. Finally, it also turned out that plantain renders very good income. These crop budgets are presented in Table 30 and Table 31.

In addition to working out crop budgets as is done in the FBS booklets, input-output data was included proportionally for the different phases of the life span of the perennial crop: one thirtieth for the planting year (year 1), four thirtieths for the juvenile phase without or with little yield (year 2-5), 20 thirtieths for the full production period (year 6-25) and 5 thirtieths for the declining production period (years 26-30). At year 30, the economic life span of cashew and cocoa ends, although farmers may continue to have some older trees still in the field. The gross margin tables by production phases are provided in Annex 3a to d. Their weighted averages are provided in Table 30, Columns 1 and 2 for cashew and in Table 31, Column 1 and 2 for cocoa.

3.3.5.2 Gross Margin Tables / Crop Budgets

We have worked out two scenarios for gross margins / crop budgets, one scenario called "current production" and a second that illustrates "improved production", see for example Column 1 versus Column 2 in Table 30. This is in line with the Farmer Business School (FBS) approach. The FBS material is used in farmer training to make farmers aware of the potential for more production and income, if better and sustainable farming practices are adopted. While in the FBS material the improved production is often depicted as potential production and tends to be exaggerated for didactical purposes, we tried to orient ourselves more along the lines of what was really possible under the assumption of good (but not best) and sustainable farming practices. The value for "current production" should, in our view, be around a median from a sample of typical cashew or cocoa farmers, while for "improved production" should be around the 75th quantile (this means the yields that start with the 75% best farmer of all (100%) farmers sorted from lowest to highest yield per area unit). Within our focus group discussions, we simply asked farmers to fill in the figures according to "ordinary farmers" and "better performing farmers".

Table 30: Gross Margin Summary Tables / Crop Budgets of Cashew Smallholder Crops per Hectare (ha)

Cashew, Production per ha			Cashew		Gr.Nuts		Maize	
	Column		1	2	3	4	5	6
Row	Item	Unit	CurPr.	Impr.Pr.	CurPr.	Impr.Pr.	CurPr.	Impr.Pr.
1	Input Cost	GHS	420.00	500.42	375.00	562.50	200.00	875.00
2	Service Cost	GHS	0.00	270.83	375.00	500.00	300.00	562.50
3	Labour Input	WD	34.58	66.67	75.00	125.00	62.50	87.50
4	Labour Cost/WD	GHS	16.00	16.00	16.00	16.00	16.00	16.00
5	Labour Cost Subtotal	GHS	553.33	1,066.67	1,200.00	2,000.00	1,000.00	1,400.00
6	Yield	kg	304.38	611.83	1,250.00	2,500.00	1,000.00	2,000.00
7	Price	GHS	4.00	4.00	1.50	1.50	1.20	1.20
8	Turnover	GHS	1,217.50	2,447.33	1,875.00	3,750.00	1,200.00	2,400.00
9	Economic GM	GHS	244.20	609.40	-75.00	687.50	-300.00	-437.50
10	Financial GM	GHS	797.50	1,676.10	1,125.00	2,687.50	700.00	962.5
11	Fin. GM/WD	GHS	23.06	25.14	15.00	21.50	11.20	11.00

Source: own source

The table above shows the subtotals by category from the gross margin calculations. The detailed operations with respect to quantity and cost of inputs and outputs are listed in the original tables. Now we shall explain, category by category, what they represent in the case of cashew farmers.

All figures in the table are per ha, although field and farm sizes may differ very much from case to case. In our meetings with farmers, we discussed operations, inputs and outputs per acre as the unit for area because farmers are not familiar with the ha unit. Likewise, farmers often do not use kg, but "bag" or other units. Thus, figures for the above and following tables were converted into conventional national and international units. The figures for perennial crops (cashew and cocoa) or semi-perennials (e.g. plantain) are on an annual basis, figures for seasonal crops (e.g. groundnuts and maize) show the value for half a year.

Input Costs (Row 1)
Input costs comprise costs for seed, fertilizer, pesticides and other inputs that farmers need for the cultivation of a crop.

Service Costs (Row 2)
Service costs comprise services that farmers usually buy for certain operations during the cultivation of a crop. In our case this could be a chainsaw service for pruning cashew trees or a tractor hiring service for ploughing, or a service for lining and pegging to plant cocoa trees offered by technicians of COCOBOD or the Ministry of Agriculture.

Labour Input and Labour Costs (Rows 3-5)
Row 3 indicates how much labour is utilized for the cultivation of a crop in workdays, one workday usually lasting four hours from 8.00 to 12.00. Such labour can be own household labour or hired labour. Row 4 indicates the cost per workday for hired labour. This is the prevailing hired labour rate in the respective area. In our case the hired labour rate was GHS 16 per workday for the northern sector and GHS 30 for the southern sector. Row 5 is a multiplication of the value of Row 3 and Row 4, although not all labour needed will be hired in. In fact, most labour in smallholder farming will be done by smallholder household members themselves and these are not paid. Nevertheless, one can cost their labour input at prevailing hired labour rates, which we did.

Yield and Turnover (Rows 6-8)
Row 6 tells us the yield in kg per ha. Row 7 shows the farm gate price which the farmer receives for the produce. Multiplying the figures in Row 6 and Row 7 gives us the turnover in Row 8. We prefer the term "turnover" in order not to confuse it with income. However, we could also call it "gross income" – gross, because in order to get a (net) income one still has to deduct the cost of production.

The Success Parameters of Production (Row 9-11)
Yield or turnover might appear impressive, but one still has to factor in costs and effort in order to judge if the effort of cultivating the crop was successful (making a profit) or not (making a loss). Here we look especially at three parameters.

Economic Gross Margin (Row 9)
Here we deduct all costs from the turnover, thus the result is the value in Row 8 – (minus) the values in Rows 1, 2 and 5.

One can see that, in this case, all labour is counted as if it were hired labour. Here the farmer is a mere entrepreneur who employs all labour needed for the cultivation of a crop. One can also refer to this as "enterprise (net) income".

Financial Gross Margin (Row 10)

We deduct only two cost categories from the turnover, i.e. Row 8 – (minus) the values in Rows 1 and 2. Here, we assume that all work/labour is performed by the household. It is a zero-game because if the farmer paid for his or her own labour, he/she would at the same time receive the money as an income. The financial gross margin in fact represents the (net) income of a household which is fully working with the labour from its own household members. This is a highly realistic scenario, especially for those households with little and very little land. Instead of employing somebody they would do the job themselves.

Financial Gross Margin per Workday (Row 11)

This is a very important figure for our purposes. It shows us how much a farmer earns per workday. It is similar to a wage. Since a wage is, strictly speaking, remuneration of somebody who is employed by somebody else, we only call it a "wage" in parenthesis, since farmers are self-employed and strictly speaking entrepreneurs. This figure is also so important because it is our "bridge" to a living wage and living income. Row 11 is calculated by taking the financial gross margin (Row 11) and dividing this figure by the number of workdays (Row 3). Here the rule of thumb is that the (net) income per workday, the "wage", should be higher than what must be paid to a hired labourer. If the wage for a hired labourer is higher than what one would earn on one's own farm, it would be better to work as a hired labourer (and vice versa).

Interpretation of Table 30 Data

We note that the yields of all crops increase substantially if an improved production system is used. However, this also means substantially more input, service and labour costs. The net household income (Row 10) appears highest for groundnuts, but groundnuts also have the highest labour requirement (Row 3). The (net) labour income per workday, or the "wage" per day, is highest for cashew, a little higher for improved cashew (GHS 25.14 per WD) than at GHS 23.06 for current cashew production. This is well above the prevailing hired labour rate of GHS 16/WD (Row 4), above the World Bank poverty line wage for low-income countries of GHS 16.29/WD and above the upper Ghanaian poverty line of GHS 20.35/WD. Maize provides the lowest "wage" at GHS 11.20 and 11.00/WD for current and improved production (Row 11, Columns 5 and 6). This "wage" is critical because it is even slightly lower than the Ghanaian minimum wage of GHS 11.82/WD, or the lower Ghanaian poverty line wage of GHS 11.35/WD and far away from a living income "wage" of GHS 45.83/WD. We may conclude that maize is performing miserably, groundnuts perform the best, especially with respect to creating household income, and cashew is best with respect to the "wage" provided per workday.

Table 31: Gross Margin Summary Tables / Crop Budgets of Cocoa Smallholder Crops per Hectare (ha)

Cocoa Production per ha			Cocoa		Cassava		Plantain	
	Column		1	2	3	4	5	6
Row	Item	Unit	CurPr.	Impr.Pr.	CurPr.	Impr.Pr.	CurPr.	Impr.Pr.
1	Input Cost	GHS	562.67	1,287.83	200.00	800.00	1,000.00	1,325.00
2	Service Cost	GHS	137.50	95.83	0.00	0.00	600.00	1,250.00
3	Labour Input	WD	110.06	142.83	75.00	87.50	75.00	100.00
4	Labour Cost/WD	GHS	30.00	30.00	30.00	30.00	30.00	30.00
5	Labour Cost Subtotal	GHS	3,301.88	4,285.00	2,250.00	2,625.00	2,250.00	3,000.00
6	Yield	kg/pc	457.83	756.67	5,500.00	10,000.00	375.00	625.00
7	Price	GHS	10.00	10.00	0.25	0.25	15.00	15.00
8	Turnover	GHS	4,578.33	7,566.67	1,375.00	2,500.00	5,625.00	9,375.00
9	Economic GM	GHS	576.30	1,898.00	-1,075.00	-925.00	1,775.00	3,800.00
10	Financial GM	GHS	3,878.20	6,183.00	1,175.00	1,700.00	4,025.00	6,800.00
11	Fin. GM/WD	GHS	35.24	43.29	15.67	19.43	53.67	68.00

Source: own source
Remark: pc = per bunch (only for plantain, weight not known)

Table 31 shows us the input-output figures for cocoa smallholder households. If we compare the figures of Table 31 with Table 30, we can immediately see that figures are generally higher in the cocoa smallholder farmer households of the southern sector compared to the cashew smallholders of the northern sector. For example, at GHS 30/WD the wage for hired labour is nearly double that in the northern sector of GHS 16/WD. Also, in this case, yields, turnover and also incomes (Row 9 and 11) are quite good. Likewise, with respect to the "wage", i.e. the income earned per workday (Row 11), a higher level is noted. At GHS 35.24 and 43.29/WD for current and improved production, cocoa exceeds all benchmarks except for a living income "wage", which is slightly higher at GHS 45.83/WD. For both cases, current and improved production, plantain also exceeds the living income "wage" at GHS 53.67 and 68.00/WD. Looking at all three crops one notes that plantain performs best, followed by cocoa and relatively poor is cassava. The remuneration for cassava per workday is, at GHS 15.67/WD and 19.43/WD for current and improved production (Row 11, Columns 3 and 4), respectively, even lower than what has to be paid for hired labour in that zone (GHS 30/WD), but still above the Ghanaian minimum wage.

3.3.5.3 Aggregating Incomes

Gross margin data is usually per unit area. However, farms have different sizes and the different crops may have different sub-farm sizes. In order to work out incomes, we therefore connect the data on farm and sub-farm size of Table 29 with the income data of Table 30 and Table 31 (we shall give an example), obtaining the results indicated in Table 32.

Table 32: Aggregation of Crop Incomes in Cashew and Cocoa Smallholder Households

	Cashew Smallholder Households				Cocoa Smallholder Households		
	(Net) Income from Crop Production	Unit	Cur.Prod.	Impr.Prod.	(Net) Income from Crop Production	Cur.Prod.	Impr.Prod.
Row	/Column		1	2		3	4
	Crop Incomes				Crop Incomes		
1	FinGM, Cashew	GHS	2,552.00	5,363.47	FinGM, Cocoa	11,169.12	17,807.04
2	FinGM, Ground Nuts	GHS	1,440.00	3,440.00	FinGM, Cassava	423.00	612.00
3	FinGM, Maize	GHS	896.00	2,464.00	FinGM, Plantain	1,449.00	2,448.00
4	**FinGM, Subtotal**	**GHS**	**4,888.00**	**11,267.47**	**FinGM, Subtotal**	**13,041.12**	**20,867.04**

Source: own source

When multiplying the area of our typical farm (Table 29) by the incomes (financial gross margins) in our gross margin tables (Table 30 and Table 31) we get the incomes from crops. For example, calculating the income for current production for cashew, we multiply 80% of the farm area of 4 ha that is cultivated with cashew, which is 3.2 ha, see Table 29, by the financial gross margin of Table 30, Row 10, Column 1, thus 3.2 ha * GHS 797.5 = GHS 2,552.0. For maize and groundnut, it is more complicated because these crops are grown as intercrops, each intercrop having half a share, which consists of the remaining 20% of the total farm area, giving 0.8 ha * 2 seasons = 1.6 ha, and 15% of the area under cashew that is grown with young cashew allowing intercropping, also during two seasons, thus providing an intercropping area of 0.15 * 3.2 = 0.48 ha per season. For two seasons in a year, we obtain 0.96 ha. Thus, the overall virtual intercropping area is 2.56, half of it for groundnut, the other half for maize. Thus, for groundnut, current production, we get 2.56 * 0.5 * 1,125 = GHS 1,440 and for maize, current production, 2.56 * 0.5 * 700 = GHS 896. It is less complicated for cassava and plantain because there we do not have to take two seasons into account.

We can see that although the virtual area of the typical cashew farm at 5.28 ha is much bigger than that for the typical cocoa farm at 3.6 ha, see Table 29, the income from crop production is much higher for cocoa smallholder households, for the case of current production more than double (GHS 4,888 against 13,041) and nearly double for improved production (GHS 11,267 against 20,867). This is most likely due to the better climate, especially higher rainfall, that allows cocoa and plantain cultivation, providing higher incomes than e.g. cashew and groundnut with maize.

3.3.5.4 Assessing Labour Requirements and the Average Weighted Labour "Wage"

Table 33: Labour Requirement for Crop Production by Cashew and Cocoa Smallholder Households

	Cashew Smallholder Households				Cocoa Smallholder Households		
	Labour Requirement and Labour Income ("Wage")	Unit	Cur.Prod.	Impr. Prod.	Labour Requirement and Labour Income ("Wage")	Cur.Prod.	Impr. Prod.
	Work Requirement (WR)		**1**	**2**		**3**	**4**
1	WR, Cashew	WD	110.67	213.33	WR, Cocoa	316.98	411.36
2	WR, Groundnut	WD	96.00	160.00	WR, Cassava	27.00	31.50
3	WR, Maize	WD	80.00	112.00	WR, Plantain	27.00	36.00
4	**WR, Subtotal**	**WD**	**286.67**	**485.33**	**WR, Subtotal**	**370.98**	**478.86**
	Labour Income & Employment				**Labour Income & Employment**		
5	Weighted avg. Labour Income/WD	GHS/WD	17.54	21.09	Weighted avg. Labour Income/WD	35.15	43.58
6	Workforce Available	WD	514.80	514.80	Workforce Available	429.00	429.00
7	**HH Labour Employment Rate**	**%**	**55.69**	**94.28**	**HH Labour Employment Rate**	**86.48**	**111.62**

Source: own source

To calculate how much labour is needed, the approach is similar to the previous tables. We multiply the area under a certain crop of Table 29 by the labour requirement in Row 3 of Table 30 and Table 31. The results are indicated in Table 33 above. We can see that cocoa is a crop requiring a lot of labour, much more than for other crops including in cashew smallholder farms. The total labour requirement, see Row 4, is much lower in cashew compared to cocoa smallholder farms, although the latter have a smaller farm size.

When comparing the required labour, see Row 4, with the available labour, see Row 6, we can see that in the case of cashew smallholder households, see Row 7, only 55.69% and 94.28% are utilized against 86.48 and 111.62% for cocoa households for current and improved production, respectively. 111.62% means that more labour is required than available in the household, thus the difference to 100% has to be covered by hired labour. This also demonstrates to us how high the labour employment capacity is, if we move from current to improved production.

It should also be noted, see Row 5, that remuneration of labour, the weighted average labour income ("wage") per workday is, at GHS 17.54 and 21.09/WD, also much lower in cashew smallholder households than in cocoa households, at GHS 35.15 and 43.5/WD for current and improved production, respectively. However, in both "wage" cases they are above the prevailing hired labour rates in the areas, GHS 16/WD for the northern sector and GHS 30/WD for the southern sector.

Here too we can compare the weighted average "wage", Row 5 with the "wage" benchmarks, noting that the average weighted "wage" for cashew smallholder households is near the GHS 16.29/WD of the World Bank poverty "wage" line for low-income countries, but less than the World Bank poverty "wage" line for lower-middle income countries (the category into which Ghana falls), which stands at GHS 27.44/WD and the Ghana upper national poverty "wage" line at GHS 20.35/WD. The reason for this is most likely the very low "wage" for growing maize, which pulls the average weighted wage down. The picture is much better, however, for cocoa smallholder households, who for the case of improved production achieve a weighted average wage of GHS 43.5/WD, see Row 5, Column 4 which is near to a living income "wage" of GHS 45.83/WD.

3.3.5.5 Estimating a Total Household Income

So far, we have looked at partial income by aggregating the (net) income derived from focus and other key crops in crop production. To get an idea of what total household income might be we perform an extrapolation and want to compare this with a living income and other benchmarks, see the following Table 34.

Table 34: Total Household Income of Cashew and Cocoa Smallholder Households

Total (Extrapolated) Household Income		Unit	Cashew Smallholder Households		Cocoa Smallholder Households	
	Production System		Cur.Prod.	Impr.Prod.	Cur.Prod.	Impr.Prod.
	Income Adjusted to Available HH Labour Force		1	2	3	4
1	FinGM, Crops, Subtotal	GHS	**4,888.00**	**11,267.47**	**13,041.12**	**20,867.04**
2	Surplus Labour	WD	228.13	29.47	58.02	-49.86
3	Labour Rate, Northern Sector / WD	GHS	16.00	16.00	30.00	30.00
4	Opportunity income	GHS	3,650.13	471.47	1,740.60	-1,495.80
5	**Total (extrapolated) Income**	**GHS**	**8,538.13**	**11,738.93**	**14,781.72**	**19,371.24**

Source: own source

In Row 1 of Table 34 we have indicated the (net) annual income derived from the production of focus and key crops. To get an idea of likely total household income, we have worked out the number of workdays that are still left as surplus labour at household level, but which cannot be employed anymore in crop production because all the land is cultivated with the focus and key crops. Available labour may still be productively used e.g. in livestock production that is less land dependent. A simple assumption is also that surplus labour can be employed in the neighbourhood as hired labour. This appears the best assumption, especially since there is a shortage of labour in many parts of Ghana. We thus calculated the number of workdays still available (Row 2) at the prevailing hired labour rates of the respective areas, see Row 3, i.e. at GHS 16/WD for the northern sector and GHS 30/WD for the southern sector. Especially in the "current production" system there is still quite some labour available. There is only one exception: In cocoa cultivation, improved production, there is a labour deficit, in other words more labour is needed than is available. We thus deducted the relevant value which is needed anyhow to perform work on the focus and key crops. This reduces the overall total income, see Row 5. What we estimate as the total household income is therefore shown in Row 5.

3.3.5.6 Comparing the Annual Income to a Living Income and Other Benchmarks

Table 35: The "Income Ladder": Total Annual Household Income Compared to Benchmarks and Gap Against a Living Income in Cashew and Cocoa Smallholder Households

Total Household Income Compared to Benchmarks and Gap Against a Living Income		Unit	Cashew Smallholder Households		Cocoa Smallholder Households	
	Production System		Cur.Prod.	Impr.Prod.	Cur.Prod.	Impr.Prod.
Row	Column		1	2	3	4
	Annual Income Benchmarks					
1	Living Income	GHS	23,591.79	23,591.79	19,659.82	19,659.82
2	World Bank LMIC Poverty Line	GHS	14,125.75	14,125.75	11,771.45	11,771.45
3	Upper GH Poverty Line	GHS	10,543.27	10,543.27	8,672.94	8,672.94
4	World Bank LIC Poverty Line	GHS	8,387.16	8,387.16	6,989.30	6,989.30
5	GH Minimum Wage	GHS	6,084.94	6,084.94	5,070.78	5,070.78
6	Lower GH Poverty Line	GHS	5,881.19	5,881.19	4,837.89	4,837.89
7	Total (exptrapolated) Actual Annual Income	GHS	8,538.13	11,738.93	14,781.72	19,371.24
8	Gap Against a Living Income	%	63.81	50.24	24.81	1.47

Source: own source

The total household income (Row 7) is compared with the respective benchmarks for an annual household income as were detailed in Table 28 and are indicated here in Rows 1 to 6.

We can see that at current production levels the cashew smallholder households with an annual total income of **GHS 8,539** (Row 7, Column 1) just surpass the World Bank poverty line for Low-Income Countries of **GHS 8,387**, (Row 4, Column 1) and with an annual total income of **GHS 11,739** (Row 7, Column 2) at improved production levels surpass the Upper Ghana poverty line of **GHS 10,543** (Row 3, Column 2).

Cocoa smallholder incomes look much better. Their target income is also smaller because they have fewer household members. With an annual income at current production levels of **GHS 14,782** (Row 7, Column 3) they well surpass the World Bank poverty line for lower-middle income countries of **GHS 11,772** (Row 2, Column 3). Smallholder households which manage to reach improved production levels even attain an income of **GHS 19,371** (Row 7, Column 4) and easily surpass the World Bank poverty line for lower-middle income countries of **GHS 11,772** (Row 2, Column 4) and are very close to a Living Income of **GHS 19,660** (Row 1, Column 4).

Row 8 shows the gap between a living income and the total income in %. The gap is calculated as follows: We take the example of cashew smallholder income at current production, which is GHS 23,591.79 – GHS 8,539.13 = GHS 15.053.66. This is then divided by the benchmark and multiplied by 100: GHS 15.053.66 / 23.591.79 * 100 = 63.81%. If of interest, one can similarly do the calculation against all other benchmarks.

We can see that the annual living income gap is largest for cashew smallholder households with current production practices and lowest for cocoa smallholder households with improved production practices, where the gap is just 1.47% to a living income.

3.3.6 Living Income (and Other Benchmarks) Reference Prices for Cashew, Cocoa and Key Crops

In this chapter, we first describe how prices referenced against benchmarks are calculated, then explain that the same formula can be extended to become a formula that calculates a "true price" and finally we present the results of our benchmark reference price calculations using the reference price formula on the basis of our gross margin and model data.

3.3.6.1 Calculating Reference Prices, the "Linnert-Steffens-Formula"

The reference price formula[17], see Formula 1, determines a price of a commodity when a certain income per work input is set. We usually call the income per work input a "wage" for wage earners. For own-account workers like farmers we refer to income to be earned or "wage" in parenthesis. With the reference price formula we calculate the price of a commodity using a desired "wage" benchmark (BMw). From the gross margin calculations we can now take the major figures, but use the BMw instead of the wage rate calculated for labour (usually the hired labour rate).

Formula 1: The Living Income (and Other Benchmarks) Reference Price Formula (the "Linnert Steffens" Formula)

$$BM_{rp} = \frac{(\frac{BM_w}{WD} * NoWDs) + CP}{Y}$$

Source: modified after KRAIN and STEFFENS (2019)

where:

Variable	Represents
BM_{rp}	A living income (or other benchmark) reference price in monetary value (e.g. a currency unit) for a particular crop per usual weight or volume unit (e.g. per kg, ton or litre) per unit area of production (e.g. per ha)
$\frac{BM_w}{WD}$	A benchmark "wage" per workday e.g. in GHS
$NoWDs$	Number of workdays needed to produce a certain yield per unit area.
CP	Cost of production (input and service cost, but no labour cost) per unit area e.g. in GHS
Y	Yield of the crop per unit area for which the benchmark reference price is calculated e.g. in kg.

So, we multiply the desired "wage", for example one of the benchmarks which we have established, by the amount of workdays that are needed to produce a particular crop and which we know from our gross margin tables, and deduct the input and service costs for producing the crop, again data which we find in our gross margin tables, and divide the result by the yield that is produced per area unit, again this figure is taken from our gross margin table.

17 The reference price formula which can be used to elegantly calculate a price corresponding to a benchmark is quite a recent innovation. The formula was worked out by Linnert Steffens who has a strong mathematical background. He developed the formula in 2019 working as an intern with Eberhard Krain. Until then, Krain had used a different way, the "goal-seek function" provided in MS Excel which gives exactly the same result, however, less elegantly. Krain had used the goal-seek function since 2016 when working on reference prices for tea smallholders in Malawi. Apart from Malawi the formula was also successfully used by KRAIN in Madagascar on vanilla and rice and by KRAIN and AFRIKA (2021) on tea, Irish potato, peas and maize in their work with tea smallholder farmers in Rwanda.

We shall now give a concrete example. We want to calculate the Living Income Reference Price for cashew, current production, so we need the following figures:

- the Living Income "wage" benchmark, $\mathbf{BM_w}$, from Table 28, Row 6, Column 1: **GHS 45.83**/WD
- the number of workdays to produce cashew per ha, ***NoWDs***, from Table 30, Row 3, Column 1: **34.58** workdays
- the cost of production (input and services), **CP**, from Table 30, the sum of Row 1, Column 1 and Row 2, Column 1: 420 + 0 = GHS **420**
- the yield, **Y**, from Table 30, Row 6, Column 1: **304.38** kg

The formula now looks as follows:

Formula 2: Calculating a Living Income Reference Price for Cashew, Current Production

$$BM_{rp} = \frac{(45.83 * 34.58) + 420}{304.38} = GHS\ 6.58\ /kg$$

Source: own source

The result is GHS 6.58 per kg. This is almost the same value as indicated in Table 36, Row 2, Column 8, where the value GHS 6.59 is shown. The slight difference is due to the fact that the computer performs calculations to more decimal places than the pocket calculator.

3.3.6.2 Extending the Reference Price Formula to a True Price Formula

Advocates of a "true price" would rightly also like to incorporate environmental and biodiversity costs (externalities) into the price of a commodity. This can, in principle, be done with the same formula which was already pointed out by KRAIN and STEFFENS (2019). It would then read as follows:

$$BM_{tp} = \frac{\left(\frac{BM_w}{WD} * NoWDs\right) + (CP_d + CP_e)}{Y}$$

Source: modified after KRAIN and STEFFENS (2019)

where in addition to Formula 1:

Variable	Represents
$\boldsymbol{BM_{tp}}$	Benchmark True Reference Price
$\boldsymbol{CP_d}$	Direct cost of production (input and service cost) e.g. in GHS
$\boldsymbol{CP_e}$	External cost of production (e.g. loss of biodiversity, CO_2 emissions) calculated e.g. GHS per kg produce.

Conceivable environmental costs, for example, a price on the CO_2 emissions caused by the cultivation of a crop (e.g. for ammonium fertilizer which is known to cause some emissions) per kg of produce could be put into the formula to then work out a price that includes not only the income benchmark for farmers but on top of that the environmental costs of production. This would then provide a "true price" of the commodity. The price part caused by the externality costs – to be paid by the consumers – would then not be channelled to farmers who caused the emissions but to environmental programmes and incentive mechanisms that compensate for the effect of emissions.

Here, the problem is to estimate the externality costs, which is an operational problem.

3.3.6.3 Living Income (and Other) Reference Prices for Cashew, Cocoa and Key Crops

Applying the benchmark reference price formula to all "wage" benchmarks listed in Table 28 and to all six crops at the two production levels gives us 6 * 12 =72 benchmark reference prices, see Table 36.

Table 36: Living Income (and Other Benchmark) Reference Prices for Cashew, Cocoa and Key Crops (in GHS)

				"Wage" Benchmarks					
	All Values in GHS	Actual price per kg	Actual "wage"	GH-l-PL	GH-MW	WB-l-IPL	GH-u-PL	WB-lm-IPL	Living Income
Row	Column	1	2	3	4	5	6	7	8
1	Benchmark income to be earned per workday ("wage")			11.35	11.82	16.29	20.35	27.44	45.83
	Prices			Reference Prices					
	Cashew SHF, Current Production Level								
2	Cashew	4.00	23.06	2.67	2.72	3.23	3.69	4.50	6.59
3	Groundnuts	1.50	15.00	1.28	1.31	1.58	1.82	2.25	3.35
4	Maize	1.20	11.00	1.21	1.24	1.52	1.77	2.21	3.36
	Cashew SHF, Impr. Production Level								
5	Cashew	4.00	25.14	2.50	2.55	3.04	3.48	4.25	6.25
6	Groundnuts	1.50	21.50	0.99	1.02	1.24	1.44	1.80	2.72
7	Maize	1.20	11.00	1.22	1.24	1.43	1.61	1.92	2.72
	Cocoa SHF, Current Production Level								
8	Cocoa	10.00	35.24	4.26	4.37	5.45	6.42	8.13	12.55
9	Cassava	0.25	15.67	0.19	0.20	0.26	0.31	0.41	0.66
10	Plantain	15.00	53.67	6.54	6.63	7.53	8.34	9.75	13.43
	Cocoa SHF, Impr. Production Level								
11	Cocoa	10.00	43.29	3.97	4.06	4.90	5.67	7.01	10.48
12	Cassava	0.25	19.43	0.18	0.18	0.22	0.26	0.32	0.48
13	Plantain	15.00	68.00	5.94	6.01	6.73	7.38	8.51	11.45

Source: own source

What can we see in Table 36?

In Column 1, we can see the actual farm gate prices farmers receive for their crops. These are also shown in Table 30, Row 7, for cashew, groundnut and maize, and in Table 31, Row 7 for cocoa, cassava and plantain. These prices serve as a comparison to the calculated benchmark reference prices. In Column 2 of table above we can see the income earned ("wage") per workday which is also shown in Table 30 and Table 31, Row 11. Row 1 of the table above and Columns 3 to 8 present the "wage" benchmarks. Then, from Rows 2 to 13 and Columns 3 to 8 the calculated benchmark reference prices are indicated, the darker ochre and darker brown cells (generally to the right of the table) showing values where the respective reference price is higher than the actual price.

Let's take an example: The current price for cocoa, current production, is GHS 10, see Row 8, Column 1. This is higher than the benchmark reference price calculated for the World Bank Poverty Line "wage" for lower-middle income countries (Row 8, Column 7), but the living income reference price (Row 8, Column 8) is not reached by the actual price. We can see that cashew, maize and cassava are some way away from a living income reference price, groundnut is not too bad, cocoa is not far off and finally plantain even exceeds the living income benchmark.

We can also see that the benchmark reference prices are all lower in the improved production scenario, which shows that improved production creates higher incomes and makes it less necessary for prices to be lifted to higher levels. We shall make this point clear taking the example of cocoa. The actual farm gate price for cocoa per kg is GHS 10 (Row 8 and 11, Column 1). The Living Income Reference Prices for cocoa are GHS 12.55 at current production (Row 8, Column 8) and GHS 10.48 (Row 11, Column 8) at improved production levels. This stresses the importance of measures to enhance production improvements.

It must also be noted that a living income or the income in accordance with other benchmarks is only reached under the assumption that the whole labour force of the household is employed in the farm. If the farmland is too small and labour left unemployed and if there are no other alternatives for work, then a benchmark income calculated per year will not be achieved even if the "wage" earned per workday is equal to the respective "wage" benchmark.

3.3.7 The Gap: Living Income (and Other Benchmark) Differentials ((L)ID)

The discussion on Living Income Price Differentials came up in Côte d'Ivoire and Ghana in 2019 after living income studies were conducted in 2018 and a living income for a typical cocoa household was determined (SMITH and SARPONG, 2018). In this context it became clear that the actual price for cocoa did not match up to a living income. Since then, the authorities have been trying to realize an additional payment of USD 400 per ton of cocoa on top of the market price from cocoa-buying companies to make up for this difference (see e.g. REUTERS, 2020; COCOA BAROMETER 2020).

In this chapter we shall first explain our understanding of a Living Income (and other benchmark) Price Differentials. Then we shall present the results from our price differential calculations in nominal and percentage values. Finally, we shall present our calculations of Living Income Differentials for cashew and cocoa for current and improved production per kg and per ton in GHS and US$.

3.3.7.1 Our Understanding of Living Income (and Other Benchmark) Price Differentials

It is a rather simple matter: The price differential is calculated taking the Living Income (and Other Benchmark) Reference Prices and subtracting the actual price for the same quantity of an agricultural product.

The formula is as follows:

Formula 3: Nominal Price Differential Formula

$$PD\ (nominal) = BM_{rp} - AP$$

Source: own source

where:

Variable	Represents
PD (nominal)	The price differential in a currency, e.g. GHS.
BM_{rp}	A living income (or other benchmark) reference price in a currency, e.g. GHS.
AP	The actual price (farm gate price) in a currency, e.g. GHS.

As an example we can take a price from Table 36, namely the living income price of cocoa, current production, which is GHS 12.55, (Table 36, Row 8, Column 8) and subtract the actual farm gate price of GHS 10 (Table 36, Row 8, Column 1).

Formula 4: Example of Applying the Nominal Price Differential Formula

$$Price\ Differential\ per\ kg, nominal, (PD) = 12.55 - 10 = GHS\ 2.55$$

Source: own source

This result of GHS 2.55 is also shown in Table 37, Row 8 and Column 8.

We can now look at the benchmark to actual price gap in relative, i.e. in percentage terms. The formula for this exercise is as follows:

Formula 5: Relative Price Differential Formula

$$PD\ (\%) = \frac{(BM_{rp} - AP) * 100}{BM_{rp}}$$

Source: own source

where:

Variable	Represents
$\boldsymbol{PD\ (\%)}$	The price differential in percent (%)
$\boldsymbol{BM_{rp}}$	A living income (or other benchmark) reference price in a currency, e.g. GHS.
$\boldsymbol{AP}$	The actual price (farm gate price) in a currency, e.g. GHS.

Here too we can provide an example. We take the same price figures from Table 36, namely the living income price of cocoa, current production, which is GHS 12.55, (Table 36, Row 8, Column 8) and the actual farm gate price of GHS 10 (Table 36, Row 5, Column 8) and insert them into the formula:

Formula 6: Example of Applying the Formula for a Relative Price Differential

$$PD\ (\%) = \frac{(12.55 - 10) * 100}{12.55} = 20.32\%$$

Source: own source

The result is 20.32% which means that in order to close the gap the price has to be increased by 20.32% in relation to the benchmark price set at 100% (12.55 * 0.2032 = 2.55, which is the difference between the reference and actual price).

This result is also shown in Table 38, Row 8, Column 8. There, the result is 20.29% which is slightly different because of the computer performs calculations to a higher number of decimal places.

3.3.7.2 Price Differentials of Crops and Scenarios

The following Table 37 shows all nominal benchmark price differentials which we have calculated for six crops and two different production levels and six different benchmarks, thus giving us 6 * 12 = 72 nominal price differentials.

Table 37: Living Income and Other Benchmark Price Differentials in Nominal Values (GHS)

		"Wage" Benchmarks					
	All Values in GHS	GH-l-PL	GH-MW	WB-l-IPL	GH-u-PL	WB-lm-IPL	Living Income
Row	Column	1	2	3	4	5	6
	Prices	Nominal Benchmark Price Differentials in %					
2	Cashew	-1.33	-1.28	-0.77	-0.31	0.50	2.59
3	Groundnuts	-0.22	-0.19	0.08	0.32	0.75	1.85
4	Maize	0.01	0.04	0.32	0.57	1.01	2.16
	Cashew SHF, Impr. Production Level						
5	Cashew	-1.50	-1.45	-0.96	-0.52	0.25	2.25
6	Groundnuts	-0.51	-0.48	-0.26	-0.06	0.30	1.22
7	Maize	0.02	0.04	0.23	0.41	0.72	1.52
	Cocoa SHF, Current Production Level						
8	Cocoa	-5.74	-5.63	-4.55	-3.58	-1.87	2.55
9	Cassava	-0.06	-0.05	0.01	0.06	0.16	0.41
10	Plantain	-8.46	-8.37	-7.47	-6.66	-5.25	-1.57
	Cocoa SHF, Impr. Production Level						
11	Cocoa	-6.03	-5.94	-5.10	-4.33	-2.99	0.48
12	Cassava	-0.07	-0.07	-0.03	0.01	0.07	0.23
13	Plantain	-9.06	-8.99	-8.27	-7.62	-6.49	-3.55

Source: own source

Where differentials are negative, this is because the actual price is higher than the benchmark. These are also the cells in lighter ochre or lighter brown. The differentials where the benchmark prices are higher than the actual prices are in the darker ochre or darker brown cells. The picture is, of course, similar to Table 36, where the reference prices were calculated, and which is the basis for calculating the figures of Table 37. We can see that, in general, the price differentials for the same crops are smaller for improved production compared to current production.

Table 38 below shows the relative benchmark price differentials for all our crops at the two production levels: current and improved production, again in 72 scenarios.

Table 38: Relative Living Income and Other Benchmark Price Differentials (in %)

		"Wage" Benchmarks					
	All Values in GHS	GH-l-PL	GH-MW	WB-l-IPL	GH-u-PL	WB-lm-IPL	Living Income
Row	Column	1	2	3	4	5	6
	Prices	Relative Benchmark Price Differentials in %					
2	Cashew	-49.84	-46.90	-23.80	-8.35	11.06	39.27
3	Groundnuts	-17.09	-14.57	4.91	17.62	33.23	55.22
4	Maize	0.78	3.13	20.96	32.27	45.82	64.33
	Cashew SHF, Impr. Production Level						
5	Cashew	-60.17	-56.96	-31.76	-15.02	5.89	36.04
6	Groundnuts	-51.13	-47.64	-21.01	-3.99	16.53	44.78
7	Maize	1.26	2.90	16.17	25.42	37.47	55.94
	Cocoa SHF, Current Production Level						
8	Cocoa	-134.85	-128.79	-83.62	-55.74	-23.07	20.29
9	Cassava	-30.79	-26.55	3.30	20.34	39.10	62.19
10	Plantain	-129.47	-126.22	-99.33	-79.93	-53.77	-11.67
	Cocoa SHF, Impr. Production Level						
11	Cocoa	-151.81	-146.31	-103.91	-76.37	-42.69	4.57
12	Cassava	-39.42	-36.30	-12.33	3.12	21.90	48.02
13	Plantain	-152.69	-149.53	-122.99	-103.37	-76.26	-30.98

Source: own source

Looking at Table 38, we note similar things as in Table 37: Where relative differentials are negative, this is because the actual prices are higher than the benchmark prices. These are visualized as cells in lighter ochre or lighter brown. The differentials where the benchmark prices are higher than the actual prices are in the darker ochre or darker brown cells. We also note that relative price differentials are smaller in improved production compared to current production.

However, when looking at relative differentials we can see which crops perform better in providing an income near or above a benchmark. We can clearly see that plantain performs best, followed by cocoa, cashew, groundnut and maize, with cassava performing worst. Indeed, we were told that cassava is a rather uninteresting crop for farmers. Farmers often do not harvest cassava themselves anymore, but look for traders that undertake the harvest instead.

3.3.7.3 Living Income Price Differentials (LID) for Cashew and Cocoa in GHS and US$

The Living Income Differential for cocoa that shall be followed and enforced according to the Ghanaian and Ivorian governments is a hotly debated matter. Therefore, we want to present our results in this particular respect. We want to do so, not only for cocoa, but also for cashew because it may be of quite some interest to exporting companies to be informed of what a living income differential is for cashew in international prices, too. This may not only be a matter

for Ghana and Côte d'Ivoire as countries of origin, but also important information for governments and consumers in consumer countries. In quite a number of consumer countries regulations have either already been put in place or are about to be put in place in order to make companies responsible for sourcing produce that is not "contaminated" by human rights violations[18].

At this point in time, however, we would like to caution the reader, and say that while our data appears relatively plausible to us, we do not claim that it is correct, or completely correct. We would like to invite researchers and practitioners to verify it by collecting their own data and performing their own calculations using their own methodology.

Table 39: Living Income Differentials for Cashew and Cocoa

	Living Income Differentials	GHS/kg	GHS/ton	US$/ton
1	Cashew, current production	2.59	2,587	467
2	Cashew, improved production	2.25	2,254	407
3	Cocoa, current production	2.55	2,546	460
4	Cocoa, improved production	0.48	479	87

Source: own source
Remark: GHS to US$ conversion rate: 5.5342 (January 2020)

Assuming our data is by and large correct, for cashew we get a living income differential of US$ 467 and 407 per ton and for cocoa of US$ 460 and 87 per ton for current and improved production, respectively.

One important point is that for the higher production level the gap is smaller and thus also the LID. This shows that every effort should be made to improve production and this will solve some of the poverty problem (all other things remaining equal).

A second point, however, concerns which production level an LID should be paid on. If we look at cocoa, we can see that there is quite a difference if an LID has to be paid for cocoa under improved or current production. One could argue that farmers should also do their share of effort. And therefore, one may conclude that in that case "only" US$ 87 per ton should be paid as an LID. Others, most notably the authors of the respected COCOA BAROMETER (2020) and ourselves among them, advocate[19] that the standard should not be the good or best performing farmer, but an ordinary one, in other words at current production levels, meaning that in this case an LID of US$ 460 would need to be paid. And likewise, for cashew, US$ 467 per ton.

18 For an excellent account of national and transnational regulations in place or on the way, the reader is referred to the Cocoa Barometer (2020, p. 14-16)
19 The authors of the COCOA BAROMETER (2020) argue: "*… earning a living income is a fundamental human right for everyone, and should not be available only to the highest achiever. Average cocoa farming households should be able to achieve a living income, not just the outliers*", p.48.

4

Conclusions and Recommendations

Description of Baseline Situation

One important objective of this report and the collecting of data that preceded it was to ensure that analysis of the situation surrounding cashew and cocoa smallholder households was as thorough as possible. We think that this has been achieved to quite some extent. On the basis of two surveys interviewing 371 cashew and 153 cocoa farmers, primary information was collected. Secondary information was added to this, as well as further primary information generated in four focus group discussions which served primarily to verify economic data on cashew, cocoa and key crops growing in conjunction with these two focus crops. A wealth of socio-economic information has been generated that can now be used as baseline data.

Using Baseline Data for Future Targeting

The reliability of the information collected, be it primary or secondary, does vary however. Some of the information appears quite solid, other information less so.

For instance, we do think that the yield per ha for cashew and cocoa, see Table 40, can be reliably used for further project planning. In that table we provide yield data from two datasets, one from the survey conducted by the project, see Table 17 for more detail, and the other from our gross margin / crop budget tables, Annex 3. These differ because the gross margin data was worked out after considering the data from the survey, the tables found in the FBS books, and most importantly, the figures we obtained through verifications with farmers in four focus group discussions and finally our own good judgement. For planning and monitoring purposes we would, nevertheless, propose using the median values from the two surveys as the point of departure, i.e. as the baseline, and the 75% quantile as the target direction. However, the targets still appear high, when you compare the percentage increase against the baseline (last column of the table). The increase that is possible after e.g. support measures have been implemented (e.g. farmer training, improving access to inputs and credit, etc.) depends, among other things, on the time between implementation of the support measures and an evaluation survey. If it is just three years later, one cannot expect more than perhaps a 10 to 15% increase. Some of the measures may have an immediate effect (e.g. weeding and pruning), while others (e.g. planting new varieties of a tree crop) may need 8 to 12 years to have an impact on yield.

Table 40: Proposed Baseline and Target Values of Yield for Cashew and Cocoa Cultivation (in kg/ha)

Focus Crop	Baseline	Target	% Increase of Baseline against Target
Cashew			
- Survey	247	420	70.0
- Gross Margin	304	611	100.0
Cocoa			
- Survey	362	546	50.8
- Gross Margin	458	757	65.3

Source: Table 17, median and 75th quantile for cashew and cocoa surveys, respectively; and Annex 3, "current production" and "improved production" for cashew and cocoa gross margin tables, respectively

Although we do not want to go into too much further detail, income is of course an important indicator, a prerequisite for livelihoods. Income is a level higher than yield. With respect to income, in future comparisons, one must take inflation into consideration, as we did when using gross margin data from previous years. This is particularly important in Ghana, where inflation has been very high in some years.

Using Gross Margin Analysis / Crop Budgets for Comparisons with Income Benchmarks

In our view, we have been able to demonstrate how important gross margin / crop budget data is in order to determine incomes, not only on an area and household basis per ha, but how we can relate them to highly important benchmarks such as a living income and poverty lines. Our example again shows that it is not necessary to have completely comprehensive data concerning a household, but that estimates can be made using centrally important data only regarding "focus" and "key crops" to arrive at a fairly good picture of the income situation and that extrapolations to estimate total household incomes are possible. This is the case because the labour input per income created is the bridge to a total income of the household. If we are able to work out how many people live in a household (and this we have shown in chapter 3.3.1), and we can additionally estimate the workforce of the household (also chapter 3.3.1), we are able to calculate the household labour's contribution proportionally to a living income, a poverty line income, a minimum wage, etc. Undertaking such calculations is a relatively new approach. It was used for the first time in 2016 with tea smallholder households in Malawi (KRAIN et al. 2017), in 2019 with tea smallholder households in Rwanda (KRAIN and AFRIKA, 2021) and it has now been applied to cashew and cocoa smallholder households in Ghana. This also demonstrates how useful the methodology of the Farmer Business School is which has gross margin calculations at its core. Hundreds of thousands of farmers have already been trained in using gross margin analysis in order to identify those crops and production intensity levels that ensure high profitability, but gross margin analyses have not yet been used for the purpose of working out how incomes per area unit and labour input relate to certain benchmarks and finally to a living income (and other) benchmark differentials.

Further Work on Solidifying and Consolidating Gross Margin / Crop Budget Data

While we were able to show that, in principle, income estimates can be made using gross margin / crop budgets, we would like to point out several issues.

Firstly, in all the FBS training material, gross margin data is presented for the focus crop (in our case a perennial) and key crops intercropped with or cultivated alongside the focus crop. However, the gross margin data for perennial crops in the FBS material only shows data for the full production period. This is understandable from a didactic point of view, since including the costs of the year of planting and the juvenile phase would complicate the training material too much and farmers would most likely be unable to follow training sessions well. If one intends to work out the entire economics of the crop, however, one must include all production phases. In standard economics one usually uses a complicated method where values are appreciated for future values and according to which year costs and returns fall. One cardinal indicator that is calculated in this respect is the internal rate of return. However, this is again very complicated and for most, even people who have studied, difficult to follow. We have used a different method. We imitated a field with the perennial crop, proportionally representing different periods of production, i.e. considering an overall economic

production period of 30 years, 1 thirtieth for planting, 4 thirtieths for years 2 to 5 (replanting and maintenance cost, no yield) for the juvenile phase, 20 thirtieths for the full production period for years 6 to 25, and 5 thirtieths for the declining production period. For each phase, a gross margin table is produced and then the total average is calculated by averaging the subtotals from the different production phases by weight of number of years of each production phase. This method also conforms with the way smallholders grow their perennials. It is hard to find a smallholder who establishes a larger piece of land with a perennial from scratch in one go. He or she will usually take a small portion of land (say a quarter of a hectare) where there is space and will grow the perennial together with intercrops. This will be the portion that is newly planted. At another end of the farm some trees will die and thus fall out of production. Some trees will be old and yield less. And again, other trees will thrive and bear well. The whole smallholder farm with the perennial is therefore often quite heterogenous. Performing the calculations as we did therefore simplifies the figures and also follows the agricultural practices of smallholder farmers. We would suggest that our example be followed in the future because it is very important to include the costs of establishment (planting) and the period where no or only little yield is obtained, otherwise an overly positive picture of the production of a perennial is given, inadequately reflecting reality.

A second point is that our data may be less than robust. Our data mainly relies on recall of farmers and experts, not on true measurements and records. We saw that e.g. calculating a living income differential, see chapter 2.2, is highly sensitive to labour input data. Only small changes in labour input results in large changes in the differential. If we want to convince others about certain figures, we must have solid base data. This can only be achieved when working closely with farmers, encouraging them to measure and record data. Farmers do not do this normally, so they need to be supported, engaged and ultimately must also benefit. We would suggest having at least one group of 10 to 15 farmers each in a principal cashew and cocoa region supported by the project and the Ministry of Food and Agriculture / COCOBOD. Cooperation with farmers should be accompanied by “crop-cuts”. Crop-cuts are random measurements/weighing of yields in the field to obtain objective numerical data. We would also like to point out that taking data from a research station is not sufficient. This is important, but unable to fully reflect a smallholder situation.

Updating Gross Margin Tables / Crop Budgets

We would further recommend that gross margin tables be updated about every two years as prices of inputs and outputs in particular change constantly. If we want to calculate e.g. Living Income Differentials, such updates may even be necessary every year.

The methodology that we have introduced here, especially the use of gross margin tables for calculating incomes and comparing them with benchmarks, should continue to be supported by the project and its partner organizations for cashew, cocoa and key crops cultivated along with these two crops, for the coming years.

The methodology should also be introduced to other interested parties perhaps through a reputable national research institute for which scientists would need to receive some training first. The research institute should entrust a unit to do this work that is specialized in economic and social matters concerning smallholder farming.

Using Gross Margin Tables / Crop Budgets for Other Crops and Agricultural Activities

There are many other important crops (coffee, rubber, oil palm, yams, …) and livestock activities where it would be desirable to generate similar gross margin data on a regular basis either just to work out the partial income situation of smallholder farmers or also with the intention of working out living income (and other benchmark) price differentials to inform negotiations between producers and buyers of agricultural produce. Presentation and technical support on a broad level could again be spearheaded by a reputable Ghanaian research institute working closely together with ministries concerned, other authorities (e.g. COCOBOD), projects (e.g. ComCashew) and private companies.

Income Increases by Intensification of Production and Price Advocacy to Go Hand in Hand

Based on field data we have been able to show that improved production leads to improved incomes. Improved production may not close the gap to a living income completely and in all cases, but at least it would solve some of the problem of low incomes among smallholder farmers. And this is an area that smallholder farmers as well as supporting organizations (field services of ministries and donor projects) have under their control to a great extent and it remains the most important area of intervention. That being said, quite a lot also needs to be done on improving prices for agricultural produce. Pressure needs to be increased e.g. through advocacy organizations and public authorities that make buyers and consumers aware that it is a human right to receive prices that adequately remunerate agricultural labour in the countries of origin. A living income differential (LID) is certainly an important tool to show how large the disparity is in accordance with human rights. This tool is all the more powerful if the calculations of an LID are based on solid data and on a transparent mechanism for performing calculations.

Certainly, there are many more measures that need to be put in place, but these are the two we would like to stress.

Need for Further Research on Living Income Reference Price Methodologies

We cross-checked how our cocoa living income reference prices compare to living income prices calculated by others. While there are no comparisons yet with respect to cashew, some work has already been done by several other organizations on cocoa. Our cocoa living income reference prices of GHS 12.55/kg and GHS 10.48/kg at current and improved production levels, see Table 36, translate to US$ 2.27/kg and US$ 1.89/kg at January 2020 exchange rates. Fairtrade[20] set a cocoa living income price for Ghana at US$ 2.30/kg, Tony's Chocolonely[21] at US$ 2.10/kg and Oxfam Fair Trade at US$ 2.67/kg[22]. Our living income reference price therefore appears to be in the same range, as far as the current production level is concerned, compared to these organizations. However, FOUNTAIN and HÜTZ-ADAMS (2019) provide another calculation, arriving at a significantly higher Living Income Reference Price at US$ 3.17/kg, which is again adjusted upwards to US$ 3.53/kg by BRONKHORST (2020). While some of the differences may be attributed to different conditions in different parts of the country affecting yields, cost of production and labour input, and possible deficiencies in the robustness of the data, there is certainly a strong need to undertake further research into methodologies and exchange of experience to develop methodologies that provide comparable results.

20 Cocoa farmers to earn more through a higher Fairtrade Minimum Price | Fairtrade Foundation
21 Ein Blick auf LIRP - Tony's Chocolonely
22 Quoted by FOUNTAIN and HÜTZ-ADAMS (2019)

ANNEX 1 REFERENCES

ANKER, R. and M. ANKER: Living Income, March 2020 Update, Rural Ghana, Cocoa Growing Areas of Ashanti, Central, Eastern and Western, for the Living Income Community of Practice, www.living-income.com, March 2020

ANKER, R. and M. ANKER: Living Wages Around the World, Edward Elger Publishing Limited, Cheltenham, UK and Northampton, USA, 2017

ARNOLDUS, M. and B. CLAUSEN: Final Report: Cashew Production Cost Analyses Ghana and Ivory Coast, Sense, September 2020

BRILL, K., and E. KRAIN: How to Determine the Actual and Living Income of Smallholder Farmers. A Guide on a Fast-Track Approach, Bonn, 2017

BRONKHORST: R.: The Economics of Human Rights, Using the Living Income / Fair Price Approach to Combat Poverty, Palgrave, Macmillan, Cham, 2020

BYMOLT, R., LAVEN, A. and TYSLER M.: Demystifying the Cocoa Sector in Ghana and Côte d'Ivoire, Royal Tropical Institute (KIT), 2018

CHED: Manual for Cocoa Extension in Ghana, Cocoa Health and Extension Division (CHED), USAID, World Cocoa Foundation (WCF), the Sustainable Trade Initiative (IDH), 2016

CHIWAULA, L.S.: Living Income among Smallholder Farmers. A User's Manual for Conducting Living and Actual Income Studies. University of Malawi, Zomba, 2018

CHIWAULA, L.S., PHANGAPHANGA, M., and Z. RABSON: Establishing Living Income Benchmark among Smallholder Farmers. A Proposed Methodology and an Application to Smallholder Tea Farmers in Malawi. University of Malawi, Zomba, 2017a

CHIWAULA, L.S., RABSON, Z. and M. PHANGAPHANGA: Living and Actual Incomes of Smallholder Tea Farm Households in Malawi. University of Malawi, Zomba, 2017b

COCOA BAROMETER: FOUNTAIN, A. C. and HÜTZ-ADAMS, F., 2020

ETHICAL TEA PARTNERSHIP and OXFAM: Understanding Wage Issues in the Tea Industry, 2013

FAIRTRADE: Fairtrade Living Income Reference Price Model, https://files.fairtrade.net/2019_FairtradeLivingIncomeReferencePrice_Model.pdf, 2019

FAOSTAT: for Cashew and Cocoa, FAOSTAT, 2019

ANNEX 1 REFERENCES

FBS CASHEW: Farmer Business School, Training Workbook, Cashew, Maize and Groundnut Production Systems, Ghana, 1st Edition, Sustainable Agricultural Supply Chain Initiative (INA), ComCashew, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), July 2020

FBS COCOA: Farmer Business School, Training Notebook and Workbook, Cocoa Production System, Ghana, 5th updated and revised edition, Sustainable Smallholder Agri-Business - Cocoa-Food Link Programme, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), July 2015

FERREIRA, F.H.G., CHEN, S., DABALENZ, A., DIKHANOV, Y., HAMADEH, N. JOLLIFFE, D., NARAYAN, A., PRYDZ, E.B., REVENGA, A., SANGRAULA, P., SERAJUDDIN, U. and YOSHIDA, N.: A Global Count of the Extreme Poor in 2012: Data Issues, Methodology and Initial Results, J Econ Inequal 14: 141-172, 2016

FOUNTAIN, A.C. (Voice Network) and HÜTZ-ADAMS, F. (Südwind Institut): Necessary Farm Gate Prices for a Living Income, Cocoa Barometer Consortium, 2019

GHANA STUDENTS: What is the Minimum Wage in Ghana 2021? What is the Minimum Wage in Ghana 2021? - GH Students, accessed 18.1.2021

GLSS7: Ghana Living Standards Survey Round 7, Poverty Trends in Ghana 2005-2017, Ghana Statistical Services (GSS), August 2018

GSS: Labour Force Survey 2015, Ghana Statistical Service (GSS), December 2016

JOLLIFFE, D. AND PRYDZ, E.B.: Estimating International Poverty Lines from Comparable National Thresholds, Policy Research Working Paper 7606, World Bank Group, March 2016

KRAIN, E. and AFRIKA, J.: Actual and Living Income (and Other Benchmarks) of Tea Smallholder Farmers and Tea Workers in Rwanda Based on a Model Farm and Household Approach, Ethical Tea Partnership and GIZ, Bremen and Kigali, forthcoming, 2021

KRAIN, E. and STEFFENS, L.: Living Income Reference Pricing Tool, a Handbook to Determine Reference Prices for Agricultural Commodities Based on Benchmarks, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), Bonn, November 2019

KRAIN, E., MARTIN, F., and K. BRILL: Living and Actual Income of Smallholder Tea Farmers in Malawi. Using a Fast-Track Method for Model Calculations, Bonn, 2017

NISR: The Fifth Integrated Household Living Conditions Survey 2016/2017 (EICV5), National Institute of Statistics Rwanda (NISR), Rwanda Poverty Profile Report, November 2018

PINHEIRO, R.D.: Guide, Culture du Cajou: Création, Entretien et Gestion, GFA-Consulting, Développement des Espaces Èconomiques et Naturels Tai et Comoé en Côte d'Ivoire, Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), November 2018

REUTERS: Ivory Coast Raises 2020/21 Cocoa Farmgate Price by 21%, https://www.reuters.com/article/us-cocoa-ivorycoast/ivory-coast-raises-2020-21-cocoa-farmgate-price-by-21-idUSKBN26M79F, accessed 9.10.2020

RYAN, J.A.: A Living Wage, Its Ethical and Economic Aspects, MacMillan, New York, 1912

TRANSFAIR: Fairtrade fordert mehr Anstrengungen des gesamten Handels, 19.1.2021, accessed 23.1.2021, https://www.fruchtportal.de/artikel/fairtrade-fordert-mehr-anstrengungen-des-gesamten-handels/047603

SMITH, S. and SARPONG, D.: Living Income Report, Rural Ghana, Cocoa Growing Areas of Ashanti, Central, Eastern, and Western Region, 2018

VARANASHI, V.M., YADUKUMAR, N. and R.N.S. SHANKAR: Handbook on Organic Cashew Cultivation, Varanashi Research Foundation, India, March 2007

WAGE INDICATOR: Minimum Wage – Ghana, Minimum wage - Ghana - WageIndicator.org, accessed 18.1.2021

WEINRAUTNER, J.: An Economic Analysis of a Cocoa Production System: A Ghanaian Case Study, Master Thesis, Humboldt University of Berlin, Berlin, March 2020

WIDMER, H. and A. MINTAH: Socio-economic Development and Income Diversification of Cashew Farmers in Rural Ghana, Case Study from Brong Ahafo and Northern Region, Aci, GIZ, 2016

WIKIPEDIA: 2020, Ghana - Wikipedia

WIKIPEDIA: 2020b, Agriculture in Ghana - Wikipedia

WIKIPEDIA: 2021, Cocoa bean - Wikipedia

WIKIPEDIA, 2021b, Cashew - Wikipedia

ANNEX 2 CURRENCIES AND CONVERSION RATES, INFLATION, LABOUR FORCE PARTICIPATION RATE, ADULT EQUIVALENCY SCALE, NATIONAL AND INTERNATIONAL POVERTY LINES

Annex 2a: Discussing Ghana's Labour Force Participation Rate for the Population 15 years and Older by Age Group, Locality and Sex

	Ghana			Urban			Rural		
All Ages	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total	**75.2**	**79.0**	**72.4**	**81.8**	**75.7**	**78.4**	**80.4**	**73.9**	**76.7**
15-19	24.7	27.6	22.7	39.1	41.3	40.2	34.2	31.7	32.8
20-24	68.1	70.8	65.9	77.9	72.0	74.5	73.7	68.6	70.9
25-29	82.0	87.2	78.3	93.4	82.7	87.0	89.6	80.0	84.0
30-34	88.7	94.2	84.5	96.4	82.5	88.2	95.1	83.6	88.5
35-39	93.8	97.2	91.5	97.1	88.8	92.5	97.2	90.3	93.2
40-44	92.8	96.1	90.0	95.8	89.7	92.5	96.0	89.8	92.6
45-49	93.5	98.9	90.1	96.4	93.7	95.0	97.5	91.8	94.3
50-54	93.0	97.0	90.1	96.7	86.5	91.2	96.8	88.2	92.1
55-59	86.8	88.9	85.4	94.0	85.0	89.2	91.4	85.2	88.0
60-64	65.0	67.3	63.2	84.3	82.0	83.1	76.3	72.1	74.0
65+	39-8	42.4	37.9	63.2	49.4	56.1	54.7	43.9	48.8

Source: GSS (2016, p. 23)

The above table appears to have some flaws and/or inconsistencies and needs further verification before it can be utilized.

Let's discuss e.g. the first line of data which comprises the labour force participation rate (LFPR) for the total population aged 15 years and above.

	Ghana			Urban			Rural		
All Ages	Total	Male	Female	Total	Male	Female	Total	Male	Female
Total	**75.2**	**79.0**	**72.4**	**81.8**	**75.7**	**78.4**	**80.4**	**73.9**	**76.7**

The breakdown data for Ghana (75.2 = total, 79.0 = male, 72.4 = female) appears to make sense because the total value is between the value for male and female. One cannot, however, expect that it is just the average of the value for male and female, because male and female do not make up exactly 50% within each age category.

While the data for Ghana makes sense, it appears not to make sense for urban and rural. Here, in each case, the total is higher than any of the corresponding values for male and female, e.g. for urban the value for male is 75.7 and for female 78.3. Thus, one would expect for the total a value that is in between these two values, however, the value 81.8 is given. The same inconsistency appears in the category "rural".

There is a further systematic inconsistency: For Ghana one would expect a value that is in between the respective values for urban and rural. The values for "total" are 81.8 for urban and 80.4 for rural. Thus, the expected value should be between 80.4 and 81.8, however, the value is 75.2.

These inconsistencies are systematic throughout the table. Therefore, this data first needs to be verified and possibly corrected before being utilized.

Annex 2b: Average Energy Allowance and Adult Equivalence Scale

Category	Age (years)	Average energy allowance per day (kcal)	Equivalence scale
Infants	0-0.5	650	0.22
	0.5-1.0	850	0.29
Children	1-3	1,300	0.45
	4-6	1,800	0.62
	7-10	2,000	0.69
Males	11-14	2,500	0.86
	15-18	3,000	1.03
	19-25	2,900	1.00
	25-50	2,900	1.00
	51+	2,300	0.79
Females	11-14	2,200	0.76
	15-18	2,200	0.76
	19-25	2,200	0.76
	25-50	2,200	0.76
	51+	1,900	0.66

Source: Recommended Dietary Allowances, 10th edition (Washington, DC: National Academy Press, 1989) quoted by GLSS7 (2018, p. 106).

Annex 2c: Adult Equivalency per Person by Age Group Used in ComCashew Survey

Age Group	Male	Female
0-14	0.681	0.628
15-64	0.971	0.746
65+	0.790	0.660

Source: own calculation based on Annex 2a, by GSS (2016, p. 23) and above table, Annex 2b, by GLSS7 (2018, p. 106)

Annex 2d: Currency Conversion Rates

1 USD to GHS, 20 January 2020	5.5342
1 EUR to GHS, 20 January 2020	6.1333

Source: Historical Interbank FX Rates – Bank of Ghana (bog.gov.gh)

USD PPP conversion rate of 2019 to GHS	1.94

Source: https://data.worldbank.org/indicator/PA.NUS.PRVT.PP

ANNEX 3 CASHEW AND COCOA GROSS MARGIN TABLES BY PRODUCTION PHASES

a) Cashew, Current Production, Gross Margin Table by Production Phase

Cashew, Current Production / Ha			Planting Year 1	Juvenile Phase Years 2-5	Full Production Years 6-25	Declining Produciton Years 26-30	Years 1-30 (weighted avg)
Row	Item	Unit	A	B	C	D	E
1	Input Cost	GHS	1,000.00	400.00	400.00	400.00	420.00
2	Service Cost	GHS	0.00	0.00	0.00	0.00	0.00
3	Labour Input	WD	37.50	25.00	37.50	30.00	34.58
4	Labour Cost/WD	GHS	16.00	16.00	16.00	16.00	16.00
5	Labour Cost Subtotal	GHS	600.00	400.00	600.00	480.00	553.33
6	Yield	kg	0.00	56.25	375.00	281.25	304.38
7	Price	GHS	4.00	4.00	4.00	4.00	4.00
8	Turnover	GHS	0.00	225.00	1,500.00	1,125.00	1,217.50
9	Economic GM	GHS	-1,600.00	-575.00	500.00	245.00	244.17
10	Financial GM	GHS	-1,000.00	-175.00	1,100.00	725.00	797.50
11	Fin. GM/WD	GHS	-26.67	-7.00	29.33	24.17	23.06

b) Cashew, Improved Production, Gross Margin Table by Production Phase

Cashew, Current Production / Ha			Planting Year 1	Juvenile Phase Years 2-5	Full Production Years 6-25	Declining Produciton Years 26-30	Years 1-30 (weighted avg)
Row	Item	Unit	A	B	C	D	E
1	Input Cost	GHS	1,537.50	400.00	500.00	375.00	500.42
2	Service Cost	GHS	0.00	0.00	375.00	125.00	270.83
3	Labour Input	WD	100.00	25.00	75.00	60.00	66.67
4	Labour Cost/WD	GHS	16.00	16.00	16.00	16.00	16.00
5	Labour Cost Subtotal	GHS	1,600.00	400.00	1,200.00	960.00	1,066.67
6	Yield	kg	0.00	120.00	800.00	375.00	611.83
7	Price	GHS	4.00	4.00	4.00	4.00	4.00
8	Turnover	GHS	0.00	480.00	3,200.00	1,500.00	2,447.33
9	Economic GM	GHS	-3,137.50	-320.00	1,125.00	40.00	609.42
10	Financial GM	GHS	-1,537.50	80.00	2,325.00	1,000.00	1,676.08
11	Fin. GM/WD	GHS	-15.38	3.20	31.00	16.67	25.14

c) Cocoa, Current Production, Gross Margin Table by Production Phase

Cocoa, Current Production / Ha			Planting Year 1	Juvenile Phase Years 2-5	Full Production Years 6-25	Declining Produciton Years 26-30	Years 1-30 (weighted avg)
Row	Item	Unit	A	B	C	D	E
1	Input Cost	GHS	555.00	175.00	625.00	625.00	562.67
2	Service Cost	GHS	1,625.00	0.00	125.00	0.00	137.50
3	Labour Input	WD	55.00	37.50	125.00	119.38	110.06
4	Labour Cost/WD	GHS	30.00	30.00	30.00	30.00	30.00
5	Labour Cost Subtotal	GHS	1,650.00	1,125.00	3,750.00	3,581.25	3,301.88
6	Yield	kg	0.00	90.00	562.50	425.00	457.83
7	Price	GHS	10.00	10.00	10.00	10.00	10.00
8	Turnover	GHS	0.00	900.00	5,625.00	4,250.00	4,578.33
9	Economic GM	GHS	-3,830.00	-400.00	1,125.00	43.75	576.29
10	Financial GM	GHS	-2,180.00	725.00	4,875.00	3,625.00	3,878.17
11	Fin. GM/WD	GHS	-39.64	19.33	39.00	30.37	35.24

d) Cocoa, Improved Production, Gross Margin Table by Production Phase

Cocoa, Current Production / Ha			Planting Year 1	Juvenile Phase Years 2-5	Full Production Years 6-25	Declining Produciton Years 26-30	Years 1-30 (weighted avg)
Row	Item	Unit	A	B	C	D	E
1	Input Cost	GHS	1,105.00	632.50	1,500.00	1,000.00	1,287.83
2	Service Cost	GHS	1,625.00	0.00	62.50	0.00	95.83
3	Labour Input	WD	60.00	50.00	162.50	155.00	142.83
4	Labour Cost/WD	GHS	30.00	30.00	30.00	30.00	30.00
5	Labour Cost Subtotal	GHS	1,800.00	1,500.00	4,875.00	4,650.00	4,285.00
6	Yield	kg	0.00	112.50	937.50	700.00	756.67
7	Price	GHS	10.00	10.00	10.00	10.00	10.00
8	Turnover	GHS	0.00	1,125.00	9,375.00	7,000.00	7,566.67
9	Economic GM	GHS	-4,530.00	-1,007.50	2,937.50	1,350.00	1,898.00
10	Financial GM	GHS	-2,730.00	492.50	7,812.50	6,000.00	6,183.00
11	Fin. GM/WD	GHS	-45.50	9.85	48.08	38.71	43.29

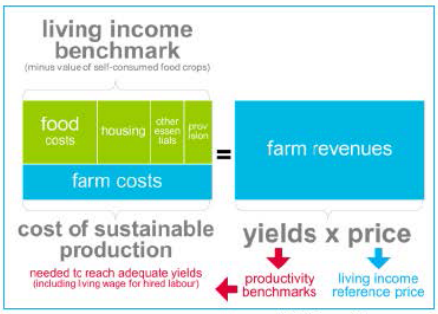
FAIRTRADE LIVING INCOME REFERENCE PRICE MODEL

LIVING INCOME REFERENCE PRICE CONCEPT

A Living Income Reference Price indicates the price needed for an average farmer household with a viable farm size and an adequate productivity level to make a living income from the sales of their crop. It is based on the following key parameters:

- Cost of a decent standard of living (Living Income benchmark)
- Sustainable yields (productivity benchmark)
- Viable farm size (to fully employ the available household labour)
- Cost of sustainable production (in order to achieve above mentioned yields)

It is important to note that for calculating the reference price we focus on the Fairtrade crop as our sphere of influence. Although it is recognized that farm income may well be diversified, the formula is based on the Fairtrade product as a single crop, assuming that any other farm activity would be as profitable as the Fairtrade crop and thus generate a proportionate share of the living income.



The price that allows an average farmer household with a viable farm size and a sustainable productivity level to earn a living income is calculated with the formula: price x total volumes produced = cost of decent living + cost of sustainable production.

$$\text{Living Income Reference Price} = \frac{\text{cost of decent living} + \text{cost of sustainable production}}{\text{viable land area} \times \text{sustainable yields}}$$

ESTABLISHING A LIVING INCOME REFERENCE PRICE

The following section describes how the values for each parameter are determined

Living Income benchmark

Living Income is defined as sufficient income generated by a household to afford a decent standard of living for the household members. Elements of a decent standard of living include: food, water, housing, education, healthcare, transport, clothing and other essential needs, including a provision for unexpected events.

If a household typically produces food crops for home consumption, these would be considered as in-kind income to be deducted from the cost of living as it reduces the food expenditures for the household.

Sustainable yields

Adequate productivity levels are determined based on feasible yields, obtained when implementing sustainable agricultural practices.

In establishing productivity benchmarks, it is crucial to consider potential adverse macro effects of increased yields. A sector-wide steep increase in productivity will lead to oversupply and downward pressure on commodity prices. In addition, higher yields do not necessarily translate into higher profitability for farmers. Therefore, we should balance maximum possible yields with optimal returns for the farmer in the long run.

Viable farm size

The Universal Declaration of Human Rights establishes: "Everyone who works has the right to just and favourable remuneration ensuring for himself and his family an existence worthy of human dignity." Hence, hired workers have the right to a living wage and self-employed farmers should be able to make a living income from their farm proceedings. Following this principle, a farm should be big enough to fully absorb the average household labour force in order to generate a living income. This would be considered a viable farm size or a "full-employment farm size".

Cost of Sustainable Production

The costs associated with producing sustainable yields are likely to be higher than the current production costs, since the actual low productivity is often a result of low farm investment. Hence we need to project the costs of production at the sustainable yield level.

This calculation is based on fully employed non-remunerated household labour. Additional hired labour needs are factored in at Living Wages. This way the living income reference price covers a living income for the household members (provided the available household labour is effectively employed on their farm) from the farm profits and a living wage for hired workers.

Source: Fairtrade (2019)
Remark: highlights added by us showing important particularities of Fairtrade's methodology

ANNEX 5 QUESTIONS AND ANSWERS FROM ONLINE MEETING PRESENTING THE BASELINE REPORT

The presentation of the report was held on 22 February 2021, in an online meeting from 11.00 to 12.00 pm CET. In total there were 21 participants from four countries: Ghana, Germany, Côte d'Ivoire and Benin. The presentation was by means of PowerPoint slides prepared by Eberhard Krain. The anonymized and slightly edited questions and answers are listed below. Answers (in black) to questions (in red) were given by the presenter, Eberhard Krain, unless otherwise stated below.

Person 1:
Does the labour input in the gross margin analysis refer to hired labour only?
No, this refers to the total labour input per area unit, not differentiating between hired and household labour per hectare.

Person 1:
Is it realistic that the surplus labour can be fully utilized to generate income?
It is realistic in the case of Ghana because there is quite a labour shortage especially in the South. People are even moving from the North to the South to find work. In one focus group discussion, labour costs went up to GHS 50 per day (which is already above a living income "wage"), mainly due to illegal mining activities in the same province. It can therefore be assumed that all surplus labour can be fully utilized.

Person 2:
What were the prices used for the gross margin calculations with respect to the different production periods? Were these an average over 5 years or prices for the 2020 season?
Prices are all calculated at 2020 levels. The recall period for the surveys was 2019/2020. Focus group discussions were conducted at the end of 2020 and in early 2021 with the recall period 2020.

Person 3:

1. Does the LI study take into consideration the fact that cashew farmers, like other farmers, also grow other food crops and do not fully depend on cashew?
   The total farm size was considered with all crops and livestock, not only the farm area under cashew. Limitation: The area of intercrops and side crops (not the focus crop) was not explicitly captured, so assumptions for the areas of crops other than the focus crops were used for the calculation.
2. What does it mean for processing if the LI price for raw cashew nuts (RCN) is higher than the market price of kernels? Shall we all pay a bit more for the kernels?
   No definite price recommendation is given yet. The information on a living income reference price shall be seen as information for authorities and farmer organizations for negotiations with big buyers. We want to bring transparency and information into negotiations.

Person 2:
Was the focus only on labour or is land etc. also included in the calculations?
Land is also included into the calculation. The gross margin / budget calculation was done for one hectare and with respect to income also on income generated per ha per workday. The hectare-based results were then multiplied by the average area size of the crop in the farm and then aggregated over all crops (focus crops and key crops) to get to a (partial) household income.

ANNEX 5 QUESTIONS AND ANSWERS FROM ONLINE MEETING PRESENTING THE BASELINE REPORT

Person 2:

The focus now is on the LI under the current production system. Did the team also discuss the option that the current system (labour intensive) is not feasible as such? In other words; how should the production system be in order to remain competitive?

For perennial crops the labour input does not yet seem high. Of course, a move to more mechanized levels can be discussed and calculations can be made to reflect such a production system. For example, can cocoa be mechanized? Currently, this is only possible to some extent, e.g. pruning of trees using chainsaws. Tractor hiring services are used for some of the intercrops (maize, groundnut) in the northern zone.

Person 4:

What does the service cost capture?

A typical service for the focus crops is pruning of cocoa and cashew trees or a tractor hiring service for ploughing maize and groundnut fields, especially in the north. Lining and pegging for cocoa farms are often also done as a service provided by technicians.

Person 5:

How was the yield data for cocoa generated?

Four sources were used. The first yield information came from the surveys among cashew and cocoa smallholder households. The second source was the Farmer Business School material, the third the focus group discussions in two cocoa- and two cashew-growing villages. Finally, expert knowledge by the specialists for cashew and cocoa within our team was included.

Person 6:

How big was the sample size and how were farmers selected?

(Answer by Martin Kuntze-Fechner): There were 372 cashew and 153 cocoa smallholder households. The sampling was done randomly among households where the project works in collaboration with cooperatives for each focus crop.

Person 7:

What information was gathered in focus group discussions?

(Answer by John Osei Gyimah): Price and yield of focus and key crops (for example for maize: what is the current price at the market). Then we looked also at the input costs such as fertilizer, at differences between two technologies (ordinary farming practice and improved farming practice), costs of services which farmers receive, such as ploughing, transport, bagging and weighing of the crop.

Person 1:

How does the calculated Living Income Reference Price (LIRP) refer to the Fairtrade LIRP or the Tony's Chocolonely living income price?

No comparison with the Fairtrade and Tony's Chocolonely LIRP was carried out. *Suggestion by person 1 to include these benchmarks in the report.* [These comparisons were then incorporated into the final version of the report.]

Person 4:

(Comment): The official farmgate price for cocoa is GHS 660 per bag or GHS 10.56 per kilo.

Noted.

IMPRINT

As a federally owned enterprise, GIZ supports the German Government in achieving its objectives in the field of international cooperation for sustainable development.

Published by:
Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Registered offices
Bonn and Eschborn, Germany

Address
Sector Programme Sustainable Supply Chains and Standards
Friedrich-Ebert-Allee 13
53113 Bonn, Germany
T +49 61 96 - 79 36 48

E ina@giz.de
I www.giz.de

Responsible:
Sector Programme Sustainable Supply Chains and Standards

Authors:
Dr. Eberhard Krain, John Osei Gyimah, Ignatius Pumpuni,
Nana Yaw Kwapong-Akuffo and Martin Kuntze-Fechner

Layout:
Umbruch Werbeagentur GmbH, Darmstadt

Photo credits:
GIZ/ComCashew photos were taken in the course of the project and the photographer was mandated by ComCashew

On behalf of
German Federal Ministry for Economic Cooperation and Development (BMZ)
Division 122 (International agricultural policy; agriculture; innovation)
E RL122@bmz.bund.de

Digital publication only
Bonn, October 2021

Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH

Registered offices
Bonn and Eschborn

Friedrich-Ebert-Allee 32 + 36
53113 Bonn, Germany
T +49 228 44 60-0
F +49 228 44 60-17 66

Dag-Hammarskjöld-Weg 1 - 5
65760 Eschborn, Germany
T +49 61 96 79-0
F +49 61 96 79-11 15

E info@giz.de
I www.giz.de

On behalf of

Federal Ministry
for Economic Cooperation
and Development