



Demystifying the Cocoa Sector in Ghana and Côte d'Ivoire

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1

Introduction

Bymolt, R., Laven, A., Tyszler, M. (2018). Demystifying the cocoa sector in Ghana and Côte d'Ivoire. Chapter 1, Introduction. The Royal Tropical Institute (KIT).

1.1 The future of cocoa

Cocoa is the raw ingredient of some of the world's most loved products. We almost cannot imagine a world without cocoa.

Yet in 2014, a series of media reports asked us to confront the question: 'Is the world running out of chocolate?'. The media based their articles¹ on warnings by large chocolate manufacturers, such as Barry Callebaut and Mars,² who had expressed concerns about a potentially serious shortage of cocoa by 2020. In response, the International Cocoa Organization (ICCO) felt compelled to issue a statement emphasising that fears of a cocoa shortage were 'overstated in the extreme'.³

This proved to be the case when consecutive production decreases in 2014/15 and 2015/16 were followed by a large 18% reversal in 2016/17. This production increase was due to favourable weather conditions resulting from the mild harmattan winds within the West African region.

The 2016/17 increase resulted in an oversupply of cocoa on the world market and a drop in prices. The government of Côte d'Ivoire was forced to slash the price it guaranteed farmers by 36%, which had serious consequences for many cocoa farmers living already in disadvantaged situations. Fortunately, the government of Ghana was able to stand firm on its guaranteed prices on this occasion.⁴

It now seems certain that the world is not running out of cocoa in the foreseeable future. This situation prompted us to ask how different actors could come to such different conclusions about the future of cocoa. As we began to delve deeper, it became apparent that one reason was a lack of quality, publically available data.

1.1.1 The age of cocoa farmers

Fears still persist that the world may be running out of cocoa farmers. Several studies have expressed a concern that older farmers are reaching their life expectancy and

¹ For example: Guardian. (2014). The cocoa crisis: why the world's stash of chocolate is melting away. Available at <https://www.theguardian.com/lifeandstyle/2014/nov/21/cocoa-crisis-world-chocolate-stash-melting-away>; Washington Post. (2014). The world's biggest chocolate maker says we're running out of chocolate. Available at <https://www.washingtonpost.com/news/wonk/wp/2014/11/15/the-worlds-biggest-chocolate-maker-says-were-running-out-of-chocolate/>; Huffington Post. (2014). The World Is Running Out Of Chocolate (Partly Because We're Eating Too Much). Available at http://www.huffingtonpost.co.uk/2014/11/17/chocolate-running-out-supply_n_6170080.html

² Food Manufacturer (2012). Mars chocolate warns action on cocoa needed to beat shortage. By R, Pendrous 13 June 2012. Available at https://www.foodmanufacture.co.uk/Article/2012/06/13/Mars-Chocolate-warns-action-on-cocoa-needed-to-beat-shortage?utm_source=copyright&utm_medium=OnSite&utm_campaign=copyright

³ ICCO (2014). ICCO Statement on Reports of a Cocoa Supply Deficit in 2020. Available at <https://www.icco.org/about-us/icco-news/270-icco-statement-on-reports-of-a-cocoa-supply-deficit-in-2020.html>

⁴ The government of Côte d'Ivoire cut farmers' pay by 36 percent to the equivalent of about 700,000 CFA francs (\$1,251) per metric ton in April 2017 to cope with global prices that dropped more than a third in a year on expectations of oversupply. Ghana, the second-biggest grower, has kept farmer payments at the equivalent of 7,600 cedis (\$1,708) per ton since October 2017 and has ruled out any cuts for the main harvest that starts next month. Cocoa is harvested twice a year in West Africa. Source: Bloomberg (2017). By Baudelaire Mieu, Moses Mozart Dzawu, and Olivier Monnier. August 31, 2017. Available at <https://www.bloomberg.com/news/articles/2017-08-31/ivory-coast-is-said-to-fear-losing-fifth-of-cocoa-to-smuggling>

that younger generations are no longer interested in farming cocoa.^{5,6} The implication is that the global supply of cocoa could be still be threatened in the years ahead.

In our chapter on household demographics we analyse whether cocoa farmers really are getting older. We also investigate trends in global cocoa production, as well as farmer reported trends in our research areas in Ghana and Cote d'Ivoire.

1.1.2 Cocoa farmer livelihoods

Beyond securing cocoa supply in the short-term, there are a variety of complex issues that the cocoa sector must come to grips with if it is to be successful and sustainable in the longer term.

A major concern is the livelihood status of cocoa farmers. Some advocates have argued that 'poverty is rampant in West Africa's cocoa fields', and that 'most cocoa farmers live in destitute poverty'.⁷

National statistics do indeed show that smallholders in developing countries are less well-off than the national averages. However, the extent to which poverty is a cocoa specific issue, rather than a broader smallholder farmer phenomena, has not received a lot of attention until recently.⁸ In this study, we have dedicated a specific chapter to analysing the wealth, income and poverty status of cocoa households in Ghana and Côte d'Ivoire.

In the literature, many reasons have been cited as to why cocoa households struggle to improve their livelihood situation. These include poor access to quality inputs, the old age of cocoa trees, ongoing use of non-hybrid varieties, the small size of many cocoa farms, insecure land tenure which discourages investments, relatively weak institutions, and the low capacity of farmer organisations. Each of these issues have been explored in the study.

However, debates on how to improve the livelihood status of cocoa households typically hone in on one of two approaches: i) improving cocoa productivity, and ii) paying higher cocoa prices. Each of these approaches are believed, by their proponents, to improve household income, although both approaches also have their drawbacks and challenges.

⁵ E.g. Hainmueller, J., Hiscox, M., & Tampe, M. (2011). Sustainable development for cocoa farmers in Ghana. MIT and Harvard University. Available at <https://www.theigc.org/wp-content/uploads/2015/02/Hainmueller-Et-Al-2011-Working-Paper.pdf>

⁶ E.g. Vigneri, M., Sera, R. & Cardenas, A.L. (2016). Researching the Impact of Increased Cocoa Yields on the Labour Market and Child Labour Risk in Ghana and Côte d'Ivoire. ICI Labour market research study. Available at: http://www.cocoainitiative.org/wp-content/uploads/2016/12/market_research_full_web.pdf

⁷ Fountain, A.C. and Hütz-Adams, F. (2015). Cocoa Barometer 2015-USA Edition. Available at http://www.cocoabarometer.org/International_files/Cocoa%20Barometer%202015%20USA.pdf

⁸ Kolavalli, S. and Vigneri, M. (2017). The cocoa coast: The board-managed cocoa sector in Ghana. Washington, D.C.: International Food Policy Research Institute (IFPRI). Synopsis available at <https://doi.org/10.2499/9780896292703>

1.1.3 Improving cocoa productivity

Improving productivity is a common approach to raising incomes in cocoa households. It is widely accepted that most cocoa farms are far from achieving potential yields due to poor agronomic practices, and low, incorrect or untimely use of inputs. Therefore, training on good agronomic practices (GAP) is often seen as a way to remedy the situation. Advocates for boosting farmer yields also see this as one way to slow or reverse deforestation.

Nevertheless, this approach is sometimes critiqued due to the disappointing achievement of results at scale. This is partly due to the fact that interventions often aim to reach a large number of farmers rather than working more intensively with a smaller number. Some actors have also expressed concerns that improving productivity could contribute to oversupply in the future, resulting lower prices.

In our study, we dedicate a chapter to describing current production practices in detail, and present an analysis of yield determinants.

1.1.4 Higher cocoa prices

The idea that cocoa farmers should receive a higher price is not a new concept, although it has been operationalised in several different ways. For example, some advocates believe in intervening in international markets, buffer stock management or the establishment of a cocoa cartel. Others believe that national marketing boards should be the ones paying farmers a higher share of the price they receive on the international market. Higher prices are sometimes operationalised through a premium model, which rewards farmers for engaging in sustainable production. In some countries, quality differentiation (such as for fine flavour cocoa) has also enabled price differentiation.

Some proponents of higher cocoa prices argue that cocoa farmers should receive a greater share of the value of a chocolate bar. Detractors argue that a chocolate bar contains many other ingredients and goes through a substantial process of value addition, rendering comparisons problematic. Competition within the chain also means that most value chain actors also face tight margins, necessitating high volumes of trade to achieve profitability.

The question of who exactly (if anyone) should bear the cost of higher cocoa prices remains a sensitive one. As a globally traded commodity, cocoa prices are logically more responsive to supply and demand dynamics than to pleas for buyers to voluntarily pay higher prices.

There is also the question of how farmers may respond to a higher price signal. There are valid concerns that farmers could clear more land for cocoa, contributing to deforestation. Others may convert land from less profitable food crops to cocoa, thereby increasing global cocoa supply and potentially depressing prices.

In this study, we present a chapter on cocoa marketing in which the formation of cocoa prices and recent price trends are discussed. Cocoa prices are also an important element our cocoa profit model, which feeds into our calculations on total household income.

1.1.5 Diversification

Another recent shift in the discourse has been to encourage households to diversify into other crops (and even other non-agriculture incomes). This approach assumes that diversification can help reduce household dependence on cocoa and make them more resilient.

However, others have argued that promoting diversification into less profitable crop options would lower household incomes and risk a rise in poverty incidence. Some believe that promoting diversification is weak approach because farmers will typically choose the best crop options available in their local context regardless.

A related notion is that of a ‘dual transition’, whereby high potential cocoa households should work to professionalise, while other households would be better off transitioning away from cocoa.⁹ It has been suggested that climate change could be one driver behind diversification and conversion away from cocoa.^{10,11}

In this study, we look at both crop and income diversification and ask to what extent cocoa households are already diversified and for what reasons, relative to non-cocoa households.

⁹ Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C. & Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics: Amsterdam. Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>

¹⁰ Wessel, M., & Quist-Wessel, P. F. (2015). Cocoa production in West Africa, a review and analysis of recent developments. NJAS-Wageningen Journal of Life Sciences, 74, 1-7. Available at https://www.researchgate.net/publication/282316360_Cocoa_production_in_West_Africa_a_review_and_analysis_of_recent_developments

¹¹ P. Läderach (2011). Predicting the Impact of Climate Change on the Cocoa-Growing Regions in Ghana and Cote d'Ivoire. Final report September, 2011. Part of the Decision and Policy Analyses (DAPA) program at the International Center for Tropical Agriculture (CIAT) under the leadership of Dr. Peter Läderach, with the collaboration of Anton Eitzinger, Armando Martinez and Narioski Castro. The compilation of the ground data has been facilitated through Agro Eco – Louis Bolk Institute in Ghana.

1.2 The importance of data for understanding complexity

What is certain is that all of the above issues are complex and intertwined.

Policymaking requires a sufficiently deep understanding of the issues and access to relevant data to quantify the size and scale of a given problem. Furthermore, it requires an integrated approach which considers relationships between different crops and their profitability, risks and resilience, nutrition, and intra-household dynamics. This approach can help explain why cocoa, for all its challenges, remains an attractive option for many households.

The Cocoa Barometer 2015 was well received by industry and non-governmental organisations (NGOs), and was also notable for its attempt to share all of its data sources. Unfortunately, this highlighted the fact that most data is only available in aggregated form. Databases are rarely made publically available to other researchers, and most studies are based on relatively small or non-representative samples.

Part of the problem is that many companies do not publish internal reviews and evaluations. A regularly shared concern is that publication of negative outcomes will lead to criticism by NGOs. Fortunately, this does appear to be changing. By involving companies in knowledge processes, there is an increasing openness to share reports.

The problem of data sharing is not limited to companies. NGOs and other researchers also do not share databases from their own studies. Access to the actual datasets is important for others to be able to have confidence in the figures presented, and to be able to replicate the findings. Access is also important to allow others to query relationships between variables, understand the distributions of variables (not just averages), and analyse whether or not differences between certain groups are statistically significant or not.

We are unsure as to the precise reasons why databases are not usually shared. In some cases this may be due to a lack of confidence in data quality, while in other cases there may be fears about revealing the performance of a programme. There is also certainly a considerable time cost involved in preparing a dataset for public access, which funders may be unwilling to pay for.

1.3 Demystifying the cocoa sector with open data

As a knowledge institute, KIT believes that research should not be seen as a cost, but as an investment that the sector must make. Without access to quality data, programmes and policies may suffer through poor design or targeting. In the worst case, harmful myths may pervade the discourse, even well-intentioned ones.

This major study aims to contribute to the cocoa sector's body of knowledge by demystifying current trends, and providing a solid evidence base to test common assumptions and beliefs. We are pleased to provide free access to the database for everyone. We also hope that other actors who commission or implement research in the cocoa sector will start publishing datasets. Doing so would increase the opportunities for data validation, enhance the evidence base for policy making and accelerate innovation.

KIT would like to thank a number of partners who made this study possible.

The researchers are thankful for the financial support provided by the International Trade Initiative (IDH), the Jacobs Foundation, the Lindt Cocoa Foundation and UTZ. KIT is also grateful for the contribution of the German Initiative on Sustainable Cocoa (GISCO).

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2

Methodology

Bymolt, R., Laven, A., Tyszler, M. (2018). Demystifying the cocoa sector in Ghana and Côte d'Ivoire. Chapter 2, Methodology. The Royal Tropical Institute (KIT).



2.1 Research approach

The research methodology was designed by KIT with input from our funding partners. The over-arching aim of the study is to contribute to the cocoa sector's body of knowledge and provide a solid evidence base to test common assumptions and beliefs.

The research covers a broad range of subjects including household demographics, food security and nutrition,¹ and crop choices and crop diversification. Specific to cocoa, the study investigates why households grow cocoa, and analyses the major aspects of cocoa production and marketing. Household wealth, income and poverty is also assessed, and further disaggregated in a cluster analysis. The study also looks at intra-household dynamics which are brought together in a gender chapter.

Originally, we aimed to integrate three elements in particular. These are 'on farm', 'between farm' and 'within household'.

On farm: This element involved analysing all aspects of cocoa production and marketing. We also sought to understand the relative importance of cocoa in relation to other 'competing crops', and the role of crop diversification within the farming system.

Between farm: This element involved analysing household demographics, and disaggregating households in the sample according certain characteristics. (For example, cocoa vs non-cocoa households; male headed vs female headed households, etc.)

Within household: This involved understanding intra-household dynamics, particularly male and female roles on the farm and in the household, as well as access to assets and decision making power.

An important consideration was to make the cocoa household (rather than the individual farmer) our unit of analysis. This is because we recognise that household members often take on different roles in cocoa production and marketing, as well as different roles in other income-generating activities, all of which contribute to household wellbeing.

¹ The Sustainable Trade Initiative (IDH) and the Global Alliance for Improved Nutrition (GAIN) have signed a Memorandum of Understanding, to mark a new partnership to improve the health and nutrition of smallholder farmers and their communities in agricultural value chains. Our research findings provide input to the development of their joint strategy and company programmes in Ghana and Côte d'Ivoire.

A mixed-methods approach was chosen for this research involving 1500 household surveys in Ghana and 1500 in Côte d'Ivoire, as well as 37 focus group discussions in each country.

For the household survey, a large sample size was deemed important so that data could be analysed for statistical significance, and findings could be potentially be generalised at the regional and country level. The household survey covered demographic information, socio-economic characteristics, nutrition and food security questions and detailed questions on the production and sales of each household's two most important crops. The survey borrowed from other indexes where relevant, including the Dietary Diversity Score (DDS)² and the Poverty Probability Index (PPI)³ and included DHS Wealth Index survey questions.⁴ The household survey was written in XLSform markdown and deployed on digital tablets running Open Data Kit. The survey has been made available for download on the project website, along with the database.

Focus group discussions were also conducted in the same communities as the household surveys. Discussions focussed on the understanding the reasons why households make particular decisions on the farm and in the household, and what the current trends are in different communities. Focus group discussions consisted of a variety of different exercises that complemented the household survey questions. The participatory exercises included scoring and ranking, and provided the opportunity to probe farmers' perceptions to understand risks and their behaviour.

Data was collected in Ghana between November 2016 and January 2017, and in Côte d'Ivoire between February and March 2017. In the household survey, respondents were asked to recall information from the 2015-2016 cocoa season. In Ghana, this timing coincided with elections in December 2016, which resulted in changes in the government and within COCOBOD. In early 2017, there was a major price-drop in the world-market price of cocoa. At the time of fieldwork, this was yet to directly affect farmers in our sample.

² FAO and FHI 360 (2016). Minimum Dietary Diversity for Women: A Guide for Measurement. Rome: FAO. Available at <http://www.fao.org/3/a-i5486e.pdf>

³ Portal on Poverty Probability Index by Innovations for Poverty Action (IPA). Link <https://www.povertyindex.org/about-ppi>

⁴ Portal on the Demographics and Health Survey Programme. USAID. Link <https://www.dhsprogram.com/topics/wealth-index/Wealth-Index-Construction.cfm>

2.2 Research phases

The research was conducted in three phases:

- Desk study and methodology development
- Fieldwork
- Analysis and reporting

2.2.1 Phase 1 - desk research and methodological development

An extensive and systematic desk study was conducted to understand the present state of knowledge of the cocoa sector in Ghana and Côte d'Ivoire. The desk research phase also allowed the researchers to identify areas where there were inconsistencies across studies, or where certain beliefs did not seem to be well supported by strong evidence.

Approximately 100 key articles were collected and coded in ATLAS.ti. A summary report was then made structured around the main coded topics. The research team are grateful to our research and funding partners for their contributions and for sharing a number of key articles with us.

2.2.1.1 Research questions

The desk research served as a basis for developing an initial list of hypotheses and assumptions to be tested. This, in turn, led to the development of overarching research questions:

- What are the defining demographic and socio-economic characteristics of cocoa and non-cocoa producing households?
- What are the dominant crop/livelihood options in the research areas, and why?
- Are cocoa households leaving cocoa or increasing the share of land under cocoa, and how is the process happening?
- To what extent are cocoa household incomes diversified, and in what ways?
- What is the poverty and wealth status of cocoa households compared with non-cocoa households?
- What is the nutrition and food security status of cocoa households compared with non-cocoa households? What is the availability, affordability of different food groups?
- To what extent do households invest in inputs and apply good agricultural practices for cocoa and other crops?
- What are the costs, revenues and profitability of cocoa compared with other crops?
- How do cocoa households sell the cocoa, and how are cocoa prices formed?
- What roles do men and women typically play on the farm and in the household, and why?

- Who typically makes decisions about investments in cocoa and expenditures on other household items?
- How are cocoa institutions perceived and what can be done to better support sustainable production?

2.2.1.2 Development of research tools

The household survey and focus group discussion exercises were developed following the desk research, cross checked with our research questions and hypotheses, and were validated with our research partners.

An extensive household survey was developed to cover each household's social-economic characteristics, nutrition and food security status, agricultural and non-agricultural income sources, and the production and sales of their two most important crops. The survey was also designed to capture information on savings and loans, household assets, livestock assets and productive assets. The survey was designed to be around one hour long to prevent respondent fatigue.

The survey tool was developed in XLSForm markdown language and deployed on digital tablets running Open Data Kit (ODK) software.⁵ ODK was chosen for its ease of use and accuracy of data collection and aggregation compared with traditional paper-based surveys. For example, the survey was programmed to make live calculations, which then gave enumerators error and warning alerts when unexpected values were entered. Programmed skip logic was used so that respondents were only asked questions consistent with their prior responses, whilst non-relevant questions were automatically skipped. Furthermore, there is no need to transcribe data from paper to digital format, saving time and eliminating the potential for transcription errors. Once completed and checked, surveys were pushed to a cloud server to provide remote backups and monitoring of progress.

To enhance the quality of survey data, we often prefaced blocks of questions with a 'do you know' question. For example, respondents were asked '*Do you know how much land your household used to cultivate all your crops last year?*' Binary yes/no questions were used in conjunction with programmed skip logic on the tablets. If respondents answered 'yes' then they would receive the block of questions. If they answered 'no', then the block would be skipped, preventing respondents from giving insufficiently informed responses on the topic. Data quality was also enhanced by allowing respondents to answer certain questions in any unit they felt most comfortable. For example, land sizes could be answered in acres, hectares or poles, and volumes could be answered in bags or kilograms.

⁵ See Open Data Kit: <https://opendatakit.org>

Focus group discussion exercises were developed to complement the household survey. Whilst the household survey tried to gather data on ‘what’ and ‘how much’, the focus group exercises were designed to answer the questions ‘why’, ‘how’, and ‘for whom’. The focus group exercises were designed to be participatory to provide participants with the opportunity to share their perceptions in detail. Many included ranking and scoring components. The exercises were methodologically underpinned by the PADev method.⁶ Men and women both attended the focus group discussions but sat apart. The facilitator took turns prompting men and women to respond during each discussion. Each focus group session took around 4-5 hours, and included the same participants who took part individually in the household survey.⁷ Four focus group exercises were conducted in each community, due to time availability. The researchers rotated the exercises between communities. The following exercises were included in the study:

- **Income sources:** identifying, ranking and describing the most important income sources in the community;
- **Calendar:** understanding income and expenditure patterns throughout the year;
- **Nutrition:** discussing availability and affordability of food groups, and understanding household decision-making roles;
- **Statements:** Likert scale scoring and discussion on a selection of research hypotheses;
- **Budget:** Participatory budget exercise focusing on labour days, input costs, yield and price as a way to triangulate survey data and generate initial estimations of profitability;
- **Changes:** understanding participant perceptions of changes and trends in a range of domains from five years ago to today;
- **Institutions:** discussion of institutions present in the community and scoring relative satisfaction/dissatisfaction with the products or services they provide;
- **Intra-household relations:** understanding household roles and input in productive decision- making (based on the A-WEAI);⁸
- **Access:** understanding ownership of assets, access to and decisions on credit, control over use of income and group membership (based on the A-WEAI).

2.2.1.3 Sampling

A sampling frame was developed during phase 1. The desire for the research to be representative and generalisable necessitated an approach to sampling that was both random and practically implementable in the field with the resources available.

Geography was the main stratification characteristic. The geographic focus in both Ghana and Côte d’Ivoire was on cocoa growing areas (rather than cocoa households

⁶ See www.padev.nl

⁷ Participants were provided with drinks and snacks, and later a lunch. Normally the 4-5 hour session would start early in the morning (8 am-1 pm).

⁸ The WEAI is a survey-based index designed to measure the empowerment, agency, and inclusion of women in the agricultural sector. Source: Malapit, H. Kovarik, C., Sproule, K., Meinzen-Dick, R. and Quisumbing, A. (2015). Instructional Guide on the Abbreviated Women’s Empowerment in Agriculture Index (A-WEAI). Available at https://www.ifpri.org/sites/default/files/a-weai_instructional_guide_final.pdf

specifically). The intention was to sample 1,500 respondents in both Ghana and Côte d'Ivoire (total 3,000). This was to be achieved by visiting one community per day, and carrying out approximately 40 surveys in each community.

Randomised sampling was done in two stages. First, a long list of cocoa growing regions was compiled for both countries. In Ghana we gave more weight to the Western Region, because it is a region with a high proportion of Ghana's total cocoa production. In the 2015/2016 season, the Western region produced 53% of Ghana's total production.⁹ Computer-generated random numbers were assigned to each community in each district of each region. In both Ghana and Côte d'Ivoire, the community randomly assigned the highest number in each district was selected for the study. This ensured that we did not simply visit communities that were the most accessible or convenient.

At the community level, randomisation was carried out by one of the research team members a few days in advance of each visit. The team member worked with local leaders in the communities to select a random sample of people in each community. This was done through a simple transect walk, north, east, south and west from the centre of the village. Ten households from each direction were selected, skipping every *N*th house, depending on the size of the community. This ensured that potential bias was removed to avoid the systematic selection of the best farmers, those who are well-connected members of groups, or those who frequently participate in projects.

It is important to note that there was no requirement that the household had to include a cocoa farmer, or even any kind of farmer. We did not intentionally select respondents that were involved in a certain programme or affiliated with a certain buyer, as is often the case in evaluations of sustainability programmes.

The only requirement was that no less than one third of respondents was female, which was important both for having women's voices in the research and, specifically, for measuring women's dietary diversity.¹⁰ In the final sample, in both countries, 34% of respondents were women.

In total, 1,560 household surveys were collected in Ghana and 1,485 in Côte d'Ivoire (total 3,045 household surveys). In each country, 37 focus group discussions were conducted, one in each of the communities visited (total 74 focus group discussions). The same sample of participants attending the focus group discussions were interviewed for the household survey.

⁹ COCOBOD (2018). Regional Cocoa Purchases. Available at https://cocobod.gh/weekly_purchase.php

¹⁰ FAO and FHI 360 (2016). Minimum Dietary Diversity for Women: A Guide for Measurement. Rome: FAO. Available at <http://www.fao.org/3/a-i5486e.pdf>

Figure 2.1 Location of sampled communities

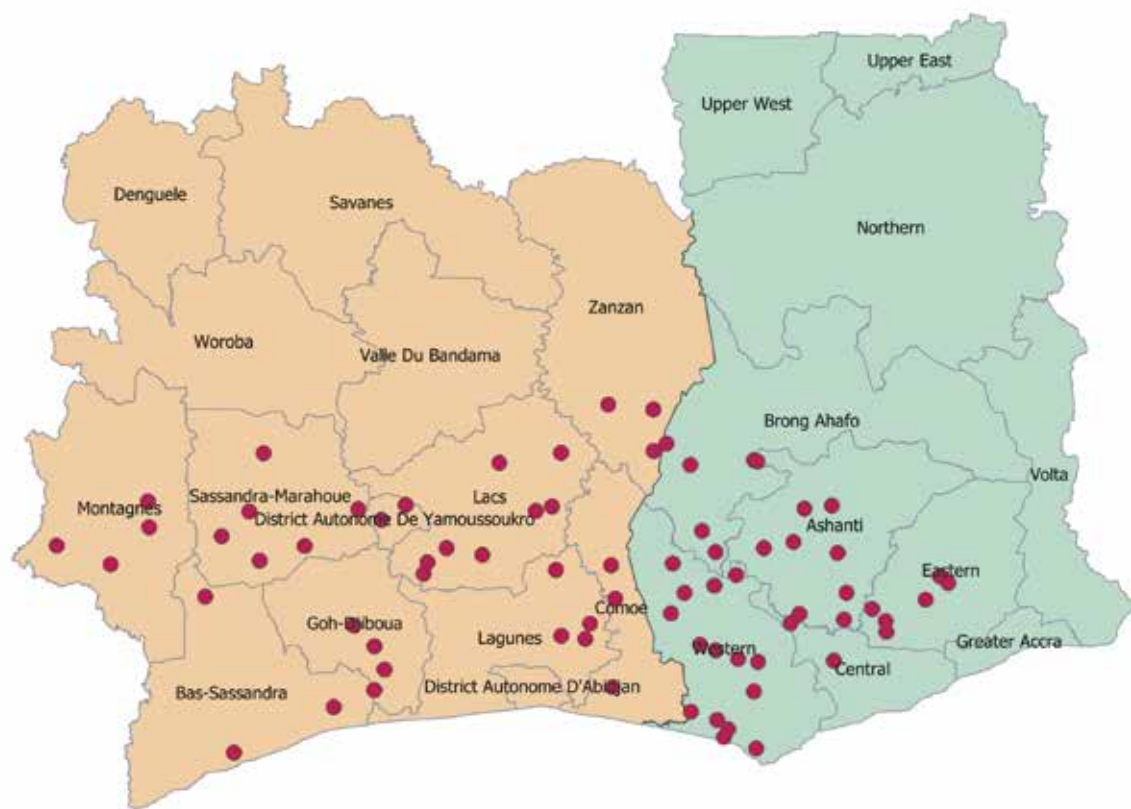


Table 2.1 Regions sampled in Ghana, percent of respondents

Region	% respondents	N respondents
Ashanti	20%	317
Central	5%	72
Brong Ahafo	17%	270
Western	41%	645
Eastern	16%	256
N		1560

Note: percentages may not add up to 100% due to rounding

Table 2.2 Administrative Districts¹¹ sampled in Côte d'Ivoire, percent of respondents

Region	% respondents	N respondents
Autonome De Yamoussoukro	6%	90
Lacs	24%	358
Montagnes	10%	142
Bas-Sassandra	11%	159
Goh-Djiboua	9%	136
Zanzan	8%	126
Sassandra-Marahoue	17%	251
Comoe	7%	97
Lagunes	8%	126
N		1485

Note: percentages may not add up to 100% due to rounding

¹¹ An administrative district in Côte d'Ivoire is approximately the same unit as a region in Ghana

2.2.2 Phase 2 - Fieldwork and data collection

In each country, local enumerators, managed by a local consultant, conducted the household surveys with respondents. Prior to fieldwork, KIT delivered three days of intensive training to enumerators in each country. The goal of the training was to familiarise the research team with the research project, train enumerators on the use of tablets and to ensure that the meaning of all questions was understood in detail. Training was followed by a testing phase in a community to address any remaining issues.

The research team arrived at each research location early in the morning and liaised with the village leader, who had been informed of our visit in advance, and who had supported the random sampling process. Following introductions with the community, the lead KIT researchers began the focus group discussion exercises.

Facilitators took particular care to involve female participants full in the focus group discussions. For example, women were often asked to give their perspectives before the men. Care was also taken to balance the involvement of 'opinion leaders', who are often well-respected and knowledgeable members of the community, with the voices of 'ordinary' farmers. A plurality of opinions was welcomed in the focus group discussions.

During the focus group discussions, the enumerators would each take one person out of the discussion to do a household survey with them individually. On completion the respondent would return to the focus group discussion and the next person would be surveyed. For most household surveys, female enumerators surveyed female respondents.

The survey and focus group discussions were always conducted in a location chosen by the community. In Ghana, the research was often conducted in a local church or community centre. In Côte d'Ivoire, once the chief has granted permission, the participants were gathered in a central, shaded place (sometimes under the central mango tree).

For the first 10 days, every completed household survey was checked by a KIT advisor for any errors or misunderstandings. Daily briefings were held at the beginning of each day to discuss with the team any problems that may have occurred the previous day. Thereafter, when enumerator errors had fallen to very low levels, a sample of each enumerators' surveys was checked daily.

2.2.3 Phase 3 - Analysis and reporting

The report has been divided into the following chapters. Following the introduction (Chapter 1) and methodology (Chapter 2), we first describe the characteristics of respondents and households in our sample, giving attention to demographics such

as age, gender of the household head, education levels and so on (Chapter 3). In various places in the report we disaggregate by these characteristics as we analyse differences between groups. In Chapter 4, we analyse the nutrition and food security status of households. In Chapter 5 we present an analysis of crop choices and crop combinations, followed by a detailed chapter on land (Chapter 6). Chapter 7 presents a qualitative description of ‘why households produce cocoa’. Chapter 8 presents data on cocoa production activities, labour and inputs. In Chapter 9, we continue with data on cocoa farmer groups, certification and training. Productivity and yields are analysed in Chapter 10. Chapter 11 gives a detailed description and analysis of cocoa production and marketing. Other major crops are compared with cocoa in Chapter 12. In Chapter 13 we analyse wealth, poverty and income. Chapter 14 summarises gender issues presented throughout the paper and provides some additional analysis of intra-household relations. A cluster analysis is presented in Chapter 15 in which we address the question of whether or households can be distinguished in certain categories. The main findings and conclusions of the study are brought together in Chapter 16.

Throughout the report, we have always disaggregated Ghana and Côte d’Ivoire data. In addition we have presented a number of tables disaggregated in other ways, such as by the sex of the household head, or by cocoa or non-cocoa households. Other disaggregation is presented where statistically significant differences were found.

The format we have chosen for most tables presents the coefficient for the two countries, the standard error (of the mean), the P-value and an indication of its statistical significance using stars. ** means statistical significance at the 5% level (the most commonly used indication that a difference in means between two groups is not attributable to chance), and *** indicates very high significance at the 1% level. At the end of most tables, we also indicate the number of observations (N). Data with low N have often been excluded because an interpretation is usually not robust. Finally, we usually include the variable name at the bottom of the table so that others can replicate the findings if they download the database.

When we present an association between two categorical variables, we have used a Chi-squared test (for example, to examine categories of educational level achieved by the sex of the household head). When analysing the association between a continuous variable and categorical variables, we have used a one-way ANOVA test (for example, to analyse land size by regions of a country). Similarly, if the categorical variable has only two groups, the one-way ANOVA is essentially the same as an unpaired t-test analysing the difference of means (for example land size by the sex of the household head).

The full dataset from our research is published on Dataverse¹² for other researchers to freely download and use for their own research. To facilitate the use of Dataverse we have included variable names under each table presented in this report. We also provide other readers with a 'data navigator' which allows any user to browse basic descriptive data in their web browser.

2.2.4 Limitations

In the set-up of our research we have tried to be as extensive as possible, however, like all studies there were still limitations. In some instances, this may suggest the need for more focussed research to answer highly specific questions.

We have given detailed attention to cocoa in this report, as it is the main crop of interest. We also collected detailed data on eight other major crop options in cocoa producing areas. However, during analysis we found that for several crops, the number of observations too low to confidently provide robust details of the production system, or revenue and profit. In other cases, respondents found it particularly difficult to recall their total production. A case in point was cassava, which is typically not harvested at once but bit by bit. Some respondents even sell the field and leave it to the buyer to harvest, which makes estimates even more complicated.

For disaggregated data, we also sometimes encountered problems with a low number of observations. For example, there is a low number of female-headed households producing cocoa in Côte d'Ivoire. In some cases, this makes it difficult to make definitive statements about certain groups or sub-groups and, in other cases, we have relied on the qualitative focus group data to describe the findings.

Finally, the research did not cover some important topics, such as child labour. This would require a specific methodological focus to do justice to the issue. We would have liked to have been able to collect more detailed survey questions on aspects like food security and household expenditures, however we judged that this would make the survey too long for respondents.

¹² <https://doi.org/10.7910/DVN/82TWZJ>

The background of the entire slide is a close-up, high-resolution photograph of cocoa beans. The beans are densely packed and show a variety of colors, including deep reds, oranges, browns, and some darker, almost black, spots, indicating different stages of fermentation or roasting. The texture of the bean shells is visible.

3

Respondent and household demographics

Bymolt, R., Laven, A., Tyszler, M. (2018). Demystifying the cocoa sector in Ghana and Côte d'Ivoire. Chapter 3, Respondent and household demographics. The Royal Tropical Institute (KIT).

3.1 Demographics

As described in the Methodology chapter, household surveys were conducted across the cocoa growing regions of Ghana and Côte d'Ivoire. In all, 1,560 surveys were conducted in Ghana (66% male, 34% female) and 1,485 surveys were administered in Côte d'Ivoire (66% male, 34% female).

Data was gathered on a number of different household characteristics of the respondent and household head, such as age, education, sex, marital status, immigrant status, leadership role, and household composition.

Household demographic data is presented in this section in basic descriptive form. Later, we analyse how this data interacts with the choice to grow cocoa (or engage in other activities) and how household characteristics may affect livelihood outcomes. Demographic data also allows for regression analysis on minimum achieved Dietary Diversity Score, access to assets, productivity levels, certain crop choices, and many other dependent variables. We also attempt to use this data for a 'cluster analysis' to understand whether or not households fall naturally into certain categories, and the implication of these findings for cocoa programmes.

In presenting the demographics, we make a distinction between 'cocoa households' and 'non-cocoa households'. We define 'cocoa households' as households for which cocoa was reported as either their most important or second most important crop. This definition was an intentional outcome of the survey design – respondents were only asked a detailed set of questions for their two most important crops due to time constraints. For Ghana, cocoa households comprised 84% of the total sample (N= 1,318) and in Côte d'Ivoire 61% (N =910).

The distinction between cocoa and non-cocoa households allows us to analyse whether certain characteristics are specific to cocoa households, or whether they are more general phenomena associated with rural smallholders. Where statistically significant regional differences were found, these have been presented.

3.1.1 Sex of respondent and sex of the household head

In a number of previous cocoa studies, the sex of cocoa farmers (often discussed in terms of gender) has been a prominent characteristic of

analysis.^{1, 2, 3, 4, 5} Sector organisations, such as the World Cocoa Foundation,⁶ and international NGOs such as Oxfam's Behind the Brands Campaign⁷ and CARE International,⁸ likewise, bring attention to gender differences.

Most of these studies identify and discuss gender inequalities, such as differences in rates of participation in cocoa production activities, unequal access to land, labour, and inputs, more limited access to training and farmer organisation membership, poorer access to credit, and generally less control over income earned from the sale of cocoa.^{9,10} Some studies stress that female farmers have higher operational costs, as they depend more on hired labour¹¹ or, because they cannot afford hired labourers, they rely more on child labour.¹²

In most cocoa studies, the overall sample size is small, or the proportion of female respondents in the sample is low. This makes it challenging to draw firm conclusions about how certain gender differences play out and affect livelihood outcomes, not just for the individual but also for the household.

To allow us to test for possible gender differences in this study, we deliberately aimed at a minimum of one third of female respondents (Table 3.1). As gender is a cross-cutting theme, gender differences are reported in each section, with a specific chapter on intra-household dynamics bringing together the most important of these findings.

Table 3.1 Respondent sex and percent of respondents, by country

	Ghana	Côte d'Ivoire	pvalue	sig
Male respondents	66%	66%	0.58	
Female respondents	34%	34%		
N	1,560	1,485		
p1_respondent_gender				

- ¹ Vigneri, M. and Serra, R. (2016). Researching the Impact of Increased Cocoa Yields on the Labour Market and Child Labour Risk in Ghana and Côte d'Ivoire. ICI Labour market research study. Available at: http://www.cocoainitiative.org/wp-content/uploads/2016/12/market_research_full_web.pdf
- ² Vigneri, M. and Holmes, R. (2009) Gender pathways out of poverty. Rural Employment. FAO, ILO. Available at http://www.fao-ilo.org/fileadmin/user_upload/fao_ilo/pdf/Papers/20_March/Vigneri-Holmes-final.pdf
- ³ Barrientos, S.W & Asenso Akyere, K. (2008). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocoalife.org/progress/mapping-sustainable-production-in-ghanaian-cocoa>
- ⁴ Barrientos, S., and Adwoa Owusuua, B. (2016) Promoting Gender Equality in the Cocoa-Chocolate Value Chain: Opportunities and Challenges in Ghana. GDI Working Paper 2016-006. Manchester: The University of Manchester. Available at http://hummedia.manchester.ac.uk/institutes/gdi/publications/workingpapers/GDI/GDI_WP2016006_Barrientos_Bobie.pdf
- ⁵ Fountain, A.C. and Hütz-Adams, F. (2015) Cocoa Barometer 2015-USA Edition. Available at http://www.cocoa-barometer.org/International_files/Cocoa%20Barometer%202015%20USA.pdf
- ⁶ World Cocoa Foundation (n.d.) The Gender and Cocoa Livelihoods Toolbox. Available at <http://genderandcocoalivelihoods.org/>
- ⁷ McFall, M., Rodehau, C., Wofford, D. (2017). Oxfam's "Behind the Brands" Campaign, Case Study. Washington, DC: Population Council, The Evidence Project. Available at <http://evidenceproject.popcouncil.org/wp-content/uploads/2017/03/Case-Study-2-Oxfam.pdf>
- ⁸ CARE International, Mondelez International's Cocoa Life program. (2016). Women's Leadership in Cocoa Life Communities. Emerging best practices of women's leadership within cocoa farming in Ghana and Côte d'Ivoire. Available at <https://insights.careinternational.org.uk/publications/women-s-leadership-in-cocoa-life-communities>
- ⁹ FAO (2012). Gender inequalities in rural employment in Ghana: an overview. Gender, Equity, and Rural Employment Division of FAO. Available at <http://www.fao.org/docrep/016/ap091e/ap091e00.pdf>
- ¹⁰ Fair Labor Association (2015). Evaluer la situation actuelle des femmes et des jeunes agriculteurs et l'état nutritionnel de leurs familles dans deux communautés productrices de cacao en Côte d'Ivoire. Rapport préparé par Fair Labor Association, Juillet 2015. Available at http://www.fairlabor.org/sites/default/files/documents/reports/femmes_et_des_jeunes_nutrition_dans_communautes_de_dacao_juillet_2015.pdf
- ¹¹ Barrientos, S.W & Asenso Akyere, K. (2008). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocoalife.org/progress/mapping-sustainable-production-in-ghanaian-cocoa>
- ¹² Vigneri, M. and Serra, R. (2016). Researching the Impact of Increased Cocoa Yields on the Labour Market and Child Labour Risk in Ghana and Côte d'Ivoire. ICI Labour market research study. Available at: http://www.cocoainitiative.org/wp-content/uploads/2016/12/market_research_full_web.pdf

To be consistent with most other household surveys, the ‘head of the household’ was not defined by the researchers, but was self-determined by respondents. Being the head of the household typically implies an important role in certain decision-making and is often related to ownership over assets such as land.

Some studies indicate that it matters whether or not the household is male headed or female headed in terms of food security and poverty rates. For example, in Ghana poverty rates among female-headed households are lower than those of their male counterparts.¹³ Also, the Ghana Living Standards Survey reports that, “Poverty incidence among male-headed households is higher (25.9%) than female-headed households (19.1%)” and that this, “follows the same pattern found in 2005/06.”¹⁴

In our study, most respondents in both countries self-identified as the head of the household (Ghana 78%, Côte d’Ivoire 69%) and, as expected, there were highly significant gender differences in both Ghana (45% female respondents) and Côte d’Ivoire (26% females) (Table 3.2). In Ghana, although 55% of female respondents in Ghana did not identify as the household head, nevertheless, they contributed their knowledge to the research in both the household surveys and focus group discussions. In 95% of cases, male respondents self-identified as the household head, and those who were not the head were often the son of the head.

In Côte d’Ivoire, fewer female respondents identified as the household head and 74% did not. Among male respondents, 90% said they were the household head and 10% said they were not.

Throughout this report, we usually report significant differences between male and female-headed households, rather than between male and female respondents. This is because most survey questions in our study were targeted at the household unit. We also note that male headed households frequently include females who also participate in cocoa production and other supporting activities. Likewise, female headed households also frequently include male household members who also contribute to farming and other related activities.

Table 3.2 Respondent is head of the household, percent of respondents, by sex of respondent

	Ghana Female respondent	Ghana Male respondent	Côte d’Ivoire Female respondent	Côte d’Ivoire Male respondent
Head	45%	95%	26%	90%
Non-head	55%	5%	74%	10%
N	538	1,022	498	987
p1_respondent_head_yn				

Note: Pvalue is 0.00 for Ghana (highly significant) and 0.00 for Côte d’Ivoire (highly significant). Table has been modified for ease of reading.

¹³ FAO (2012). Gender inequalities in rural employment in Ghana: an overview. Gender, Equity, and Rural Employment Division of FAO. Available at <http://www.fao.org/docrep/016/ap090e/ap090e00.pdf>

¹⁴ Although both sexes have seen a decline in poverty, the rate is three times greater for male headed households (9 percentage points compared with 3 percentage points for female headed households). Ghana Statistical Service. (2014). Ghana living standards survey round 6 (GLSS 6), Poverty profile in Ghana 2005-2013. Available at http://www.statsghana.gov.gh/docfiles/glss6/GLSS6_Poverty%20Profile%20in%20Ghana.pdf p.19

3.1.2 Age

The age of cocoa farmers has sometimes been a contentious discussion in the cocoa sector. There is some concern that cocoa farmers are getting older and could become unproductive. For example, Aneani *et al.* argue that, “The age of cocoa farmers is predicted to have a negative impact on adoption because, as the age increases, his physical strength tends to reduce and this is assumed to impact negatively on adoption of the technologies. Farmers with more experience in cocoa cultivation would be able to apply their cropping experience in the cultivation of cocoa and this would increase their ability to adopt the cocoa technologies”.¹⁵ Likewise, Barrientos & Akyere found that there are significant differences in productivity by age of farmers, with older farmers producing lower yields per acre than younger farmers.¹⁶

On the other hand, some authors have suggested that youth are not interested in cocoa farming and may seek other crop options or non-agricultural livelihood options.¹⁷ The feared implication is that, as one generation passes away, the next generation may not be willing to take over, which would contribute to long-term global supply pressures. The World Health Organisation reports that, in 2015, life expectancy in Ghana was 61 years for men and 64 for women¹⁸ and in Côte d’Ivoire: 52 years for men and 54 for women.¹⁹

The mean age of cocoa farmers is regularly reported in many studies. However, care needs to be taken in the interpretation of age data to avoid drawing the wrong conclusions about the age of farmers and the future direction of the cocoa sector.

Most household surveys collect information on the age of respondent or household head (or both), rather than the ages of all household members working on cocoa (i.e. ‘cocoa farmers’). The respondent is most often the household head, and is also frequently the oldest person in the household. Therefore, the ‘average age of cocoa farmers’ is skewed upwards by the age of the head. In reality, the head may only be one of several household members contributing to the cultivation of cocoa.

Most studies only report mean age, do not present age distribution, and do not share the raw dataset. Another commonly encountered limitation is that other studies typically do not make a comparison between cocoa and non-cocoa households from within the same geographic areas. In general, it is difficult for other researchers

¹⁵ Aneani, F., Anchirinah, V., Owusu-Ansah, F., Asamoah, M. (2012). Adoption of Some Cocoa Production Technologies by Cocoa Farmers in Ghana. Sustainable Agriculture Research Vol. 1, No. 1; February 2012. Available at <http://www.ccsenet.org/journal/index.php/sar/article/view/14550>

¹⁶ Barrientos, S.W & Asenso Akyere, K. (2008). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocoalife.org/progress/mapping-sustainable-production-in-ghanaian-cocoa>

¹⁷ Fountain, A.C. and Hütz-Adams, F. (2015) Cocoa Barometer 2015-USA Edition. Available at http://www.cocoabarometer.org/International_files/Cocoa%20Barometer%202015%20USA.pdf

¹⁸ World Health Organisation (2018). Ghana. Available at <http://www.who.int/countries/gha/en/>

¹⁹ World Health Organisation (2018). Côte d’Ivoire. Available at <http://www.who.int/countries/civ/en/>

to interpret the data presented in most reports. We believe it is important to know whether or not there is an issue around aging cocoa farmers and, if so, whether this is specific to cocoa or a more general smallholder farmer phenomena.

We reviewed the reported mean age in several earlier studies (Table 3.3). In Ghana, there does not seem to be any obvious indication that cocoa farmers are older now than in earlier times. One reference expressed concerns about the old age of cocoa farmers as far back as 1998.²⁰ As far as we can tell, concerns about an aging population of cocoa farmers in Ghana is largely anecdotal.²¹ Cocoa farmers (often the household head) surveyed in recent decades may seem relatively old, but there is no evidence the mean age is increasing. Furthermore, we are unaware of a large study that has compared the ages of cocoa and non-cocoa farmers in the same communities

Table 3.3 Mean ages of cocoa farmers (respondents) reported in previous studies, Ghana

Mean age	Region/other	Source	Sample size
55	Eastern Region	Anon (1973) cited in Dormon <i>et al.</i> (2004) ²²	103
53	Eastern Region	Boahene <i>et al.</i> (1999) ²³	Unknown
55	Eastern Region	Anon (1999) cited in Dormon (2006) ²⁴	Unknown
~50	Ashanti and Volta regions	Baah & Anchirarah (2010) ²⁵	300, random
51.5	Ashanti Brong-Ahafo Western Eastern Central Volta	Aneani <i>et al.</i> (2011a) ²⁶	300
50	Eastern, Central, Ashanti, Brong Ahafo, and Western	Hainmueller <i>et al.</i> (2011) ²⁷	3000
51	Ashanti, Western South and Eastern Regions	Barrientos & Akyere (2008) ²⁸	217
49.5	Ashanti, Eastern, Western	Waarts <i>et al.</i> (2013) ²⁹	385
48.7	11 cocoa districts	Asamoah <i>et al.</i> (2013) ³⁰	637
47.8	Ghana	Tulane University (2015) ³¹	1047

²⁰ MASDAR (1998). Socio-Economic Study of Cocoa Farming in Ghana. Consultancy report, Accra: Ghana Cocoa Board / MASDAR International consultants. UK.

²¹ For example, during a stakeholders' workshop to present the results of a national survey on labour use in cocoa (Ministry of Manpower, Youth and Employment, 2008), there was general consensus that the future of Ghana's cocoa is threatened by the country's inability to attract the youth into the sector. See Baah, F *et al.* (2012). Examining the cocoa farmer-purchasing clerk relationship in Ghana. *Global Journal of Science Frontier Research*, 12(11-D). Available at: <https://journalofscience.org/index.php/GJSFR/article/download/552/475/>

²² Dormon, E. N. A., Van Huis, A., Leeuwis, C., Obeng-Ofori, D., & Sakyi-Dawson, O. (2004). Causes of low productivity of cocoa in Ghana: farmers' perspectives and insights from research and the socio-political establishment. *NJAS-Wageningen journal of life sciences*, 52(3-4), 237-259. Available at: <https://www.sciencedirect.com/science/article/pii/S1573521404800162>

²³ Boahene, K., Snijders, T. A., & Folmer, H. (1999). An integrated socioeconomic analysis of innovation adoption: the case of hybrid cocoa in Ghana. *Journal of Policy Modeling*, 21(2), 167-184. Available at: <https://www.sciencedirect.com/science/article/pii/S0161893897000707>

²⁴ Dormon, E. N. (2006). From a technology focus to innovation development: the management of cocoa pests and diseases in Ghana. Available at: <http://library.wur.nl/WebQuery/wurpubs/fulltext/37758>

²⁵ Baah, F., & Anchirarah, V. (2010). Looking for convergence: Stakeholders' perceptions of cocoa extension constraints in Ghana. *Journal of Science and Technology (Ghana)*, 30(3). Available at: <https://www.ajol.info/index.php/just/article/view/64626>

²⁶ Aneani, F., Anchirarah, V. M., Owusu-Ansah, F., & Asamoah, M. (2011a). An analysis of the extent and determinants of crop diversification by cocoa (*Theobroma cacao*) farmers in Ghana. *African Journal of Agricultural Research*, 6(18), 4277-4287. Available at: http://www.academicjournals.org/article/article1380813419_Aneani%20et%20al.pdf

²⁷ Hainmueller, J., Hiscoc, M., & Tampe, M. (2011). Sustainable development for cocoa farmers in Ghana. MIT and Harvard University. Available at: <https://www.theigc.org/wp-content/uploads/2015/02/Hainmueller-Et-Al-2011-Working-Paper.pdf>

²⁸ Barrientos, S.W & Asenso Akyere, K. (2008). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocoalife.org/~media/CocoaLife/en/download/article/IDS.PDF>

²⁹ Waarts, Y., Ge, L., Ton, G. & van der Meen, J. (2013). A touch of cocoa: Baseline study of six UTZ- Solidaridad cocoa projects in Ghana. LEI report 2013-2014. LEI Wageningen UR. Available at: <http://library.wur.nl/WebQuery/wurpubs/fulltext/305316>

³⁰ Asamoah, M., Ansah, F. O., Anchirarah, V., Aneani, F., & Agyapong, D. (2013). Insight into the standard of living of Ghanaian Cocoa Farmers. *Greener Journal of Agricultural Sciences*, 3(5), 363-370. Available at: <http://cocoa.kit-ipp.org/cocoa/sites/default/files/publication/standard%20of%20living%20of%20ghanaian%20cocoa%20farmers.pdf>

³¹ Tulane University (2015). Survey Research on child labor in West African cocoa producing regions, 2013/14. School of Public Health and Tropical Medicine, Tulane University. July 30 2015. Available at: https://makechocolatefair.org/sites/makechocolatefair.org/files/newsimages/tulane_university_-_survey_research_on_child_labor_in_the_cocoa_sector_-_30_july_2015.pdf

In Côte d'Ivoire, we do not often encounter the same discourse on aging cocoa farmers. In most literature, the average age of the respondent (often the head) is lower than in Ghana. There are a few possible reasons for this, such as the country having a lower average life expectancy, or that there are “traditionally large age differences between husbands and wives (leading to a high number of widows), male mortality from AIDS and war, and male urban migration”.³²

Table 3.4 Mean ages of cocoa farmers (respondents) reported in previous studies, Côte d'Ivoire

Mean age	Region/other	Source	sample size
49	Est, Centre-Ouest, Sud-Ouest	Assiri et al. (2009) ³³	800
50, 54, 45	Baoulé, Bakwé, Burkinabé	Tano (2012) ³⁴	174
46	Côte d'Ivoire	Ingram et al. (2014) ³⁵	708
45	Côte d'Ivoire	Tulane University (2015) ³⁶	1214
47	Indénié-Djuablin, Nawa, Loh-Djiboua, Haut-Sassandra	Vigneri et al. (2016) ³⁷	918

In this study, we have tried to demystify the question of whether cocoa farmers really are older than non-cocoa farmers, by how much, why, and whether or not this matters.

In Ghana, we find that there is, in fact, a 5.5 year difference in mean age between respondents in cocoa households (50.69 years) and non-cocoa households (45.04 years) (*highly significant*). Similarly, we observe a five year difference in mean age between household heads from cocoa and non-cocoa households (*highly significant*) (Table 3.5). Analysis of the distribution of respondent age suggests this difference in means is a result of *both* a higher proportion of older respondents of cocoa households and a lower proportion of young respondents of cocoa household.

The reasons for these differences were not studied in detail, however, we have two hypotheses that other researchers may wish to explore further. First, we have heard anecdotes that some people refer to cocoa as ‘a retirement job’, meaning that it does not require particularly strenuous labour once established, requires relatively low labour days compared with other crops, and hired labourers can manage the cocoa farm. Second, many focus group participants discussed how sharecropping was a common way to get into cocoa farming. This may be a barrier for some young farmers as they may have to save before they can pay the upfront sharecropping fee.

³² Ingram, V., Waarts, Y., Ge, L., van Vugt, S., Wegner, L., Puister-Jansen, L., Ruf, F., Tanoh, R. (2014). Impact of UTZ certification of cocoa in Ivory Coast; Assessment framework and baseline. Wageningen, LEI Wageningen UR (University & Research centre), LEI Report 2014-010. Available at: <http://edepot.wur.nl/307584>

³³ Assiri, A. A., Yoro, G. R., Deheuvels, O., Kébé, B. I., Keli, Z. J., Adiko, A., & Assa, A. (2009). Les caractéristiques agronomiques des vergers de cacaoyer (# Theobroma cacao# L.) en Côte d'Ivoire. Journal of animal and plant sciences, 2(1), 55-66. Available at: <http://agritrop.cirad.fr/555828/>

³⁴ Tano, M. A. (2012). Crise cacaoyère et stratégies des producteurs de la sous-préfecture de Méadji au Sud-Ouest ivoirien (Doctoral dissertation, Université Toulouse le Mirail-Toulouse II). Available at: <https://halshs.archives-ouvertes.fr/tel-00713662/>

³⁵ Ingram, V., Waarts, Y., Ge, L., van Vugt, S., Wegner, L., Puister-Jansen, L., Ruf, F., Tanoh, R. (2014). Impact of UTZ certification of cocoa in Ivory Coast; Assessment framework and baseline. Wageningen, LEI Wageningen UR (University & Research centre), LEI Report 2014-010. Available at: <http://edepot.wur.nl/307584>

³⁶ Tulane University (2015). Survey Research on child labor in West African cocoa producing regions, 2013/14. School of Public Health and Tropical Medicine, Tulane University, July 30 2015. Available at: https://makechocolatefair.org/sites/makechocolatefair.org/files/newsimages/tulane_university_-_survey_research_on_child_labor_in_the_cocoa_sector_-_30_july_2015.pdf

³⁷ Vigneri, M. and Serra, R. (2016). Researching the Impact of Increased Cocoa Yields on the Labour Market and Child Labour Risk in Ghana and Côte d'Ivoire. ICI Labour market research study. Available at: http://www.cocoinitiative.org/wp-content/uploads/2016/12/market_research_full_web.pdf

In general, we find that the average age of Ghanaian respondents is fairly consistent with other studies, which suggests to us that fears that ‘the cocoa sector may be running out of cocoa farmers’ is unfounded.³⁸ Instead, we suggest that younger farmers do continue to enter the cocoa sector in sufficient numbers to replace older farmers as they step out. This argument is supported by the fact that the mean age of cocoa farmers reported in various studies has remained relatively constant in recent decades.

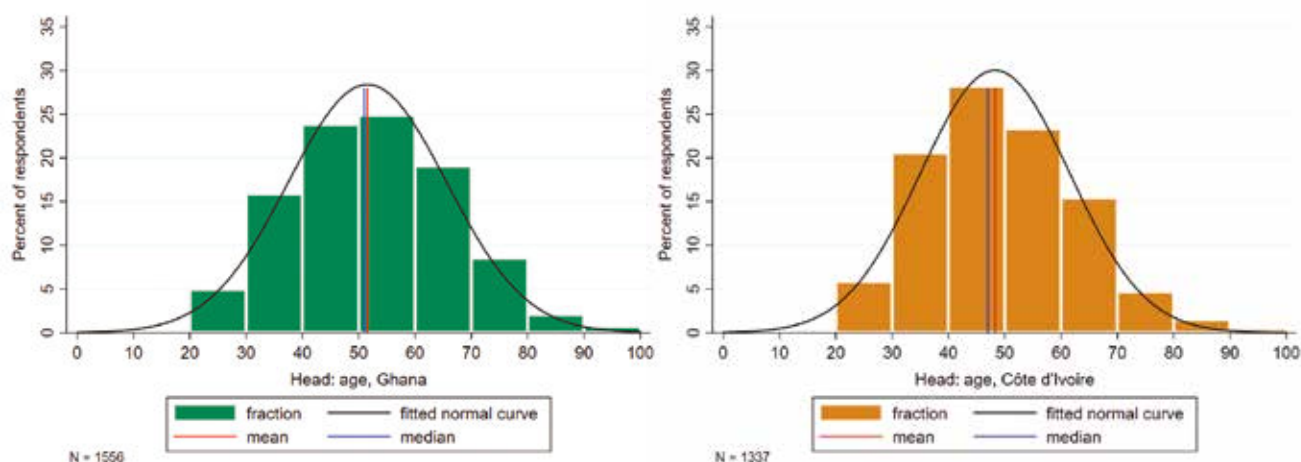
In Côte d’Ivoire, we also observe an age difference of nearly two years between the mean age of cocoa and non-cocoa respondents (*highly significant*) (Table 3.5). However, we find that differences in the mean age of cocoa and non-cocoa household heads is not statistically significant. Likewise, when analysing the distribution of the age of cocoa and non-cocoa respondents, there is no statistical significance Table 3.6.

Table 3.5 Age of respondents and household head (mean years), by cocoa vs non-cocoa household

	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d’Ivoire cocoa	Côte d’Ivoire non-cocoa	pvalue	sig
Mean respondent age	50.59	45.04	0.00	***	45.55	43.32	0.00	***
std.error	0.37	0.89			0.45	0.55		
N	1,316	242			888	554		
p1_respondent_age								
Mean household head age	52.34	47.22	0.00	***	50.48	47.77	0.15	
std.error	0.38	0.94			1.43	0.61		
N	1,316	240			830	508		
head_age								

Note: The respondent age includes many respondents who are also head of the household.

Figure 3.1 Age of the household head, distribution, by country



³⁸ Fountain, A.C. and Hütz-Adams, F. (2015). Cocoa Barometer 2015-USA Edition. Available at http://www.cocoa-barometer.org/International_files/Cocoa%20Barometer%202015%20USA.pdf

Table 3.6 Age of respondent (distribution), by cocoa vs non-cocoa household

Age Group	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
Under 17	0%	0%	0.00	***	0%	0%	0.07	*
17-25	2%	6%			6%	8%		
26-35	12%	22%			20%	24%		
36-45	23%	27%			27%	26%		
46-55	28%	23%			24%	24%		
56-65	20%	14%			17%	13%		
66-older	14%	7%			7%	5%		
N	1,316	242			888	554		
age_cat								

Figure 3.2 Age of the household head, distribution, cocoa and non-cocoa households, Ghana

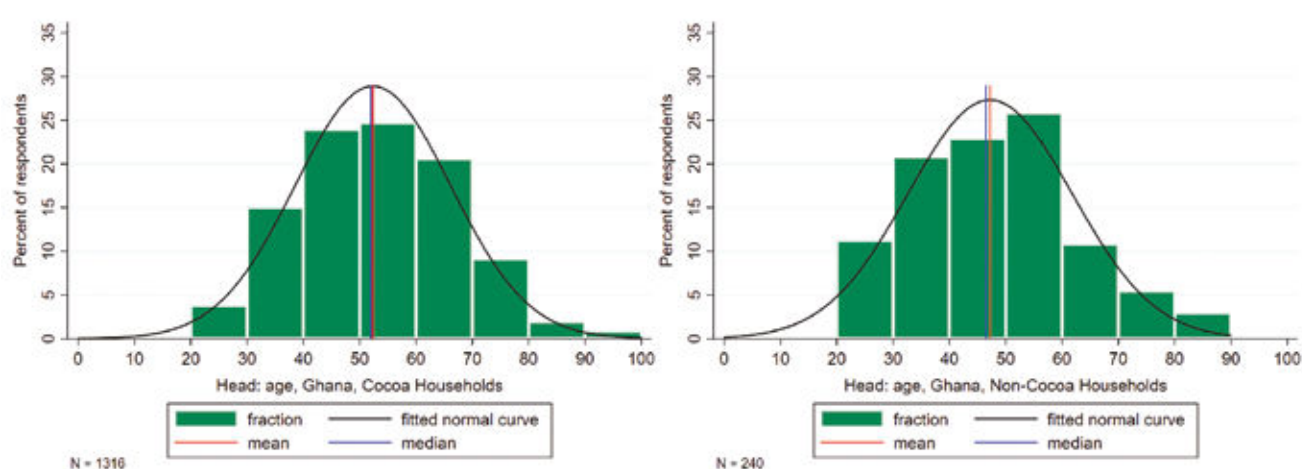
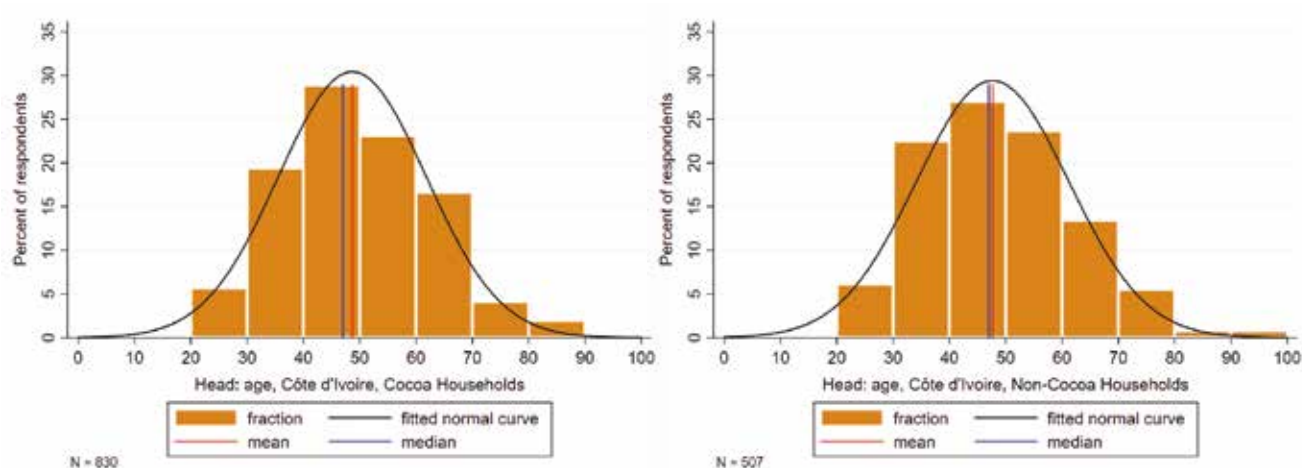


Figure 3.3 Age of the household head, distribution, cocoa and non-cocoa households, Côte d'Ivoire



Some other studies have argued that the age of cocoa farmers is (indirectly) correlated with cocoa yields.^{39,40} The theory is that older cocoa farmers make lower investments

³⁹ Aneani, F., Anchirinah, V. M., Asamoah, M., & Owusu-Ansah, F. (2011b). Analysis of economic efficiency in cocoa production in Ghana. *African Journal of Food, Agriculture, Nutrition and Development*, 11(1). Available at <https://www.ajol.info/index.php/ajfand/article/view/65877>

⁴⁰ Barrientos, S.W & Asenso Akyere, K. (2008). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocoalife.org/~media/CocoaLife/en/download//article/IDS.PDF>

than younger farmers, adopt new agricultural practices at lower rates, or can no longer optimally perform certain tasks (such as pruning of mistletoe). However, this is countered by others⁴¹ who argue that empirical evidence on the relation between age and innovation is not clear-cut. In this research, we have also run our own analysis based on the age of the household head and, where significant differences are found, these have been reported. It is important to note that several people of different ages may contribute their labour to the household cocoa farm, and could also be considered ‘cocoa farmers’.

3.1.2.1 Youth

According to Ghana’s National Youth Policy, youth is defined as those between 15-35 years.⁴² To compare youth household heads with non-youth household heads we have used the same age definition for both Ghana and Côte d’Ivoire.⁴³

In Ghana, 14% of the total sample consisted of ‘youth’ household heads (N=213). Of these, 73% were cocoa households. This compared with 19% in Côte d’Ivoire (N=252), of which 58% were cocoa households. These relatively small sample sizes of youth cocoa households make it difficult to test many youth-related hypotheses. Therefore, in this report, we have only included youth data for which we found there to be a statistical significance.

As Giuliani *et al.* (2017) note, “Youth remain a highly diverse group of people, with different backgrounds, drivers and experiences leading to varying ideas, challenges and aspirations”.⁴⁴ Therefore, a more focussed study than this would be required to adequately address youth and non-youth differences in a rigorous way.

3.1.3 Education

Three main indicators of education level are used in literature related to cocoa production in West Africa: i) number of years of completed education,^{45,46} ii) type/level of education

⁴¹ E.g. Ruf, F., and Schroth, G. (2015). Introduction—Economic and Ecological Aspects of Diversification of Tropical Tree Crops. In: Ruf, F. & Schröth, G. (Eds) Economics and ecology of diversification. Springer, Dordrecht. Available at: https://link.springer.com/chapter/10.1007/978-94-017-7294-5_1

⁴² Ghana Ministry of Youth and Sports. (2010). National Youth Policy of Ghana, Towards an empowered youth, impacting positively on national development. Available at http://www.youthpolicy.org/national/Ghana_2010_National_Youth_Policy.pdf

⁴³ While Côte d’Ivoire does not provide a definition of youth, the Youth Card is available to all citizens ages 16-35. Youth Policy. (2014). Factsheet: Côte d’Ivoire. Available at <http://www.youthpolicy.org/factsheets/country/cote-divoire/>

⁴⁴ Giuliani *et al* 2017, 3. Full reference: Giuliani, A., Mengel S., Paisley, C., Perkins, N., Flink, I., Oliveros, O. and Wongschowski, M (2017) Realities, Perceptions, Challenges and Aspirations of Rural Youth in Dryland Agriculture in the Midelt Province, Morocco. In Sustainability 2017, 9(6), 871. Available at <http://www.mdpi.com/2071-1050/9/6/871/htm>

⁴⁵ Waarts, Y., Ge, L., Ton, G. & van der Meen, J. (2013). A touch of cocoa: Baseline study of six UTZ- Solidaridad cocoa projects in Ghana. LEI report 2013-2014. LEI Wageningen UR. Available at : <http://edepot.wur.nl/305316>

⁴⁶ Vigneri, M., Sera, R. & Cardenas, A.L. (2016). Researching the Impact of Increased Cocoa Yields on the Labour Market and Child Labour Risk in Ghana and Côte d’Ivoire. ICI Labour market research study. Available at: http://www.cocoinitiative.org/wp-content/uploads/2016/12/market_research_full_web.pdf

completed;^{47,48} and, iii) literacy (i.e. literate vs illiterate).^{49,50} In this study, we chose to ask respondents and household heads for level of education they had completed.

Recent studies indicate that cocoa farmers have low literacy rates in Ghana (65% illiterate)⁵¹ and Côte d'Ivoire (56% illiterate).⁵² Nevertheless, many authors found that the majority of uncertified cocoa farmers in Ghana have had basic education, meaning farmers have completed primary education and/or junior high school (also called primary and middle school).^{53,54} In a research on the impact of certification on cocoa production in Ghana, some authors⁵⁵ use the number of years of education as one of the indicators. They found that almost half of farmers received between 7 and 12 years of education, while between 15% and 20% of farmers did not receive any education. No difference between uncertified and certified farmers was found with regard to years of education.⁵⁶

Education levels are an important characteristic because some studies have reported that younger and more educated farmers are, on average, more productive than older farmers and more likely to adopt new farming technologies.⁵⁷ Others have argued that there is a positive correlation between being literate and total cocoa income.⁵⁸

In our survey, we gathered data on education attainment of the household head and the school enrolment rate of their children. In addition, we asked about the respondent's ability to read a sentence in English (Ghana) or French (Côte d'Ivoire).

3.1.3.1 Education of household head

Across the whole sample, we found that household heads in Ghana had a generally higher level of educational attainment than those in Côte d'Ivoire. For example, in Ghana, 24% of household heads reported having attained no formal education with a further 12% only attaining primary school education. The most common category of educational attainment in Ghana was Junior high school (JHS), which was attained by 46% of household heads.

⁴⁷ FAO (2012). Gender inequalities in rural employment in Ghana: an overview. Gender, Equity, and Rural Employment Division of FAO. Available at: <http://www.fao.org/docrep/016/ap090e/ap090e00.pdf>

⁴⁸ Aneani, F., Anchirinah, V. M., Asamoah, M., & Owusu-Ansah, F. (2011b). Analysis of economic efficiency in cocoa production in Ghana. *African Journal of Food, Agriculture, Nutrition and Development*, 11(1). Available at <https://www.ajol.info/index.php/ajfand/article/view/65877>

⁴⁹ Hiscox, M., & Goldstein, R. (2014). Gender Inequality in the Ghanaian Cocoa Sector. Harvard University. Available at: https://www.business-humanrights.org/sites/default/files/webform/2014%20April%2023%20Gender%20inequality%20in%20the%20Ghanaian%20cocoa%20sector.%20Assessment%20by%20Harvard%20University_0.pdf

⁵⁰ Assiri, A. A., Yoro, G. R., Deheuvels, O., Kébé, B. I., Keli, Z. J., Adiko, A., & Assa, A. (2009). Les caractéristiques agronomiques des vergers de cacaoyer (# Theobroma cacao# L.) en Côte d'Ivoire. *Journal of animal and plant sciences*, 2(1), 55-66. Available at: <http://agritrop.cirad.fr/555828/>

⁵¹ This sample included only members of the farmer organisation Kuapa Kokoo Farmers' Union. Nelson, V., Opoku, K., Martin, A., Bugri, J., & Posthumus, H. (2013). Assessing the poverty impact of sustainability standards: Fairtrade in Ghanaian cocoa. London: DfID UK. Available at <https://www.gov.uk/dfid-research-outputs/final-report-assessing-the-poverty-impact-of-sustainability-standards-fairtrade-in-ghanaian-cocoa>

⁵² This included only uncertified famers. Deheuvels, O., Assiri, A. A., Yoro, G. R., Kébé, B. I., Keli, Z. J., Adiko, A., & Assa, A. (2009). Les caractéristiques agronomiques des vergers de cacaoyer (# Theobroma cacao# L.) en Côte d'Ivoire. *Journal of animal and plant sciences*, 2(1), 55-66. Available at <http://m.elewa.org/JAPS/2009/2.1/3.pdf>

⁵³ Hainmueller, J., Hiscox, M., & Tampe, M. (2011). Sustainable development for cocoa farmers in Ghana. MIT and Harvard University. Available at <https://www.theigc.org/wp-content/uploads/2015/02/Hainmueller-Et-Al-2011-Working-Paper.pdf>

⁵⁴ Aneani, F., Anchirinah, V., Owusu-Ansah, F., Asamoah, M. (2012). Adoption of Some Cocoa Production Technologies by Cocoa Farmers in Ghana. *Sustainable Agriculture Research* Vol. 1, No. 1; February 2012. Available at <http://www.ccsenet.org/journal/index.php/sar/article/view/14550>

⁵⁵ Waarts, Y., Ge, L., Ton, G. & van der Meen, J. (2013). A touch of cocoa: Baseline study of six UTZ- Solidaridad cocoa projects in Ghana. LEI report 2013-2014. LEI Wageningen UR. Available at: <http://edepot.wur.nl/305316>

⁵⁶ Ibid

⁵⁷ Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C. & Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics. Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>

⁵⁸ Hiscox, M., & Goldstein, R. (2014). Gender Inequality in the Ghanaian Cocoa Sector. Harvard University. Available at <https://www.coccolife.org/~media/CocoaLife/News%20Articles%20PDF/Ghana%20Gender%20Assessment%20by%20Harvard%20University.pdf>

By comparison, a higher proportion of household heads in Côte d'Ivoire had attained no formal education (32%) or only primary school education (34%). A much lower proportion of Côte d'Ivoire heads had completed JHS (21%) (*highly significant*) (Table 3.7).

Table 3.7 Educational attainment of the household head, by country

	Ghana	Côte d'Ivoire	pvalue	sig
No formal education completed	24%	32%	0.00	***
Primary school	12%	34%		
Junior high school (JHS) / middle school	46%	21%		
Senior high school (SHS) A/O level	11%	8%		
University	4%	1%		
Technical college / vocational	2%	1%		
Other, École Franco-arabe / Coranique	1%	2%		
Don't know	0%	0%		
N	1,548	1,458		
head_education				

In Ghana and Côte d'Ivoire, substantial differences in educational attainment were observed between male and female-headed households. For example, in Ghana, 46% of female household heads reported having attained no formal education, compared with 21% of male household heads. Likewise, in Côte d'Ivoire, 50% of female heads reported having attained no formal education, compared with 30% of male heads. Male heads in both countries attained JHS education at approximately twice the rate of female heads (*highly significant*) (Table 3.8). It is important to emphasise that household heads are, on average, 50 years old in Ghana and 45 years old in Côte d'Ivoire (Table 3.5). Therefore, these findings do not reflect the current state of the education system in either country, but rather illustrate educational disparities in past years.

Table 3.8 Educational attainment of the household head, by sex of head

	Ghana female head	Ghana male head	pvalue	sig	Côte d'Ivoire female head	Côte d'Ivoire male head	pvalue	sig
No formal education completed	46%	21%	0.00	***	50%	30%	0.00	***
Primary school	20%	14%			37%	38%		
Junior high school (JHS) / middle school	27%	49%			10%	20%		
Senior high school (SHS) A/O level	3%	10%			1%	7%		
University	1%	3%			1%	1%		
Technical college / vocational	2%	2%			1%	1%		
Other	0%	0%			0%	0%		
École Franco-arabe / Coranique	0%	0%			0%	2%		
Don't know	0%	0%			0%	0%		
N	288	1270			157	1323		
p1_respondent_education								

In Ghana, there was found to be no statistical difference in educational attainment between cocoa and non-cocoa household heads. However, in Côte d'Ivoire, the data does show a *highly significant* difference between cocoa and non-cocoa heads (Table 3.9). However, this can be largely explained by lower educational attainment of female heads who less frequently reported producing cocoa as one of their most important crops. This finding should not be interpreted as cocoa production affecting the educational attainment of household heads in Côte d'Ivoire.

Table 3.9 Educational attainment of the household head, by cocoa vs non-cocoa household

	Ghana cocoa head	Ghana non-cocoa head	pvalue	sig	Côte d'Ivoire cocoa head	Côte d'Ivoire non-cocoa head	pvalue	sig
No formal education completed	24%	26%	0.30		28%	39%	0.00	***
Primary school	13%	10%			36%	32%		
Junior high school (JHS) / middle school	47%	42%			23%	17%		
Senior high school (SHS) A/O level	10%	14%			8%	8%		
University	3%	5%			2%	1%		
Technical college / vocational	2%	3%			1%	1%		
Other	1%	0%			0%	0%		
École Franco-arabe / Coranique	0%	0%			2%	3%		
Don't know	0%	0%			0%	0%		
N	1311	237			897	561		
head_education								

Regional differences for the education level of the head of the household are illustrated in Table 3.10 and Table 3.11 for Ghana and Côte d'Ivoire, respectively (both *highly significant*). In Brong Ahafo, and in the Western region of Ghana, the percentage of head of households without any formal education was respectively 31 and 28%, respectively, compared to 11% in the Eastern region. In Côte d'Ivoire, the district of Lacs and Yamoussoukro had relatively high percentages of household heads without any formal education (44% and 43% respectively). The district of Lagunes stood out for its relatively high percentages of head of households with JHS or SHS (respectively 31% and 18%).

Table 3.10 Education level of the head of the household in different regions in Ghana

	Ashanti	Brong Ahafo	Central	Eastern	Western	pvalue	sig
no formal education completed	22%	31%	25%	11%	28%	0.00	***
Primary school	15%	8%	14%	11%	13%		
Junior high school (JHS) / middle school	45%	43%	36%	57%	45%		
Senior high school (SHS) A/O level	14%	10%	14%	10%	9%		
University	2%	3%	3%	6%	4%		
Technical college / vocational	2%	4%	4%	3%	2%		
Other	0%	0%	3%	2%	0%		
Don't know	0%	0%	0%	0%	0%		
N	316	267	69	256	640		
head_education							

Note: p-value from a Chi-squared test

Table 3.11 Education level of the head of the household in different regions in Côte d'Ivoire

	Bas-Sassandra	Comoe	Yamoussoukro	Goh-Djiboua	Lacs	Lagunes	Montagnes	Sassandra-Marahoue	Zanzan	pvalue	sig
no formal education completed	28%	41%	43%	31%	44%	12%	29%	19%	37%	0.00	***
Primary school	42%	32%	33%	23%	28%	35%	35%	45%	37%		
Junior high school (JHS) / middle school	17%	10%	13%	19%	19%	31%	24%	27%	17%		
Senior high school (SHS) A/O level	7%	10%	8%	11%	6%	18%	6%	7%	4%		
University	1%	3%	1%	2%	1%	3%	1%	0%	1%		
Technical college / vocational	2%	0%	2%	1%	1%	1%	0%	0%	1%		
Other	3%	3%	0%	12%	1%	0%	4%	1%	4%		
Don't know	0%	0%	0%	0%	0%	0%	0%	0%	0%		
N	151	97	89	131	356	125	139	244	126		
head_education											

Note: p-value from a Chi-squared test

3.1.3.2 Education of children and youth

Respondents were also asked to report on the school attendance status of all their children aged between 5 and 14 years. In Ghana, 98% of respondents reported that all of their children aged 5-14 years currently attend school. There were found to be no statistical differences between reported boy and girl attendance, nor between attendance of children in cocoa households compared with non-cocoa households.

However, in Côte d'Ivoire, only 80% of respondents reported that all boys in the household aged 5-14 year attended school. Furthermore, 77% of cocoa households reported all girls currently attend school compared with 82% of non-cocoa households (*not statistically significant*). (Table 3.12).

Table 3.12 Percent of households where all boys and girls aged 5 to 14 are currently attending school, by cocoa vs non-cocoa households

	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
All boys in the household attending school	98%	97%	0.74		80%	80%	0.94	
std.error	1%	2%			2%	2%		
N	734	112			576	335		
male_children_5_14_school								
All girls in the household attending school	98%	98%	0.81		77%	82%	0.13	
std.error	1%	1%			2%	2%		
N	647	111			492	325		
female_children_5_14_school								

Note: The question was asked: 'Are all household boys ages 5 to 14 currently attending school?' and 'Are all household girls ages 5 to 14 currently attending school?' Only households who previously indicated having children in these age groups were asked these questions.

In Ghana, youth (those aged 15-35) have a slightly higher educational attainment than non-youth. In Côte d'Ivoire, this difference is more marked, particularly at the higher primary school attainment (Table 3.13) (*highly significant*). Additionally, in both countries, we see that the percentage of youth completing senior high school and university attainment is slightly higher than non-youth.

Table 3.13 Education level of heads belonging to youth, versus non-youth

Head: Education level	Ghana non-youth	Ghana youth	pvalue	sig	Côte d'Ivoire non-youth	Côte d'Ivoire youth	pvalue	sig
no formal education completed	25%	22%	0.02	**	32%	22%	0.00	***
Primary school	13%	10%			34%	43%		
Junior high school (JHS) / middle school	46%	45%			22%	18%		
Senior high school (SHS) A/O level	10%	13%			8%	11%		
University	3%	8%			1%	3%		
Technical college / vocational	3%	2%			1%	1%		
Other	1%	0%			3%	2%		
Don't know	0%	0%			0%	0%		
N	1334	212			1076	251		
head_education								

Note: p-value from a Chi-squared test

3.1.3.3 Literacy

In Ghana, 43% of the respondents said that they were able to read a sentence in English, while in Côte d'Ivoire, 53% of the respondents reported being able to read a sentence in French. However, Table 3.14 shows that there are significant gender differences. In Ghana, only 19% of female respondents were able to read in English, versus 56% of the male respondents.

In Côte d'Ivoire, only 32% female respondents reported being able to read a sentence in French, compared with 64% of male respondents. However, it is interesting to note that the percentage of female respondents in Côte d'Ivoire able to read French is higher than the percentage of women able to read English in Ghana, despite reporting lower educational attainment.

Table 3.14 Percent of respondents able to read a sentence in English/French, by sex of the respondent

	Ghana female resp	Ghana male resp	pvalue	sig	Côte d'Ivoire female resp	Côte d'Ivoire male resp	pvalue	sig
mean	19%	56%	0.00	***	32%	64%	0.00	***
std.error	2%	2%			2%	2%		
N	538	1,022			498	987		
p1_respondent_read								

Note: p-value from a one-way ANOVA test

Table 3.15 shows that only in Côte d'Ivoire is there a *highly significance* difference between cocoa-households and non-cocoa households. In Côte d'Ivoire, the percentage of cocoa households that is able to read in French is 59%, while for non-cocoa households this is only 45%.

Table 3.15 Percent of respondents able to read a sentence in English/French, by cocoa and non-cocoa household

	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
mean	44%	40%	0.32		59%	45%	0.00	***
std.error	1%	3%			2%	2%		
N	1318	242			910	575		
p1_respondent_read								

Note: p-value from a one-way ANOVA test

Table 3.16 and Table 3.17 show that there are large regional differences in respondents' ability to read in English or French. In Ghana, the Eastern region and Ashanti region show the highest level of literacy. In Côte d'Ivoire, the Lagunes district stands out with 81% of respondents able to read French. In Côte d'Ivoire, in Yamoussoukro, the percentage of respondents able to read French is lowest, with only 34%. These regional differences in literacy levels correspond with the regional differences we found in relation to the received education of the household heads.

Table 3.16 Percent of respondents able to read a sentence in English in Ghana, per region

	Ashanti	Brong Ahafo	Central	Eastern	Western	pvalue	sig
mean	46%	38%	36%	58%	39%	0.00	***
std.error	3%	3%	6%	3%	2%		
N	317	270	72	256	645		
p1_respondent_read							

Note: p-value from a one-way ANOVA test

Table 3.17 Percent of respondents able to read a sentence in French in Côte d'Ivoire, per district

	Bas-Sassandra	Comoe	Yamous-soukro	Goh-Djiboua	Lacs	Lagunes	Montagnes	Sassandra-Marahoue	Zanzan	pvalue	sig
mean	49%	54%	34%	51%	46%	81%	52%	61%	55%	0.00	***
std.error	4%	5%	5%	4%	3%	4%	4%	3%	4%		
N	159	97	90	136	358	126	142	251	126		
p1_respondent_read											

Note: p-value from a one-way ANOVA test

3.1.4 Marital status

Many reports on cocoa in Ghana and Côte d'Ivoire give some attention to gender differences between men and women.^{59,60,61} The role of marital status in cocoa producing households is investigated to a lesser extent, even though a number of authors found marital status to be a relevant indicator.^{62,63,64} For example, it is argued that marriage gives women access to land and men access to labour.⁶⁵

In a recent study authors identify four different statuses: not married (single), married, divorce/separated, and widowed.⁶⁶ In addition, the Ghana Statistical Service⁶⁷ and the Ivorian Ministry of Agriculture⁶⁸ make a distinction between formal and informal marriages. An informal marriage, also known as 'concubinage' or 'cohabitation', is not recognised as an official marriage in Ghana or in Côte d'Ivoire.⁶⁹ Another form of marital status is a polygamous marriage, where a man has multiple wives (never the other way around).

In our study, the majority of respondents in Ghana (79%) and Côte d'Ivoire (80%) reported being married or in concubinage. Concubinage was only reported in Côte d'Ivoire.⁷⁰ However, *highly significant* differences were observed with regards to the sex of the household head in both countries. A substantially higher proportion of male heads in Ghana were married (91%) compared with female heads (24%). Similarly, in Côte d'Ivoire, 86% of male heads reported being married or in concubinage, compared with 27% of female heads (*highly significant*). This is because it is most common for married men to self-identify as the 'household head'.

It is important to note that female household heads were found to be a mix of single, divorced and widowed women in Ghana and Côte d'Ivoire. Furthermore, around a quarter of female heads in both countries also reported being married or in concubinage, but we are unsure whether these women consider themselves to

⁵⁹ Waarts, Y., Ge, L., Ton, G. & van der Meen, J. (2013). A touch of cocoa: Baseline study of six UTZ- Solidaridad cocoa projects in Ghana. LEI report 2013-2014. LEI Wageningen UR. Available at <http://edepot.wur.nl/305316>

⁶⁰ Source: CLP survey; Empowering Women and Fighting Poverty: Cocoa and Land Rights in West Africa: International Food and Policy Research Institute; Dalberg analysis

⁶¹ Barrientos, S.W & Asenso Akyere, K. (2008). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocoalife.org/progress/mapping-sustainable-production-in-ghanaian-cocoa>

⁶² Fountain, A.C. and Hütz-Adams, F. (2015). Cocoa Barometer 2015-USA Edition. Available at http://www.cocoabarometer.org/International_files/Cocoa%20Barometer%202015%20USA.pdf

⁶³ Takane, T. (2000). Incentives embedded in institutions: the case of share contracts in Ghanaian cocoa production. The Developing Economies, 38(3), 374-397. Available at: <http://onlinelibrary.wiley.com/doi/10.1111/j.1746-1049.2000.tb00883.x/full>

⁶⁴ Higgins, T., & Fenrich, J. (2012). Legal Pluralism, Gender, and Access to Land in Ghana. Fordham Environmental Law Review, 7-21. Available at: <http://www.jstor.org/stable/44175842>

⁶⁵ Kolavalli, S., & Vigneri, M. (2018). The cocoa coast: The board-managed cocoa sector in Ghana. Intl Food Policy Res Inst.. Available at : <http://www.ifpri.org/publication/cocoa-coast-board-managed-cocoa-sector-ghana>

⁶⁶ Vigneri, M. and Serra, R. (2016). Researching the Impact of Increased Cocoa Yields on the Labour Market and Child Labour Risk in Ghana and Côte d'Ivoire. ICI Labour market research study. Available at: http://www.cocoinitiative.org/wp-content/uploads/2016/12/market_research_full_web.pdf

⁶⁷ Ghana Statistical Service (2015). Ghana poverty mapping report. Available at : <http://www.statsghana.gov.gh/docfiles/publications/POVERTY%20MAP%20FOR%20GHANA-05102015.pdf>

⁶⁸ République de la Côte d'Ivoire (2009). Evaluation approfondie de la sécurité alimentaire des ménages ruraux en Côte d'Ivoire. http://www.insci/n/templates/docss/secualim_ruraux.pdf

⁶⁹ Kumasi Metropolitan Assembly (2017). Marriage services. Available at: <http://www.kma.gov.gh/kma/?marriage-services&page=5354>

⁷⁰ This does not mean that in Ghana this kind of informal marriage does not exist. However, it was not included as an option in the survey. Only by the time the survey was tested in Cote d'Ivoire, it was decided to include this type of marriage as a category.

be the sole head or co-head of the household (Table 3.18). This diversity of marital status may be important to keep in mind as we describe differences between male and female-headed households throughout the report. Certainly, female-headed households should not be thought of as a relatively homogenous group of older, widowed women.

Table 3.18 Respondent marital status, by sex of household head

	Ghana female head	Ghana male head	pvalue	sig	Côte d'Ivoire female head	Côte d'Ivoire male head	pvalue	sig
Single	12%	4%	0.00	***	30%	10%	0.00	***
Married/Concubinage	24%	91%			27%	86%		
Divorced	23%	3%			10%	1%		
Widowed	40%	2%			34%	3%		
Don't know	0%	0%			0%	0%		
N	287	1,270			157	1319		
p1_respondent_marital								

3.1.5 Leadership positions

Social relations can play a major role in facilitating or constraining farmers in accessing inputs and services. Previous research⁷¹ shows that in Ghana there is a significant positive correlation between leadership, ownership and productivity levels. According to other sources this correlation can also be negative if fulfilling leadership tasks take up a lot of time. To be able to capture how ones position in the community can influence livelihood choices and options, we asked survey respondents whether or not they held any kind of leadership position in their community.

This question was also included so as to be able to distinguish leaders from non-leaders in the analysis. Whilst considerable care was taken during random sampling of communities, we had some concerns that uninvited leaders may turn up to research meetings. We thought it would be unwise to turn leaders away from attending the research due to their status. However, in practice, we had few difficulties in this regard.

We were surprised how many respondents self-identified as leaders, in both countries. In Ghana, more men (37%) than women (14%) self-identified as a leader (*highly significant*). Likewise, in Côte d'Ivoire, a higher proportion of men (37%) than women (14%) self-identified as a leader (*highly significant*) (Table 3.19). In both countries, the most common reported category of leader was 'other'. We are unsure about what constitutes 'other' beyond the many leadership categories provided.

⁷¹ Laven, A. (2010). The risks of inclusion: Shifts in governance processes and upgrading opportunities for cocoa farmers in Ghana. Amsterdam: KIT. Available at: https://pure.uva.nl/ws/files/1437472/77981_18.pdf

‘Elder’ and ‘church/mosque leader’ were among the most common leadership categories in Ghana, while ‘church/mosque leader’ and ‘opinion leader’ were the most common in Côte d’Ivoire.

Table 3.19 shows that fewer female respondents reported holding leadership positions than male respondents. The roles of elder, opinion leader, chief farmer and village leader were reportedly only held by male respondents. In both Ghana and Côte d’Ivoire, leaders were found to be, on average, 3.5 years older than non-leaders (*highly significant*). This is not surprising as leadership is often associated with seniority and experience.

Table 3.19 Respondent holds a leadership position, by sex of respondent

	Ghana female resp	Ghana male resp	pvalue	sig	Côte d’Ivoire female resp	Côte d’Ivoire male resp	pvalue	sig
No / none	86%	63%	0.00	***	88%	63%	0.00	***
Other	3%	11%	0.00	***	5%	17%	0.00	***
Elder	1%	8%	0.00	***	0%	1%	0.04	**
Church / mosque leader	4%	8%	0.01	**	0%	5%	0.00	***
Opinion leader	0%	5%	0.00	***	0%	6%	0.00	***
Chief farmer	0%	3%	0.00	***	0%	1%	0.02	**
Village chief	0%	2%	0.00	***	0%	2%	0.00	***
Other association leader	1%	2%	0.08	*	2%	3%	0.38	
Purchasing clerk	0%	1%	0.01	**	0%	0%	0.48	
Assembly man/women	0%	1%	0.06	*	0%	0%		
Lead farmer	0%	1%	0.04	**	0%	0%		
Farmer organisation leader	0%	1%	0.26		1%	1%	0.66	
Extension officer / trainer	0%	0%	0.15		0%	0%	0.48	
Queen mother	1%	0%	0.01	**	0%	0%		
Women’s leader	4%	0%	0.00	***	4%	0%	0.00	***
Tribe chief	0%	0%			0%	0%	0.32	
Canton chief	0%	0%			0%	0%		
Youth president	0%	0%			0%	3%	0.00	***

3.1.6 Migration

A number of earlier studies looked at migration in cocoa growing countries and the position of migrants.^{72,73,74} These describe how the planting of cocoa is historically linked with migration. The Eastern region was the first ‘cocoa frontier’ and the first to experience the influx of migrants when cocoa production began around 1880.

⁷² Ruf, F., Schroth, G., & Doffangui, K. (2015). Climate change, cocoa migrations and deforestation in West Africa: What does the past tell us about the future?. *Sustainability Science*, 10(1), 101-111. Available at: <https://link.springer.com/article/10.1007/s11625-014-0282-4>

⁷³ Knudsen, M. H., & Agergaard, J. (2015). Ghana’s cocoa frontier in transition: the role of migration and livelihood diversification. *Geografiska Annaler: Series B, Human Geography*, 97(4), 325-342. Available at: <http://onlinelibrary.wiley.com/doi/10.1111/geob.12084/full>

⁷⁴ Hill, P. 1963. *The Migrant Cocoa-Farmers of Southern Ghana*. Cambridge: University Press. Available at <https://www.questia.com/library/3137384/the-migrant-cocoa-farmers-of-southern-ghana-a-study>

The cocoa frontier shifted from the Eastern Region to the Ashanti Region and Brong Ahafo in the 1940s. When most land in the Eastern and other regions was in use, and production started to decline, migration shifted to the Western Region in the 1980s.⁷⁵ According to a recent study⁷⁶ the Western region is currently still taking in most migrants (of the cocoa producing regions) as it is the last region to open up its virgin forests to cocoa production.

In Côte d'Ivoire, we see similar patterns, where cocoa production expanded progressively from east to west. The South Western area of Côte d'Ivoire, around San Pédro, is currently seen as the best region for cocoa production, mostly due to its climatic suitability in terms of rainfall.⁷⁷ It is argued that the rapid increase in cocoa production in Côte d'Ivoire between 1930 and 2010 was made possible by the influx of hundreds of thousands migrants from the Savannah.⁷⁸ In Côte d'Ivoire, migrants were encouraged by high cocoa prices and favourable migration policies from the country's first president, Félix Houphouët-Boigny, making land acquisition easier. In Ghana, migration has largely been internal, whereas in Côte d'Ivoire migration has been internal and from neighbouring Burkina Faso and Mali.⁷⁹

A previous study⁸⁰ discusses some of the differences between Ivorian migrants, and immigrants who came to Côte d'Ivoire from Burkina Faso and Mali. According to the authors, transnational immigrants are much worse off than their Ivorian counterparts. They argue that transnational immigrants are often poorly educated, do not speak the local language and rely on non-permanent work. The workers often receive wages far below the national minimum wage.⁸¹ Furthermore, the children of migrant workers often join their parents in Côte d'Ivoire and are unable to attend school due to language barriers or lack of income.⁸² Another study reports similar findings with low literacy rates among Burkinabé migrants in Côte d'Ivoire.⁸³ Other authors, on the other hand, report more positively with regard to migrants, namely that migrants own farms that are generally larger than that of autochthones (indigenous people) (for Côte d'Ivoire).⁸⁴ Finally, a study found that, overall, migrant farmers more often opt for zero-shade cocoa production than autochthone farmers.⁸⁵ Zero-shade production systems are associated with higher yields and higher net returns in the short term.⁸⁶ Some

⁷⁵ COCOBOD (2000) Ghana Cocoa Board Handbook. Accra: The Ghana Cocoa Board

⁷⁶ Knudsen, M. H., & Agergaard, J. (2015). Ghana's cocoa frontier in transition: the role of migration and livelihood diversification. *Geografiska Annaler: Series B, Human Geography*, 97(4), 325-342. Available at: <http://onlinelibrary.wiley.com/doi/10.1111/geob.12084/full>

⁷⁷ Ruf, F., Schroth, G., & Doffangui, K. (2015). Climate change, cocoa migrations and deforestation in West Africa: What does the past tell us about the future?. *Sustainability Science*, 10(1), 101-111. Available at: <https://link.springer.com/article/10.1007/s11625-014-0282-4>

⁷⁸ *ibid*

⁷⁹ *ibid*

⁸⁰ Lambert, A., Gearhart, J. McGill, A. & Wrinkle, H. (2014). The Fairness Gap: Farmer incomes and root cause solutions to ending child labor in the cocoa industry. International Labour Rights Forum, Washington D.C. Available at: <https://www.laborrightrights.org/publications/fairness-gap>

⁸¹ *ibid*

⁸² *ibid*

⁸³ Tano, M. A. (2012). Crise cacaoyère et stratégies des producteurs de la sous-préfecture de Méadji au Sud-Ouest ivoirien (Doctoral dissertation, Université Toulouse le Mirail-Toulouse II). Available at: <https://halshs.archives-ouvertes.fr/tel-00713662/>

⁸⁴ Smith-Dumont, E., Gnahoua, G. M., Ohouo, L., Sinclair, F. L., & Vaast, P. (2014). Farmers in Côte d'Ivoire value integrating tree diversity in cocoa for the provision of ecosystem services. *Agroforestry systems*, 88(6), 1047-1066. Available at: <https://link.springer.com/article/10.1007/s10457-014-9679-4>

⁸⁵ Ruf, F. O. (2011). The myth of complex cocoa agroforests: the case of Ghana. *Human Ecology*, 39(3), 373. Available at: <https://link.springer.com/article/10.1007/s10745-011-9392-0>

⁸⁶ *ibid*

studies also suggest a relationship between ethnic groups and diet, pointing out that, in Côte d'Ivoire, migrants rely more on rice compared to natives.⁸⁷

In our study, respondents were asked about their migration background. We chose to define a 'migrant' as one who was born outside of the region where they now live. This regional definition was chosen because district boundaries sometimes change (and hence may cause confusion), and because so few respondents in the sample were born in a different country.

In Ghana, 25% of respondents from cocoa households reported being born outside of the region where they currently live. A slightly higher proportion of respondents from non-cocoa households are migrants (32%) (*significant*) (Table 3.20). Less than 1% of all Ghanaian respondents reported being born outside the country.

In Côte d'Ivoire, 17% of respondents from cocoa households reported being born in a different region to where they now live, compared with 9% of non-cocoa households (*highly significant*) (Table 3.20). Furthermore, in Côte d'Ivoire, 9% of cocoa households and 3% of non-cocoa households reported being born in another country (*highly significant*).

Table 3.20 Percent of migrants who are cocoa who are migrants from another region, by country

	Ghana cocoa	Ghana non-cocoa	Pvalue	sig	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
Percent of respondents who are migrants from another region	25%	32%	0.04	**	17%	9%	0.00	***
std.error	1%	3%			1%	1%		
N	1318	242			910	575		
migrant								

Note: p-value from a one-way ANOVA test

In Ghana, most migrants in our sample live currently in the Western region (37%) and Brong-Ahafo (37%). In Côte d'Ivoire, the highest proportion of migrants in our sample live in Bas-Sassandra.

Table 3.21 Proportion of migrants from another region, by region in Ghana

	Ashanti	Brong Ahafo	Central	Eastern	Western	pvalue	sig
mean	13%	37%	18%	7%	37%	0.00	***
std.error	2%	3%	5%	2%	2%		
N	317	270	72	256	645		
migrant							

Note: p-value from a one-way ANOVA test

⁸⁷ FLA (2015). Evaluer la situation actuelle des femmes et des jeunes agriculteurs et l'état nutritionnel de leurs familles dans deux communautés productrices de cacao en Côte d'Ivoire. Rapport préparé par Fair Labour Association, Juillet 2015. Available at : http://www.fairlabor.org/sites/default/files/documents/reports/femmes_et_des_jeunes_nutrition_dans_communautes_de_dacao_juillet_2015.pdf

Table 3.22 Proportion of migrants from another region, by district in Côte d'Ivoire

	Bas-Sassandra	Comoe	Yamous-soukro	Goh-Djiboua	Lacs	Lagunes	Montagnes	Sassandra-Marahoue	Zanzan	pvalue	sig
mean	41%	16%	1%	27%	7%	3%	23%	11%	3%	0.00	***
std.error	4%	4%	1%	4%	1%	2%	4%	2%	2%		
N	159	97	90	136	358	126	142	251	126		
migrant											

Note: p-value from a one-way ANOVA test

While migrant data is interesting in itself, we have also disaggregated a number of data points in the research by migrant status. This disaggregation will be revisited throughout the report with regards to land tenure and other statistically significant variables.

3.1.7 Household composition

A large household can be beneficial for cocoa households as, depending on the age of household members, they may be able to rely more on household labour than hired labour.⁸⁸ On the other hand, a large household can also mean a higher number of dependants, which increases the overall living costs of a household.⁸⁹

The reported household size depends, to a large extent, on the definition of a 'household'. There are different definitions in use: "the number of people the farmer takes care of",⁹⁰ "number of people to feed"⁹¹ or "the number of family members living on the farm".⁹²

The average household size in Ghana is frequently reported to be between 5 and 6.^{93,94} However, in Côte d'Ivoire, the average household size varies substantially. Several authors give an average household size of 11^{95,96}, with Maytak⁹⁷ reporting household sizes ranging from 7 to 13. Several others give much lower estimations.

⁸⁸ Anang, B. T., Adusei, K., & Mintah, E. (2011). Farmers' assessment of benefits and constraints of Ghana's cocoa sector reform. Current research journal of social sciences, 3(4), 358-363. Available at : http://www.worldcocoaoundation.org/wp-content/uploads/files_mf/anang2011.pdf

⁸⁹ Fountain, A.C. and Hütz-Adams, F. (2015) Cocoa Barometer 2015-USA Edition. Available at http://www.cocoaabrometer.org/International_files/Cocoa%20Barometer%202015%20USA.pdf

⁹⁰ Ingram, V., Waarts, Y., Ge, L., van Vugt, S., Wegner, L., Puister-Jansen, L., Ruf, F., Tanoh, R. (2014). Impact of UTZ certification of cocoa in Ivory Coast: Assessment framework and baseline. Wageningen, LEI Wageningen UR (University & Research centre), LEI Report 2014-010. Available at: <http://edepot.wur.nl/307584>

⁹¹ Varlet, F. & Kouamé, G. (2013). Étude de la production de cacao en zone riveraine du parc national de Taï. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and Ministère de l'Agriculture de la Côte d'Ivoire.

⁹² Maytak, L. (2014). Report on Farm Level Sustainability of Cocoa in Côte d'Ivoire: A Synthesis of Five Studies.

⁹³ Waarts, Y., Ge, L., Ton, G. & van der Meen, J. (2013). A touch of cocoa: Baseline study of six UTZ- Solidaridad cocoa projects in Ghana. LEI report 2013-2014. LEI Wageningen UR. Available at: <http://library.wur.nl/WebQuery/wurpubs/fulltext/305316>

⁹⁴ Nelson, V., Opoku, K., Martin, A., Bugri, J., & Posthumus, H. (2013). Assessing the poverty impact of sustainability standards: Fairtrade in Ghanaian cocoa. London: DFID UK. Available at <https://www.gov.uk/dfid-research-outputs/final-report-assessing-the-poverty-impact-of-sustainability-standards-fairtrade-in-ghanaian-cocoa>

⁹⁵ Ingram, V., Waarts, Y., Ge, L., van Vugt, S., Wegner, L., Puister-Jansen, L., Ruf, F., Tanoh, R. (2014). Impact of UTZ certification of cocoa in Ivory Coast: Assessment framework and baseline. Wageningen, LEI Wageningen UR (University & Research centre), LEI Report 2014-010. Available at: <http://edepot.wur.nl/307584>

⁹⁶ Varlet, F. & Kouamé, G. (2013). Étude de la production de cacao en zone riveraine du parc national de Taï. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and Ministère de l'Agriculture de la Côte d'Ivoire.

⁹⁷ Maytak, L. (2014). Report on Farm Level Sustainability of Cocoa in Côte d'Ivoire: A Synthesis of Five Studies.

Vigneri and Serra⁹⁸ report an average household size of only 6.21. A recent large-scale study by CGAP finds that an average number of members in a rural Ivorian household is 5.66.⁹⁹ Furthermore, a 2015 Household Lifecycle Survey by the National Institute of Statistics reports that 31.7% of rural households have less than 3 members, 45.3% have between 4 and 6 members, and only 23% of rural households have more than 6 members.¹⁰⁰

In our research, we were sceptical about the accuracy of some of these figures, particularly in Côte d'Ivoire. From prior experience, we knew that respondents sometimes report family members as household members, even if they don't usually live in the same house or compound, and may even live in another village or town. Such cases have the effect of increasing the mean household size.

In our household survey, we first asked “*What is the total number of members in your household?*” and recorded this value. However, we know that sometimes respondents interpret ‘household’ as ‘family’, or that enumerators may accidentally translate to ‘family’. Therefore, we asked a follow-up question: “*Of those, how many members usually live in your compound/house?*” As expected, fewer household members were found to actually live in the same house.

Using the second value of household members who usually live in the same house or compound, the mean household size in Ghana was 5.77 members. In Côte d'Ivoire, the mean number of household members was 6.79 (*highly significant*)(Table 3.23).

We should also consider the distribution of household sizes in both countries. This shows that, in Côte d'Ivoire, a left-skewed distribution with a long tail of large households has pulled up the average, whereas the Ghanaian sample is nearer to a normal distribution. In fact, the median household size is 6 in both countries. The finding that Ghanaian households are smaller than Ivorian households is consistent with most other studies.

⁹⁸ Vigneri, M. and Serra, R. (2016). Researching the Impact of Increased Cocoa Yields on the Labour Market and Child Labour Risk in Ghana and Côte d'Ivoire. ICI Labour market research study. Available at: http://www.cocoinitiative.org/wp-content/uploads/2016/12/market_research_full_web.pdf

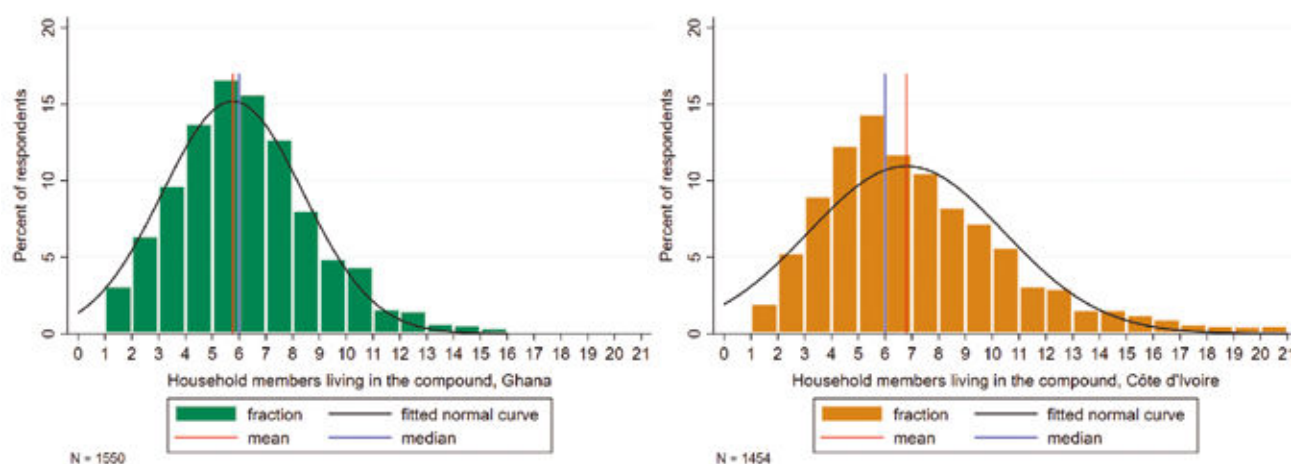
⁹⁹ CGAP. (2016). Côte d'Ivoire – CGAP Smallholder Household Survey 2016, Building the Evidence Base on the Agricultural and Financial Lives of Smallholder Households. Report available at <http://www.cgap.org/sites/default/files/Working-Paper-Survey-and-Segmentation-Smallholders-Coted%27Ivoire-Jul-2017.pdf> Database available at http://microdata.worldbank.org/index.php/catalog/2789/get_microdata

¹⁰⁰ Institut National de la Statistique. (2015). Enquête Niveau de Vie des Ménages 2015, rapport définitif. Available at <http://www.ins.ci/n/templates/docss/env2015.pdf> p.28

Table 3.23 Household, mean number of members in the household, by country

	Ghana	Côte d'Ivoire	pvalue	sig
Mean	5.77	6.79	0.00	***
Males > 65	0.15	0.13	0.25	
Females > 65	0.12	0.17	0.00	***
Males 15-65	1.62	1.76	0.00	***
Females 15-65	1.65	1.76	0.01	**
Boys 5-14	0.87	1.10	0.00	***
Girls 5-14	0.78	0.96	0.00	***
Boys 0-4	0.29	0.47	0.00	***
Girls 0-4	0.28	0.43	0.00	***
N	1550	1454		

Figure 3.4 Number of household members, distribution, by country



Small but significant differences were found between cocoa and non-cocoa households in Ghana and Côte d'Ivoire. In both countries, cocoa households were slightly larger on average than non-cocoa households. In Ghana, cocoa households had an average of 5.85 persons, compared with 5.30 persons in non-cocoa households (*highly significant*). In Côte d'Ivoire, an average of 6.98 persons lived in each household compared with 6.51 persons in non-cocoa households (*significant*) (Table 3.24).

Table 3.24 Number of household members, by cocoa vs non-cocoa households

	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
Mean	5.85	5.30	0.00	***	6.98	6.51	0.02	**
Males > 65	0.17	0.06	0.00	***	0.14	0.13	0.47	
Females > 65	0.13	0.08	0.03	**	0.16	0.20	0.06	*
Males 15-65	1.63	1.60	0.73		1.85	1.61	0.00	***
Females 15-65	1.66	1.60	0.40		1.80	1.70	0.12	
Boys 5-14	0.90	0.69	0.00	***	1.14	1.04	0.11	
Girls 5-14	0.78	0.78	0.94		0.95	0.99	0.55	
Boys 0-4	0.30	0.20	0.01	**	0.48	0.45	0.41	
Girls 0-4	0.28	0.30	0.59		0.45	0.39	0.15	
N	1310	240			889	565		

Figure 3.5 Number of household members, distribution, by cocoa vs non-cocoa households, Ghana

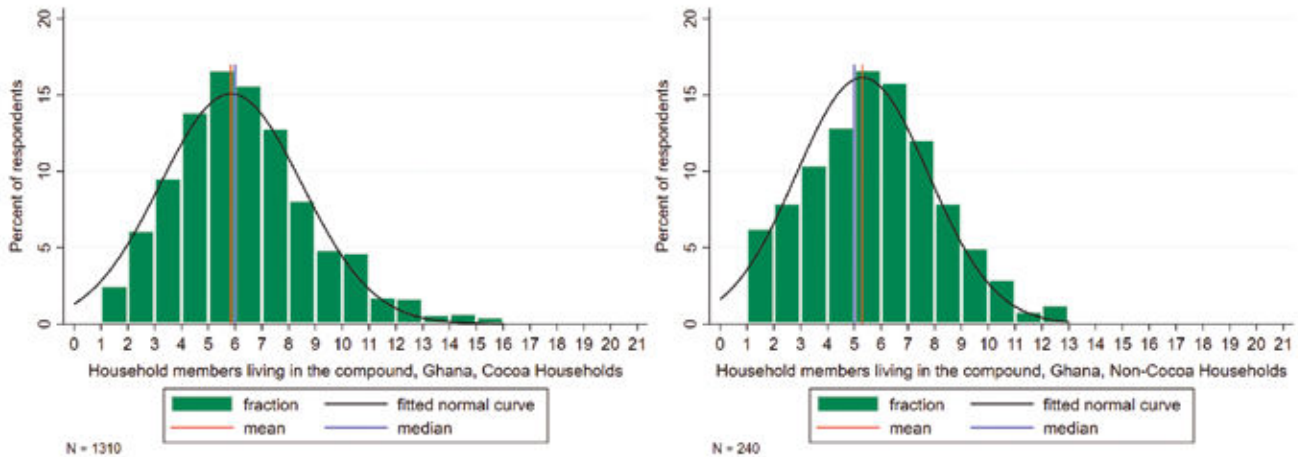
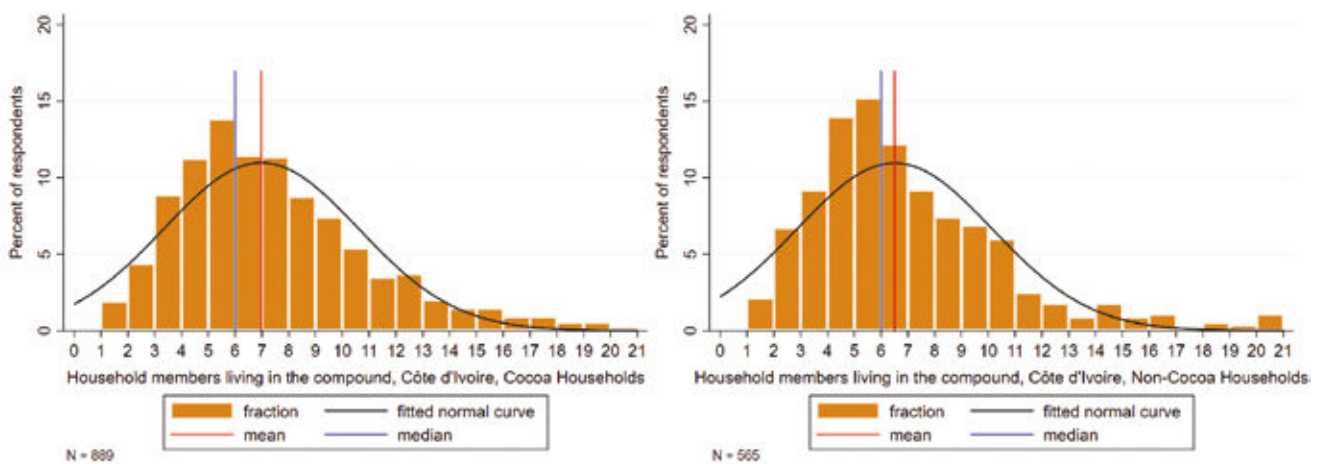


Figure 3.6 Number of household members, distribution, by cocoa vs non-cocoa households, Côte d'Ivoire



Furthermore, significant differences in the number of people in the household were found when disaggregating by gender of the household head. Female-headed households tend to include a much higher proportion of single, widowed and divorced respondents than male-headed households. It stands to reason then that unmarried households would have, on average, fewer people in the household. In Ghana, female-headed households had an average of 5.01 members compared with 5.95 members for male-headed households (*highly significant*). In Côte d'Ivoire, female-headed households had an average of 5.29 members compared with 6.99 members for male-headed households (*highly significant*) (Table 3.25).

Table 3.25 Number of household members, by sex of household head

	Ghana female head	Ghana male head	pvalue	sig	Côte d'Ivoire female head	Côte d'Ivoire male head	pvalue	sig
mean	5.01	5.95	0.00	***	5.29	6.99	0.00	***
std.error	0.16	0.07			0.27	0.10		
N	286	1262			153	1296		
hhmem_number								

Figure 3.7 Number of household members, distribution, by sex of household head, Ghana

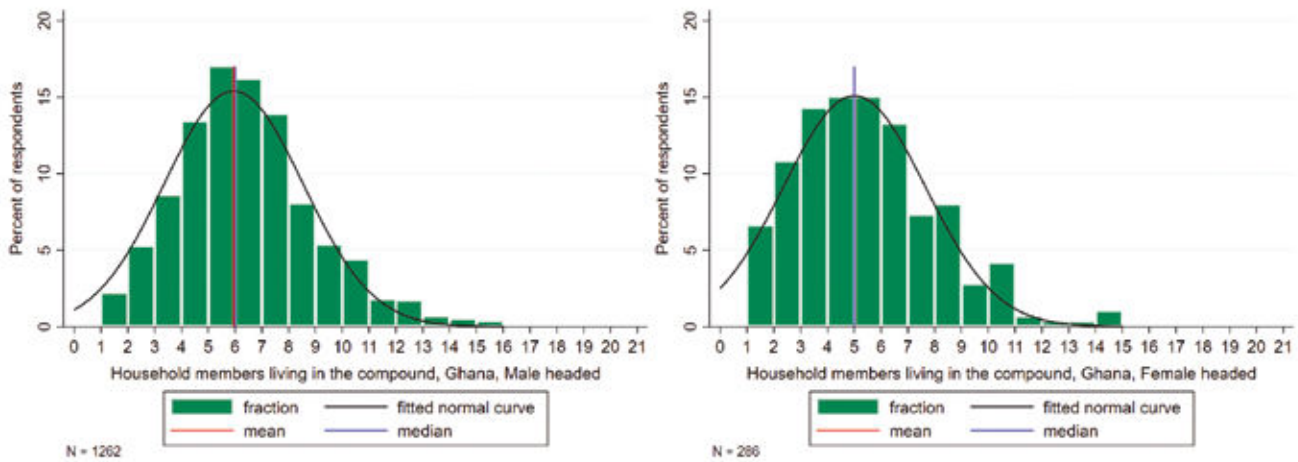
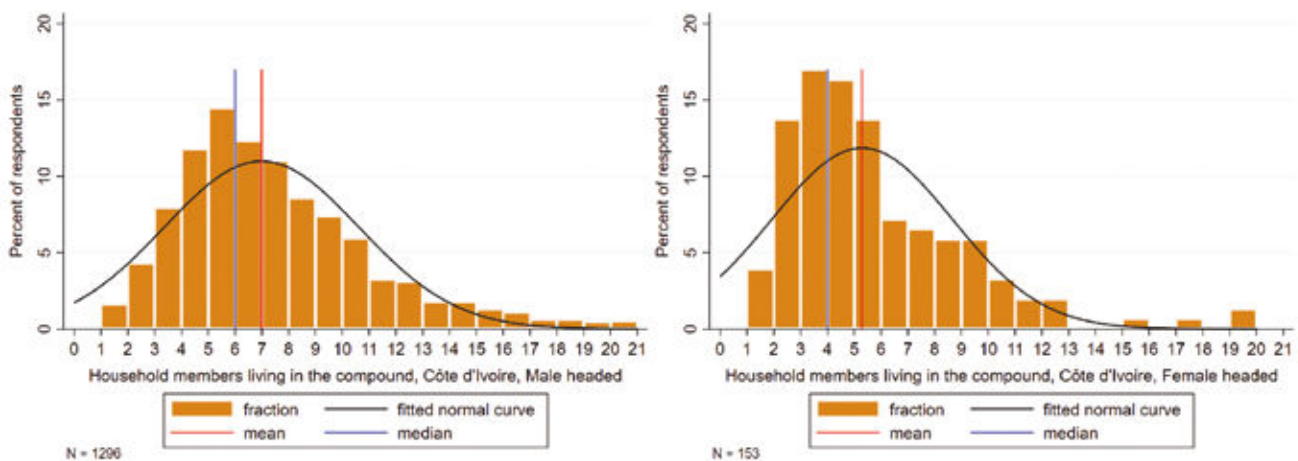


Figure 3.8 Number of household members, distribution, by sex of household head, Côte d'Ivoire



The dependency ratio is used to measure the pressure on productive household members. It is an age-population ratio of those typically not in the labour force (the dependent part comprises ages 0 to 14 and 65+) and those typically in the labour force (the productive part comprises ages 15 to 64). Based on survey household composition data, we can calculate the dependency ratio. In Ghana, in cocoa households the dependency ratio is 1.01, compared with 0.80 for non-cocoa households (*highly significant*). This means that there is slightly more burden on productive members of cocoa households than non-cocoa households. However, there was found to be no statistical differences between cocoa and non-cocoa households in Côte d'Ivoire (Table 3.26).

Table 3.26 Household, dependency ratio, by cocoa vs non-cocoa households

	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
mean	1.01	0.80	0.01	***	1.09	1.17	0.11	
std.error	0.03	0.05			0.03	0.05		
N	1282	237			882	558		
dep_ratio								

There was also found to be no statistically significant difference in dependency ratio for male and female-headed households in either country. While female-headed households have fewer household members, on average, they also have fewer dependents.

3.1.8 Summary

The world is not ‘running out of cocoa farmers’. We find no evidence that the average age of cocoa farmers is increasing over time. Younger farmers continue to step into cocoa at a rate that at least replaces older farmers stepping out. In Ghana, the mean average of cocoa farmers in our sample is 50.69 years, and is 45.55 years in Côte d’Ivoire. It should be noted that, as in other studies, the respondent was often the age of the household head, who is typically the oldest person in the household.

In Ghana, respondents from cocoa households were found to be older, on average, by 5.5 years than respondents from non-cocoa households. Analysis of the distribution of respondent ages suggests this is a result of both a higher proportion of older respondents and a lower proportion of young respondents in cocoa households. We hypothesise that some older farmers stay in cocoa longer than other crops because once cocoa farms are established there is lower labour demand than for other crops, and hired labourers can manage the cocoa farm. Also young farmers face barriers to owning land for cocoa, whereas they can choose to lease land for other non-tree crops.

In Côte d’Ivoire, respondents from cocoa households were found to be older, on average, than respondents from non-cocoa households by 2 years. However, when analysing the distribution of the age of cocoa and non-cocoa respondents, we did not find a statistical significance, which casts doubt on the sample populations differing in age.

Both in Ghana and in Côte d’Ivoire substantial differences in educational attainment were observed between male and female-headed households. In Ghana, 46% of female heads reported having attained no formal education, compared with 21% of male heads. Likewise, in Côte d’Ivoire, 50% of female heads reported having attained no formal education, compared with 30% of male heads. Educational attainment is a reflection on the education system many decades ago rather than the present system. As expected there were no major differences in educational attainment between cocoa and non-cocoa household heads.

In Ghana, youth have a slightly higher educational attainment than non-youth, while in Côte d’Ivoire this difference is more marked. Ivorian youth have a significantly higher primary school attainment than non-youth. Additionally, in both countries, we find youth completing senior high school and university at slightly higher rates than non-youth.

In Ghana, virtually all school-aged girls and boys were reported to be in school. However, around 20% of Ivorian boys 23% of Ivorian girls are not in school. No statistically significant differences were found between cocoa and non-cocoa households.

Female household heads represent a mix of single, divorced, widowed or married women. This diversity of marital status may be important to keep in mind as we describe differences between male and female-headed households throughout the report.

Male head of households are usually married, while female headed households are not. This reflects cultural norms whereby, in marriage, the male normally self-identifies as the household head.

In Ghana and Côte d'Ivoire, more than one third of respondents self-identified as 'leaders'. In both countries, more men (37%) than women (14%) self-identified as a leader. 'Elder' and 'church/mosque leader' were among the most common leadership categories in Ghana, while 'church/mosque leader' and 'opinion leader' were the most common in Côte d'Ivoire.

Leadership was often associated with age. Ghanaian leaders are, on average, almost 4 years older than non-leaders. In Côte d'Ivoire, this difference is around 3.5 years.

The regions in the Ghana sample with the most migrants were Western and Brong Ahafo. In Côte d'Ivoire, Bas-Sassandra reported the most migrants, defined as people born outside the region (now an administrative district). In both countries, these are border areas.

In Ghana, the mean household size was 5.77 members and, in Côte d'Ivoire, households were slightly larger at 6.79 household members. Using two stages of questioning, we believe this is a more accurate estimate for Côte d'Ivoire than is often reported. In both countries, cocoa households were slightly larger on average.

Significant differences in the number of people in the household were found when disaggregating by gender of the household head. In Ghana, female-headed households had an average of 5.01 members compared with 5.95 members for male-headed households. In Côte d'Ivoire, female-headed households had an average of 5.29 members compared with 6.99 members for male-headed households.

In Ghana, there is a slightly higher burden on productive members of cocoa households (1.01) than non-cocoa households (0.80) (significant). However, there was found to be no statistical differences between cocoa (1.09) and non-cocoa households (1.08) in Côte d'Ivoire.

There was found to be no statistically significant difference in dependency ratio for male and female-headed households in either country.



4

Food and nutrition security

Bymolt, R., Laven, A., Tyszler, M. (2018). Demystifying the cocoa sector in Ghana and Côte d'Ivoire. Chapter 4, Food and nutrition security. The Royal Tropical Institute (KIT).



Food and nutrition security is a central issue in the lives of cocoa farmers and their families. It is therefore important to understand the food and nutrition situation of households in Ghana and Côte d'Ivoire, and to identify possible synergies and trade-offs between the production of cocoa and food and nutrition security.^{1,2}

4.1 Food security

Many studies have highlighted the fact that food insecurity is a typically seasonal phenomenon. The main cocoa harvest from around October to January is associated with a period in which households have relatively more money and relative food security. However, in the middle of the year, around June and July, cocoa households face greater risk of becoming food insecure.^{3,4,5}

In our household survey, respondents were asked food consumption questions to better understand how patterns changed throughout the year. All respondents were asked, 'How many meals did you usually consume per day both at home and on the farm?' for each month of the year.

This question had to be relatively simple because respondents had to recall this information from the past year.⁶ We certainly accept that these basic survey questions on household food consumption do not provide a detailed description of 'food security'. Whilst, there are several reputable food security survey modules available, they all had certain drawbacks for this study. For example, some involve a long set of questions that we could not accommodate due to time constraints,⁷ while others limit their recall period to the past four weeks,⁸ rather than the past year.

One obvious limitation of our approach is that we have not captured how the serving size or quality of household meals changes throughout the year. Households may choose to continue consuming three meals per day through the year, but could reduce

¹ Anderman, T.L., Remans, R., Wood, S.A., DeRosa, K., DeFries, R. (2014) Synergies and tradeoffs between cash crop production and food security: a case study in rural Ghana. Springer Science + Business Media Dordrecht and International Society for Plant Pathology 2014. Available at <https://static1.squarespace.com/static/53ea24a8e4b0b0caeccc2efb/t/53eb6733e4b004775184e690/1407936307556/Anderman+et+al+%28Food+Sec+2014%29.pdf>

² Kenkhuis, M. (2016). Nutritional status among cocoa farming families and underlying causes in Ghana. Student Nutrition and Health at Wageningen University, intern at GAIN. Global Alliance for Improved Nutrition. Available at <http://www.gainhealth.org/wp-content/uploads/2017/03/Desk-research-Ghana.pdf>

³ Nestlé (2017) Findings from Nestlé Rural development Framework (RDF) baselines in 2013. Power point presentation, Living Income Community of Practice, Nov 2017-Berlin.

⁴ De Vries, K. (2015). Could nutrition sensitive cocoa value chains be introduced in Ghana? Report of a brief study that identifies opportunities and bottlenecks. Centre for Development Innovation, Wageningen UR (University & Research centre). Report CDI-15-105. Wageningen. Available at <http://edepot.wur.nl/364252>

⁵ Kenkhuis, M. (2016). Nutritional status among cocoa farming families and underlying causes in Ghana. Student Nutrition and Health at Wageningen University, intern at GAIN. Global Alliance for Improved Nutrition. Available at <http://www.gainhealth.org/wp-content/uploads/2017/03/Desk-research-Ghana.pdf>

⁶ These questions been successfully employed by the researchers in other household surveys.

⁷ Moltedo, A., Troubat, N., Lokshin, M., Sajaia, Z. (2014). Analyzing Food Security Using Household Survey Data : Streamlined Analysis with ADePT Software. Washington, DC: World Bank. Available at <https://openknowledge.worldbank.org/handle/10986/18091>

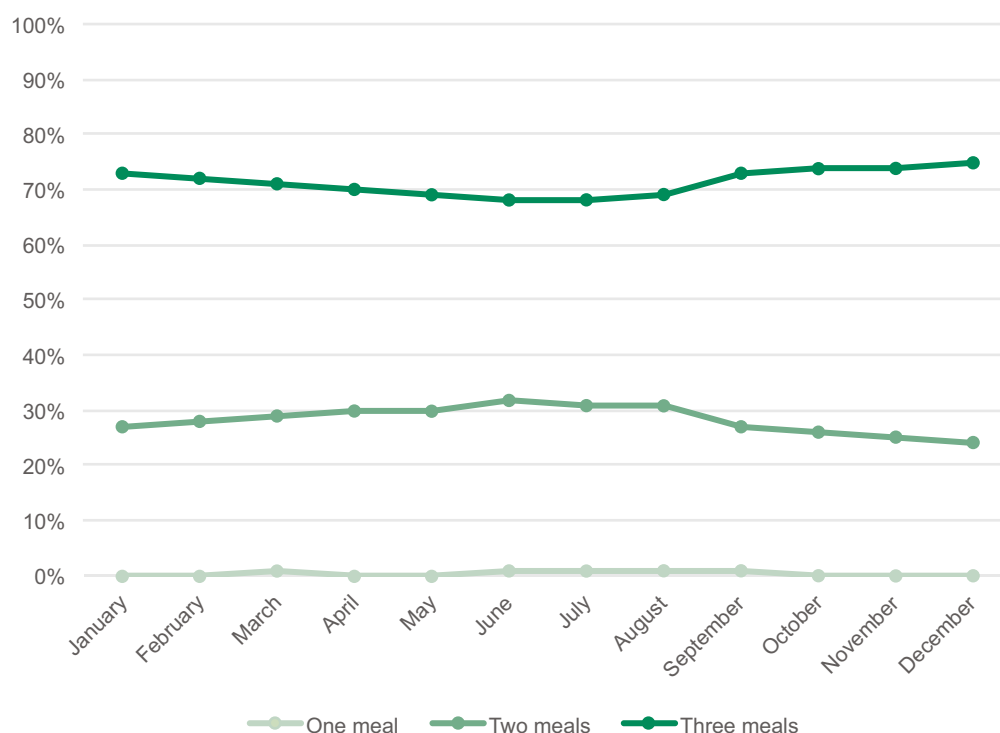
⁸ Coates, J., Swindale, A., Bilinsky, P. (2007). Household Food Insecurity Access Scale (HFIAS) for Measurement of Food Access: Indicator Guide. Version 3. FANTA food and nutrition technical assistance. Available at https://www.fantaproject.org/sites/default/files/resources/HFIAS_ENG_v3_Aug07.pdf

their calorie intake. Furthermore, the number of meals consumed does not capture how dietary diversity changes throughout the year. To have a detailed understanding of food security, a more intensive set of questions would need to have been included in the survey.⁹ However, due to the wide scope of the research and length of the survey, we chose to take a different approach. Availability and affordability of food groups were discussed with participants in focus group discussions (see 4.2), and nutritional information was captured for the 24 hours prior to the survey using the MDD-W index (see 4.1).

In our survey sample, Ghanaian respondents (Figure 4.1) reported consuming three meals per day more frequently than Ivorian respondents (Figure 4.2). There is also a corresponding lower incidence of Ghanaian households only consuming one meal per day compared with Côte d'Ivoire respondents (*highly significant*).

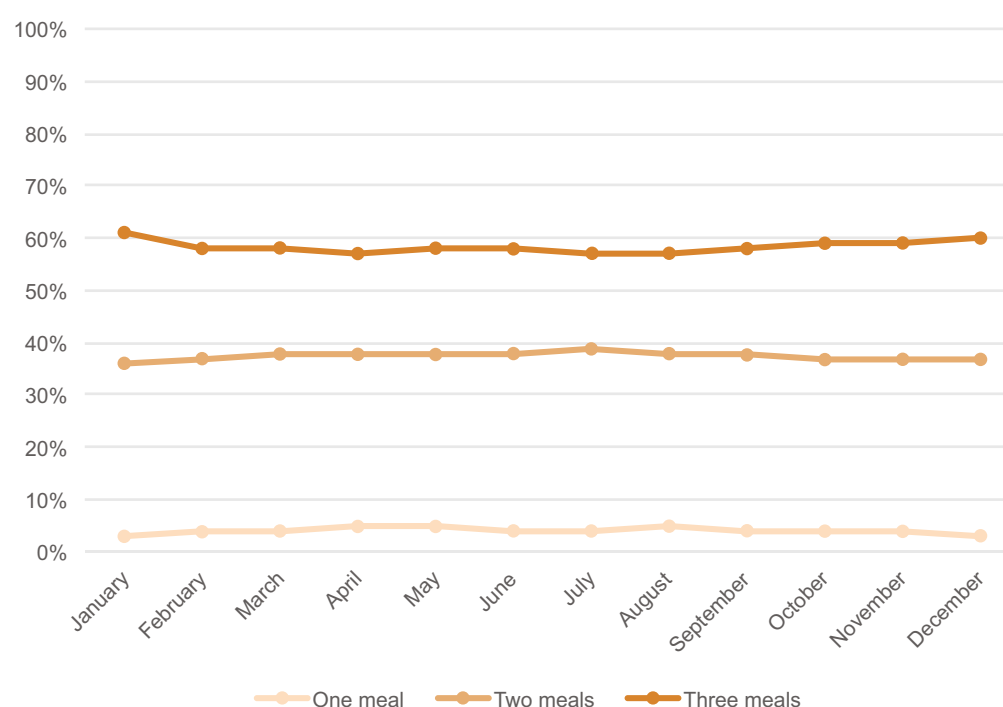
A review of the literature suggested we would find a decline in the number of meals consumed per day around the middle of the year, when food crops are yet to be harvested and before the cocoa main season begins around October. In our analysis, only a weak pattern is evident in Ghana, affecting a relatively small proportion of households. In Côte d'Ivoire, there is no clear variation in the proportion of households consuming one, two or three meals per day throughout the year.

Figure 4.1 Food security, percent of respondents who reported consuming 1, 2 or 3 meals per day each month, Ghana



⁹ For recent discussion on this topic see Jones, A.D., Ngure, F.M., Pelto, G., Young, S.L. (2013). What are we assessing when we measure food security? A Compendium and Review of Current Metrics. 2013 American Society for Nutrition. Adv. Nutr. 4: 481–505, 2013; doi:10.3945/an.113.004119. Available at http://www.fao.org/fileadmin/templates/ess/documents/meetings_and_workshops/cfs40/001_What_Are_We_Assessing_When_We_Measure_Food_Security.pdf

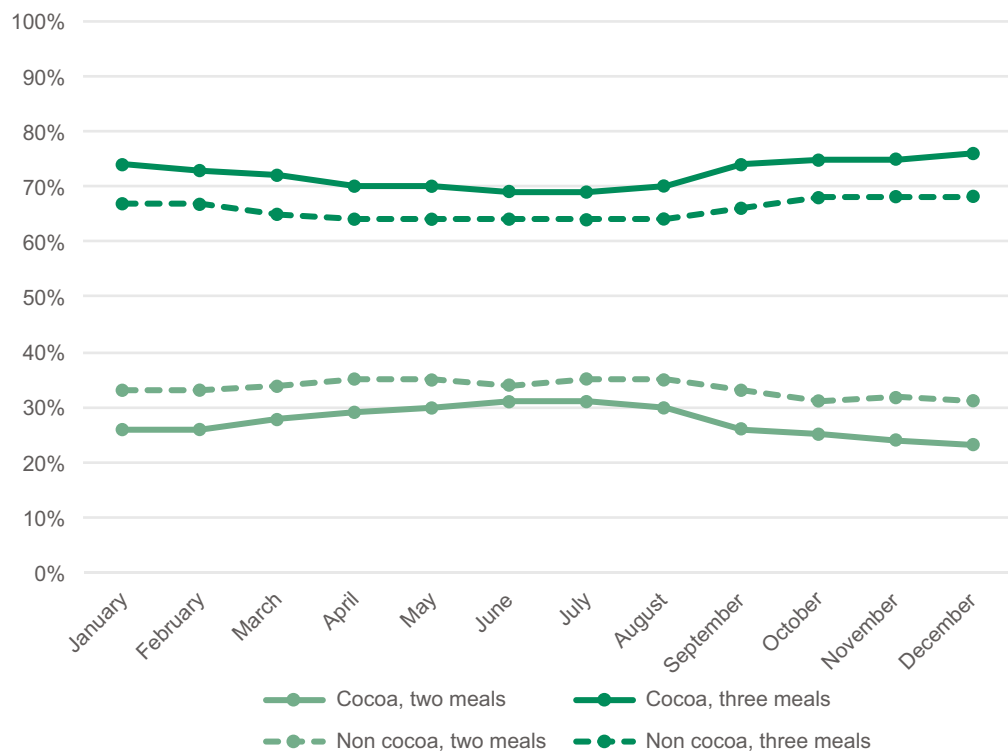
Figure 4.2 Food security, percent of respondents who reported consuming 1, 2 or 3 meals per day each month, Côte d'Ivoire



In addition to the country level analysis, we wanted to know whether there was a difference in the number of meals consumed between cocoa and non-cocoa households. In Ghana, we found a difference between cocoa and non-cocoa households (*highly significant*) (Figure 4.3). This suggests that cocoa households in Ghana are more 'food secure' than non-cocoa households. In Côte d'Ivoire, however, there is no statistically significant difference between cocoa and non-cocoa households. Overall, in both countries, the data suggests that we can reject the hypothesis that cocoa households are less food secure than non-cocoa households.

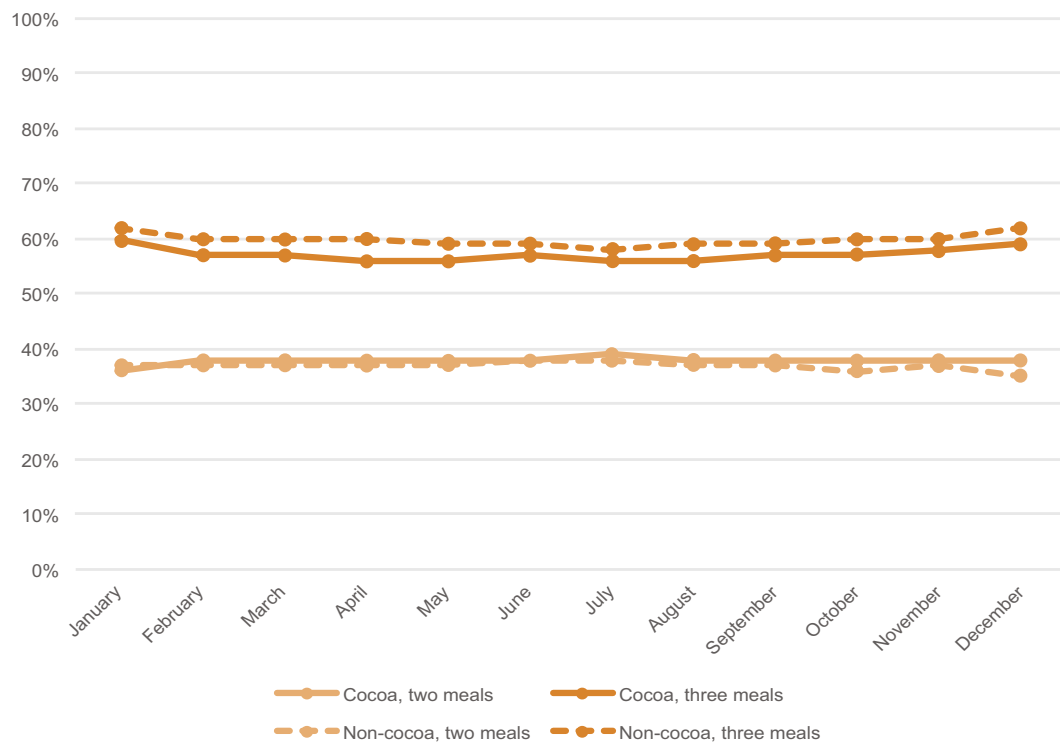
We also analysed the difference in the number of meals usually consumed by male and female-headed households. In Ghana and Côte d'Ivoire, the data suggests that 2-3% more male-headed households consistently consume three meals per day than female-headed households across the year. However, this is not statistically significant and should therefore not be interpreted as male-headed households being more food secure than female-headed households.

Figure 4.3 Food security, percent of respondents who reported consuming 2 or 3 meals per day each month, cocoa and non-cocoa households, Ghana



Note: Differences between cocoa and non-cocoa households are statistically significant for most months. N cocoa households = 1318; N non-cocoa households = 242;

Figure 4.4 Food security, percent of respondents who reported consuming 2 or 3 meals per day each month, cocoa and non-cocoa households, Côte d'Ivoire



Note: Differences between cocoa and non-cocoa households are not statistically significant for most months. N cocoa households = 908; N non-cocoa households = 575

4.2 Nutrition

Dietary diversity is an important component of nutrition. Generally, more diverse diets associated with higher micronutrient intakes. Micronutrient deficiencies, like iron or vitamin A deficiency lead to higher morbidity and disease. Studies also show that improved nutrition status, specifically reduced iron deficiency, results in higher productivity levels, because people are stronger, less tired and develop better cognitively.^{10,11}

For this study, we were asked by IDH and GAIN to include nutrition questions based on the MDD-W index, developed by FAO in collaboration with the USAID Food and Nutrition Technical Assistance III Project (FANTA). The MDD-W is a dichotomous indicator of whether or not women of reproductive age (15–49 years) have consumed at least 5 out of 10 defined food groups the previous day and night. The proportion of women 15–49 years of age who reach this minimum in a population can be used as a proxy indicator for higher likelihood of micronutrient adequacy, one important dimension of diet quality. Women who consume food items from 5 or more of the 10 groups are also highly likely to consume at least one animal-source food and either pulses or nuts/seeds and food items from 2 or more of the fruit/vegetable food groups.¹²

As per the MDD-W methodology, only female respondents between 15-49 years old were asked questions on nutrition, because they are typically the household members who buy the food and prepare meals and are representative for the food intake of the whole household. In addition, women are one of the vulnerable populations (last to eat but also higher nutrient requirements), along with children.

In our survey, female respondents were asked a series of 10 questions related to the food groups consumed the 24 hours prior to the survey (Table 4.1). The questions were based on the MDD-W model questionnaire,¹³ with some descriptions elaborated to include examples of local foods. The process for asking questions is strict; female respondents were asked if they had anything to eat when they woke, and if so what they ate. The respondent is then sequentially asked about food consumed later in the morning, at midday, during the afternoon, in the evening, and before going to bed. Quantities of food only above X ml/mg were considered sufficient to count towards a food group.

¹⁰ Haas, J. and Brownly, T. (2001). Iron Deficiency and Reduced Work Capacity: A Critical Review of the Research to Determine a Causal Relationship. In the Journal of Nutrition, Volume 131, Issue 2, 1 February 2001, Pages 676-690. Available at <https://doi.org/10.1093/jn/131.2.676>

¹¹ De Vries, K. (2015). Could nutrition sensitive cocoa value chains be introduced in Ghana? Report of a brief study that identifies opportunities and bottlenecks. Centre for Development Innovation, Wageningen UR (University & Research centre). Report CDI-15-105. Wageningen. Available at <http://edepot.wur.nl/364252>

¹² Martin-Prévêla, Y., Allemand, P., Wiesmann, D., Arimond, M., Ballard, T., Deitchler, M., Dop, M., Kenned, G., Lee, W.T.K., Moursi, M. (2015). Moving Forward in Choosing a Standard Operational Indicator of Women's Dietary Diversity. Food and Agricultural Organization of the United Nations. Available at <http://www.fao.org/3/a-i4942e.pdf>

¹³ FAO and FHI 360 (2016). Minimum Dietary Diversity for Women: A Guide for Measurement. Rome: FAO. Available at <http://www.fao.org/nutrition/assessment/tools/minimum-dietary-diversity-women/en/>

The survey was implemented in Ghana between December 2016 and mid-January 2017 (peak season cocoa) and, in Côte d'Ivoire, from February 2017 to March 2017 (end of cocoa season). As the survey has been carried out in different months, we suggest that it would not be appropriate to compare the Ghana and Côte d'Ivoire samples. As per the MDD-W guidance document, future studies wishing to compare nutrition data with this study must bear in mind seasonal variations and seek to align the timing of data collection.

Table 4.1 MDD-W categories and descriptions used in the household survey

Code	Category	Description
A	Foods made from grains	Maize, wheat or Hausa (spicy millet) porridge; Bread or sometimes buff loaf (puff puff); Kenkey (fermented cornmeal dough); Wakye (rice and beans); Tuozaafi (cooked maize dough)
B	White roots and tubers and plantains	Fufu; Banku (fermented corn and cassava dough); Akpele (corn and cassava dough); Ampesi (boiled yam/plantain/cocoyam/cassava)
C	Pulses (beans, peas, lentils)	Bean stew; Koose (fried bean cake); Wakye (rice and beans)
D	Nuts and seeds	Any nuts or peanuts, groundnut soup, groundnut sauce, seeds
E	Milk and milk products	Milk, cheese, yoghurt or other milk products (but NOT including condensed milk or powdered milk)
F	Organ meat	Liver, kidney, heart or other organ meats or blood-based foods, including from wild game
G	Meat and poultry	Beef, pork, lamb, goat, rabbit, wild game meat, chicken, duck or other bird
H	Fish and seafood	Fresh or dried fish, shellfish or seafood
I	Eggs	Eggs from poultry or any other bird
J	Dark green leafy vegetables	Medium-to-dark green leafy vegetables, including wild/foraged leaves; Mainly consumed as kontomire stew and Ayoyo (corchorus leaves)
K	Vitamin A-rich vegetables, roots and tubers	Pumpkin, carrots, squash or sweet potatoes that are yellow or orange inside
L	Vitamin A-rich fruits	Red palm oil, ripe mango, ripe papaya;
M	Other vegetables	Mainly eggplants, tomatoes, okras
N	Other fruits	Mainly oranges and sweet bananas
U	Condiments	Ingredients used in small quantities for flavour, such as chillies, spices, herbs, fish powder, tomato paste, flavour cubes or seeds
V	Other food or beverage	Tea and coffee, if not sweetened, clear broth, alcohol, pickles, olives and similar

To construct the MDD-W indicator, we add up the scores from the 10 MDD-W food groups (A-N), where each 'yes' response receives the value '1'. Table 4.2 shows the MDD-W score by country for female respondents that fall within the reproductive age. With a mean score of 5.15, the MDD-W in Ghana score is significantly higher than in Côte d'Ivoire, which has a score of 4.06. The distribution of MDD-W scores for both countries is shown in Figure 4.5. In Ghana, 64% of the respondents has achieved MDD-W, in Côte d'Ivoire this is only 35% (Table 4.3).

The difference between the two countries can be partly explained by the survey timing; in Ghana, we conducted the survey during the cocoa peak season, when generally more money is available. In addition, we expect that the data collection date has quite an influence on the MDD-W and the respective analysis done here, as it would possibly look completely different during other periods of the year.

Table 4.2 Nutrition, mean MDD-W score, by country

	Ghana	Côte d'Ivoire	pvalue	sig
mean	5,15	4,06	0,00	***
std. error	0,11	0,08		
N	230	293		
MDD-W_score				

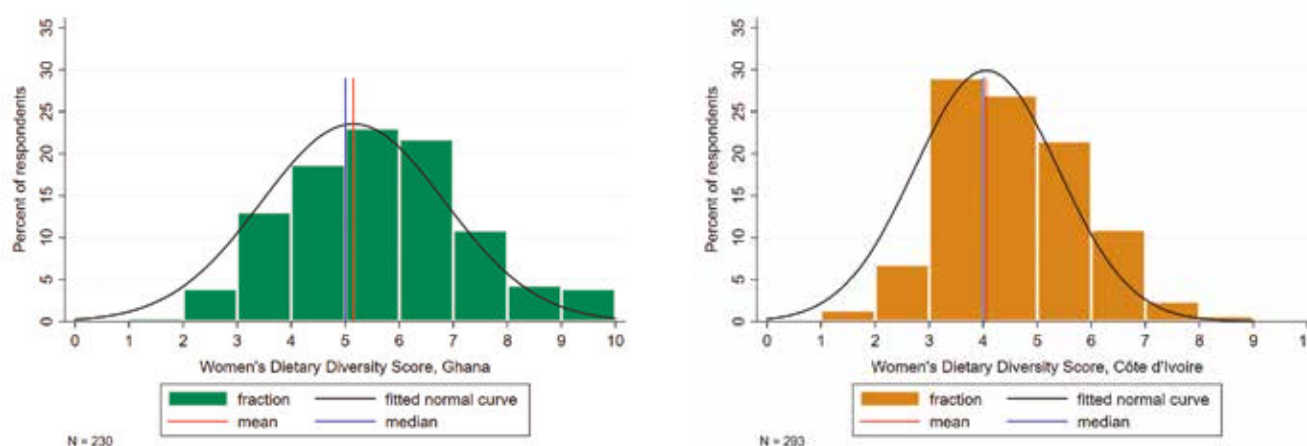
Note: p-value from a one-way ANOVA test

Table 4.3 Nutrition, achieved MDD-W score (percent of respondents), by country

	Ghana	Côte d'Ivoire	pvalue	sig
Mean	64%	35%	0.00	***
std. error	3%	3%		
N	230	293		
MDD-W_bin				

Note: p-value from a one-way ANOVA test

Figure 4.5 Distribution of MDD-W score in percentage



We further analysed whether MDD-W scores differed between cocoa and non-cocoa households. In Ghana, there is no statistical difference between cocoa and non-cocoa households (Table 4.4). But in Côte d'Ivoire, we do see a small difference between women in cocoa and non-cocoa household (*highly significant*). This suggests that women in cocoa households in Côte d'Ivoire have a higher MDD-W score than women in non-cocoa households. Overall, in both countries, the data suggests that cocoa households are not less dietary diverse than non-cocoa households.

Table 4.4 Nutrition, mean MDD-W score, by cocoa vs non-cocoa

	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
Mean	5.09	5.32	0.37		4.28	3.88	0.01	***
std. error	0.13	0.22			0.12	0.10		
N	170	60			133	160		
MDD-W_score								

Table 4.5 Nutrition, Achieved Minimum Dietary Diversity Score (percent of respondents), by cocoa vs non-cocoa

	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
mean	62%	70%	0.25		41%	31%	0.09	*
std. error	6%	4%			4%	4%		
N	170	60			133	160		
MDD-W_score_coded								

Figure 4.6 shows the distribution of MDD-W scores for cocoa and non-cocoa households in Ghana, while Figure 4.7 shows the distribution of MDD-W scores for cocoa and non-cocoa households in Côte d'Ivoire.

Figure 4.6 Distribution of MDD-W score cocoa and non-cocoa households, Ghana

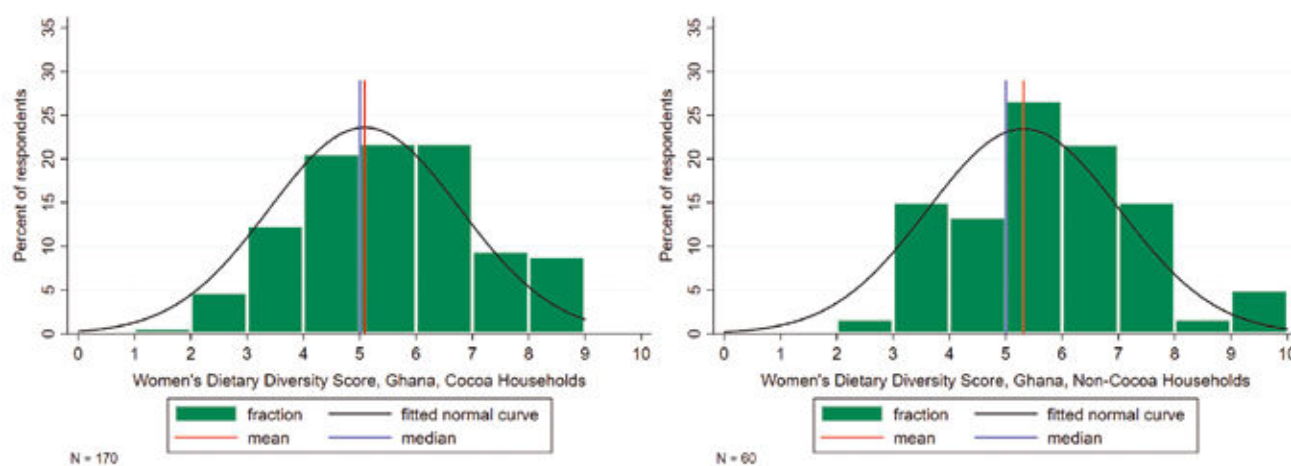
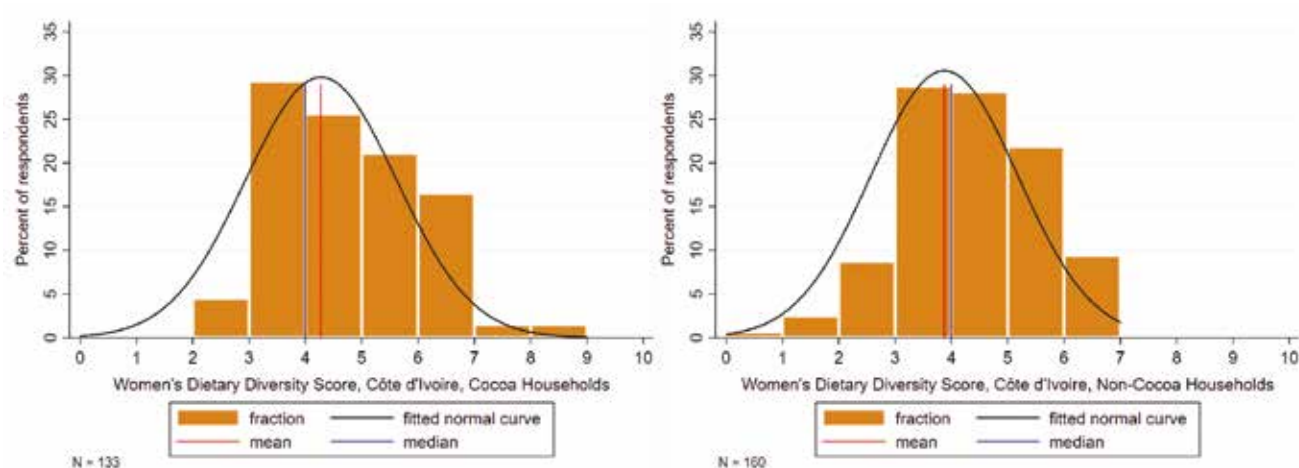


Figure 4.7 Distribution of MDD-W score cocoa and non-cocoa households, Côte d'Ivoire



Dietary diversity scores were also analysed according to whether the household was male or female-headed.¹⁴ The data suggests that, in both countries, women in female-headed households score slightly lower on dietary diversity than women in male-headed households. However, in Ghana, there is no significant difference in the proportion of male and female-headed households achieving the MDD-W. In Côte d'Ivoire, a higher proportion of male-headed households achieved the MDD-W than female headed households, however the number of observations for female headed households is quite small, so this may not be a robust finding.

Table 4.6 Nutrition, mean MDD-W score, by sex of household head

	Ghana female head	Ghana male head	pvalue	sig	Côte d'Ivoire female head	Côte d'Ivoire male head	pvalue	sig
mean	4.92	5.31	0.08	*	3.75	4.15	0.04	**
std. error	0.17	0.15			0.17	0.09		
N	96	132			57	234		
MDD-W_score								

Table 4.7 Nutrition, achieved MDD-W score (percent of respondents), by sex of respondent

	Ghana female head	Ghana male head	pvalue	sig	Côte d'Ivoire female head	Côte d'Ivoire male head	pvalue	sig
mean	60%	67%	0.26		19%	40%	0.00	***
std. error	5%	4%			5%	3%		
N	96	132			57	234		
MDD-W_bin								

¹⁴ Note: female respondents answered the MDD questions and come from either male or female-headed households.

4.3 Availability and affordability of food groups

Accessibility, availability, affordability and usage of food are key determinants for food intake and household nutrition security.¹⁵ There are also other factors that influence food intake, such as own food crop production and purchasing power, but also tradition, culture, and knowledge regarding the importance of a good diet.¹⁶

Households in cocoa growing areas in Ghana and Côte d'Ivoire grow a number of different food crops, which are used for consumption and for sale. During the lean season certain food groups are less available or not affordable.

The data presented in this section is mainly qualitative data, extracted from 23 focus group discussions, involving more than 1,000 farmers in total (34% women), in cocoa growing areas in Ghana and Côte d'Ivoire. Focus group participants were asked for their perspectives on the availability and affordability of different food groups according to the pre-defined food groups used in the MDD-W (Table 4.1).

4.3.1 Availability and affordability of food products in Ghana

In Ghana, the availability and affordability of different food groups were discussed in 13 focus group discussions. Table 4.8 shows the number of focus groups (approx. 50 participants per group) that agreed each food group was 'generally available', 'sometimes available' or 'poorly available'. Table 4.9 shows the number of focus groups in Ghana that predominantly agreed each food group was 'generally affordable', 'sometimes affordable' or 'poorly affordable'.¹⁷

¹⁵ Kenkhuis, M. (2016). Nutritional status among cocoa farming families and underlying causes in Ghana. GAIN. Available at <http://www.gainhealth.org/wp-content/uploads/2017/03/Desk-research-Ghana.pdf>

¹⁶ Ibid

¹⁷ Note: Both tables represents general agreement by the majority of focus group participants, even though some individual participants may have a dissenting view. In the group discussions it was not possible to make a distinction between cocoa households and non-cocoa households.

Table 4.8 Food group availability in Ghana (number of focus groups reporting)

	Poor availability	Sometimes available	Generally available
Dairy	1		12
Eggs			13
Fish and seafood		1	12
Grains	1		12
Condiments		1	12
Leafy vegetables		6	7
Meat and poultry	2		11
Nuts and seeds		1	12
Organ meat	4	2	7
Other fruits		4	9
Other vegetables		3	10
Pulses	1		12
Root vegetables	2	7	4
Roots and tubers			13
Tea and coffee		1	12
Vitamin A rich fruits		9	4

Table 4.9 Food group affordability in Ghana (number of focus groups reporting)

	Poor affordability	Sometimes affordable	Generally affordable
Dairy	11	1	1
Eggs	3		10
Fish and seafood	8	1	4
Grains	2	9	2
Condiments	4		9
Leafy vegetables		2	5
Meat and poultry	12	1	
Nuts and seeds	6	4	3
Organ meat	9	2	
Other fruits		3	8
Other vegetables		8	5
Pulses	4	7	2
Root vegetables	8		3
Roots and tubers		6	7
Tea and coffee	8		5
Vitamin A rich fruits		2	10

The focus group discussions offer insight on what influences availability and affordability of certain food groups, and to what extent affordability affects usage (consumption).¹⁸ Table 4.8 suggests that, in Ghana, most food groups are ‘generally available’, whereas affordability is often perceived to be more problematic.

Eggs, fruits and condiments (e.g. flavour cubes, herbs, spices) are food groups that are generally locally available and affordable. Eggs and condiments are available throughout the year and are consumed in small quantities. The availability of fruits is generally not

¹⁸ Note: In many cases, participants in the focus group discussions were referring only to a few food items that fall under the broader food group. We were not always able to discuss all food groups.

a problem because farmers produce fruits themselves (e.g. bananas, oranges, papaya, mango), although availability (and prices) fluctuate for seasonal fruits.

"In the peak season, fruit is very cheap. [...] We don't buy papaya because we all have our own in the garden." (FGD, Western Region, Ghana)

Dairy, fish, and meat are generally available but poorly affordable. Dairy foods, tea and coffee are often available only in small quantities and are perceived to be relatively expensive because they are processed and 'imported' from outside the communities.

The availability of grains (e.g. maize, rice and wheat), vegetables (e.g. tomatoes, okra, and *garden eggs*),¹⁹ pulses (e.g. beans), roots and tubers (e.g. cassava and plantain) and nuts and seeds (e.g. groundnuts) varies. Affordability largely depends on seasonal availability, whether or not it is produced locally and whether or not it can be stored for a long period.

"Maize is planted by everyone and is therefore cheap and available. Rice, however, is planted by few and is therefore expensive. We need to import it." (FGD, Ashanti Region, Ghana)

"Wheat is always expensive as we do not produce it. It's the food for the white men." (FGD, Western Region, Ghana)

"In January, February, March garden eggs are scarce and become very expensive" (FGD, Western Region, Ghana)

"The land here is not good to plant beans." (FGD, Ashanti Region, Ghana)

"In the dry season cassava becomes expensive. The soil is hard and it is more difficult to harvest. But in March and April there is oversupply and the cassava gets rotten" (FGD, Brong-Ahafo, Ghana)

Leafy vegetables (e.g. cocoyam leaves) are, although only 'sometimes available', considered to be cheap, except for the dry season.²⁰ Focus group participants often stated that they fully relied on their own production and that they do not buy these leafy vegetables.

Usually when foods are expensive, consumption declines. However, demand for meat increases during the main cocoa season, when there is more money to spend, and on special occasions, such as Christmas.

"On special occasions, I cook a full pot of chicken and meat. The type of meat depends on family taste and money." (FGD, Ashanti Region, Ghana)

"We only eat meat on occasions, at Christmas or Easter." (FGD, Ashanti Region, Ghana)

¹⁹ You could compare garden eggs with eggplant; garden eggs are whitish/yellow and used for stew.

²⁰ See also: Quaye, W., Adofo, K., Agyeman, K. O., & Nimoh, F. (2010). Socioeconomic survey of traditional commercial production of cocoyam and cocoyam leaf. Available at <http://www.bioline.org.br/abstract?id=nd10096>

"Most eat fish every day, but in March and April we reduce the amount because there is less money to spend." (FGD, Western Region, Ghana)

When certain foods are expensive, farmers may opt for an alternative. For example, fish and meat are both seen as an important source of protein, and both foods are expensive. Because fish is usually 'cheaper' compared to meat, farmers tend to prefer fish over meat. Also, when foods are considered to be healthy, farmers do continue to consume these products.

"Fish reduces cholesterol, makes you stronger. Men must eat, no matter of the price." (FGD, Ashanti Region, Ghana)

"We only buy [milk] when we are sick and the doctor in the hospital prescribes it." (FGD, Western Region, Ghana).

"The price for organ meat is high, but when we feel like eating we buy it. The doctor advises that organ meat is good for the human body." (FGD, Western Region, Ghana)

4.3.2 Food availability and affordability in Côte d'Ivoire

The availability and affordability of different food groups were discussed in 10 focus group discussions in Côte d'Ivoire. Table 4.10 shows the number of focus groups in Côte d'Ivoire that predominantly agreed each food group was 'generally available', 'sometimes available' or 'poorly available'. Table 4.11 shows the number of focus groups in Côte d'Ivoire that agreed each food group was 'generally affordable', 'sometimes affordable' or 'poorly affordable'.²¹

Table 4.10 Food group availability in Côte d'Ivoire

	Poor availability	Sometimes available	Generally available
Dairy	4		6
Eggs	1	1	8
Fish and seafood			11
Grains		2	9
Condiments			10
Leafy vegetables		1	10
Meat and poultry	1	6	4
Nuts and seeds	1	2	7
Organ meat	3	4	2
Other fruits	1	5	5
Other vegetables		5	5
Pulses	1	1	8
Root vegetables	7	1	2
Roots and tubers	1	1	9
Tea and coffee			10
Vitamin A rich fruits		5	5

²¹ Note: Both tables represents general agreement by the majority of focus group participants, even though some individual participants may have a dissenting view. In the group discussions it was not possible to make a distinction between cocoa households and non-cocoa households.

Table 4.11 Food group affordability in Côte d'Ivoire

	Poor affordability	Sometimes affordable	Generally affordable
Dairy	8		1
Eggs	5	1	4
Fish and seafood	4	1	5
Grains	4	3	3
Condiments		2	8
Leafy vegetables			4
Meat and poultry	8	2	
Nuts and seeds	3	3	4
Organ meat	8	1	
Other fruits	1	2	4
Other vegetables	2	5	3
Pulses	2	3	4
Root vegetables	5	2	2
Roots and tubers	1	5	3
Tea and coffee	1		8
Vitamin A rich fruits	1	1	4

Table 4.10 suggests that, in Côte d'Ivoire, most food groups are 'generally available', although some food groups are more often available than others. As in Ghana, the affordability of food groups in Côte d'Ivoire is widely perceived to be more problematic than availability.

In Côte d'Ivoire, tea (*Lipton tea*) and coffee (*Nescafé sachets*) are generally available and affordable, even though these products are imported. Other foods that are generally affordable are condiments (e.g. Maggi cubes) and leafy vegetables (e.g. spinach, okra, taro, cassava, *moringa*, sweet potatoes, eggplant), which farmers use for stews and other meals. Farmers said they generally do not need to buy these vegetables as they are produced by the farmers themselves.

"Leafy vegetables are usually in abundance. We go to the field and pick leaves for the food. We do not buy." (FGD, Haut-Sassandra, Côte d'Ivoire)

"Maggi is cheap. We use it in almost every meal." (FGD, Grebe, Côte d'Ivoire)

Fish was considered to be widely available in Côte d'Ivoire, but the affordability varies according to local availability, and whether or not the fish is sold as 'fresh' or 'smoked'. In Côte d'Ivoire, most groups mentioned that nearby rivers are the most important source of fish. Other food groups that are widely available, but not always affordable are grains, eggs, and roots and tubers.

"The price of fish varies: expensive in the rainy season [when water rises], less expensive in the dry season [when the water is low]." (FGD, Guémon, Côte d'Ivoire)

"We find fish expensive, because we have to travel to buy and we don't have fishermen in our town." (FGD, Indenie-Ojuablin, Côte d'Ivoire)

"The bread is expensive, but the maize is cheap as we produce it ourselves. However, prices of maize increase in the dry season and affordability goes down." (FGD, Haut-Sassandra, Côte d'Ivoire)

In Côte d'Ivoire the availability of meat and dairy (e.g. milk) varies because these products are often not locally produced, or only in small amounts. The availability of vegetables (e.g. eggplant, tomatoes, okra and spices) and fruits (e.g. oranges, bananas, avocado, papaya, mango and passion fruit) also varies, depending mainly on the season. Because farmers produce vegetables and fruits themselves, they generally do not need to buy these crops.

"Organ meat is too expensive. We need to go to the next town to buy. The next town is 9 km away. We either, walk, bike or take the bus to the city depending on what we have." (FGD, Haut-Sassandra, Côte d'Ivoire)

"We usually don't buy as fruits are in abundance in the season." FGD, Gôh Region, Côte d'Ivoire)

When certain foods are expensive, consumption reduces. In Côte d'Ivoire, more than in Ghana, consumption of expensive products, such as meat and milk, is often limited to special occasions or when more cocoa money is available.

"Milk is expensive. We only drink it during holiday season when there is something to celebrate." (FGD, San Pedro, Côte d'Ivoire)

"We can buy meat in San Pedro but we can only afford it when we have had a good cocoa harvest. So only in the main season." (FGD, San Pedro, Côte d'Ivoire)

"We maybe eat meat once a month. We eat more meat during festival seasons." (FGD, Grebe, Côte d'Ivoire)

"We can only buy bush meat in the village, we do not produce [other] meat.. We only buy [other] meat in the holiday season when traders come from the town to sell in the village." (FGD, Haut-Sassandra, Côte d'Ivoire)

When certain foods are not available or expensive, farmers may shift to alternatives. For example, instead of 'normal' meat farmers will consume alternative bush meat, like agouti and antelope, or even dogs and snakes.

"Beef is not affordable, chicken is a little bit affordable. We hardly eat it as it is too expensive. We prefer fish." (FGD, Guémon, Côte d'Ivoire)

4.4 Periods of food insecurity

While our household survey data shows only a weak variation in the number of meals consumed throughout the year, focus group participants did suggest that there are periods of relative food insecurity during the year.

In Ghana, farmers explained that after most food crops have been harvested in March, food availability may become scarcer. It is also the period when cassava becomes difficult to harvest due to the hardness of the soil. In April, when the first rains begin, food crops are replanted. The main rainy season is in June and July, and in these months there can be periods of food scarcity. In this period the newly planted food crops are not yet ready to be harvested and low supply in most communities leads to increased food prices. Furthermore, durable food stuffs that have been purchased during the main cocoa season usually start running low in this period. As coping strategies, some farmers may reduce the amount of food they consume or, as a last resort, take out loans. Participants explained that not all households were able to maintain a healthy diet during this period of scarcity. The main cocoa harvest begins from around September (even though it officially begins 1 October). Table 4.12 illustrates the timing of the dry and rainy seasons, periods of food insecurity and the timing of the cocoa harvest.

Table 4.12 Seasons in Ghana

Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dry season												
Rainy season												
Periods of food insecurity												
Cocoa harvest				Light cocoa harvest					Main cocoa harvest			

Source: Author's interpretation of focus group data

In Côte d'Ivoire, we see a rather similar situation as in Ghana. The main difference is that some areas in Côte d'Ivoire experience an additional 'short rains'. Most farmers mentioned April, May and June as the rainy season although some said the rainy season continued in July. Around half of the groups identified September and October as an additional rainy period (Table 4.13). Focus group participants agreed that in terms of food security and nutrition, August is the most difficult month for them. In this month, most food crops that have been replanted in April are not yet ready for harvesting. Scarcity leads to higher food prices in the markets. The main cocoa season begins in October, a month later than in Ghana, and lasts until January.

Table 4.13 Seasons in Côte d'Ivoire

Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Dry season												
Rainy season												
Periods when there is food insecurity												
Cocoa harvest				Light cocoa harvest						Main cocoa harvest		

Source: Author's interpretation of focus group data

In both Ghana and Côte d'Ivoire, food was reported as some of farmers' biggest household expenditures. This is particularly the case in the middle of the year (due to scarcity) and at the end of the year, when farmers have more cocoa money to spend, and households celebrate the holiday period.

In Ghana, school fees were also ranked as one of the biggest expenditure items by many groups. Participants explained that this was because of the number of school age children in an average household; the value that most families attribute to education as a means of improving future livelihood prospects; the fact that child labour is prohibited by the Ghanaian government and usually enforced by local child well-being committee; and the cost of school fees itself. School fees are typically paid over three terms: in September at the start of the school year, in January and in April/May. Participants explained that paying school fees is most difficult in September which is at the beginning of the cocoa seasons and prior to the harvesting of other crops. During this period, farmers either rely on savings, find non-agricultural income sources, or take out a loan (only when no other options are available).

Farm inputs, such as fertiliser, were either bought immediately after the cocoa harvest (December/January), when money is available, or just at the time they need some (March/April for fertiliser, July/August for fungicides). In Ghana, COCOBOD supplies fertiliser and some other farm inputs which takes the pressure off households who receive these inputs.

Social expenditures, such as church contributions, marriages and funerals can occur at any time during the year. In Ghana, the annual sum paid for church contributions can be up to 10% of a respondents' total income and can be paid either in cash or with produce. Church contributions can be made weekly, monthly, yearly, or a combination of these, depending on which church is attended. Funerals also involve great expenses. In both Ghana and Côte d'Ivoire, there can be a difference between when a person is buried and when the last funeral rites are performed. This timing partly depends on the wealth of the family as to whether funeral rites take place immediately when a person is buried, or a little later when money becomes available such as after the main cocoa harvest. Many participants said that it is common for households to take out a loan to pay for funeral costs.

It is also common for churches or community members to donate a small amount to help pay for funerals.

Construction requires significant investment in building materials, labour, and land. Households often make housing investments in stages, whenever they have money to invest. In Ghana, participants frequently mentioned that households engage in construction after the main cocoa harvest when money is available.

Table 4.14 Rank of biggest household expenditures (number of focus groups), Ghana

Rank	Biggest	Second biggest
School fees	6	3
Food for the household	4	5
Buying fertiliser	2	1
Healthcare		2

Note: Only the expenditure items most frequently ranked by focus group are presented above

Table 4.15 Timing of household expenditures during the year, Ghana

Months	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
School fees												
Food for the household												
Healthcare, insurance												
Buying fertiliser												

Source: Author's interpretation of focus group responses

In Côte d'Ivoire, education-related expenses were also highlighted by focus group participants, although in theory public schools are in theory free of charge. Parent-Teacher Associations require membership fees at the beginning of the year, and expenses such as uniforms and books also need to be paid. Education costs may be often problematic because of the timing, which falls between the main and light cocoa seasons. Many participants say they lack disposable income in this period and either ask permission from school to delay their payment, or they take out a loan from the local buyer (*pisteur*) that is repaid in the main season.

Healthcare was ranked as the second highest expenditure in Côte d'Ivoire. Unlike in Ghana, Ivoirians do not benefit from a national health insurance programme. Ivoirian participants explained that healthcare costs are made throughout the year, but there are certain periods when they are more vulnerable to falling ill. For example, in the dry season from December to March (also known as the *Harmattan* season), the air is dry and dusty, which leads to more health problems. In addition, the rainy season leads to an increase in the number of mosquitoes, which results in a higher incidence of malaria. Participants said that they do more heavy farm work during this period, which may lead to fatigue or injury.

Table 4.16 Rank of biggest household expenditures, Côte d'Ivoire (number of FGD groups)

Rank	Biggest	Second biggest
School fees/ education costs	6	2
Food for the household	3	
Healthcare		7

Note: Only the expenditure items most frequently ranked by focus group are presented above

Table 4.17 Timing of household expenditures during the year, Côte d'Ivoire (number of FGDs)

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Food for the household												
Healthcare												
Educational costs												

Source: Author's interpretation of focus group responses

4.5 Summary

Ghanaian households appear to be more 'food secure' than Ivorian households.

Ghanaian respondents more frequently report consuming three meals per day than Ivorian respondents throughout the year. Fewer Ghanaian households consume only one meal per day compared with Côte d'Ivoire respondents. Focus group data suggests that there is greater availability of most food groups in Ghana compared with Côte d'Ivoire.

There is relatively little variation in the number of meals consumed per day throughout the year in both Ghana and Côte d'Ivoire. Nevertheless, qualitative data suggests that there *are* periods of relative food insecurity.

Food insecurity is greatest just before the cocoa main season. This is the period when there is little money left in the household, farmers run out of stocks, and it is still too early to harvest replanted food crops. In this period, food prices are relatively high.

Cocoa households are not less food secure than non-cocoa households. In Ghana, cocoa households reported a significantly higher average number of meals per day than non-cocoa households. In Côte d'Ivoire, differences were not statistically significant.

Affordability of certain food groups is more of a challenge than availability.

Affordability becomes a particular issue when a food is not widely produced in the community and has to be imported, and when it is out of season.

In the lean season, households apply a range of coping strategies. When stored food begins to run low, households may need to purchase more food than usual. Unfortunately, they also face higher food prices caused by the lower food supply and an increase in demand. Households may need to rely on savings or income from other sources to purchase food.

In Ghana, 64% of women in reproductive age achieved minimum dietary diversity. In Côte d'Ivoire, only 35% respondents achieved the same. It should be noted that, in Ghana the data was collected during the main cocoa season when households had more disposable income available, whereas data was collected a month or two later in Côte d'Ivoire. This means the two countries are not directly comparable.

Cocoa is at the centre of many household decisions. Where possible, household expenditures are deferred to the main cocoa harvest, which may include funeral expenditures, construction work, or spending on more expensive food products. This shows the need for good financial planning within the household.

Education-related expenses are the most important expense mentioned in both countries. Other major expenditures are food, healthcare (for Côte d'Ivoire), inputs, labour, social expenditures and construction.



5

Crop choice and diversification

Bymolt, R., Laven, A., Tyszler, M. (2018). Demystifying the cocoa sector in Ghana and Côte d'Ivoire. Chapter 5, Crop choice and diversification. The Royal Tropical Institute (KIT).



Cocoa has sometimes been described as a ‘poor man’s crop’,¹ as some recent studies have calculated that a large proportion of cocoa farmers live in extreme poverty.^{2,3} Concerns increased with negative movements in world cocoa prices in the 2016/2017 season, and how this may negatively impact on the livelihoods of cocoa households.

One narrative that has been gathering pace is that farmers should diversify further into other crop options. Proponents of this narrative suggest that diversification can help cocoa households mitigate risk from cocoa price fluctuations. Greater diversification with food crops is also considered to be useful for mitigating food insecurity and malnutrition, particularly outside of the main cocoa season.⁴ Some see diversification as a kind of insurance against climate change, which is expected to have at least some effect on producers in the coming decades.^{5,6} Others have suggested that increased diversification could also slow the worrying trend of deforestation and ‘bush clearing’ for cocoa.⁷ A final version of the diversification narrative is that diversified income from other crops can raise household incomes. In this view, population trends will lead to more demand for food and an associated increase in food prices.⁸

We caution that crop diversification is quickly becoming a new mantra, and yet the benefits of increased diversification for cocoa households is still under-researched. For each of the arguments presented above in favour of greater diversification we note there are also compelling counter-arguments. For example, diversification may reduce risks associated with cocoa price fluctuations, but economic theory suggests that specialisation has its advantages in terms of technical and economic efficiency and that highly diversified farms may face higher costs in marketing small volumes, especially in remote locations.⁹ Likewise, the production of a higher number of food crops intuitively suggests a household would be more secure throughout the year. However, if cocoa generates higher income to buy food from sufficiently well-functioning markets, this is not necessarily true – particularly if the diversified crops

¹ v.d. Kooij, S. (2015). De McDonaldisatie van de cacaosector. Vice Versa. Available at <http://hetnieuwe.viceversaonline.nl/blog/de-mcdonaldisatie-van-de-cacaosector/>

² Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C. & Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics. Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>

³ Fountain, A.C. and Hütz-Adams, F. (2015) Cocoa Barometer 2015-USA Edition. Available at http://www.cocoabarometer.org/International_files/Cocoa%20Barometer%202015%20USA.pdf

⁴ Anderman, T. L., Remans, R., Wood, S. A., DeRosa, K., & DeFries, R. S. (2014). Synergies and tradeoffs between cash crop production and food security: a case study in rural Ghana. *Food security*, 6(4), 541-554. Available at: <https://link.springer.com/article/10.1007/s12571-014-0360-6>

⁵ Schroth, G., Läderach, P., Martinez-Valle, A. I., & Bunn, C. (2017). From site-level to regional adaptation planning for tropical commodities: cocoa in West Africa. *Mitigation and Adaptation Strategies for Global Change*, 22(6), 903-927. Available at: <https://link.springer.com/article/10.1007/s11027-016-9707-y>

⁶ Schroth, G., Läderach, P., Martinez-Valle, A. I., Bunn, C., & Jassogne, L. (2016). Vulnerability to climate change of cocoa in West Africa: Patterns, opportunities and limits to adaptation. *Science of the Total Environment*, 556, 231-241. Available at: <https://www.sciencedirect.com/science/article/pii/S0048969716304508>

⁷ Ruf, F., Schroth, G. & Doffangui, K. (2014). Climate change, cocoa migrations and deforestation in West Africa: What does the past tell us about the future? In *Sustain Science* (2015) 10:101-111. Springer. Available at https://www.researchgate.net/profile/Goetz_Schroth2/publication/268507038_Climate_change_cocoa_migrations_and_deforestation_in_West_Africa_What_does_the_past_tell_us_about_the_future/links/549dfdbd0cf2d6581ab6437e/Climate-change-cocoa-migrations-and-deforestation-in-West-Africa-What-does-the-past-tell-us-about-the-future.pdf?origin=publication_detail

⁸ Wessel, M., & Quist-Wessel, P. F. (2015). Cocoa production in West Africa, a review and analysis of recent developments. *NJAS-Wageningen Journal of Life Sciences*, 74, 1-7. Available at: <https://www.sciencedirect.com/science/article/pii/S1573521415000160>

⁹ Ruf, F., & Schroth, G. (Eds.). (2015). *Economics and ecology of diversification: the case of tropical tree crops*. Springer. Available at: <http://www.springer.com/cn/book/9789401772938>

are easy perishable. Concerns about climate change are valid, although specific scenarios are still being modelled. There are also no guarantees that crop options for diversification will fare better than cocoa in the context of a changing climate. Finally there is a lack of evidence that encouraging farmers to diversify more will lead to higher household incomes. In fact, encouraging households to diversify part of their land holdings out of cocoa may worsen household incomes if the markets for the alternative options are not strong and established, and if alternative crops generate lower profits per unit of land allocated. The narrative is also unclear on the optimal 'level' of diversification, or the optimal crop combinations for different purposes (e.g. to combat periods of food insecurity or to slow down deforestation).

In this study, we took a broad perspective to understand the relative importance of cocoa in cocoa growing areas, and to understand typical household strategies for generating income and improving their livelihoods. By taking this perspective, we found that 'diversification' is not a new phenomenon, but is already part of the farming system of cocoa and non-cocoa households alike.

Households make conscious decisions about the crop types and combinations to grow. These decisions may not always appear to be optimally efficient. However, by carefully analysing the factors that play on the minds of households, we can better understand household motivations, and the kinds of incentives or market conditions that would be required for them to change their choices and practices. For example, we must take into consideration factors such as profitability, access to a good market with good prices, the perceived risk of crop failure or a market price crash, different labour demands for each crop, climate and soil conditions, the seasonality of different crops and much more. Male and female-headed households may also have different preferences or face certain barriers to producing and marketing different crops. The reasons why households choose to grow certain crops was captured during focus group discussions, a summary of which is presented in this chapter.

5.1 Crops produced

Many household studies in cocoa growing regions in Ghana and Côte d'Ivoire suggest that cocoa is the most important source of income.^{10,11} But other crops are also considered to be of relative importance, such as cassava, plantain, oil palm, maize, and

¹⁰ Waarts, Y., Ge, L., Ton, G. & van der Meen, J. (2013). A touch of cocoa: Baseline study of six UTZ- Solidaridad cocoa projects in Ghana. LEI report 2013-2014. LEI Wageningen UR. Available at: <http://library.wur.nl/WebQuery/wurpubs/fulltext/305316>

¹¹ Ingram, V., Waarts, Y., Ge, L., van Vugt, S., Wegner, L., Puister-Jansen, L., Ruf, F., Tanoh, R. (2014). Impact of UTZ certification of cocoa in Ivory Coast: Assessment framework and baseline. Wageningen, LEI Wageningen UR (University & Research centre), LEI Report 2014-010. Available at: <http://edepot.wur.nl/307584>

yam.^{12,13,14} In Côte d'Ivoire, different studies suggest that rubber, palm oil or cashew production could become an alternative to cocoa.^{15,16,17} However, before considering diversification strategies, we first analyse household's current crop choices.

In our study, respondents were asked about the crops their households produced. The most frequently produced crop in both Ghana (90%) and Côte d'Ivoire (69%) was cocoa. After cocoa, the next most commonly produced crops are cassava and plantain (Table 5.1). These crops partly derive their popularity from their dual role as food and cash crops. Furthermore, both are frequently intercropped with young cocoa (Table 5.2). In Côte d'Ivoire, a variety of crops such as chili, yam, eggplant, okra, tomatoes and groundnuts are more frequently produced than in Ghana. Vegetables are often produced on small plots, compared with more staple crops such as maize, rice, and yam. The reasons why farmers grow cocoa and other major crops are presented in later chapters of this book.

Table 5.1 Crops produced, by country

	Ghana	Côte d'Ivoire	pvalue	sig
Cocoa	90%	69%	0.00	***
Cassava	84%	66%	0.00	***
Plantain	80%	45%	0.00	***
Maize	46%	34%	0.00	***
Cocoyam	45%	19%	0.00	***
Peppers	27%	0%	0.00	***
Yam	24%	48%	0.00	***
Tomatoes	21%	28%	0.00	***
Palm	14%	7%	0.00	***
Okra	14%	46%	0.00	***
Eggplant	10%	44%	0.00	***
Rice	6%	28%	0.00	***
Bananas	6%	1%	0.00	***
Rubber	5%	19%	0.00	***
Other	4%	6%	0.00	***
Coconut	4%	1%	0.00	***
Oranges	3%	0%	0.00	***
Cashews	3%	21%	0.00	***
Pineapple	3%	0%	0.00	***
Chili ¹⁸	2%	53%	0.00	***
Beans	1%	5%	0.00	***
Groundnuts	1%	25%	0.00	***
Coffee	0%	14%	0.00	***

Note: Only includes crops for which at least 2% of respondents reported producing in either country

¹² Wiggins, S & Leturque, H. (2011). Ghana's sustained agricultural growth: Putting underused resources to work. London: ODI Publications. Available at: <https://www.odi.org/publications/5059-ghana-agriculture-growth-development-progress>

¹³ Traoré, S, Kobenan, K., Kouassi, K.S. & Gnonhouri, G. (2009). Systèmes de culture du bananier plantain et méthodes de lutte contre les parasites et ravageurs en milieu paysan en Côte d'Ivoire. Journal of Applied Biosciences, 19, 1094-1101. Available at: <http://m.elewa.org/JABS/2009/19/8.pdf>

¹⁴ Hainmueller, J., Hiscox, M., & Tampe, M. (2011). Sustainable development for cocoa farmers in Ghana. MIT and Harvard University. Available at: <https://www.theigc.org/wp-content/uploads/2015/02/Hainmueller-Et-Al-2011-Working-Paper.pdf>

¹⁵ Tano, M. A. (2012). Crise cacaoyère et stratégies des producteurs de la sous-préfecture de Méadji au Sud-Ouest ivoirien (Doctoral dissertation, Université Toulouse le Mirail-Toulouse II). Available at: <https://halshs.archives-ouvertes.fr/tel-00713662/>

¹⁶ Lemeilleur, S., N'Dao, Y. & Ruf, F. (2015). The productivist rationality behind a sustainable certification process: evidence from the Rainforest Alliance in the Ivorian cocoa sector. International Journal of Sustainable Development, 18(4), 310-328. Available at: <https://www.inderscienceonline.com/doi/abs/10.1504/IJSD.2015.072661>

¹⁷ ICCO (2010). Inventory of diversification strategies on cocoa farms. Consultative board on the World Economy, 22nd meeting. London 13th of September 2010. Available at: https://www.icco.org/about-us/international-cocoa-agreements/cat_view/30-related-documents/32-consultative-board-on-the-world-cocoa-economy.html

¹⁸ Respondents in Ghana and Côte d'Ivoire may have used the terms 'chili' and 'peppers' for the same crop

In Ghana, we find relatively few crops for which there are large, statistically significant differences between male and female headed households. Cocoa was produced by a high proportion of both male (91%) and female (86%) headed households (*highly significant*). Cassava, which is sometimes described as a ‘women’s crop’ was produced at more or less equal rates by male and female headed households. We do find some significant differences in the choice to grow cocoa, oil palm, rubber and rice – crops which are sometimes considered ‘cash crops’ – but the difference in effect size is only between 3% and 5%.

In Côte d’Ivoire, we find more meaningful differences between male and female headed households. Cocoa was produced much more frequently by male headed households (73%) than by female headed households (36%) (*highly significant*) (Table 5.2). Maize, plantain, rice, rubber and coffee are other significant crops produced more frequently by male headed households. However, for some of these crops the effect size is relatively small, whilst for others the total sample of households producing the crop is relatively small, thereby affecting confidence in the strength of the results. Likewise, a higher proportion of female headed households produce cassava, although the effect size is not particularly large.

Table 5.2 Crops produced, by sex of household head

	Ghana female head	Ghana male head	pvalue	sig	Côte d’Ivoire female head	Côte d’Ivoire male head	pvalue	sig
Cocoa	86%	91%	0.02	**	36%	73%	0.00	***
Cassava	84%	84%	0.92		76%	65%	0.01	***
Plantain	82%	80%	0.36		35%	47%	0.01	***
Maize	44%	47%	0.43		20%	36%	0.00	***
Cocoyam	44%	45%	0.84		18%	19%	0.84	
Peppers	31%	26%	0.09	*	1%	0%	0.35	
Yam	20%	25%	0.09	*	50%	48%	0.70	
Tomatoes	24%	20%	0.09	*	34%	27%	0.05	*
Oil palm	9%	15%	0.01	***	4%	7%	0.14	
Okra	14%	14%	0.75		52%	46%	0.18	
Eggplant	8%	10%	0.16		52%	44%	0.04	**
Rice	2%	8%	0.00	***	16%	29%	0.00	***
Bananas	5%	6%	0.27		1%	2%	0.82	
Rubber	3%	6%	0.04	**	10%	20%	0.00	***
Coconut	3%	4%	0.55		0%	1%	0.17	
Other	3%	4%	0.76		8%	6%	0.29	
Oranges	2%	4%	0.19		1%	0%	0.00	***
Cashews	2%	3%	0.41		18%	21%	0.46	
Chili	1%	2%	0.18		62%	52%	0.02	**
Beans	2%	1%	0.14		3%	6%	0.18	
Groundnuts	0%	1%	0.27		21%	25%	0.26	
Coffee	0%	0%	0.63		7%	15%	0.01	***
N	288	1,270			157	1,323		

Note: Table sorted on Ghana male head. Only includes crops for which at least 2% of respondents reported producing in either country

5.2 Crops sold

Distinctions between cash crops and food crops are often not clear cut. A cash crop is often thought of as a non-food commodity, but ‘food crops’ can also be profitably produced and marketed. The term ‘food crop’ usually refers to crops produced mainly for household consumption. Confusion arises when some households produce a given crop predominantly for household consumption, whilst other households produce the same crop mainly to sell. In addition, confusion arises when ‘cash crops’ and ‘export crops’ are used synonymously, when cash crops can also be produced to market locally or regionally.¹⁹ A good understanding of the distinction between food, non-food, cash and export crops is important in light of the discussion on how the expansion of cash cropping for export affects food production, or pushes subsistence farming to marginal areas.

In our study, we find that many crops commonly thought of as ‘food crops’ play a dual role, defying a binary categorisation. Table 5.3 presents the percentage of respondents who sold some of their crop if they produced it.

In both Ghana and Côte d’Ivoire, a fairly high proportion of respondents reported selling at least some of their staple food crops, including cassava (Ghana 72%, Côte d’Ivoire 52%), plantain (72%, 38%), maize (62%, 34%), yam (34%, 27%) and rice (80%, 46%).

It should be noted that for some ‘cash crops’ (such as cocoa, coffee, palm and rubber) not all respondents reported selling the crop last year. In some cases these may have been planted relatively recently, and not yet being mature enough to harvest. In other cases, respondents may have also let old and unproductive trees remain on the land and thus still reported these as being ‘produced’.

In Côte d’Ivoire, a higher proportion of female-headed households (48%) reported selling cassava than male-headed households (28%). While the number of female-headed households in the sample in Côte d’Ivoire is too small to draw firm conclusions, it seems plausible that cassava is a more important ‘cash crop’ for women than for men.

¹⁹ Barbier, E. B. (1987). Cash crops, food crops and agricultural sustainability. Agriculture Programme. Gatekeeper, Series No SA2. Available at <http://eprints.icrisat.ac.in/12180/>

Table 5.3 Percent of households who sold the crop in the last year (if they produced it), by country

	Ghana	Côte d'Ivoire	pvalue	sig
Cocoa	96%	94%	0.02	**
Cassava	72%	52%	0	***
Plantain	72%	38%	0	***
Maize	62%	34%	0	***
Cocoyam	42%			
Peppers	58%	75%	0.50	
Yam	34%	27%	0.01	***
Tomatoes	52%	27%	0	***
Oil palm	79%	62%	0	***
Okra	43%	36%	0.06	*
Eggplant	43%	37%	0.17	
Rice	80%	46%	0	***
Bananas	43%	9%	0.00	***
Rubber	65%	47%	0	***
Coconut	72%	31%	0.00	***
Cashews	80%	69%	0.11	
Chili		44%		
Groundnuts		61%		
Coffee		85%		

Note: The above table has retained the same order as that presented for crops produced.

5.3 Most important crops

Survey respondents were asked what they considered to be their most important and second most important crops. Respondents could interpret 'important' as they saw fit.²⁰

In Ghana and Côte d'Ivoire, cocoa was frequently reported as the most important crop produced by the household (Table 5.4). In the Ghana sample, 79% of respondents said that it was their household's most important crop. By way of contrast, only 4% of respondents said that cassava was their household's most important crop. In Côte d'Ivoire, 53% of respondents also indicated that cocoa was their most important crop. Only 13% indicated that cassava was their household's most important crop.

Table 5.4 also shows changes in perceived importance ascribed to a crop compared with 5 years ago. We observe, particularly in Ghana, an increase in the importance given to cocoa (4%). In Côte d'Ivoire, the growing importance of cashews (3%) is perhaps most remarkable, although this is largely a regional phenomenon (Table 5.8).

²⁰ This question is simpler than asking about the 'most profitable crop', 'most produced', or 'most land under each crop'. Asking about 'importance' shows how households value certain crops. Furthermore, the question was used to ask more detailed questions about the most important and second most important crops later in the survey.

Table 5.4 Most important crop now and five years ago, by country, percentage of respondents

Most important crop	Ghana	Ghana 5 years ago	Côte d'Ivoire	Côte d'Ivoire 5 years ago
Cocoa	79%	75%	53%	52%
Cassava	4%	5%	13%	11%
Rubber	3%	2%	4%	3%
Maize	3%	3%	1%	1%
Plantain	2%	3%	1%	1%
Palm	2%	2%	2%	1%
Rice	1%	1%	4%	2%
Cashews	1%	1%	12%	9%
Yam	0%	0%	2%	3%
N	1,560	1,560	1,485	1,485

Note: Table includes only crops that were cited as the 'most important' by at least 2% of respondents in either country. Differences between Ghana and Côte d'Ivoire were highly significant *** (Pvalue 0.00). Respondents were also asked what crop was the most important 5 years ago. The questions 'What was your household's most important crop last year?', and '5 years ago, what was your household's most important crop?' have been combined into a single table for ease of reading.

While cocoa was clearly found to be the most important crop, both countries reported a lot more variation in their choice of second most important crop. We believe that it is more relevant to look at which crops were identified as either the most or second most important crop, as presented in Table 5.5. In this study, we refer to households that identify cocoa as their most or second most important crop as 'cocoa households'. For other households, we refer to them as 'non-cocoa households'.

In Ghana, currently 84% of respondents identified cocoa as the 'most important' or 'second most important'. A big gap separates cocoa from plantain (26%), cassava (23%) and maize (10%). No other crop in Ghana had more than 10% of respondents identifying it as either their most important or second most important crop. In Côte d'Ivoire, 61% of respondents identified cocoa as the 'most important' or 'second most important'. Cassava was the next most frequently reported at 25% followed by cashews (15%) and rice (12%). No other crop in Côte d'Ivoire had more than 10% of respondents identifying it as either their most important or second most important crop (Table 5.5).

Comparing today with 5 years ago, we observe that, for cocoa households in both Ghana and Côte d'Ivoire, the importance of cocoa increased (5% and 4%) (*highly significant*). In Côte d'Ivoire, cashews (4%) and rubber (2%) became more important. Crops that have declined slightly in importance are plantain, maize and cassava, in Ghana, and yam and coffee in Côte d'Ivoire.

Table 5.5 Most important or second most important crop, now and five years ago, by country

	Ghana					Côte d'Ivoire				
	Now	5 years ago	Change	pvalue	sig	Now	5 years ago	Change	pvalue	sig
Cocoa	84%	79%	5%	0.00	***	61%	57%	4%	0.00	***
Plantain	26%	29%	-3%	0.00	***	5%	6%	0%	0.48	
Cassava	23%	25%	-2%	0.01	**	25%	23%	1%	0.04	**
Maize	10%	13%	-3%	0.00	***	6%	5%	1%	0.30	
Oil palm	8%	8%	1%	0.14		4%	3%	1%	0.00	***
Peppers	5%	4%	1%	0.08	***	0%	0%	0%	0.56	
Rice	5%	5%	0%	0.74		12%	13%	-1%	0.02	**
Rubber	3%	3%	1%	0.00	***	9%	7%	2%	0.00	***
Tomatoes	3%	3%	0%	0.65		2%	2%	0%	1.00	
Cashews	2%	2%	0%	0.10	***	15%	11%	4%	0.00	***
Cocoyam	2%	3%	0%	0.51		0%	0%	0%	0.56	
Okra	2%	1%	0%	0.53		3%	2%	0%	0.18	
Yam	1%	1%	0%	0.21		8%	11%	-3%	0.00	***
Eggplant	1%	1%	0%	0.25		4%	3%	0%	0.37	
Chili	0%	0%	0%	0.08	***	8%	6%	1%	0.00	***
Groundnuts	0%	0%	0%	0.32		5%	5%	0%	0.33	
Coffee	0%	0%	0%			7%	10%	-2%	0.00	***

Note: The above table presents the percentage of respondents in each country for which a crop was reported to be either the most important or second most important crop. This categorisation of 'most important or second most important' was used to ask survey respondents detailed questions about each crop later in the survey. For example, those with cocoa as the most important or second most important crop are defined as 'cocoa households' throughout the book. The table includes only crops reported by at least 2% of respondents in either country, sorted by Ghana.

Male and female headed households reported some differences in terms of crops they rank as being first or second most important (Table 5.6). In Ghana, there was found to be little relatively little difference in the importance of cocoa or any other crop.

Where statistical significance was found, the effect size tended to be relatively small, or the number of observations was quite low.

However, in Côte d'Ivoire, only 31% of female headed households reported cocoa as their most or second most important crop, compared to 65% of male headed households (*highly significant*). Cassava was regarded as important by 40% of female headed households compared with 23% of the male headed households (*highly significant*). For chili, 15% of the female headed households reported this crop being their first or second most important crop, compared with 7% of the male headed households (*highly significant*). Statistical significance was also found for some other crops such as coffee and rubber, however the number of observations is quite low for these other crops making it difficult to make firm claims.

Table 5.6 First or second most important crop, by sex of the household, by country

	Ghana female head	Ghana male head	pvalue	sig	Côte d'Ivoire female head	Côte d'Ivoire male head	pvalue	sig
Cocoa	81%	86%	0.04	**	31%	65%	0	***
Plantain	32%	25%	0.01	**	8%	5%	0.19	
Cassava	24%	23%	0.75		40%	23%	0	***
Maize	9%	10%	0.63		4%	6%	0.46	
Tomatoes	7%	2%	0	***	2%	3%	0.62	
Peppers	6%	4%	0.31		0%	0%	0.73	
Oil palm	5%	9%	0.04	**	3%	4%	0.48	
Cashews	2%	2%	0.52		15%	15%	0.84	
Coconut	2%	2%	0.8		0%	0%	0.55	
Cocoyam	2%	2%	0.84		1%	0%	0.03	**
Rubber	2%	4%	0.31		4%	10%	0.01	**
Okra	1%	2%	0.2		6%	2%	0.01	**
Rice	1%	6%	0	***	10%	12%	0.34	
Chili	0%	0%	0.41		15%	7%	0	***
Coffee	0%	0%	0.63		3%	8%	0.03	**
Eggplant	0%	1%	0.05	**	4%	3%	0.53	
Groundnuts	0%	0%	0.5		7%	5%	0.24	
Yam	0%	1%	0.12		7%	8%	0.53	
N	288	1,270			157	1,323	N	

In Ghana, cocoa was regarded as the most important or second most important crop in all regions sampled. Plantain competed for importance in all regions. Cassava was found to be particularly prominent in the Western region, and much less so in the Eastern region. Maize has relative importance in Brong Ahafo, but has low presence in the Western region. Oil palm stands out in the Eastern region and rice is relatively popular in the Central region (although the sample size in the Central region is quite small so this is not considered to be a strong finding). Two other crops have a regional presence in Brong Ahafo: cashew and peppers. This may be related to its geography as a border region with Côte d'Ivoire, where both cashew and (chili) peppers have more prominence (Table 5.7).

Table 5.7 Most important or second most important crop (combined), by region in Ghana

	Ashanti	Brong Ahafo	Central	Eastern	Western	pvalue	sig
Cocoa	84%	75%	94%	97%	82%	0.00	***
Plantain	37%	25%	35%	25%	20%	0.00	***
Cassava	20%	13%	28%	10%	34%	0.00	***
Maize	14%	20%	8%	13%	3%	0.00	***
Palm	10%	4%	4%	17%	6%	0.00	***
Rice	4%	3%	19%	7%	3%	0.00	***
Peppers	3%	10%	0%	2%	5%	0.00	***
Oranges	3%	1%	0%	2%	0%	0.00	***
Cocoyam	1%	4%	0%	1%	3%	0.02	**
Yam	1%	4%	0%	0%	1%	0.00	***
Coconut	0%	0%	0%	0%	4%	0.00	***
Pineapple	0%	4%	0%	0%	0%	0.00	***
Tomatoes	0%	3%	1%	1%	6%	0.00	***
Cashews	0%	13%	0%	0%	0%	0.00	***
Rubber	0%	0%	0%	0%	8%	0.00	***
N	317	270	72	256	645	N	

Note: table shows only those crops where at least 3% of respondents indicated it was their households most important or second most important crop in at least one region. Sorted on Ashanti. This categorisation of 'most important or second most important' was used to ask survey respondents detailed questions about each crop later in the survey. For example, those with cocoa as the most important or second most important crop are defined as 'cocoa households' throughout the book.

In Côte d'Ivoire, we also observe some differences between districts. Cocoa was frequently regarded as the most or second most important crop, particularly in Lagunes, Bas-Sassandra and Sassandra-Marahoue, whereas in other districts, such as Yamoussoukro and Zanzan, only a small number of respondents saw cocoa as one of their most important crops. Cassava instead stands out in Yamoussoukro, and cashew is dominant in Zanzan. Oil palm is most prominent in Goh-Djiboua, while rice was relatively important in different districts, particularly in Montagnes and Sassandra-Marahoue (Table 5.8).

Table 5.8 Most important or second most important crop (combined), by district in Côte d'Ivoire

	Bas-Sassandra	Comoe	Yamoussoukro	Goh-Djiboua	Lacs	Lagunes	Montagnes	Sassandra-Marahoue	Zanzan	pvalue	sig
Cocoa	84%	74%	13%	79%	40%	91%	67%	81%	23%	0.00	***
Plantain	1%	2%	0%	5%	10%	7%	5%	5%	5%	0.00	***
Cassava	23%	12%	79%	21%	28%	29%	24%	20%	1%	0.00	***
Maize	3%	1%	7%	5%	5%	2%	2%	9%	16%	0.00	***
Oil palm	3%	16%	1%	31%	0%	0%	0%	0%	0%	0.00	***
Rice	18%	1%	0%	17%	4%	1%	28%	27%	0%	0.00	***
Peppers	0%	0%	1%	0%	0%	0%	0%	0%	0%	0.05	**
Oranges	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Cocoyam	0%	1%	0%	0%	0%	1%	0%	0%	2%	0.20	
Yam	3%	4%	22%	0%	20%	0%	0%	2%	16%	0.00	***
Coconut	0%	0%	0%	0%	0%	0%	0%	0%	2%	0.00	***
Pineapple	0%	0%	0%	0%	0%	0%	0%	0%	0%		
Tomatoes	0%	0%	20%	0%	5%	0%	1%	0%	0%	0.00	***
Cashews	0%	0%	9%	0%	23%	0%	0%	5%	92%	0.00	***
Rubber	14%	58%	0%	4%	2%	27%	6%	1%	2%	0.00	***
N	159	97	90	136	358	126	142	251	126		

Note: This categorisation of 'most important or second most important' was used to ask survey respondents detailed questions about each crop later in the survey. For example, those with cocoa as the most important or second most important crop are defined as 'cocoa households' throughout the book.

5.4 Number of crops produced

Household cropping systems are characterised by a fair diversity of crops. Table 5.1 above presented the diversity of crops produced within the cocoa regions of Ghana and Côte d'Ivoire. We find that in Ghana, cocoa households produced 5.08 different crops in the last year compared with 4.60 for non-cocoa households (*highly significant*). This pattern is repeated in Côte d'Ivoire, where cocoa households grew 6.09 crops in the last year, compared with 5.46 crops for non-cocoa households (*highly significant*).

Two findings stand out here. First, in both Ghanaian and Ivorian cases, cocoa households feature greater crop diversification than non-cocoa households (*highly significant*). Second, Ivorian households have greater crop diversity (number of crops) than Ghanaian households. Both of these findings are linked to land size.

Cocoa households have on average slightly larger areas of cultivated land than non-cocoa households, and Ivorian households have larger plots of land than Ghanaian households.

This finding should dispel any myths that cocoa households lack crop diversity, at least in relation to other farming households in cocoa regions.

Table 5.9 Crop diversity, number of crops produced, by cocoa vs non-cocoa households

	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
Mean	5.08	4.60	0.01	***	6.09	5.46	0.00	***
std.error	0.07	0.17			0.11	0.12		
N	1,318	242			910	575		
n_crops_produced								

In Ghana, there is no significant difference in the number of crops produced by male and female headed households. In Côte d'Ivoire on the other hand, there is a small difference, with female headed households producing around half a crop less than male headed households (*significant*). Nevertheless, female headed households in Cote d'Ivoire remain more diversified than male headed households in Ghana (Table 5.10).

Table 5.10 Crop diversity, number of crops produced, by sex of household head

	Ghana female head	Ghana male head	pvalue	sig	Côte d'Ivoire female head	Côte d'Ivoire male head	pvalue	sig
Mean	4.79	5.05	0.12		5.29	5.92	0.02	**
std. error	0.15	0.07			0.24	0.09		
N	288	1,270			157	1,323		
n_crops_produced								

In Ghana, this pattern changes little when we consider the number of crops sold. Cocoa households were also found to have sold, on average, a higher number of crops (3.42) than non-cocoa households (2.88) in the last year (*highly significant*) (Table 5.11). This is not particularly surprising because, on average, cocoa households grow a slightly higher number of crops on larger plots of land than non-cocoa households.

In Côte d'Ivoire, cocoa households sold 2.87 different crops last year, which was not significantly different to non-cocoa households (Table 5.11). This also shows that while Ivorian households produce a higher number of crops, they market proportionally fewer than Ghanaian households. This can probably be explained by the fact that Ivorian households reported producing more horticultural produce such as chilli, eggplant, tomatoes and okra, which may be planted in small gardens for household consumption.

Table 5.11 Number of crops sold, by cocoa vs non-cocoa household

	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
Mean	3.42	2.88	0.00	***	2.87	2.72	0.14	
std.error	0.05	0.12			0.06	0.08		
N	1318	242			910	575		
n_crops_sold								

5.5 Crop combinations and diversification

There are quite a number of studies that discuss diversification in relation to cocoa farming, and different definitions are being used. Aneani *et al.*, (2011a) define agricultural diversification as: “The growing of new and/or different crops in addition to an existing one, or engaging in off- and non-farm activities using farm resources.”²¹ This understanding of diversification implies that it involves a shift in crop choice and combinations. A distinction that is often made is between ‘horizontal’ diversification or ‘vertical’ diversification.^{22,23,24} Horizontal diversification is about producers who move into or mix existing crop with other crops, horticulture, fisheries, and livestock. In such an approach, farmers could still be involved in the existing activity or they could move out of it completely. Vertical diversification involves graduating to a higher value-adding activity by going further downstream in the value chain.

In this study, we focus on ‘horizontal’ diversification. Horizontal (crop) diversification can take place by using separate fields for additional crops or intercropping. Intercropping is usually employed during the replanting of cocoa farms. The crops, such as plantain, provide shade for the young cocoa trees, while simultaneously providing the household with an income and food security.²⁵

The distinction between diversification and conversion relates to the scale at which we analyse the process. If farmers believe that they would be better off by allocating some of their labour or capital to a new crop, they have several options to do so. For example, instead of filling gaps in an old cocoa plantation with new cocoa seedlings,

²¹ Aneani, F., Anchirinah, V. M., Owusu-Ansah, F., & Asamoah, M. (2011a). An analysis of the extent and determinants of crop diversification by cocoa (*Theobroma cacao*) farmers in Ghana. *African Journal of Agricultural Research*, 6(18), 4277-4287. Available at: http://www.academicjournals.org/article/article1380813419_Aneani%20et%20al.pdf

²² Aneani, F., Anchirinah, V. M., Owusu-Ansah, F., & Asamoah, M. (2011a). An analysis of the extent and determinants of crop diversification by cocoa (*Theobroma cacao*) farmers in Ghana. *African Journal of Agricultural Research*, 6(18), 4277-4287. Available at: http://www.academicjournals.org/article/article1380813419_Aneani%20et%20al.pdf

²³ ICCO (2010). Inventory of diversification strategies on cocoa farms. Consultative board on the World Economy, 22nd meeting. London 13th of September 2010. Available at: https://www.icco.org/about-us/international-cocoa-agreements/cat_view/30-related-documents/32-consultative-board-on-the-world-cocoa-economy.html

²⁴ Ruf, F., & Schroth, G. (Eds.). (2015). *Economics and ecology of diversification: the case of tropical tree crops*. Springer. Available at: <http://www.springer.com/cn/book/9789401772938>

²⁵ Aneani, F., Anchirinah, V. M., Owusu-Ansah, F., & Asamoah, M. (2011a). An analysis of the extent and determinants of crop diversification by cocoa (*Theobroma cacao*) farmers in Ghana. *African Journal of Agricultural Research*, 6(18), 4277-4287. Available at: http://www.academicjournals.org/article/article1380813419_Aneani%20et%20al.pdf

they can introduce an additional crop (banana, fruit, timber or rubber). Alternatively, they could decide to cut down the old cocoa trees when rubber trees or fruit trees are nearing the start of production, or even to cut down the old cocoa trees at the outset to make a rubber or teak plantation. Finally, different farmers in the same village or landscape may specialise in different crops. In this case, households and farms are specialised, but diversification takes place at the landscape level. In this scenario, the risks of specialisation are reduced at the regional level, but they remain high at the household level.²⁶

Diversification is not a new phenomenon. Ruf & Schröth (2015)²⁷ have explained the reasons for diversification in detail. Actually, they argue that for Côte d'Ivoire, the 'cocoa boom' of the 1970s can be seen as diversification at the national level from coffee cultivation to cocoa. This was influenced to a great extent by a decline in world coffee prices compared to those of cocoa, and also by guaranteed procurement prices for cocoa which encouraged adoption. According to the authors, there are innumerable cases of farmers adopting a new crop because of its more favourable price.

Another important, and linked, reason to diversify is to reduce risks. Volatility in international markets – partly stemming from boom-and-bust cycles – is one of the risks of producing a commodity like cocoa, coffee, rubber, oil palm, clove or pepper. Fluctuations in farm-gate prices are also linked to national policies, especially taxation policies.²⁸ According to Ruf & Schroth, diversification of cocoa cultivation towards rubber production observed in West Africa, especially in Côte d'Ivoire, reveals in particular the risks of replanting cocoa in a degraded environment. They pointed out that diversification is also response to the depletion of environmental resources. Thus, ecological change in these areas has clearly been identified as a factor, not only in farm abandonment and migration but also in diversification into alternative crops.²⁹

Other determinants of crop diversification are credit, market availability, land availability and size, land suitability and rights, infrastructure, public policy, behaviour of neighbours, labour requirements of certain crops, water availability and other resources.^{30,31,32}

²⁶ Ruf, F., & Schroth, G. (Eds.). (2015). *Economics and ecology of diversification: the case of tropical tree crops*. Springer. Available at: <http://www.springer.com/cn/book/9789401772938>

²⁷ Ibid

²⁸ Ibid

²⁹ See also Malézieux, É., & Moustier, P. (2005). La diversification dans les agricultures du Sud: à la croisée de logiques d'environnement et de marché I. Un contexte nouveau. *Cahiers Agricultures*, 14(3), 277-281. Available at: <http://revues.cirad.fr/index.php/cahiers-agricultures/article/view/30519>

³⁰ Aneani, F., Anchirinah, V. M., Owusu-Ansah, F., & Asamoah, M. (2011a). An analysis of the extent and determinants of crop diversification by cocoa (*Theobroma cacao*) farmers in Ghana. *African Journal of Agricultural Research*, 6(18), 4277-4287. Available at: http://www.academicjournals.org/article/article1380813419_Aneani%20et%20al.pdf

³¹ Wiggins, S & Leturque, H. (2011). *Ghana's sustained agricultural growth: Putting underused resources to work*. London: ODI Publications. Available at: <https://www.odi.org/publications/5059-ghana-agriculture-growth-development-progress>

³² Malézieux, É., & Moustier, P. (2005). La diversification dans les agricultures du Sud: à la croisée de logiques d'environnement et de marché I. Un contexte nouveau. *Cahiers Agricultures*, 14(3), 277-281. Available at: <http://revues.cirad.fr/index.php/cahiers-agricultures/article/view/30519>

Diversification is increasingly promoted as a pathway to move ‘out of poverty’. Oomes *et al.* (2016)³³ promote a dual transition whereby conditions are being created that would allow cocoa farmers to earn alternative income sources and become less dependent on cocoa. Ruf & Schroth (2015) agree that crop diversification usually leads to a better distribution of income and labour over the year.

Not all crops are seen as alternatives to cocoa, and there are important regional differences that affect diversification.³⁴ Ruf & Schroth (2015) and Aneani *et al.* (2011a)³⁵ point out that diversification or conversion of cocoa to another tree crop is a slow process since both crops are fixed assets from which an income can be derived for over 20 years. Therefore, they argue that unless the benefits of other tree crops are higher for a longer period of time, the farmer will not convert his cocoa farm into that activity. According to Ruf & Schroth (2015), “It is for this reason that rubber took several decades to emerge as a real alternative to cocoa in countries such as Côte d’Ivoire and Ghana.”

In our study, we looked at current crop combinations and diversification patterns. In Ghana, it is well known that cassava and plantain are both staple food crops which are easily marketed and area also often intercropped on young cocoa farms^{36,37} (Table 5.12). The crop combinations in Côte d’Ivoire (Table 5.13) show more variation and less strong patterns. As in Ghana, cocoa is most often produced in combination with cassava and plantain.

³³ Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C. & Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics. Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>

³⁴ Aneani, F., Anchirinah, V. M., Owusu-Ansah, F., & Asamoah, M. (2011a). An analysis of the extent and determinants of crop diversification by cocoa (*Theobroma cacao*) farmers in Ghana. *African Journal of Agricultural Research*, 6(18), 4277-4287. Available at: http://www.academicjournals.org/article/article1380813419_Aneani%20et%20al.pdf

³⁵ Aneani, F., Anchirinah, V. M., Owusu-Ansah, F., & Asamoah, M. (2011a). An analysis of the extent and determinants of crop diversification by cocoa (*Theobroma cacao*) farmers in Ghana. *African Journal of Agricultural Research*, 6(18), 4277-4287. Available at: http://www.academicjournals.org/article/article1380813419_Aneani%20et%20al.pdf

³⁶ Aneani, F., Anchirinah, V. M., Owusu-Ansah, F., & Asamoah, M. (2011a). An analysis of the extent and determinants of crop diversification by cocoa (*Theobroma cacao*) farmers in Ghana. *African Journal of Agricultural Research*, 6(18), 4277-4287. Available at: http://www.academicjournals.org/article/article1380813419_Aneani%20et%20al.pdf

³⁷ Ameyaw, K., Oppong, F. K., Acheampong, K., & Amoah, F. M. (2012). Long Term Assessment of the Agronomic and Economic Benefits of Cocoa Food Crop Intercropping in the Absence of Fertilizer Application. *American Journal of Experimental Agriculture*, 2(2), 186-197. Available at: http://www.journalrepository.org/media/journals/AJEA_2/2012/Mar/1331451859-Opoku-Ameyawetal_2011AJEA1015.pdf

Table 5.12 Crop combinations, percent of respondents reporting that the household produces each crop pair, Ghana

	Bananas	Cashews	Cassava	Chili	Cocoa	Coconut	Cocoyam	Eggplant	Maize	Okra	Oranges	Oil palm	Pepper	Pineapple	Plantain	Rice	Rubber	Tomatoes	Yam
Bananas		0	6	0	6	1	4	2	4	2	1	2	3	1	6	1	1	3	4
Cashews	0		3	0	3	0	2	1	2	1	1	1	1	0	3	0	0	1	2
Cassava	6	3		2	76	3	43	9	43	13	3	13	25	2	76	5	4	19	23
Chili	0	0	2		2	0	2	1	2	1	0	1	0	0	2	0	0	1	2
Cocoa	6	3	76	2		3	43	9	42	13	3	13	24	2	74	6	2	18	23
Coconut	1	0	3	0	3		2	1	2	1	0	2	2	0	3	0	1	1	1
Cocoyam	4	2	43	2	43	2		7	27	9	2	7	16	1	43	3	1	13	18
Eggplant	2	1	9	1	9	1	7		7	6	1	2	7	1	9	1	1	7	5
Maize	4	2	43	2	42	2	27	7		11	2	8	18	1	42	4	2	14	17
Okra	2	1	13	1	13	1	9	6	11		1	3	11	1	13	1	1	9	7
Oranges	1	1	3	0	3	0	2	1	2	1		1	1	0	3	0	0	1	1
Oil palm	2	1	13	1	13	2	7	2	8	3	1		4	1	12	1	1	4	5
Pepper	3	1	25	0	24	2	16	7	18	11	1	4		1	24	1	2	15	11
Pineapple	1	0	2	0	2	0	1	1	1	1	0	1	1		3	0	0	1	1
Plantain	6	3	76	2	74	3	43	9	42	13	3	12	24	3		4	3	19	22
Rice	1	0	5	0	6	0	3	1	4	1	0	1	1	0	4		0	1	1
Rubber	1	0	4	0	2	1	1	1	2	1	0	1	2	0	3	0		2	1
Tomatoes	3	1	19	1	18	1	13	7	14	9	1	4	15	1	19	1	2		9
Yam	4	2	23	2	23	1	18	5	17	7	1	5	11	1	22	1	1	9	

Note: Figures presented in the above table are percentages of households who report producing each pair. The percentage sign has been removed for legibility. Crops that do not have at least one crop pair produced by 3% of respondents have not been included.

Table 5.13 Crop combinations, percent of respondents reporting that the household produces each crop pair, Côte d'Ivoire

	Beans other	Cashews	Cassava	Chili	Cocoa	Cocoyam	Coffee	Eggplant	Groundnuts	Maize	Okra	Oil palm	Plantain	Rice	Rubber	Tomatoes	Yam
Beans other		1	4	4	5	2	2	4	3	4	4	1	3	4	1	2	2
Cashews	1		13	14	9	6	2	9	8	9	12	0	10	2	1	7	16
Cassava	4	13		42	45	17	10	36	18	25	37	4	38	17	12	23	38
Chili	4	14	42		35	17	8	39	19	24	41	2	33	14	9	24	35
Cocoa	5	9	45	35		15	14	30	15	24	31	5	37	24	16	20	28
Cocoyam	2	6	17	17	15		4	14	7	11	16	0	17	3	5	13	15
Coffee	2	2	10	8	14	4		7	5	6	7	1	8	6	3	5	6
Eggplant	4	9	36	39	30	14	7		17	20	35	2	28	13	9	23	28
Groundnuts	3	8	18	19	15	7	5	17		14	18	1	14	7	4	12	17
Maize	4	9	25	24	24	11	6	20	14		22	2	20	13	6	16	20
Okra	4	12	37	41	31	16	7	35	18	22		2	28	13	8	23	31
Oil palm	1	0	4	2	5	0	1	2	1	2	2		2	3	3	1	2
Plantain	3	10	38	33	37	17	8	28	14	20	28	2		12	10	20	28
Rice	4	2	17	14	24	3	6	13	7	13	13	3	12		5	5	7
Rubber	1	1	12	9	16	5	3	9	4	6	8	3	10	5		6	7
Tomatoes	2	7	23	24	20	13	5	23	12	16	23	1	20	5	6		21
Yam	2	16	38	35	28	15	6	28	17	20	31	2	28	7	7	21	

Note: Figures presented in the above table are percentages of households who report producing each pair. The percentage sign has been removed for legibility. Crops that do not have at least one crop pair produced by 3% of respondents have not been included.

Data collected during focus group discussion revealed several reasons for the high frequency of pairing of cocoa with plantain or cassava. First, cassava and plantain provide excellent possibilities for intercropping with young cocoa; Second, pairing these crops provides additional income more regularly and in the cocoa off-season; Third, households regard cassava and plantain as nutritious staple foods, and for these crops often fit current gender roles within households. For example, men are typically the ones engaged in heavy work such as land clearing and land preparation. When cocoa is young, women often tend to these and are responsible for the food crops that are intercropped with cocoa. Women are also frequently involved in processing and sales of cassava.

Other crops can be said to be ‘competing’ with cocoa. Households weigh up a variety of economic and non-economic reasons for their crop choices. Table 5.14 and Table 5.15 summarise participant responses from focus group discussions as to why they produce certain crops, in respectively Ghana and Côte d’Ivoire.³⁸

In the focus group discussions cocoa stood out as a point of reference. Participants often highlighted how certain crops complement cocoa – in terms of seasonal cycles, additional income, household consumption, or intercropping. Participants also often described why cocoa had an edge over other crop options when discussing benefits and challenges. Benefits (or opportunities) can be thought of as ‘pull factors’, which encourage a move into a certain crop. For example, a good, reliable market might give a household the confidence to invest a proportion of their land and labour to another crop. On the other hand, challenges can be regarded as ‘push factors’, which, if strong enough, may lead a household to leave a certain crop when there is perceived to be a better option available. Push factors may include a price crash, or deterioration of environmental suitability.

³⁸ This topic was discussed in total 76 focus group discussions, 38 in each country.

Table 5.14 Reasons to produce certain crops in Ghana, summary of farmers' perceptions

	Major benefits	Other benefits
Cocoa	<ul style="list-style-type: none"> • High income, guaranteed price, bulk income, easy to market • Land tenure security if cocoa is on the land. Land can be bequeathed to children • Harvested in a main and light season • Regarded as nationally important because it generates foreign exchange • Regarded as a traditional crop 	<ul style="list-style-type: none"> • Relatively short period to mature for a tree crop • Institutional support from COCOBOD in the form of training, inputs and price guarantees. • Less labour intensive than many crops, does not require replanting for at least 25 years. • Climate and soil is suitable • Credit more obtainable because cocoa income is reliable • Cocoa byproducts provide small additional revenue (mainly women)
Cassava	<ul style="list-style-type: none"> • Household staple food, ingredient in Fufu. • Regarded as a good source of energy and nutrition. • Reduces household food expenditure • Provides additional income to cocoa • Can be left in the soil to grow until needed for sale or consumption • Relatively fast maturing varieties available (6 months-1 year) • Can be intercropped with young cocoa trees • Easy to grow, low labour inputs 	<ul style="list-style-type: none"> • Can be processed into Gari which can be preserved. • Easy to market locally. Can be sold in multiple ways (harvested, sell the plot, processed as Gari) • Byproduct can provide feed for farmers' livestock
Plantain	<ul style="list-style-type: none"> • Household staple food, ingredient in Fufu, Red red stew, boiled in Ampesi • Reduces household food expenditure • Regarded as a good source of energy and nutrition. • Can be intercropped with young cocoa trees, providing shade • Provides additional income, particularly during the light cocoa season; • Bunches of plantain can be regularly harvested 	<ul style="list-style-type: none"> • It does not require replanting, requires low labour inputs
Maize	<ul style="list-style-type: none"> • Household staple food, ingredient in Banku and Kenkey • Reduces household food expenditure • Can be easily stored for consumption in the lean season or future sale • Can be harvested 2 times a year • Short maturation period of around 3 months 	<ul style="list-style-type: none"> • Easy to market locally. It can provide bulk income if sold at once • Byproduct leaves and stems can be used as livestock feed, grain as poultry feed
Oil palm	<ul style="list-style-type: none"> • Good income, steady source of weekly and monthly income; • Processed into oil for sale and consumed in the household with soup 	<ul style="list-style-type: none"> • A variety of products can be produced from oil palm, such as variety of oils, palm wine, local gin, soap, woven products from leaves, broom handles etc.
Rubber	<ul style="list-style-type: none"> • Regular income from rubber tapping • Generates jobs, including for youth 	<ul style="list-style-type: none"> • It is a new alternative to try

In the focus group discussions the focus was on reasons to grow certain crops, and not so much on challenges. However, participants mentioned some risks and challenges. In Ghana, for plantain and maize it was mentioned that the high supply in the main season drives the prices of these crops down. Oil palm was considered to be particularly hard work. In both countries, a major constraint for producing rubber was the long maturation period of 5-7 years. In Côte d'Ivoire, farmers emphasised some of the risks involved in coffee production. Coffee is perceived as traditional crop by many farmers. The reason why farmers shifted to cocoa was because coffee production was declining in the research areas, it is less profitable than cocoa, while it is more labour intensive than cocoa and there is only one harvest per year.

Table 5.15 Reasons to produce certain crops in Côte d'Ivoire, summary of farmers' perceptions

	Major benefits	Other benefits
Cocoa	<ul style="list-style-type: none"> • High income, guaranteed price, bulk income, easy to market • Harvested in a main and light season 	<ul style="list-style-type: none"> • National importance & traditional crop in some areas • Less labour intensive than other crops • Allows for intercropping on young farms (unlike rubber)
Cassava	<ul style="list-style-type: none"> • Household staple food, ingredient in Plakali (Fufu) • Can be fermented into Attieke and processed into Gari. • Additional source of income between cocoa seasons, some produce it as a major cash crop 	<ul style="list-style-type: none"> • Soil and climate suitability • Can be intercropped with young cocoa • Easy to sell at local markets
Plantain		<ul style="list-style-type: none"> • Household staple food, ingredient in Plakali (Fufu) • Additional income, easy to market • Intercropped (with young cocoa and young rubber.
Maize		<ul style="list-style-type: none"> • Household staple food • Easy to market locally • Byproduct leaves and stems can be used as livestock feed, grain as poultry feed
Oil Palm	<ul style="list-style-type: none"> • Good income, steady source of weekly and monthly income; • Processed into oil for sale and consumed in the household with soup 	<ul style="list-style-type: none"> • A variety of products can be produced from oil palm, such as variety of oils, palm wine, local gin, soap, woven products from leaves, broom handles etc.
Coffee	<ul style="list-style-type: none"> • Traditional crop in many areas • Good source of income, relatively good price; • Easy to market to pisteurs • Can harvest before the main cocoa season • Once planted coffee takes around 5 years to mature and can produce for 50 years or more 	<ul style="list-style-type: none"> • Dried coffee can be stored • With good pruning the coffee tree will start producing well again after 2 years.
Rubber	<ul style="list-style-type: none"> • Regular income from rubber tapping • Generates jobs, including for youth and those without land • Can replace cocoa in areas that have become less suitable for cocoa production • Can replace coconut if affected by diseases • Land planted with rubber can be bequeathed to children • Maintenance costs is said to be relatively low • Relatively few inputs are used. 	<ul style="list-style-type: none"> • Rubber is more resistant to a changing climate than cocoa

5.6 Summary

Cocoa is the most frequently produced crop in the researched areas of Ghana and Côte d'Ivoire. In Ghana, cocoa was produced by a high proportion of both male and female headed households in all regions. In Côte d'Ivoire, cocoa was found to be more commonly produced by male headed households, and there was more regional variation in the frequency of production.

In Ghana, the next most frequently produced crops are cassava and plantain. These crops partly derive their popularity from their role as being both food and cash crops. A further advantage is that they can be intercropped with young cocoa and act as shade trees.

In Côte d'Ivoire, the next most frequently produced crop was cassava. It is not uncommon for female headed households to treat cassava as a 'cash crop'. Other frequently produced crops are chili, okra, plantain, eggplant, and maize.

‘Cash crops’ such as rubber, cashew, palm and coffee are frequently mooted as alternatives to cocoa, but these are all produced at much lower rates in both countries (with some regional exceptions).

Many crops commonly thought of as ‘food crops’ actually play a dual role. Staple crops such as cassava, plantain, maize, yam and rice are frequently sold in both countries to supplement household incomes.

The study confirms the systematic intercropping of plantain and cassava on young cocoa farms before the canopy closes after 3-5 years. However, care should be taken with the interpretation of ‘intercropping’. Cocoa trees are not necessarily planted in rows, and intercropping with cocoa can be more in patches.

Cocoa households already diversify their crops, both for economic and non-economic reasons.

Cocoa households are actually more diversified than non-cocoa households in both Ghana and Côte d’Ivoire. The higher number of crops produced is correlated with the slightly larger average land sizes of cocoa households compared with non-cocoa households. There is no evidence that cocoa has adversely displaced crops needed for household food security.

More respondents report cocoa to be their most important crop than any other. This capacity of cocoa to remain attractive and important despite long periods of declining prices and revenues is explained by many factors. Among them are the guaranteed market and established knowledge and habits.

Competing crops are not (yet) perceived to be better than cocoa; the importance of cocoa is growing. The importance of cocoa was said to have increased in the past 5 years in both Ghana and Côte d’Ivoire. Presently, there are no signs that households will move out of cocoa in the short to medium term.



Land

Bymolt, R., Laven, A., Tyszler, M. (2018). Demystifying the cocoa sector in Ghana and Côte d'Ivoire. Chapter 6, Land. The Royal Tropical Institute (KIT).



6.1 Land tenure

Land is a critical productive asset for farmers, but it also plays an important role in social prestige and is regarded as the basis for wealth and political power. It has been documented that farmers' attitudes and investment decisions in cocoa production are directly linked to the issue of land tenure arrangements and security,^{1,2} and that there is an important relationship between land tenure and sustainable livelihoods.³ The way in which land tenure arrangements have developed in Ghana and Côte d'Ivoire is rooted in the history of each country.

A brief history of land tenure in Ghana and Côte d'Ivoire

In Ghana, both customary and statutory law play a role in the country's land tenure system. Most land is essentially private, and managed by customary authorities (approximately 80% of all land), whereas state ownership ('public lands') is limited to about 20%.⁴ Given the pluralistic legal environment within which land is managed, both formal and informal routes exist to accessing land. There have been numerous attempts to reform Ghana's land tenure system, however land ownership and management remains highly contested.⁵

In pre-colonial Ghana, land was held by communities under local rules and practices (customary law). Land titling was vested in traditional authorities and tenure practices varied from place to place. Customary law was usually unwritten, and based on local practices and norms that were flexible and negotiable. Three kinds of customary land law rights were recognised: allodial title, customary freehold and leasehold.⁶

Allodial title: This is the highest form of customary interest in land, and is vested in Stools/Skin or clans or families. These entities are seen as custodians who hold land in trust for community members (made up of living members, the dead, and those to come). Only indigenes can hold allodial title to land.

Customary freehold: This type of land right is created when an allodial holder allocates land to a subgroup or individual. Customary freehold rights are conditionally perpetual, and holders may

¹ Asamoah, M. and Owusu-Ansah, F. (CRIG) Report on land tenure & Cocoa production in Ghana. A USAID, CRIF and WCF Collaborative Survey, February 2017. <http://www.worldcocoaoundation.org/usaaid-report-on-land-tenure-cocoa-production-in-ghana-a-crigwcf-collaborative-survey>

² USAID, WCF. (2015). Assessment of Land Tenure-Related Constraints to Cocoa Productivity in Ghana. Available at https://www.land-links.org/wp-content/uploads/2016/09/USAID_Land_Tenure_Ghana_Cocoa_Report.pdf

³ Bugri, J.T. (2012) Final Report: Improving Land Sector Governance in Ghana Implementation of the Land Governance Assessment Framework. Department of Land Economy College of Architecture and Planning Kwame Nkrumah University of Science and Technology, Kumasi. Available at http://siteresources.worldbank.org/INTLGA/Resources/Ghana_Final_Report.pdf

⁴ Narh, P., Lambini, C., Sabbi, M., Pham, v d., Nguyen, T.T. (2015). Land Sector Reforms in Ghana, Kenya and Vietnam: A Comparative Analysis of Their Effectiveness. Land 2016, 5(2), 8; Available at <https://doi.org/10.3390/land5020008>

⁵ Ibid

⁶ Djokoto, G. and Opoku, K. (2010). Land tenure in Ghana: making a case for incorporation of customary law in land administration and areas of intervention by the growing forest partnership. Commissioned by International Union for the Conservation of Nature and Growing Forest Partnership. Available at https://www.growingforestpartnerships.org/sites/gfp.iiedlist.org/files/docs/ghana/ghana_land_tenure-gfp_project.pdf

sell, lease or mortgage their rights. However, customary freehold holders must recognise the superior ownership of the Stool and must perform any customary services to the Stool when necessary. Only indigenes can hold customary freehold title.

Leasehold: Allodial title holders may enter into a formal leasehold agreement for up to 99 years with other Ghanaians or up to 50 years with foreigners. Leaseholds are generally entered into by settlers.

With colonisation, statutory law was introduced in Ghana. Unlike customary law, this was set down (codified) by a body of legislature. Under statutory law, land rights are allocated and confirmed through the issue of titles or other forms of ownership registration.⁷ The government aimed to exert state control and management over lands in the country and fundamentally reform the land sector. It was not until 1979 that the Constitution re-vested land administration in local authorities.

There are currently 166 laws pertaining to land in Ghana, although their implementation is often limited in rural areas. The most important land laws pertaining to customary tenure are the Land Title Registration Law of 1986 that identified which land can be legally registered, including customary freehold registration although, in practice, very little rural land has been registered; The 1992 Constitution of the Republic of Ghana, which recognised all forms of landholding including customary rights; The Office of the Administrator of Stool Lands Act of 1994, which provided the framework for the management of Stool and Skin lands; and The Lands Commission Act of 2008, which merged several major land sector agencies into one umbrella body known as the Lands Commission.⁸

It has been argued that all these state interferences created a general 'indiscipline' in Ghana's land market and weakened traditional and customary institutions and authorities. Problems mentioned in different studies include land encroachment, multiple land sales, and unapproved maps, which leads to conflict and disputes between traditional authorities and governments.^{9,10} These problems are said to be exacerbated due to population pressures and growing commercial activities.

In Côte d'Ivoire, land was traditionally appropriated collectively and controlled on a village or lineage basis; this was called common or communal property. This meant that villagers, on condition that the piece of forest they were clearing was not already appropriated, did not have to ask permission to start cultivating the land. Only 'outsiders' had to ask permission from the chief and offer him a symbolic gift. It was possible to pass the land on to one's children but it was not possible to sell the land. With the introduction of tree crops, such as a cocoa and coffee, private property rights emerged, mainly because of the long lifespan of these trees compared to food crops. Therefore, planting trees legitimised permanent land control. Another factor was that trees were considered one's property and could be sold (while land officially could not be sold). With

⁷ USAID, WCF and CRIG (2015) Assessment of land tenure-related constraints to cocoa productivity in Ghana. Available at https://www.land-links.org/wp-content/uploads/2016/09/USAID_Land_Tenure_Ghana_Cocoa_Report.pdf

⁸ Ibid

⁹ Djokoto and Opoku refer to the State Lands Act, 1962 (Act 125), the Administration of Lands Act of 1962 (Act 123) and the Concessions Act, 1962 (Act 124). Djokoto, G. and Opoku, K. (2010) Land tenure in Ghana: making a case for incorporation of customary law in land administration and areas of intervention by the growing forest partnership. Commissioned by International Union for the Conservation of Nature and Growing Forest Partnership. Available at https://www.growingforestpartnerships.org/sites/gfp.iedlist.org/files/docs/ghana/ghana_land_tenure-gfp_project.pdf.

¹⁰ Narh, P., Lambini, C., Sabbi, M., Pham, v d., Nguyen, TT. (2015). Land Sector Reforms in Ghana, Kenya and Vietnam: A Comparative Analysis of Their Effectiveness. Land 2016, 5(2), 8; Available at <https://doi.org/10.3390/land5020008>

these shifts, the perception of land scarcity also appeared. Planting trees became a strategy to secure future land, and made the plantation itself sometimes more of a by-product. The demand for land was further increased by the 'sometimes massive arrival of immigrants'.¹¹

State attempts to redefine the structure of property rights in Côte d'Ivoire were unsuccessful. A 1935 decree gave the State the control of all land unexploited for more than ten years. On 20 March 1963, a Law was introduced that laid down the principle that the State was the owner of all non-registered land. But this law was never truly enforced.¹² In 1998, the Rural Land Law was adopted, which reserved rural land ownership for Ivorian citizens.^{13, 14} However, this law has remained problematic and difficult to implement. In January 2017, a new rural land policy was adopted by the Government of Côte d'Ivoire. This law confirms the objectives of the 1998 Rural Land Law, and also the government's intention to identify and formalise the boundaries between rural villages, and to clarify the land property rights of rural landholders. For this purpose the Rural Land Tenure Agency (AFOR) was established.¹⁵ The current land tenure system in Côte d'Ivoire is still regarded as complicated, costly, and outdated.¹⁶

6.2 Land scarcity

In Ghana and Côte d'Ivoire, focus group participants often discussed how agricultural land is becoming scarcer. As researchers, this is not uncommon to hear throughout sub-Saharan Africa, and mainly relates to rapid population growth in recent decades rather than the establishment of large plantations (although this can also be an issue in some contexts).

In Ghana, Amanor (2001) has discussed access to land for cocoa through the generations.¹⁷ The first generation of cocoa farmers of the 1920s–1940s could establish ownership over large tracts of forest land which became individual property through clearance. The next generation met growing land shortage and had limited

¹¹ Colin, J. (1998) The Emergence of Private Property in Land and the Dynamics of Agricultural Production: A Case Study from the Ivory Coast. In Hunt, R. and Gilman, A. (eds) *Property in Economic Context*. Page 317–49. University Press of America. New York/Oxford. http://horizon.documentation.ird.fr/exl-doc/pleins_textes/pleins_textes_7/b_fdi_55-56/010023171.pdf

¹² Ibid

¹³ According to Jean-Pierre Chauveau (2000), the Law provided for an initial ten-year phase (subsequent to its promulgation, i.e. until January 2009) during which any person holding land tenure rights involving appropriation of land (excluding derived rights holders) must have his rights officially recognised with a view to obtaining a land tenure certificate (individual or collective). After this deadline, land unclaimed in this way would be registered in the name of the State and the person farming it will be deemed a tenant. Land tenure certificates held by Ivorians entitle the holders to have their land registered on an individual basis after a period of three years, and result in the issue of a permanent private ownership title. Chauveau, J. (2000). The land tenure question in Côte d'Ivoire: A lesson in history. This text is an edited English translation of an article which originally appeared in French in special edition on Côte d'Ivoire of *Politique Africaine* 2000 (no 78) under the title "Question foncière et construction nationale en Côte d'Ivoire. Les enjeux silencieux d'un coup d'Etat". Available at http://hubrural.org/IMG/pdf/iied_dry_ip95english.pdf.

¹⁴ Ibid.

¹⁵ USAID, country profile Côte d'Ivoire. Available at <https://www.land-links.org/country-profile/cote-divoire/>

¹⁶ Press release World Bank 28 March 2018. Available at <http://www.worldbank.org/en/news/press-release/2018/03/28/world-bank-supports-rural-land-tenure-security-in-cote-divoire>.

¹⁷ Amanor, K. S. (2001). Land, Labour and the Family in Southern Ghana. A Critique of Land Policy under Neo-Liberalisation. Research Report No 116. Nordiska Afrikainstitutet. Available at <https://www.files.ethz.ch/isn/95533/116.pdf>

potential to clear new forest land. This generation had smaller lands and also limited access to land they could claim to have been created by their own labour, individual property that they had added to abusa property. They became more dependent upon abusa land and gifts from their fathers and matrilineal kin. The third generation has hardly any scope to clear its own land from forest land, and is competing with the second generation to use existing farm land.¹⁸

Likewise, in Côte d'Ivoire, frontier expansion in the 1920s and the booming cocoa economy translated into rapid population growth.¹⁹ Immigration from neighbouring countries and the Northern part of the country contributed to the demand for land. Initially, as in Ghana, settlers cut down prime rainforest for cocoa and, once land became scarce in a certain region, simply moved to another region where new land could still be found.^{20,21} Therefore, in the mid-twentieth century cocoa farms were rarely replanted with farmers preferring to move and cut down virgin forest because of better soil fertility. Over time this naturally exacerbated the pressure on land, which led to more land fragmentation and forest loss.

Land scarcity is therefore not a new phenomenon in Ghana and Côte d'Ivoire. What has changed is the scale and intensity of the issue as the population has continued to grow in both countries. In Ghana presently, there is additional pressure on land from illegal gold mining and commercial agriculture investment. In the future, changing climatic conditions may force farmers to abandon areas where the climate is no longer suitable for cocoa production. Untapped forest areas located in the south-western regions of both countries (Western Region in Ghana and Bas-Sassandra in Côte d'Ivoire) may have a more favourable climate for future cocoa production.^{22, 23} Decreasing land availability increases the cost of land, restricts households' ability to expand their land under cultivation and, if land is not well managed, can lead to depletion of soil fertility.

As researchers, we would like to add that the mean size of cocoa households' land is not usually contextualised in cocoa literature in relation to other countries. Without intending to diminish the important issue of land pressure in Ghana and Côte d'Ivoire, we typically encounter smallholders with much smaller land sizes throughout East Africa, regardless of their main crop.²⁴

¹⁸ Ibid

¹⁹ Ibid

²⁰ Knudsen, M. H. & Agergaard, J. (2015). Ghana's cocoa frontier in transition: the role of migration and livelihood diversification. *Geografiska Annaler: Series B, Human Geography*, 97(4), 325- 342. Available at <https://www.tandfonline.com/doi/abs/10.1111/geob.12084>

²¹ Ruf, F., Schroth, G., Doffangui, K. (2015). Climate change, cocoa migrations and deforestation in West Africa: What does the past tell us about the future?. *Sustainability Science*, 10(1), 101- 111. Available at http://publications.cirad.fr/une_notice.php?dk=575355

²² Kroeger, A., Bakhtary, H., Haupt, F., Streck, C. (2017). Eliminating Deforestation from the Cocoa Supply Chain. World Bank, Washington, DC. World Bank. Available at <https://openknowledge.worldbank.org/handle/10986/26549>

²³ Schroth, G., Läderach, P., Martinez-Valle, A.I., Bunn, C. (2017). From site-level to regional adaptation planning for tropical commodities: cocoa in West Africa. *Mitigation and Adaptation Strategies for Global Change*, 22(6), 903-927. Available at <https://link.springer.com/article/10.1007/s11027-016-9707-y>

²⁴ For example, in recent years we have carried out several assignments in Ethiopia, Kenya, Tanzania, and Uganda. In all of these studies we find that smallholders have, on average, roughly half the land as the smallholders in this study.

In Ghana, focus group participants confirmed that natural population growth, migration and (illegal) mining activities in the Ashanti Region and Central Region, has led to increasing land scarcity.

"There is not enough land. The population is increasing and we use most of the land for buildings. We also lose land to gold mining." (FGD, Ashanti Region, Ghana)

Ghanaian participants explained how the choice to grow cocoa contributes to pressure on land availability. Once planted, cocoa typically remains on the land for 30 years or more, as it offers long-term land tenure security and income. Participants explained that land owners are rarely interested in selling land if there is cocoa planted on it because income from cocoa is believed to be more profitable than selling the land. Participants also explained that a lack of land has inevitably led to some households intensifying production on the same piece of land. Previously they would rotate (non-cocoa) crops and leave land fallow at times so as not to exhaust the soil of nutrients, however now land is frequently under continuous cultivation. Farmers expect yields to decline in the future, unless fertiliser use is increased. This emphasizes to us the importance of programmes that educate on erosion control and soil fertility management.

"There used to be virgin forest many years back and we had fallow land. Now we have a lack of land and it has forced us to use same plots of land all the time, which depletes the soil. We cannot let the soil rest because we need the revenue." (FGD, Ashanti Region, Ghana)

In Côte d'Ivoire, focus group participants in some parts in the North of the Ivorian cocoa belt explained that access to land is further constrained by desertification or the expanding savannah land. The lack of rain in the northern limits combined with deforestation is seen as the primary driver of desertification there. More generally, participants frequently explained that population increases in communities has led to more houses being built. This simultaneously reduces land availability and increases demand for agricultural land. Population increases were also said to be exacerbated by migrants from the North of Côte d'Ivoire or from Burkina Faso and Mali illegally claiming pieces of land.

"We do not have enough land because the increasing population makes land scarce. There is no more forest land to expand into. All lands are in use and cannot be divided amongst the children as it will be too fragmented. The land we have is used continuously and is exhausted." (FGD, Béliér, Côte d'Ivoire)

6.3 All land data

Estimating and measuring land size

Most studies report farmer estimations of land size, whilst a few have been able to record land sizes using GPS. The question inevitably arises, ‘can farmers accurately estimate their land sizes?’ This is an important question because estimations of land size are used to calculate other values such as yield and revenue per hectare.

We don’t dispute that some farmers don’t know their land sizes. However, we think a better question is, ‘Can farmers who believe they know their land size accurately report the correct size?’. A related question is ‘How accurately can enumerators measure land sizes with GPS enabled devices?’

Reporting land size in a unit the respondent is familiar with

In our study, all respondents were first asked in which unit they would like to report their land size. In Ghana, farmers frequently responded in acres, but many also used a unit known locally as ‘poles’. In Ghana, 27% of cocoa farmers and 43% of non-cocoa farmers reported their land size in poles. Unfortunately, a ‘pole’ varies in size across communities in Ghana. Poles are calculated using the width of an average man’s arm span multiplied by a certain number squared.²⁵ Whilst the reporting of land in poles seems inconvenient, it does imply that land has been measured, and is probably less prone to rounding errors. We have come across very few studies looking at cocoa in Ghana which allowed land to be reported in poles. We suggest that land size estimates are more accurate when respondents can opt for the unit they are most comfortable reporting in. In this report, land sizes given to us in poles and acres have been converted to hectares to be consistent with most cocoa research in West Africa. In Côte d’Ivoire, respondents usually gave their land size in hectares.

Do farmers think they know their land sizes?

The next step was to ask respondents, “Do you know how many [land unit] of land your household used to cultivate all your crops last year?” This binary yes/no question was designed to prevent respondents from guessing their land sizes in subsequent questions. Table 6.2 shows that substantially fewer female respondents reported knowing their household’s land size than male respondents. In Ghana, 81% of female respondents and 94% of male respondents said they know their land size. In Côte d’Ivoire, 71% of female respondents and 94% of male respondents said they know their land size. If respondents answered that they weren’t sure of their land size (or if our

²⁵ Typically, one pole was reported as being between 30x30 and 45x45 arm widths, and this data was also captured for each respondent. This means that one pole ranges between $30 \text{ m}^2 * 1.75 \text{ m} = 1,575 \text{ m}^2$ and $45 \text{ m}^2 * 1.75 = 3,544 \text{ m}^2$ across communities.

enumerators saw that they were struggling to make estimates) then no further questions were asked on land size. We only wanted land size estimates from those who were quite confident that they knew their land size to avoid obvious reporting bias. In hindsight, we would have liked to add a question on whether a respondent had ever had their land measured. We do not think that it is good methodological practice to ask respondents to make an estimate of land size (or production output or other such continuous variables) without first checking on the respondent's confidence to do so.

GPS mapping accuracy

In general, we support the use of GPS mapping to improve the accuracy of data wherever possible. That said, we would like to highlight that GPS data can also be prone to error for a number of reasons and comparisons between farmer recall data and GPS data rarely consider the possibility that GPS data has contributed to a mismatch between measured and estimated data.

First, GPS measurement is very time consuming to collect, and most studies can only GPS record a sub-set from the total sample. This sub-sample is often quite small, may not be random, and can be chosen for its convenience to the centre of the community. This is important to consider if the objective of the GPS sampling is to adjust the size of estimated plots by the error of those measured.

Studies that GPS measure land typically do not first select out farmers who are not confident that they know the size of their land (we have never seen this mentioned in other researcher's methodologies). In our view, these farmers shouldn't be in the GPS measurement sample because we already know that some farmers don't know their land sizes. We only really want to compare those who believe they know their land size with GPS measured data.

The most commonly described approach is to first ask a farmer their land size, record this, and then to go and measure it with a GPS enabled device. Whilst this sounds simple enough, there are several points at which recording errors can be made.

We suggest that farmers should be asked to make the estimate twice, once before measuring and once after measuring (both estimates should be the same). This is because we have often found that farmers and enumerators are not always talking about the same piece of land. Farmers have multiple plots of land and they can be also referring to nearby or adjoining land parcels which are not GPS measured. We suggest that the farmer should walk with the enumerator to make absolutely sure they are talking about the exact same plot of land that has been estimated.

Second, GPS data is often recorded using a mobile phone or tablet. This is usually because the survey is loaded on the same device. We know from experience that even the latest models of these devices are not highly accurate. In our study we also collected GPS data points on the location of each survey, and we can see the accuracy of each reading in meters squared. We frequently observe an accuracy of 16m, often 32m, and sometimes 64m per reading. An error of 32m x 32m is nearly a quarter of an acre, and 64m x 64m is roughly an acre. Part of the problem

is that often GPS enabled devices are not also setup with 3G or 4G sim cards to support signal triangulation. In remote areas there may be few mobile towers and very weak (or no) signal. The location GPS readings we took in our study were under clear sky.

GPS accuracy in a cocoa plot is an even greater issue. The perimeter of cocoa plots are often under dense foliage, which affects GPS accuracy. This issue is compounded when an enumerator has to collect multiple data points to measure an area. Most plots are not a rectangle and are multisided, implying multiple opportunities for measurement inaccuracy. It is vital that enumerators are properly trained, but it is almost impossible to check if they consistently make accurate measurements.

Unfortunately, the boundaries of many plots also have geographical features that might dissuade an enumerator from walking a perimeter properly (such as a boggy area). An enumerator may sometimes take shortcuts either by not fully walking the edges of a farm, or in recording all of the data points for an irregularly shaped plot of land. Such a case would give the appearance that a farmer had over-estimated the land size in relation to the measurement. We also suggest that the larger the land area to be measured, the greater the likelihood that an enumerator will take a shortcut. Land is unlikely to be over-measured because an enumerator does not walk further than necessary.

Analysis of a recent study using GPS measurements

We were interested in one recent study conducted by Wageningen University for IDH²⁶ which collected GPS coordinates for a small sample of 99 farms in Côte d'Ivoire. The study states that "GPS measurements indicated that 26% of farmers had miscalculated their farm size, with on average a 7% over-estimation of field size".²⁷ We are not surprised as this is a similar proportion of respondents in our study who said they didn't know their land size. The study helpfully published their GPS measurements alongside farmer estimates in their Annex 9.

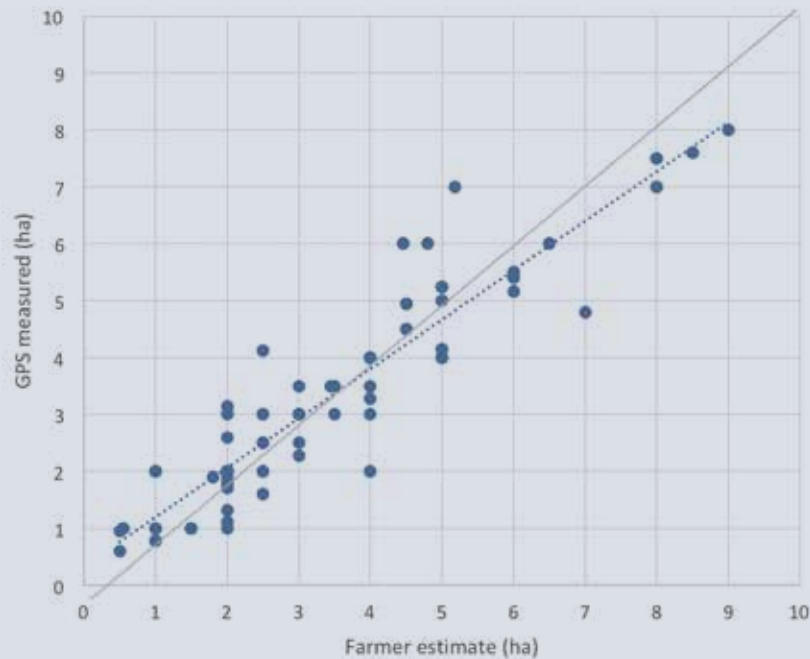
We used this data to plot estimated and measured land sizes (Figure 6.1). The first thing we noticed was that there were about 10 extreme outliers, representing about 10% of the sample of measured plots. We suspect that these outliers were either farmers who didn't know (and hence wouldn't be asked to estimate their land size in our study), or measurement was done incorrectly (see earlier discussion).

The trend line of the remaining data plots indicates that there is a reasonably good fit between farmer estimations and GPS measurements in most cases. We note that at higher land sizes it appears that farmers have over-estimated their land holdings. However, we must remember that data measurement inaccuracies will be compounded with larger land sizes and this could also be a enumerator error. At smaller land sizes under 1 hectare it appears that farmers may have rounded up to the nearest hectare. It is also possible that GPS inaccuracy has had a greater effect at smaller land sizes.

²⁶ Ingram, V., Waarts, Y., Ge, L., van Vugt, S., Wegner, L., Puister-Jansen, L., Ruf, F., Tanoh, R. (2014). The IDH Cocoa Productivity and Quality Programme (CPQP) in Côte d'Ivoire. Impact assessment framework and baseline. Available at <http://edepot.wur.nl/311372>

²⁷ Ibid, p.61

Figure 6.1 Farmer estimations of land size vs measured land (Ingram et.al 2014)²⁸



Concluding remarks on measurement

In our study, we have used farmer estimations of land size. We took a number of reasonable measures to ensure our farmer reported data was as accurate as possible, as described above. We also cleaned and omitted extreme outlier values falling outside four standard deviations from the mean (less than 1% of the total number of observations).

Based on a light analysis of the Wageningen data set of measured and estimated data, we have not felt persuaded that we should adjust our land data in either direction. While we would have liked to GPS measure a good sample cocoa farms, this simply wasn't possible for reasons of logistics and available resources.

While we certainly make no claim that all respondents accurately reported their land sizes, we feel reasonably confident about accuracy of the mean values we have reported for the overall sample, due to our large sample size. We have less confidence in the mean values of regional data (for instance) because as the sample size falls the risk of sampling bias increases, as does the possible effect of outlier values caused by a few inaccurate farmer estimations.

We think that land size estimations in Ghana may be slightly more accurate than those in Côte d'Ivoire. Ghanaian respondents reported in smaller land units (acres or poles), meaning that rounding errors will have a less pronounced effect than for Ivorian respondents reporting in hectares.

We also found that farmers are not able to estimate the number of cocoa trees they cultivate. Less than 2% of all respondents said they know the number of cocoa trees they have.

²⁸ Ibid

Table 6.1 Land unit that respondents used to report land size, percent of respondents, by country

	Ghana Cocoa HH	Ghana Non-Cocoa HH	pvalue	sig	Côte d'Ivoire Cocoa HH	Côte d'Ivoire Non-Cocoa HH	pvalue	sig
acre(s)	73%	57%	0.00	***	0%	0%	0.00	***
ha(s)	0%	0%			100%	94%		
pole(s)	27%	43%			0%	0%		
carré(s) 0.25 ha	0%	0%			0%	6%		
N	1,318	242			910	575		
land_unit_preference								

Table 6.2 Percent of respondents who know the size of household land used to cultivate all crops last year, by country

	Ghana Female respondent	Ghana Male respondent	pvalue	sig	Côte d'Ivoire Female respondent	Côte d'Ivoire Male respondent	pvalue	sig
mean	81%	94%	0.00	***	71%	94%	0.00	***
std.error	2%	1%			2%	1%		
N	538	1,022			498	987		
all_land_known_yn								

6.3.1 All land - use and ownership

In our household survey, only respondents who said they knew the size of their household's land were asked further questions their household's land (Table 6.2).

Many households in both Ghana and Côte d'Ivoire cultivate more than one plot of land. On average, Ghanaian households cultivated 2.58 plots of land compared with the 3.3 plots of land that Ivorian households reported. This is consistent the generally larger land sizes found in Côte d'Ivoire (Table 6.3).

Land tenure arrangements, Abunu and Abusa

There are two main types of land tenure arrangements, abunu and abusa. These are mainly used in relation to cocoa, but not exclusively.

The abunu system is the most frequently encountered system in our study.²⁹ There can be local variations, but in general a land owner offers an uncultivated part of his/her land (often bush or forested land) to a farmer (or labourer), who then works for several years to clear the land and establish cocoa trees on the new plot. After the new cocoa plantation is established (often a period of around six years), the land will be divided in two equal parts with (customary) ownership rights secured for each. From this time on, the cocoa plots will be independently managed. For the original owner, the main advantage of the abunu system is that he or she can expand his/her land under cocoa without using their own labour or incurring financial cost. For the farmers or labourer that enters the arrangement, the main advantage of the abunu system is that he or she can acquire a portion of land without buying it for a substantial amount of money.³⁰ It is important to emphasize that the main feature of the abunu system is the sharing of land, not the harvested crop. It should also not be assumed that abunu is a discreet category of farmer. Many farmers are already landowners and engage in abunu as a way to enlarge the amount of land they already own.

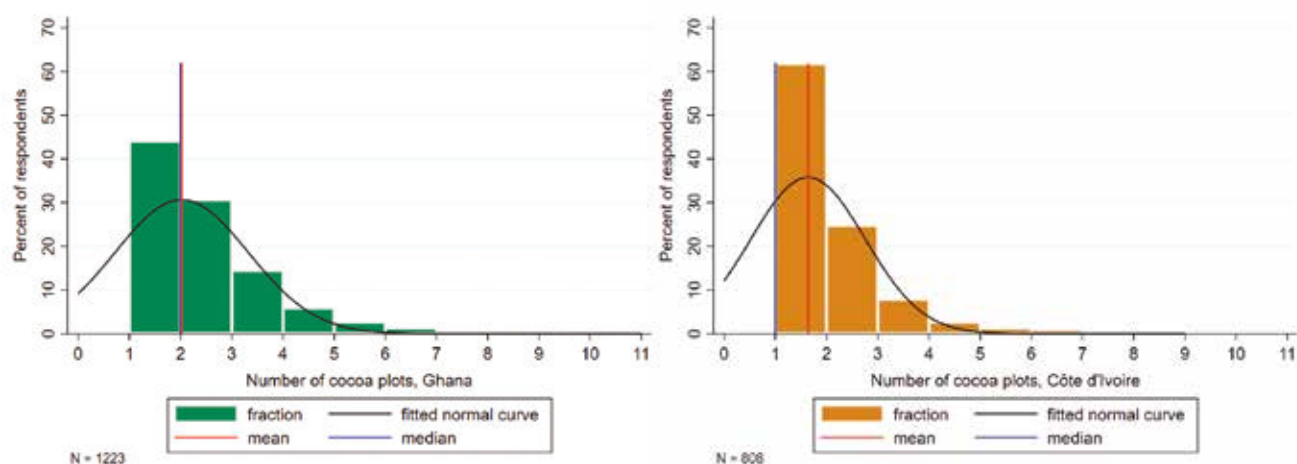
In Ghana, abunu contracts emerged in the 1940s and 1950s, while in Côte d'Ivoire they emerged in the 1980s before blossoming in the 2000s. In Côte d'Ivoire, the abunu contract is sometimes referred to as 'Partager-Travailler' (Work-and-Share) or 'Planter-Partager' (Plant-and-Share). According to Ruf (2010) these arrangements have become more popular with the increasing scarcity of land.³¹ While abunu is often referred to as a 'contract' between parties, this does not necessarily mean that the terms of the arrangement are written down and signed. Often abunu contracts are agreed verbally before a witness and may not be extensive in detail. In some cases there may be misunderstandings or disputes during the course of the contract period which may need to be renegotiated.³² Nevertheless, the relative frequency of abunu contracts in Ghana suggests to us that abunu is a reasonably well functioning system.

Another sharecropping arrangement is known as abusa. In its most direct translation from the Twi language, abusa simply means 'one-third', but during the course of this century it has come specifically to denote a crop-sharing arrangement whereby the supplier of labour and other inputs (the abusa man) receives from his partnership with a farm owner a third of the cocoa produced.³³ This was formally an important system. According to Hill (1956), as much as three-quarters of Ghanaian cocoa used to be produced under such arrangements in the middle of the twentieth century.³⁴ However, both in Ghana and in Côte d'Ivoire, we find very few households who continue to undertake abusa contracts in our sample.

Figure 6.2 Distribution of land parcels (separate plots) in Ghana and Côte d'Ivoire

Significant differences in the number of land parcels cultivated were also found between cocoa and non-cocoa households in both countries. Ghanaian cocoa households reported cultivating crops on 2.69 plots of land compared with 1.88 plots for non-cocoa households (highly significant). In Côte d'Ivoire, the cocoa households cultivated 3.52 plots of land, compared with 2.91 plots of land for non-cocoa

households (highly significant) (Table 6.4). These findings are consistent with higher



land sizes cultivated by cocoa households compared with non-cocoa households.

Table 6.3 Mean number of land parcels (separate plots), by country

	Ghana	Côte d'Ivoire	pvalue	sig
mean	2.58	3.30	0.00	***
std.error	0.05	0.05		
N	1,395	1,279		
all_land_numlandparcels				

Note: The question asked was "How many separate parcels of land did your household cultivate crops on last year?"

Table 6.4 Land, mean number of land parcels (separate plots), by cocoa vs non-cocoa household

	Ghana Cocoa HH	Ghana Non-HH	pvalue	sig	Côte d'Ivoire HH	Côte d'Ivoire Non-Cocoa HH	pvalue	sig
mean	2.69	1.88	0.00	***	3.52	2.91	0.00	***
std.error	0.05	0.08			0.06	0.08		
N	1,191	204			808	471		
all_land_numlandparcels								

Table 6.5 summarises our findings on average land sizes. These figures are averages and include respondents who did not ‘own’, ‘lease’, ‘have land under abunu or abusa’, or ‘do not have fallow land’.³⁵

On average we find that Ivorian households cultivate their crops on significantly larger farms than Ghanaian farmers. In Ghana, the mean land size on which all crops were cultivated was 4.77 ha, compared with 5.36 ha in Côte d’Ivoire (*highly significant*) (Table 6.5).

Most households in Ghana reported owning³⁶ at least some land (86%) and virtually all those in Côte d’Ivoire reported doing so (98%) (Table 6.5). This may mean that respondents are in possession of formal land title, that land was once given for ownership through chieftaincy or tribal agreements, or that land is considered to be owned under ancestral title. Ivorian respondents reported owning considerably more land than Ghanaian respondents on average. In Ghana, respondents reported owning an average of 4.06 ha, compared with 7.95 ha in Côte d’Ivoire (*highly significant*). (Of only those who owned some land, the average was 4.74ha in Ghana and 7.95ha in Côte d’Ivoire)

It is important to note that ‘land owned’ can be greater than total land cultivated because households may choose to keep some land fallow during crop rotation, may use fallow land as grazing land for animals, or leave land as bush because they do not have sufficient household labour available to cultivate more land. In Côte d’Ivoire, the average amount of fallow land is 2.74 ha. This considerably higher than in the average fallow land in Ghana, which is only 0.76 ha (*highly significant*).

Our interpretation is that, while pressure on land may be increasing (as reported in focus group discussions and literature), these are still relatively large farm sizes by smallholder standards in Africa. It is certainly debatable whether a household can efficiently manage this amount of land without considerable hired labour. Also, the presence of substantial amounts of fallow land in Côte d’Ivoire in particular (which may be bush), suggests that we are not close to a crisis point in terms of land availability.

In Ghana, only 6% of respondents reported that their household leases some land. A more common way to cultivate additional land is via the abunu system. In Ghana, 31% of all respondents engage in at least some abunu farming, which implies that a substantial number of households both own land and practice abunu farming at the same time. Across the Ghana sample, respondents reported that their household

³⁵ This implies that if the respondent household does not have a particular type of land they will be assigned ‘0’. This will affect the average for each type. We have chosen to also report the average of those with each land type in the text only so that tables will not be confused.

³⁶ In this study we use respondent interpretations of ‘owned’. It may be that it is either customary or statutory ownership, but either way respondents consider it to be theirs.

practices abunu farming on an average of 1 hectare (Table 6.5). However, among only those doing abunu farming, the average is 3.29 hectares. A relatively small number of respondents reported doing abusa farming (5%).

In Côte d'Ivoire, 10% of respondents reported that their household leases some land. However, from previous studies we expected a much higher proportion of respondents reporting abunu (2%) or abusa (2%) farming.^{37,38} We cannot easily explain the low abunu and abusa numbers in Côte d'Ivoire. They may reflect the natural shift from abunu to full ownership (since 98% of respondents reported owning some land). Abunu is, after all, a temporary arrangement. However, we suspect that the low percentage is also the result of the way in which the question was asked. While our enumerators in Côte d'Ivoire were trained on what was meant by abunu and abusa farming, we suspect this was still not understood by some respondents.

Table 6.5 Mean land cultivated, owned, leased, sharecropped, fallow, (ha), by country

	Ghana	Côte d'Ivoire	pvalue	sig
Land used to cultivate all crops (ha)	4.77	5.36	0.00	***
All land own (ha)	4.06	7.95	0.00	***
All land leased (ha)	0.11	0.16	0.07	*
All land abunu (ha)	1.00	0.07	0.00	***
All abusa (ha)	0.14	0.06	0.00	***
All fallow land or land left for grazing (ha)	0.76	2.74	0.00	***

Note: Land owned, leased, abunu, abusa may not add up to land cultivated due to rounding and cleaning of extreme outliers. Also fallow land is, by definition, not cultivated land.

Table 6.6 Land, proportion of households owning, leasing, abunu, abusa (percent) by country

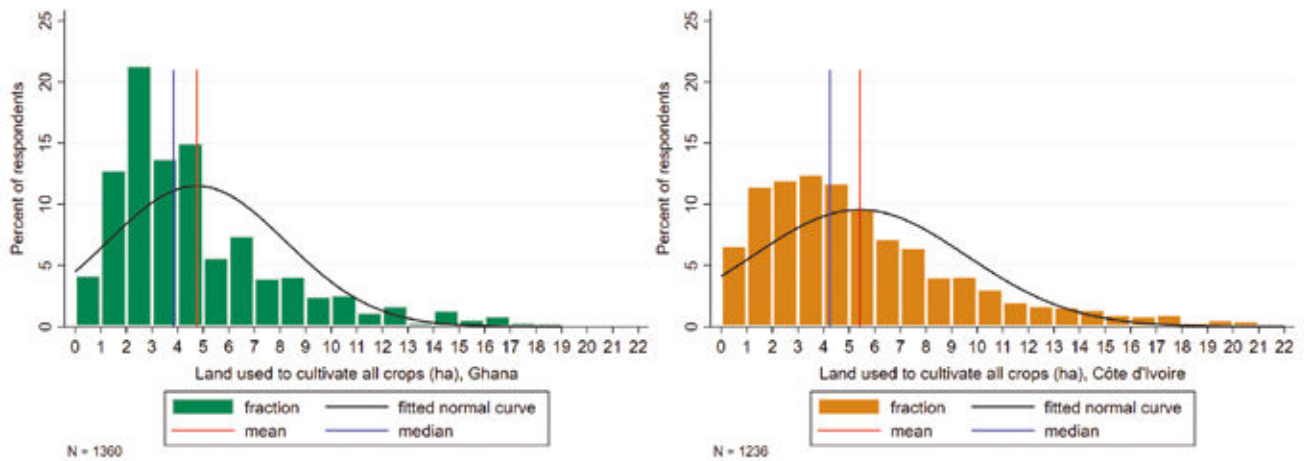
Type	Ghana	Côte d'Ivoire	pvalue	sig
Owned land	86%	98%	0.00	***
Leased land	6%	10%	0.00	***
Abunu	31%	2%	0.00	***
Abusa	5%	2%	0.00	***
N	1360	1102		

Note: p-value from a one-way ANOVA test

³⁷ Ruf, F. (2010) You Weed and We'll share. Land Dividing Contracts and Cocoa Booms in Ghana, Côte d'Ivoire and Indonesia. Available at https://www.researchgate.net/publication/293482558_You_Weed_and_We'll_share_Land_Dividing_Contracts_and_Cocoa_Booms_in_Ghana_Cote_d'Ivoire_and_Indonesia

³⁸ Waarts, Y., Ingram, V., Linderhof, V., Puister-Jansen, L., van Rijn, F., Aryeetey, R. (2015). Impact of UTZ certification on cocoa producers in Ghana, 2011 to 2014. Available at <http://edepot.wur.nl/366868>

Figure 6.3 Distribution of land cultivated in Ghana and Côte d'Ivoire (ha)



In Ghana, the size of land cultivated was found to differ between regions. However, these were not as pronounced as may be expected, and we must be careful with interpretation as the sample size falls considerably in some regions. The region with the smallest average land size cultivated was the Central region (4.06 ha) and the region with the highest average land size was Brong Ahafo (5.28 ha) (*highly significant*) (Table 6.7).

In Côte d'Ivoire, significant differences were also found between administrative districts, although the sample size per district is too low to draw firm conclusions. The district autonome de Yamoussoukro has the smallest mean land size cultivated (2.41 ha); Lagunes (7.85 ha) and Comou (7.76) had relatively the largest mean land size to cultivate all crops (*highly significant*) (Table 6.8).

Table 6.7 Mean land cultivated, owned, leased, abunu, abusa, fallow, by Ghana region (ha)

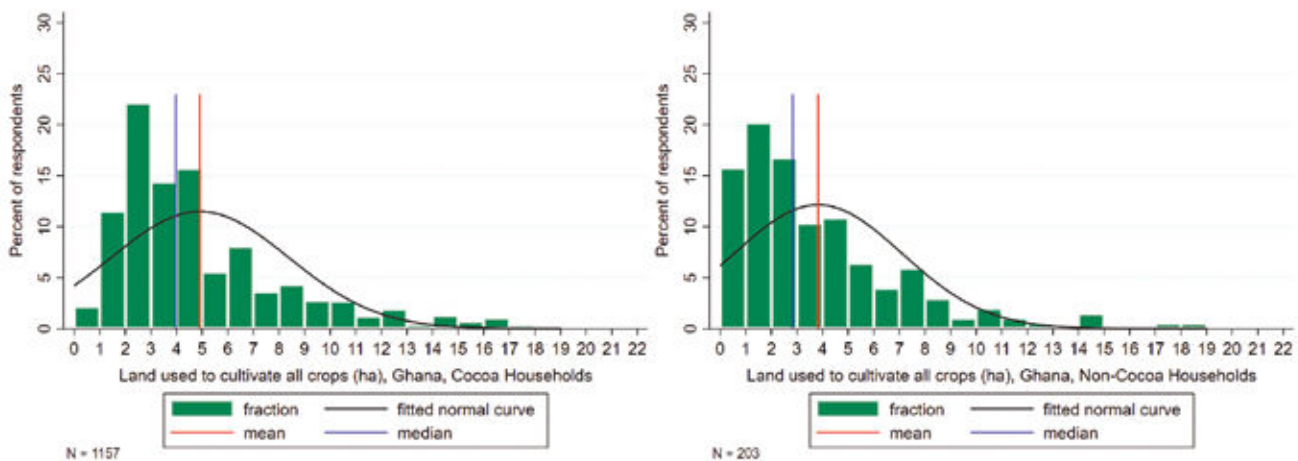
	Ashanti	Brong Ahafo	Central	Eastern	Western	pvalue	sig
Land used to cultivate all crops (ha)	4.32	5.28	4.06	4.39	5.03	0.00	***
All land own (ha)	3.86	4.70	3.47	3.54	4.20	0.02	**
All land leased (ha)	0.10	0.26	0.08	0.07	0.09	0.01	***
All land abunu (ha)	0.71	0.95	0.82	1.26	1.09	0.04	**
All abusa (ha)	0.10	0.35	0.03	0.05	0.13	0.00	***
All fallow land or land left for grazing (ha)	0.82	1.11	0.62	0.49	0.73	0.00	***
N	280	221	68	230	589		

Table 6.8 Mean land cultivated, owned, leased, abunu, abusa, fallow, by Côte d'Ivoire district (ha)

	Bas-Sassandra	Comoe	Yamoussoukro	Goh-Djiboua	Lacs	Lagunes	Montagnes	Sassandra-Marahoue	Zanzan	pvalue	sig
Land used to cultivate all crops (ha)	6.23	7.76	2.41	6.29	4.07	7.85	5.58	4.73	6.23	0.00	***
All land own (ha)	7.15	7.40	6.40	7.77	8.39	10.56	7.46	6.22	9.47	0.00	***
All land leased (ha)	0.18	0.16	0.01	0.22	0.13	0.09	0.26	0.25	0.04	0.08	*
All land abunu (ha)	0.09	0.46	0.00	0.14	0.03	0.03	0.02	0.01	0.04	0.00	***
All abusa (ha)	0.26	0.19	0.00	0.04	0.02	0.03	0.00	0.05	0.01	0.00	***
All fallow land or land left for grazing (ha)	1.82	1.04	4.57	1.54	4.55	3.28	2.15	1.93	3.48	0.00	***
N	138	73	78	114	295	95	114	219	104	138	

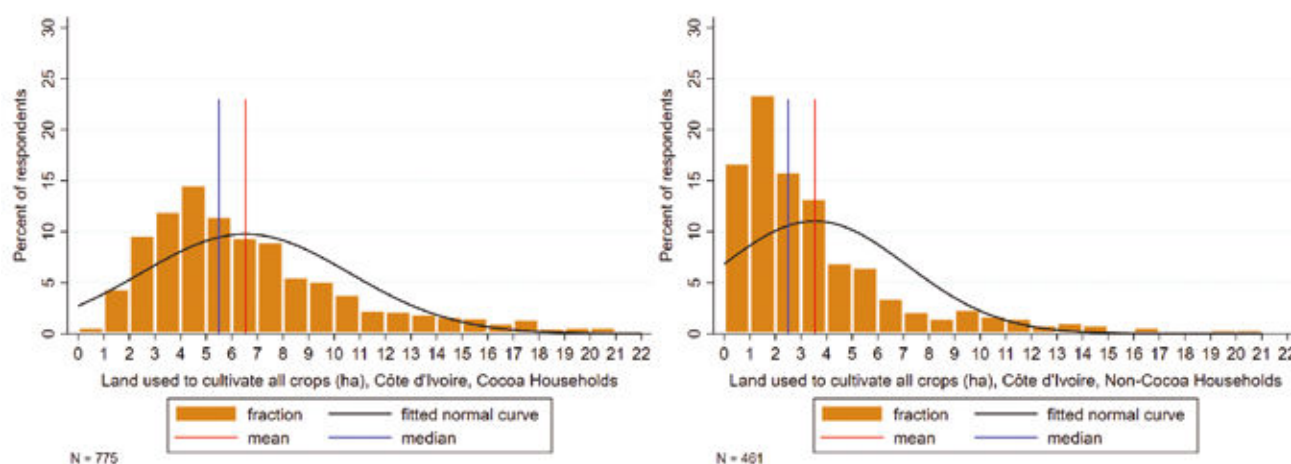
In Ghana, cocoa households reported cultivating more land (for all their crops) than non-cocoa households. The mean land size cultivated by cocoa households was 4.93 ha, considerably larger than the 3.90 ha reported by non-cocoa households (*highly significant*) (Table 6.9).

Figure 6.4 All land cultivated by cocoa and non-cocoa households, Ghana (ha)



The pattern is much the same in Côte d'Ivoire. The mean land size on which cocoa households cultivated all their crops was 6.48 ha, compared with only 3.50 ha for non-cocoa households (*highly significant*) (Table 6.9).

Figure 6.5 All land cultivated by cocoa and non-cocoa households, Côte d'Ivoire (ha)



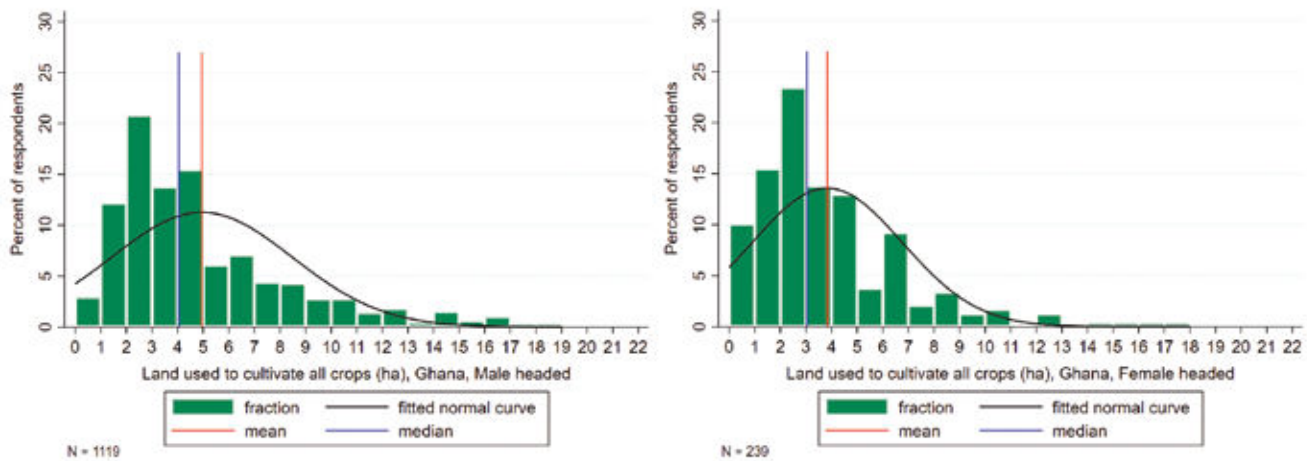
Correlations between the amount of land cultivated and whether or not the household produces cocoa need to be carefully interpreted as correlation does not imply causation. For example, it is not clear whether a larger landholding allows a household to invest in cocoa production, or whether good income from cocoa allows a household to invest in more land (perhaps through the abunu arrangement). We think that it is likely there is a two-way relationship.

Table 6.9 Land, mean land cultivated, owned, leased, abunu, abusa, fallow, (ha) by cocoa vs non-cocoa households

	Ghana Cocoa HH	Ghana Non-Cocoa HH	pvalue	sig	Côte d'Ivoire Cocoa HH	Côte d'Ivoire Non-Cocoa HH	pvalue	sig
Land used to cultivate all crops (ha)	4.93	3.90	0.00	***	6.48	3.50	0.00	***
All land own (ha)	4.21	3.20	0.00	***	8.32	6.78	0.00	***
All land leased (ha)	0.08	0.33	0.00	***	0.19	0.11	0.07	*
All land abunu (ha)	1.06	0.71	0.02	**	0.07	0.06	0.86	
All abusa (ha)	0.11	0.31	0.00	***	0.09	0.01	0.01	***
All fallow land or land left for grazing (ha)	0.74	0.88	0.22		2.45	3.36	0.00	***

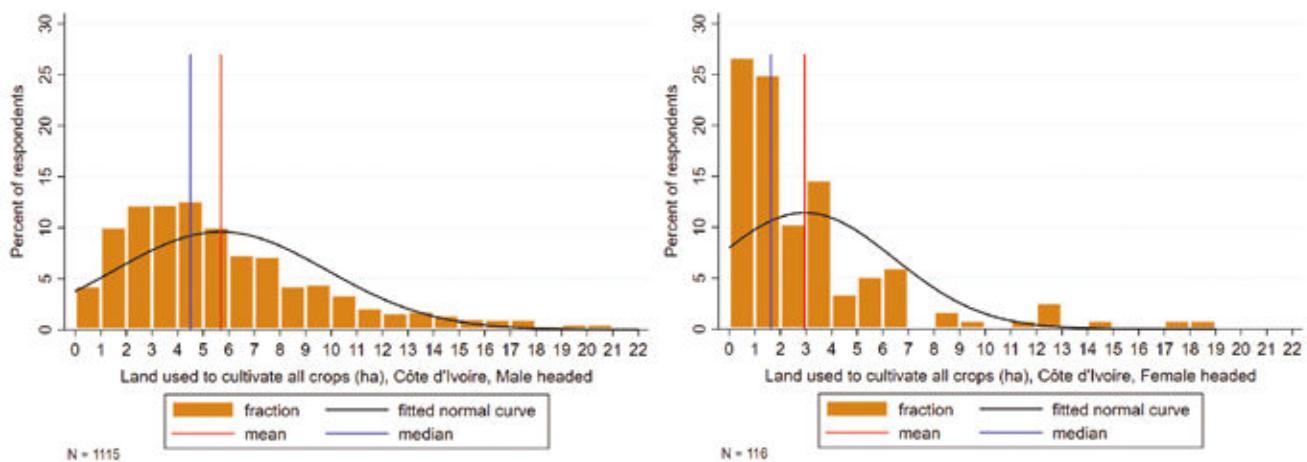
Differences in land cultivation and ownership were also found between male and female-headed households. In Ghana, a slightly higher proportion of female headed households (91%) reported owning land than male headed households (85%) (*significant*). However, female-headed households own a little less land on average (3.49 ha), compared with male-headed households (4.28 ha) (*highly significant*). Also we find that there is a slightly smaller proportion of female headed households who do abunu farming (24%) compared with male headed households (32%). This is consistent with focus group discussion data in which it was sometimes explained that land owners (whether men or women) prefer men to take abunu contracts on their land because they are physically stronger, and therefore more likely to be successful.

Figure 6.6 All land cultivated by male headed and female headed households, Ghana (ha)



In Côte d'Ivoire, differences were found to be much more pronounced. While nearly all households reported owning at least some land, female-headed households own, on average, 4.54 ha of land, compared with 8.16 ha for male-headed households (*highly significant*)³⁹.

Figure 6.7 All land cultivated by male headed and female headed households, Côte d'Ivoire (ha)



This data needs to be interpreted carefully. We must emphasize that female household heads (who are typically single, divorced or widowed) are not the same as females living in male headed households (and who are typically married). These findings should not be interpreted more broadly in terms of 'female land ownership'. The findings do suggest that narratives that women typically don't own land are not accurate⁴⁰

³⁹ We note that our sample size of 'female-headed households in Côte d'Ivoire who report that they know their land size' is quite small.

⁴⁰ This narrative is often expressed alongside reasons why women participate less frequently in training, have lower membership in farmer groups, or access credit less frequently. For example, see Zoen, S. (2015). The truth about women and chocolate – soft promises or solid change? Oxfam. Available at <https://policy-practice.oxfam.org.uk/blog/2015/03/cocoa>

(particularly for female headed households), while at the same time highlighting that there are differences in the amount of land owned by male and female-headed households, particularly in Côte d'Ivoire. We are not sure if the relatively moderate difference in Ghana is a sign that legislative changes are having an effect, or if there has been a cultural shift.

Table 6.10 Land, mean land cultivated, owned, leased, abunu, abusa, fallow, (ha) by sex of household head

	Ghana Female head	Ghana Male head	pvalue	sig	Côte d'Ivoire Female head	Côte d'Ivoire Male head	pvalue	sig
Land used to cultivate all crops (ha)	3.83	4.98	0.00	***	2.96	5.63	0.00	***
All land own (ha)	3.49	4.19	0.01	***	4.54	8.16	0.00	***
All land leased (ha)	0.13	0.11	0.74		0.05	0.17	0.07	*
All land abunu (ha)	0.61	1.09	0.00	***	0.00	0.07	0.29	
All abusa (ha)	0.04	0.16	0.05	**	0.00	0.06	0.18	
All fallow land or land left for grazing (ha)	0.60	0.80	0.07	*	2.17	2.80	0.07	*
N	241	1145			117	1160		

Land ownership patterns also differ between migrant households (those born outside the region where they now live) and non-migrant households. In Ghana we find no significant difference in the amount of land each group cultivates for all crops. However, a higher proportion of non-migrant (autochthonous) households (91%) reported owning land than migrant households (71%) (*highly significant*). As a result, autochthonous households own more land on average (Table 6.11). Migrant households compensate for lower land ownership rates by undertaking abunu arrangements more frequently (45%) than autochthonous households (26%) (*highly significant*).

In Côte d'Ivoire, both migrant and non-migrant groups own considerably more land than Ghanaian households. Ivorian migrants own about 1 ha less land than non-migrants (*significant*). Migrant households appear to compensate for the difference in ha owned by cultivating a higher proportion of their own land and leaving a smaller proportion fallow. Migrants in Côte d'Ivoire actually report cultivating all their crops on more land than non-migrants (*highly significant*) (Table 6.11).⁴¹

⁴¹ In Côte d'Ivoire, the same definition of migrant was used, however 'une région' in Côte d'Ivoire is a lower administrative unit than that in Ghana.

Table 6.11 Land, mean land cultivated, owned, leased, abunu, abusa, fallow, (ha) by migrant vs non-migrant household

	Ghana Migrant	Ghana Non-Migrant	pvalue	sig	Côte d'Ivoire Migrant	Côte d'Ivoire Non-Migrant	pvalue	sig
Land used to cultivate all crops (ha)	4.79	4.77	0.91		6.82	5.13	0.00	***
All land own (ha)	3.30	4.43	0.00	***	7.07	8.11	0.03	**
All land leased (ha)	0.13	0.11	0.52		0.45	0.11	0.00	***
All land abunu (ha)	1.64	0.78	0.00	***	0.13	0.06	0.17	
All abusa (ha)	0.22	0.11	0.02	**	0.23	0.03	0.00	***
All fallow land or land left for grazing (ha)	0.68	0.79	0.22		1.23	3.02	0.00	***
N	361	1,033			183	1,099		

6.3.2 All land – regression analysis

A regression analysis was conducted on determinants of all land, in order to add a layer of robustness to the descriptive data presented above.

For Ghana, Table 6.12 confirms all of the earlier findings. Households in Brong Ahafo and the Western Region own and cultivate more land than other regions. On average, female headed households cultivate approximately 1 hectare less land than male headed households and also own around half a hectare less land than male headed households. Cocoa households cultivate and own more land than non-cocoa households, and migrant households have more land under abunu arrangements than autochthonous households. Leaders also have more land than non-leaders. We suggest that this is because leaders tend to be relatively important and successful community members in the first instance, although leadership positions may also provide privileged access to land in some instances. Households with older heads in the 56-65 and 66+ categories have more land than households with younger heads. This stands to reason because they have had a lifetime to acquire more land, and they likely acquired a good portion of land prior before relative scarcity became an issue.

Table 6.12: Regression, determinants of land cultivated, owned and under abunu, Ghana (ha)

	Land used to cultivate all crops (ha)	All land own (ha)	Abunu land (ha), if abunu
Head: Sex: female	-0.97 (0.25)***	-0.58 (0.28)**	-0.65 (0.34)*
Region: Central	-0.43 (0.47)	-0.33 (0.52)	-0.35 (0.55)
Region: Brong Ahafo	1.20 (0.31)***	1.45 (0.35)***	0.96 (0.42)**
Region: Western	0.84 (0.26)***	0.94 (0.29)***	0.61 (0.35)*
Region: Eastern	-0.13 (0.31)	-0.56 (0.34)	0.54 (0.37)
Age Group (head): 26-35	0.46 (0.71)	0.13 (0.79)	-0.31 (0.82)
Age Group (head): 36-45	0.98 (0.68)	0.94 (0.76)	-0.42 (0.80)
Age Group (head): 46-55	1.06 (0.68)	1.17 (0.76)	-1.00 (0.80)
Age Group (head): 56-65	1.89 (0.69)***	2.37 (0.77)***	-0.31 (0.82)
Age Group (head): >66	1.67 (0.70)**	2.34 (0.78)***	-0.46 (0.85)
Cocoa Household: yes	0.98 (0.27)***	0.89 (0.30)***	0.57 (0.37)
Migrant: yes	-0.22 (0.22)	-1.38 (0.25)***	0.55 (0.26)**
Number of household members living in the compound	0.11 (0.04)***	0.09 (0.04)**	0.02 (0.05)
Leader: yes	0.42 (0.21)**	0.79 (0.23)***	0.48 (0.26)*
Constant	1.66 (0.73)**	1.06 (0.81)	2.47 (0.90)***
N	1,349	1,347	413
R ²	0.07	0.10	0.08

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$ Robust se in parenthesis

For Côte d'Ivoire, Table 6.13 also confirms the earlier analysis. Female headed households cultivate 1.7 ha less than male headed households, and own around 2.5 ha less. Cocoa households also cultivate around 1.5 ha more and own around 2 ha more than non-cocoa households. Migrants are also confirmed to cultivate more land than autochthonous households but own less (because they appear to cultivate more fallow land). As in Ghana, households with older heads in the 56-65 and 66+ categories have more land than households with younger heads.

Table 6.13 Regression, determinants of land cultivated and owned, Côte d'Ivoire (ha)

	Land used to cultivate all crops (ha)	All land own (ha)
Head: Sex: female	-1.70 (0.38)***	-2.55 (0.58)***
Region: Lacs	1.08 (0.48)**	1.57 (0.79)**
Region: Montagnes	1.67 (0.57)***	0.60 (0.92)
Region: Bas-Sassandra	1.85 (0.58)***	0.07 (0.92)
Region: Goh-Djiboua	2.00 (0.59)***	0.27 (0.92)
Region: Zanzan	3.57 (0.56)***	2.68 (0.88)***
Region: Sassandra-Marahoue	0.82 (0.53)	-0.94 (0.85)
Region: Comoe	3.17 (0.63)***	-0.43 (0.97)
Region: Lagunes	3.81 (0.59)***	3.10 (0.94)***
Age Group (head): 26-35	0.32 (0.69)	1.07 (1.08)
Age Group (head): 36-45	0.42 (0.68)	0.69 (1.06)
Age Group (head): 46-55	0.66 (0.68)	1.28 (1.06)
Age Group (head): 56-65	1.20 (0.70)*	2.66 (1.09)**
Age Group (head): >66	1.22 (0.74)*	2.31 (1.14)**
Cocoa Household: yes	2.16 (0.26)***	1.44 (0.41)***
Migrant: yes	1.04 (0.32)***	-1.21 (0.48)**
Number of household members living in the compound	0.24 (0.03)***	0.33 (0.05)***
Leader: yes	0.15 (0.23)	0.20 (0.35)
Constant	-0.04 (0.79)	2.89 (1.25)**
N	1,126	1,019
R ²	0.28	0.17

* $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$ Robust se in parenthesis

6.4 Cocoa land data

6.4.1 Cocoa land

Land under cocoa in Ghana is estimated to have increased from around 1 million ha in 1995 to 1.6 million ha in 2010,⁴² and has recently been estimated at 1.8 million ha.⁴³ In Côte d'Ivoire, total land covered by cocoa plantations is estimated to have increased from 1.6 million ha to 2.5 million ha between 1990 and 2011.^{44,45}

Estimations of the average land size of smallholder cocoa farms vary somewhat across studies, depending on factors such as regional differences and sample variance.

Table 6.14 Land sizes reported in other studies, Ghana

Farm size	Region	Source	Notes
4,6 ha 2,2 ha	Western Eastern	Ruf (2011) ⁴⁶	-
3,0 ha	Unknown	Aneani et al (2011) ⁴⁷	-
2 types: 1,4-2,7 ha (smallholder), 5,5 ha or more (larger farms)	Unknown	Barrientos & Akyere (2012) ⁴⁸	Larger farms mostly in Western Region
2 ha	Unknown	Victor et al. (2010) ⁴⁹	-
7.14 acres	Mean for Ashanti, Eastern, Western	Waarts et al. (2013) ⁵⁰	Certified farmers Highest acreage in Ashanti Smallest acreage in Eastern
5 acres	Mean for all regions	Hainmueller et al (2011) ⁵¹	Difference between reported (3.6 a) and measured (5.1 a) farm sizes
4 acres 4 acres 3 acres 2,5 acres 3 acres	Ashanti Bhrong-Ahafo Central Eastern Western	Hainmueller et al (2011)	Median sizes reported
4.7 ha	Mean for Ghana	Calkins & Ngo (2005) ⁵²	Older source, larger farms in Western compared to Ashanti

⁴² Wessel, M., & Quist-Wessel, P. F. (2015). Cocoa production in West Africa, a review and analysis of recent developments. *NJAS-Wageningen Journal of Life Sciences*, 74, 1-7. Available at <https://doi.org/10.1016/j.njas.2015.09.001>

⁴³ Kroeger, A., Bakhtary, H., Haupt, F., Streck, C. (2017). Eliminating Deforestation from the Cocoa Supply Chain. World Bank, Washington, DC. World Bank. Available at <https://openknowledge.worldbank.org/handle/10986/26549>

⁴⁴ Ibid

⁴⁵ Wessel, M., & Quist-Wessel, P. F. (2015). Cocoa production in West Africa, a review and analysis of recent developments. *NJAS-Wageningen Journal of Life Sciences*, 74, 1-7. Available at <https://doi.org/10.1016/j.njas.2015.09.001>

⁴⁶ Ruf, F.O. (2011). The myth of complex cocoa agroforests: the case of Ghana. *Human Ecology*, 39(3), 373. Available at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3109247/>

⁴⁷ Aneani, F., Anchirinah, V. M., Owusu-Ansah, F., Asamoah, M. (2011). An analysis of the extent and determinants of crop diversification by cocoa (Theobroma cacao) farmers in Ghana. *African Journal of Agricultural Research*, 6(18), 4277-4287. Available at <https://academicjournals.org/journal/AJAR/article-full-text-pdf/D36327231736>

⁴⁸ Barrientos, S.W & Asenso Akyere, K. (2012). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocoalife.org/progress/mapping-sustainable-production-in-ghanaian-cocoa>

⁴⁹ Victor, A.S., Gockowski, J., Agyeman, N. F., Dziwornu, A.K. (2010). Economic cost-benefit analysis of certified sustainable cocoa production in Ghana. In *Proc. of the 3rd African Association of Agricultural Economists (AAAE) and 48th Agricultural Economists Association of South Africa (AEASA) Conference* (pp. 19-23). Available at <https://ageconsearch.umn.edu/bitstream/97085/2/33.%20Cost%20benefit%20of%20cocoa%20in%20Ghana.pdf>

⁵⁰ Waarts, Y., Ge, L., Ton, G., van der Meen, J. (2013). A touch of cocoa: Baseline study of six UTZ- Solidaridad cocoa projects in Ghana. LEI report 2013-2014. LEI Wageningen UR. Available at <http://edepot.wur.nl/305316>

⁵¹ Hainmueller, J., Hiscox, M., Tampe, M. (2011). Sustainable development for cocoa farmers in Ghana. MIT and Harvard University. <https://www.theigc.org/wp-content/uploads/2015/02/Hainmueller-Et-Al-2011-Working-Paper.pdf>

⁵² Calkins, P., & Ngo, A. (2005). The Impacts of Farmer Cooperatives on the Standard of Living Of Cocoa Producing Villages in Côte d'Ivoire and Ghana. Canada: Societe de Cooperation pour le Developpement International. Available at <http://socodevi.org/contenu/prospecteur/uploads/Cocoa-Cooperatives-and-Well-being-20051130.pdf>

Farm size	Region	Source	Notes
7.1 acres (2.9 ha)	Mean for Ghana	Waarts et al. (2013)	Certified farmers Highest acreage in Ashanti
2.3 ha	Mean for Ghana	Wiggins & Leturque (2011) ⁵³	-
7.8 acres (3.2 ha)	Western Region	Anang (2016) ⁵⁴	-
3.0 ha (mean), 0.4 ha (min), 36 ha (max)	Whole of Ghana	Aneani et al (2011)	Research conducted over different cocoa growing regions
10.5 acres (4.2 ha)	Ashanti region	Schouten (2016) ⁵⁵	Three communities in Ashanti
5.5 acres (2.2 ha)	Mean for Ghana	Hiscox & Goldstein (2014) ⁵⁶	
7.5 acres (3 ha)	Mean for Ghana	Tulane university (2015) ⁵⁷	Farm size decreased from 9.6 acres in 2009 to 7.5 in 2014
Q1: 1.65 ha Q2: 3.14 ha Q3: 5.24 ha Q4: 10.12 ha	Mean for Ghana	Kolavalli et al. (2016) ⁵⁸	Makes distinction between 4 quartiles of landholdings based on size
4.98 acres (2 ha) 10.6 acres (4.3 ha) 4.78 acres (1.9 ha) 8.73 acres (3.5 ha)	Eastern Western Volta Mean for all three	Baah et al. (2012) ⁵⁹	-
2-4 ha	Average for West Africa	Barry Callebaut (2014) ⁶⁰	-
66% of farm sizes 0-8 ha, 18,9% of farm sizes 20 ha+	Whole of Ghana	Addae (2014) ⁶¹	-
12.4 acres (5 ha) 10.9 acres (4.4 ha)	Uncertified farmers Certified farmers	Nelson et al. (2013) ⁶²	-
2.47 ha	Mean for Ghana	Oomes et al. (2016) ⁶³	-
4.3 ha	Mean for Ghana	Donovan et al. (2016) ⁶⁴	Total farm sizes of which 30% is fully for cocoa
2.14 ha 1.94 ha	Ashanti Western	Vigneri and Serra (2016) ⁶⁵	Average calculated based on 4 districts in Ashanti, 2 in Western
2-5 ha	Mean for Ghana	Lambert et al. (2014) ⁶⁶	Rather broad mean size

⁵³ Wiggins, S & Leturque, H. (2011). Ghana's sustained agricultural growth: Putting underused resources to work. London: ODI Publications. Available at <https://www.odi.org/sites/odi.org.uk/files/resource-documents/11558.pdf>

⁵⁴ Anang, B.T. (2016). Determinants of Farmers' Satisfaction with the Price of Cocoa in Ghana. Available at https://www.researchgate.net/profile/Benjamin_Tetteh_Anang/publication/283575616_Determinants_of_Farmers%27_Satisfaction_with_the_Price_of_Cocoa_in_Ghana/links/5806088b08aeb85ac85f1104/Determinants-of-Farmers-Satisfaction-with-the-Price-of-Cocoa-in-Ghana.pdf

⁵⁵ Schouten, E. (2016). Household food security of Ghanaian cocoa producers: the impact of UTZ-certification (Master's thesis). Available at <https://dspace.library.uu.nl/handle/1874/339348>

⁵⁶ Hiscox, M., & Goldstein, R. (2014). Gender Inequality in the Ghanaian Cocoa Sector. Harvard University. Available at <https://www.cocoalife.org/~media/CocoaLife/News%20Articles%20PDF/Ghana%20Gender%20Assessment%20by%20Harvard%20University.pdf>

⁵⁷ Tulane University (2015). Survey Research on child labor in West African cocoa producing regions, 2013/14. School of Public Health and Tropical Medicine, Tulane University. July 30 2015. Available at https://makechocolatefair.org/sites/makechocolatefair.org/files/newsimages/tulane_university_-_survey_research_on_child_labor_in_the_cocoa_sector_-_30_july_2015.pdf

⁵⁸ Kolavalli, S., Vigneri, M., Gockowski, J. (2016). The Cocoa Coast: the board managed cocoa sector in Ghana. Ghana strategy support program, International Food Policy Research Institute (IFPRI). Available at <http://www.ifpri.org/publication/cocoa-coast-board-managed-cocoa-sector-ghana-synopsis>

⁵⁹ Baah, F., Anchirah, V., Badger, E., Badu-Yeboah, A. (2012). Examining the cocoa farmer-purchasing clerk relationship in Ghana. Global Journal of Science Frontier Research, 12(11-D). Available at <https://journalofscience.org/index.php/GJSFR/article/download/552/475/>

⁶⁰ Barry Callebaut (2014). Cocoa sustainability report 2012/2014. Available at https://www.barry-callebaut.com/system/files/download/barry_callebaut_cocoa_sustainability_report_2014_web.pdf

⁶¹ Addae, S. (2014). The Cocoa Certification Program and Its Effect on Sustainable Cocoa Production in Ghana: A Case Study in Upper Denkyira West District (Doctoral dissertation, Kwame Nkrumah University Of Science And Technology, Kumasi). Available at <http://ir.knust.edu.gh/xmlui/handle/123456789/6966>

⁶² Nelson, V., Opoku, K., Martin, A., Bugri, J., Posthumus, H. (2013). Assessing the poverty impact of sustainability standards: Fairtrade in Ghanaian cocoa. London: DfID UK. Available at <https://fairtradekookboek.files.wordpress.com/2013/12/apiss-fairtradeinghanaiancocoa.pdf>

⁶³ Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C., Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics. Available at <http://www.seo.nl/pagina/article/market-concentration-and-price-formation-in-the-global-cocoa-value-chain/>

⁶⁴ Donovan, J., Stoian, D., Foundjem, D., Degrande, A. (2016). Fairtrade Cocoa in Ghana: Taking Stock and Looking Ahead. Available at <https://www.biodiversityinternational.org/e-library/publications/detail/fairtrade-cocoa-in-ghana-taking-stock-and-looking-ahead/>

⁶⁵ Vigneri, M. and Serra, R. (2016). Researching the Impact of Increased Cocoa Yields on the Labour Market and Child Labour Risk in Ghana and Côte d'Ivoire. ICI Labour market research study. Available at: http://www.cocoainitiative.org/wp-content/uploads/2016/12/market_research_full_web.pdf

⁶⁶ Lambert, A., Gearhart, J., McGill, A., Wrinkle, H. (2014). The Fairness Gap: Farmer incomes and root cause solutions to ending child labor in the cocoa industry. International Labour Rights Forum, Washington D.C. Available at https://laborrights.org/sites/default/files/publications/Fairness%20gap_low_res.pdf

Table 6.15 Land sizes reported in other studies, Côte d'Ivoire

Farm size	Region/other	Source	Notes
5 ha 2-10 ha	Local farmers National/migrant farmers	Smith-Dumont et al. (2014) ⁶⁷	-
2.8 ha 6.2 ha 9.5 ha 6.2 ha	Tiassalé Adzopé Abengourou Mean for Côte d'Ivoire	Calkins & Ngo (2005)	Older source. Mean for Côte d'Ivoire has been calculated based on these three regions
5.34 ha (estimated) 3.7 ha (measured)	Mean for Côte d'Ivoire	Ingram et al. (2014) ⁶⁸	Farmers significantly overestimate farm sizes
3-4 ha	Mean for Côte d'Ivoire	Wessel & Quint-Wessel (2015) ⁶⁹	"No reliable statistics"
5.69 ha 5.84 ha	Uncertified farmers Certified farmers	Plate-Form pour le Commerce Equitable (2016) ⁷⁰	-
5.6 ha 6.4 ha	Uncertified farmers Certified farmers	Lemeilleur et al (2015) ⁷¹	-
6.3 ha	Mean for Côte d'Ivoire	Assiri et al. (2009) ⁷²	80% of the farmers have a farm smaller than 10 ha (also see tables on next page)
11.7 acres 8.8 acres	In 2009 In 2014	Tulane University (2015)	Average acreage used for cocoa by households
5.65 ha 4.96 ha 4.25 ha	For Baoulé For Bakwé For Burkinabé	Tano (2012) ⁷³	The study is about differences between ethnicities
5.8 ha	Mean for specific region in Côte d'Ivoire	Varlet & Kouamé (2013) ⁷⁴	Research about cocoa lands bordering the Taï national park near Liberia
6.76 ha 7.19 ha 5.29 ha 2.08 ha 5.77 ha	Indénie-Juabin Nawa Loh Jibua Haut-Sassandra Mean for all four	Vigneri and Serra (2016)	-
7.2 ha 6.31 ha	Study A (mean for Côte d'Ivoire) Study B (mean for Côte d'Ivoire)	Maytak (2014) ⁷⁵	Synthesis of 2 other reports
2-5 ha	Mean for Côte d'Ivoire	Lambert et al. (2014)	Very broad classification
4.31 ha >12ha >23ha 4.87ha <3.34ha	Average cocoa plot size 5% of plots are >12ha 1% of plots are >23ha Average all plots combined 50% of plots are <3.34ha	Balineau et al. (2017) ⁷⁶	Farmers have one or more cocoa plots. The first three statistics are the size per plot. The last two are the size of all plots combined.

⁶⁷ Smith-Dumont, E., Gnahoua, G. M., Ohouo, L., Sinclair, F. L., Vaast, P. (2014). Farmers in Côte d'Ivoire value integrating tree diversity in cocoa for the provision of ecosystem services. *Agroforestry systems*, 88(6), 1047-1066. Available at <https://www.mendeley.com/papers/farmers-c%C3%B4te-divoire-value-integrating-tree-diversity-cocoa-provision-ecosystem-services/>

⁶⁸ Ingram, V., Waarts, Y., Ge, L., van Vugt, S., Wegner, L., Puister-Jansen, L., Ruf, F., Tanoh, R. (2014). Impact of UTZ certification of cocoa in Ivory Coast: Assessment framework and baseline. Wageningen, LEI Wageningen UR (University & Research centre), LEI Report 2014-010. Available at https://utz.org/wp-content/uploads/2016/03/Impact-of-UTZ-certification-of-cocoa-in-Ivory-Coast_2014.pdf

⁶⁹ Wessel, M., & Quist-Wessel, P. F. (2015). Cocoa production in West Africa, a review and analysis of recent developments. *NJAS-Wageningen Journal of Life Sciences*, 74, 1-7. Available at https://www.researchgate.net/publication/282316360_Cocoa_production_in_West_Africa_a_review_and_analysis_of_recent_developments

⁷⁰ Plate-Forme pour le Commerce Equitable (2016). La Face Cachée du Chocolat: Une comparaison des coûts sociaux et environnementaux des filières conventionnelles, durables et équitables du cacao. Available at https://lebasic.com/wp-content/uploads/2016/05/Etude-Cacao_Synthese.pdf

⁷¹ Lemeilleur, S., N'Dao, Y., Ruf, F. (2015). The productivist rationality behind a sustainable certification process: evidence from the Rainforest Alliance in the Ivorian cocoa sector. *International Journal of Sustainable Development*, 18(4), 310-328. Available at http://publications.cirad.fr/une_notice.php?dk=576452

⁷² Assiri, A. A., Yoro, G.R., Deheuvels, O., Kébé, B.I., Keli, Z.J., Adiko, A., Assa, A. (2009). Les caractéristiques agronomiques des vergers de cacaoyer (# Theobroma cacao# L.) en Côte d'Ivoire. *Journal of animal and plant sciences*, 2(1), 55-66. Available at http://publications.cirad.fr/une_notice.php?dk=555828

⁷³ Tano, M.A. (2012). Crise cacaoyère et stratégies des producteurs de la sous-préfecture de Meadji au sud-ouest ivoirien (Doctoral dissertation, Université Toulouse le Mirail-Toulouse II). Available at <https://tel.archives-ouvertes.fr/tel-00713662/document>

⁷⁴ Varlet, F. & Kouamé, G. (2013). Étude de la production de cacao en zone riveraine du parc national de Taï. *Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and Ministère de l'Agriculture de la Côte d'Ivoire*.

⁷⁵ Maytak, L. (2014). Report on Farm Level Sustainability of Cocoa in Côte d'Ivoire: A Synthesis of Five Studies. International Finance Corporation, New York. Available at https://www.uni-goettingen.de/de/document/download/133209052e4238ff6de0f471ff51abb.pdf/GlobalFood_DP103.pdf

⁷⁶ Balineau, G., Bernath, S., Pahuatini, V. (2017). Cocoa farmers' agricultural practices and livelihoods in Côte d'Ivoire. Insights from cocoa farmers and community baseline surveys conducted by Barry Callebaut between 2013 and 2015. Technical Reports, No. 24. AFD, Paris. Available at <http://www.afd.fr/en/cocoa-farmers-agricultural-practices-and-livelihoods-cote-divoire>

In our sample, Ghanaian households reported cultivating cocoa on an average of 3.65 hectares (Table 6.16), with the majority cultivating between 2 and 5 hectares (Figure 6.1). 82% of respondents said that their household ‘owns’ the cocoa land. On average, Ghanaian cocoa households own 2.74 ha of cocoa land. (The average among those who own at least some land is 3.35 ha). Furthermore, 28% of respondents reported that their household is engaged in abunu farming. This means that a considerable proportion of households that own cocoa land are also trying to acquire more land through the abunu system. On average, Ghanaian cocoa households have 0.78 hectares of cocoa under abunu arrangements. (The average among those doing only abunu 2.82 ha).

In Côte d’Ivoire, cocoa is cultivated on slightly bigger farms (4.17 ha) than in Ghana, with most households reporting cocoa farms of between 2 and 5 ha (Figure 6.2).

Table 6.16 Cocoa land under cocoa, owned, leased, abunu, abusa (ha), by country

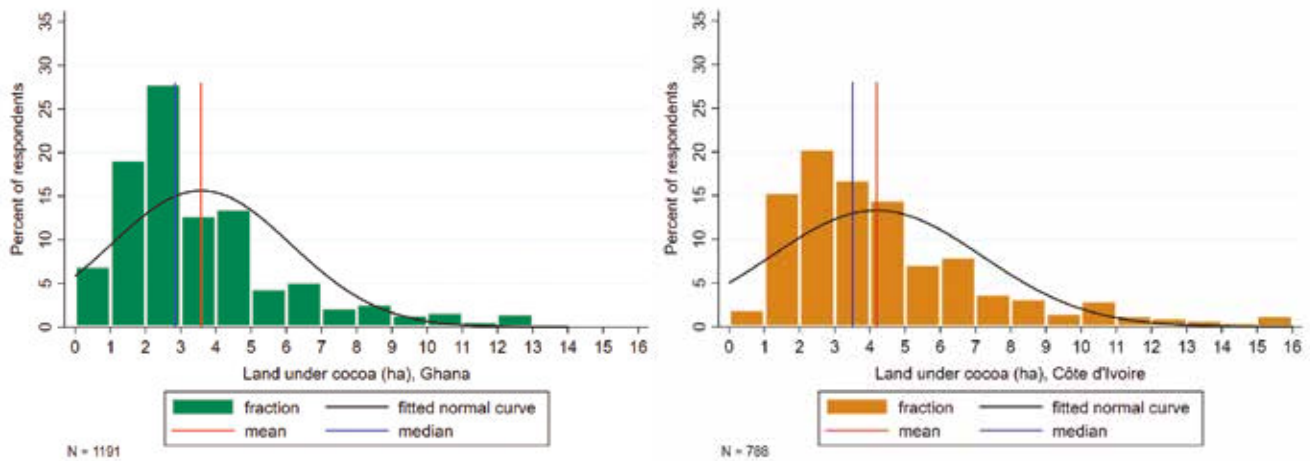
	Ghana	Côte d’Ivoire	pvalue	sig
Land under cocoa (ha)	3.65	4.17	0.00	***
Land under cocoa, with trees older than 5 years (ha)	2.80	3.48	0.00	***
Cocoa land owned (ha)	2.74	3.89	0.00	***
Cocoa land leased (ha)	0.02	0.01	0.42	
Cocoa land abunu (ha)	0.78	0.01	0.00	***
Cocoa land abusa (ha)	0.09	0.08	0.76	
N	1,199	787		

Note: N is given for the category ‘land under cocoa (ha)’. The N for some categories may slightly differ by a few respondents.

Table 6.17 Land, proportion of cocoa households owning, leasing, abunu, abusa, by country

	Ghana	Côte d’Ivoire	pvalue	sig
Cocoa land owned	82%	99%	0.00	***
Cocoa land leased	1%	1%	0.38	
Cocoa land abunu	28%	0%	0.00	***
Cocoa land abusa	3%	2%	0.85	
N	1146	753		

Figure 6.8 Distribution of land under cocoa, Ghana and Côte d'Ivoire



Cocoa land was also disaggregated by sex of the household head. In Ghana, we find that male-headed households cultivate more cocoa land (3.77 ha) than female-headed households (3.02 ha) (*highly significant*) (Table 6.18). However, In terms of the average amount of land owned, we find no statistical differences between male and female headed households. (However, of those only who own cocoa land, female headed households own 2.82 ha compared with 3.47 ha for male headed households, *highly significant*). One reason for the difference in cocoa land cultivated is the proportion of female (19%) and male (29%) headed households who do abunu farming (*highly significant*).

In Côte d'Ivoire, we find no statistical differences between male and female headed households because the sample size of female headed households is too small. This is due to a combination of factors – There are proportionally fewer female headed households in our Ivoirian sample than in our Ghanaian sample, fewer female-headed households opt to produce cocoa in Côte d'Ivoire, and also because a higher proportion of female respondents reported that they didn't know their land size.

Table 6.18 Cocoa land under cocoa, owned, leased, abunu, abusa (ha), by sex of household head

	Ghana female head	Ghana male head	pvalue	sig	Côte d'Ivoire female head	Côte d'Ivoire male head	pvalue	sig
Land under cocoa (ha)	3.02	3.77	0.00	***	3.45	4.21	0.14	
Land under cocoa, with trees older than 5 years (ha)	2.27	2.90	0.00	***	2.88	3.51	0.19	
Cocoa land owned (ha)	2.53	2.79	0.23		3.27	3.92	0.17	
Cocoa land leased (ha)	0.02	0.02	0.99		0.00	0.01	0.71	
Cocoa land abunu (ha)	0.38	0.86	0.00	***	0.00	0.01	0.72	
Cocoa land abusu (ha)	0.08	0.09	0.82		0.00	0.08	0.44	
N	200	1,005			35	738		

Note: N is given for the category 'land under cocoa (ha)'. The N for some categories may slightly differ by a few respondents.

6.4.2 Cocoa land – regression analysis

A regression analysis was conducted on determinants of cocoa land, adding a further layer of robustness to the descriptive data presented above.

For Ghana, Table 6.19 supports the above findings. Households in the Western Region cultivate more cocoa and own more land under cocoa than other regions. Female headed households cultivate a little less cocoa land than male headed households, but there is no statistically significant difference in the amount of land that they own under cocoa. Female headed household do have less cocoa land under abunu arrangements. There is no statistical difference between migrant and autochthonous households regarding the amount of cocoa land cultivated. However, migrants own a little less land and make up this difference through abunu arrangements. Other variables have either a weak effect or are not significant.

Table 6.19 Cocoa land, regression analysis of cocoa land cultivated, owned, under abunu, Ghana (ha)

	Land under cocoa (ha)	Cocoa land own (ha)	Abunu land (ha), if abunu
Head: Sex: female	-0.60 (0.21)***	-0.23 (0.21)	-0.92 (0.34)***
Region: Central	-0.37 (0.38)	0.00 (0.38)	-0.70 (0.49)
Region: Brong Ahafo	0.42 (0.26)	0.44 (0.27)*	0.80 (0.42)*
Region: Western	0.61 (0.22)***	0.81 (0.22)***	0.07 (0.32)
Region: Eastern	-0.22 (0.24)	-0.57 (0.24)**	0.34 (0.32)
Age Group (head): 26-35	0.05 (0.65)	0.18 (0.64)	-0.53 (0.70)
Age Group (head): 36-45	0.45 (0.62)	0.59 (0.61)	-0.48 (0.67)
Age Group (head): 46-55	0.31 (0.62)	0.96 (0.61)	-1.13 (0.68)*
Age Group (head): 56-65	0.88 (0.62)	1.63 (0.61)***	-0.60 (0.69)
Age Group (head): 66-older	0.62 (0.63)	1.57 (0.62)**	-0.56 (0.74)
Migrant: yes	0.11 (0.18)	-0.82 (0.18)***	0.57 (0.24)**
Number of household members living in the compound	0.08 (0.03)**	0.05 (0.03)	0.00 (0.04)
Household is member of a farmer group: yes	0.47 (0.25)*	0.27 (0.26)	-0.59 (0.33)*
Leader: yes	0.26 (0.17)	0.29 (0.17)*	0.09 (0.24)
Constant	2.40 (0.65)***	1.27 (0.63)**	3.26 (0.71)***
N	1,189	1,136	315
R ²	0.05	0.08	0.11

For Côte d'Ivoire, Table 6.20 presents few significant determinants. As with all land, the analysis suggests that female headed households produce cocoa on less land than male headed households. However, this finding is not particularly robust due to the very small sample size of female headed households who grow cocoa in Côte d'Ivoire (as discussed earlier). Migrants cultivate a little over half a hectare more cocoa than autochthonous households. We also see a positive relationship between the number of members in the household and the amount of cocoa land cultivated, but we suggest that this finding is not of importance because the effect size is so weak.

Table 6.20 Cocoa land, regression analysis of cocoa land cultivated, owned, Côte d'Ivoire (ha)

	Land under cocoa (ha)	Cocoa land own (ha)
Head: Sex: female	-1.31 (0.54)**	-1.10 (0.50)**
Region: Lacs	0.76 (1.18)	0.63 (1.07)
Region: Montagnes	1.11 (1.20)	0.92 (1.09)
Region: Bas-Sassandra	1.41 (1.19)	0.95 (1.08)
Region: Goh-Djiboua	0.82 (1.19)	0.79 (1.09)
Region: Zanzan	1.46 (1.30)	1.25 (1.19)
Region: Sassandra-Marahoue	0.32 (1.17)	0.35 (1.06)
Region: Comoe	1.83 (1.21)	1.32 (1.10)
Region: Lagunes	3.27 (1.19)***	2.93 (1.09)***
Age Group (head): 26-35	0.20 (0.79)	0.25 (0.73)
Age Group (head): 36-45	0.55 (0.78)	0.74 (0.72)
Age Group (head): 46-55	0.60 (0.79)	0.99 (0.72)
Age Group (head): 56-65	0.71 (0.79)	0.96 (0.73)
Age Group (head): 66-older	0.92 (0.83)	1.11 (0.76)
Migrant: yes	0.62 (0.29)**	0.50 (0.27)*
Number of household members living in the compound	0.13 (0.03)***	0.11 (0.03)***
Household is member of a farmer group: yes	0.26 (0.26)	0.35 (0.24)
Leader: yes	-0.04 (0.23)	-0.06 (0.21)
Constant	1.43 (1.39)	1.32 (1.27)
N	725	697
R ²	0.14	0.13

6.4.3 Cocoa land expansion

Cocoa production is a contributor to deforestation in Ghana and Côte d'Ivoire.⁷⁷ Recent study shows that many protected areas have been cleared mainly for cocoa growing operations, and there is a risk both countries will lose all of their forest in coming decades if no action is taken.⁷⁸

Map 6.1 Forest cover in Côte d'Ivoire, 1990–2015⁷⁹



Note: Map shows any surface 1 hectare or more with a tree canopy density of at least 30 percent.

Cutting fertile forest and bush land is still the most common way for farmers to increase their cocoa production. Studies have offered a number of reasons for this, such weak laws and enforcement, weak legal systems, and government policies promoting cocoa production.⁸⁰ Other studies have suggested that smallholder farmers open up new land due to their inability to increase productivity on existing land due to factors such as aging cocoa trees, insufficient use of inputs (mainly fertiliser), declining soil fertility, and the high incidence of pests and diseases.⁸¹

In our household survey, respondents were asked if their household's land under cocoa had changed in the past five years. A fairly high proportion of respondents in Ghana (46%) and in Côte d'Ivoire (35%) reported that their household had increased the amount of land under cocoa (*highly significant*). Very few respondents reported decreasing their land under cocoa in either Ghana (5%) or Côte d'Ivoire (7%) (Table 6.21).

This is concerning because most respondents in Ghana (84%) and Côte d'Ivoire (66%) who increased their land under cocoa did so not by converting land under other

⁷⁷ Fountain, A.C. and Hütz-Adams, F. (2015) Cocoa Barometer 2015-USA Edition. Available at http://www.cocoabarometer.org/International_files/Cocoa%20Barometer%202015%20USA.pdf

⁷⁸ Higonnet, E., Bellantonio, M., Hurowitz, G. (2017) Chocolate Dark's Secret. How the cocoa industry destroys national parks. Mighty. Available at http://www.mightyearth.org/wp-content/uploads/2017/09/chocolates_dark_secret_english_web.pdf

⁷⁹ Cabrera, G. Ivory Coast's Deforestation. MapHubs Forest. Available at <https://www.reuters.com/article/us-cocoa-sustainability-forests/explainer-plans-to-end-cocoa-deforestation-face-multiple-hurdles-idUSKBN1HQ1V3>

⁸⁰ Kroeger, A., Bakhtary, H., Haupt, F., Streck, C. (2017). Eliminating Deforestation from the Cocoa Supply Chain. World Bank, Washington, DC. World Bank. Available at <https://openknowledge.worldbank.org/handle/10986/26549>

⁸¹ Wessel, M., & Quist-Wessel, P. F. (2015). Cocoa production in West Africa, a review and analysis of recent developments. NJAS-Wageningen Journal of Life Sciences, 74, 1-7. Available at https://www.researchgate.net/publication/282316360_Cocoa_production_in_West_Africa_a_review_and_analysis_of_recent_developments

crops, but by clearing bush or a natural area (Table 6.22). This could be considered rational economic behaviour. Forestland typically has good soil fertility, and the household doesn't lose income (or the value of food crops) from conversion. Planting cocoa may also allow the household to strengthen their tenure claims over the land in a context of increasing land scarcity. Deforestation will be extremely difficult, if not impossible, to reverse. It would also be a concern if the lagged effect of high rates of planting drives future supply faster than demand. A structural surplus on the world market would inevitably depress prices. We discuss this further in the chapter on marketing and prices.

Table 6.21 Cocoa, percent of households who increased or decreased land under cocoa compared with 5 years ago, by country

	Ghana	Côte d'Ivoire	pvalue	sig
Increased land under cocoa	46%	35%	0.00	***
Decreased land under cocoa	5%	7%		
No change	49%	52%		
Not done for 5 years (new farmer)	0%	5%		
N	1,298	880		
cocoa_land_incdecnc_5ago				

Table 6.22 Cocoa, how did the household increase the amount of land under cocoa, by country

	Ghana	Côte d'Ivoire	pvalue	sig
Cleared bush/natural area	84%	66%	0.00	***
Converted crop or pasture land	10%	15%		
Purchased land	2%	2%		
Inherited	2%	12%		
Other	1%	2%		
Abunu/abusa	0%	3%		
N	591	312		
cocoa_land_inc_how_5ago				

Note: Table is of those who responded that their household had increased land under cocoa

6.4.4 Cocoa tree ages

In the household survey, respondents were asked about their household's experience growing cocoa. In Ghana, we find that most households have been producing cocoa for less than 25 years (often given as the end of peak cocoa productivity). In Côte d'Ivoire, cocoa farmers have a fairly similar experience profile as those in Ghana (Table 6.23).

Table 6.23 Cocoa experience, number of years the household has been growing cocoa, by country

	Ghana	Côte d'Ivoire	pvalue	sig
1-5 years	6%	5%	0.00	***
6-10 years	21%	20%		
11-15 years	22%	16%		
16-20 years	16%	15%		
20-24 years	10%	9%		
More than 25 years	25%	35%		
N	1,318	909		
cocoa_years				

Note: p-value from a Chi-squared test

Cocoa trees start to become productive after three to five years depending on whether the variety is a hybrid and whether or not fertilizer is used. Trees are fully matured within about eight years and can maintain good yields until they are approximately 25 years old. Thereafter productivity begins to drop off, however trees can remain somewhat productive for 40 years.⁸²

In our household survey, the mean age of cocoa trees was found to be 14 years in Ghana and 16 years in Côte d'Ivoire (Table 6.24). We note that this is a younger average age than some other studies. For example, Kolavalli et al. (2016)⁸³ report an average age of 20.29 years in Ghana. Three recent studies in Côte d'Ivoire report the average age of trees at between 22 and 25 years.^{84,85,86} We have a hypothesis for this difference. In our study, we asked “How many years old are *most* of your cocoa trees?” and then averaged observations across the sample. This is not quite the same as asking “On average how old are your trees?”, which is what commonly gets asked in most studies. The problem with the latter is that the enumerator (or respondent) typically gives an average age of different *plots* of cocoa trees (or patches thereof) rather than an average of all the *trees*. For example, if a farmer had two plots of cocoa trees and one was a small plot of 30 year old trees and the other was a large plot of 10 year old trees, the enumerator typically records 20 years as the average, even though the average of all the trees in both the plots would be nearer to 10 years.

⁸² Assiri, A. A., Yoro, G.R., Deheuvels, O., Kébé, B.I., Keli, Z.J., Adiko, A., Assa, A. (2009). Les caractéristiques agronomiques des vergers de cacaoyer (# Theobroma cacao# L.) en Côte d'Ivoire. Journal of animal and plant sciences, 2(1), 55-66. Available at http://publications.cirad.fr/une_notice.php?dk=555828

⁸³ Kolavalli, S., Vigneri, M., Gockowski, J. (2016). The Cocoa Coast: the board managed cocoa sector in Ghana. Ghana strategy support program, International Food Policy Research Institute (IFPRI). Available at <http://www.ifpri.org/publication/cocoa-coast-board-managed-cocoa-sector-ghana-synopsis>

⁸⁴ Tano, M.A. (2012). Crise cacaoyère et stratégies des producteurs de la sous-préfecture de Meadji au sud-ouest ivoirien (Doctoral dissertation, Université Toulouse le Mirail-Toulouse II). Available at <https://tel.archives-ouvertes.fr/tel-00713662/document>

⁸⁵ Vigneri, M. and Serra, R. (2016). Researching the Impact of Increased Cocoa Yields on the Labour Market and Child Labour Risk in Ghana and Côte d'Ivoire. ICI Labour market research study. Available at: http://www.cocoainitiative.org/wp-content/uploads/2016/12/market_research_full_web.pdf

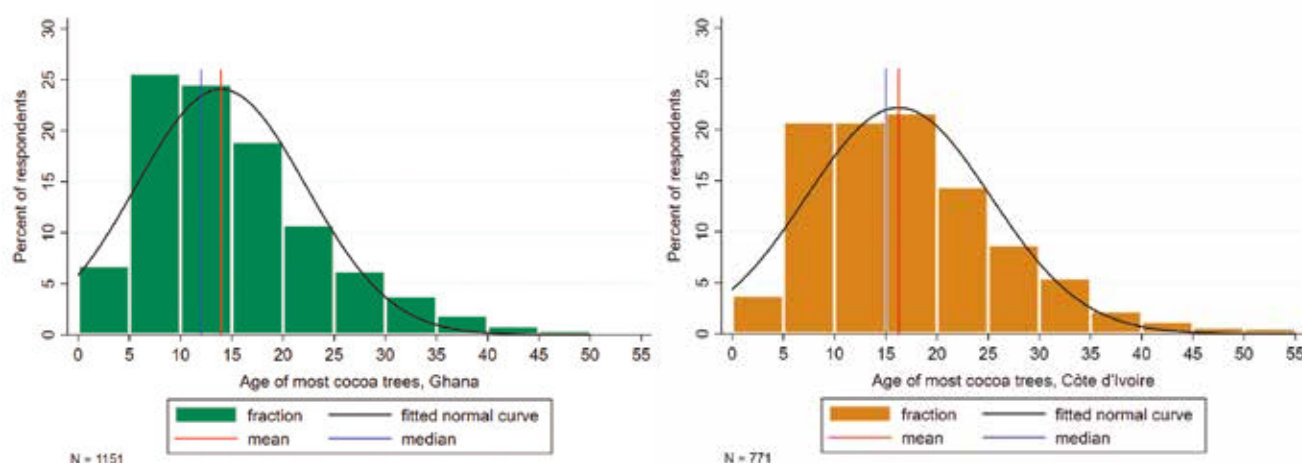
⁸⁶ Barry Callebaut. (2017). Cocoa Farmers in Côte d'Ivoire continue to live in poverty. Press release. Available at <https://www.barry-callebaut.com/news/2017/02/cocoa-farmers-cote-divoire-continue-live-poverty>

Table 6.24 Mean age of most cocoa trees on a farm (years), by country

	Ghana	Côte d'Ivoire	pvalue	sig
mean	14.21	16.21	0.00	***
std.error	0.26	0.32		
N	1,159	770		
cocoa_trees_most				

Note: p-value from a one-way ANOVA test. The question was asked, 'how many years old are most of your cocoa trees?'

Figure 6.9 Mean age of most cocoa trees on a farm in Ghana and Côte d'Ivoire (years)



To understand in more detail the age of trees for each household, respondents were asked to estimate the amount of land they had with trees i) younger than 5 years, ii) 5-25 years iii) more than 25 years old (Table 6.25).

A remarkably high proportion of cocoa households in Ghana (71%) and Côte d'Ivoire (48%) reported having at least some trees younger than 5 years old⁸⁷ (Table 6.25), which further suggests that future cocoa supply is likely to continue increasing. As expected, most land is under cocoa of productive age (5-25 years), with roughly equal amounts of young and older cocoa phasing in and phasing out (Table 6.25).

Table 6.25 Cocoa, mean land size under cocoa with trees of different ages (ha), by country

	Ghana	Côte d'Ivoire	pvalue	sig
Trees 5 years or younger (ha)	0.86	0.70	0.00	***
Trees 5-25 years old (ha)	2.29	2.64	0.00	***
Trees more than 25 years old (ha)	0.51	0.84	0.00	***
N	1,189	781		
cocoa_trees_age_5yo_ha				
cocoa_trees_age_5_25yo_ha				
cocoa_trees_age_25yo_ha				

Note: p-value from a one-way ANOVA test

⁸⁷ This is supported by a later finding in our 'production activities' block of questions. In Ghana, 52% of respondents reported planting at least some cocoa just last year, with a further 32% in Côte d'Ivoire saying the same.

6.4.5 Cocoa varieties

The main cocoa varieties are Criollo, Forastero and Trinitario. As a generalisation, Criollo and Trinitario trees produce fine or flavour cocoa beans, while bulk cocoa beans come from Forastero trees.⁸⁸ Only 5% of the world's production is fine or flavour cocoa. Farmers and researchers, sometimes use different names for cocoa varieties, leading to confusion. Box 6.1 explains the different cocoa varieties.

Box 6.1 Explanation of different cocoa varieties

The most commonly grown cocoa tree is Forastero. It is most likely native to the Amazon basin. Today, Forastero is mainly grown in Africa, Brazil and Ecuador. This variety is hardier and more resistant to diseases and is said to have a much higher yield than the Criollo variety. Forastero cocoa has purple-coloured beans and is mainly used to give chocolate its full-bodied flavour. There are many Forastero subspecies: for example, Amelonado, Cundeamor and Calabacillo. Amelonado cocoa is the most extensively planted cocoa of all.

Trinitario is a natural hybrid biological class resulting from cross-pollination. Trinitario combines the best of the two other main varieties: the hardiness and high yield of Forastero and the refined taste of Criollo. The quality of the cocoa varies between average and superior. It is the predominant fine flavour cocoa. Trinitario populations are usually variable in pod and bean characteristics because the parents have highly contrasting characters. They can now be found in all the countries where Criollo cocoa was once grown: Colombia, Mexico, Venezuela, the Caribbean islands, in parts of Southeast Asia,⁸⁹ and many more.

In Ghana and Côte d'Ivoire, 'Amazonia' is referred to as one of the cocoa varieties. Amazonia is a sub-species of Forastero, whose origins can be traced back to planting materials collected in 1944 and distributed to the West African Cocoa Research Institute headquarters in Tafo, Ghana and Ibadan in Nigeria. These were widely distributed and second and third generations of Amazon known as 'F3 Amazon' or 'Mixed Amazon' were also later developed by the early 1960s.

In Côte d'Ivoire, this variety is also known as 'Ghana variety'.⁹⁰ Tetteh Quarshie is the oldest variety still in production in Ghana. The variety is named after the Ghanaian agriculturalist who introduced cocoa to Ghana. The pods introduced by Tetteh Quarshie are of the Amelonado variety, which is a Forastero sub-species.⁹¹ In Côte d'Ivoire, 'Cacao Français' is another variety that is often referred to, which is an Amelonado type with some Trinitario germplasm.⁹²

⁸⁸ ICCO (2017) Fine or flavor cocoa. Last updates January 2017. Available at <https://www.icco.org/about-cocoa/fine-or-flavour-cocoa.html>

⁸⁹ Barry Callebaut. (n.d). Theobroma cacao, the food of the gods. Available at <https://www.barry-callebaut.com/about-us/media/press-kit/history-chocolate/theobroma-cacao-food-gods>

⁹⁰ Pokou, N., N'Goran, J., Eskes, A., Sangaré, A. (2009). Cocoa farm survey in Côte d'Ivoire. In International Workshop on Cocoa Breeding for Farmers' Needs.

⁹¹ Aikpokpodion, P.O. (2012). Defining Genetic Diversity in the Chocolate Tree, *Theobroma cacao* L. Grown in West and Central Africa, Genetic Diversity in Plants, Prof. Mahmut Caliskan (Ed.), ISBN: 978-953-51-0185-7, InTech, Available from: <http://www.intechopen.com/books/genetic-diversity-in-plants/defining-geneticdiversity-in-the-chocolate-tree-theobroma-cacao-l-grown-in-west-and-central-africa>

⁹² Pokou, N., N'Goran, J., Eskes, A., & Sangaré, A. (2009). Cocoa farm survey in Côte d'Ivoire. In International Workshop on Cocoa Breeding for Farmers' Needs.

Forastero is the most widely used cocoa variety. Both Ghana and Côte d'Ivoire produce mainly varieties which are a Forastero sub-species. To improve productivity and precocity of production, hybrid varieties have been introduced.

In Ghana, the Seed Production Division (SPD), a subsidiary of the Ghana Cocoa Board (COCOBOD), is charged with producing and distributing seedlings to farmers.⁹³ In Ghana, hybrid cocoa seed pods are crosses between Amelonado and upper Amazon clones, both sub-species of Forastero, produced through hand pollination.⁹⁴ Since 2015, these hybrid cocoa seedlings and the pods are freely distributed to farmers.⁹⁵

In Côte d'Ivoire, the Centre National de Recherche Agronomique (CNRA) developed another new hybrid called 'Cocoa Mercedes'.⁹⁶ 'Cocoa Mercedes' was introduced and extensively promoted and freely distributed by the Conseil du Café-Cacao (CCC), and Nestlé.

In Ghana and Côte d'Ivoire, raising clones and seedlings is heavily promoted, and less focus is put on (side) grafting as rehabilitation strategy.⁹⁷ This despite some reported downsides of the hybrid seeds and seedlings. For example, hybrid varieties require more care, including more harvesting rounds, which can interfere with other activities such as the production of other crops or trading responsibilities.⁹⁸ According to another study, hybrid seeds deplete soil nutrients faster if not accompanied by fertiliser. Furthermore, hybrid seeds tend to have shorter production cycles because of the physiological stress in producing higher yields.⁹⁹ A recent study states that the success of hybrids is highly dependent on the conditions under which it is grown, including the weather.¹⁰⁰

In our study, we find in Ghana the most common variety to be 'hybrid' (66%) followed by 'Amazonia' (42%). Tetteh Quarshie is reportedly produced by 15% of respondents. In Côte d'Ivoire, the most frequently reported variety was 'Amazonia' (45%) (sometimes called 'Ghana variety'). 'Cacao Français' is produced by a further 19% of households in Côte d'Ivoire (Table 6.26).

⁹³ <https://cocobod.gh/oursubsidiaries.php>

⁹⁴ Kolavalli, S., Vigneri, M. & Gockowski, J. (2016). The Cocoa Coast: the board managed cocoa sector in Ghana. Ghana strategy support program, International Food Policy Research Institute (IFPRI). Available at <http://www.ifpri.org/publication/cocoa-coast-board-managed-cocoa-sector-ghana>

⁹⁵ Ghanaweb. (2015). COCOBOD distributes seedlings to farmers. Available at <https://www.ghanaweb.com/GhanaHomePage/business/COCOBOD-distributes-seedlings-to-farmers-355130>

⁹⁶ Yapo, K. D., Ouifoué, S. K., N'guessan, B. R., Okpekon, T. A., Dade, J., Say, M., & Kouakou, T.H. (2014). Contrôle de la qualité par la détermination de métaux lourds dans une nouvelle variété de cacao (cacao mercedes) en Côte d'Ivoire. Journal de la Société Ouest- Africaine de Chimie, 37, 56. Available at http://www.soachim.org/files/volume_37/8-KD%20Yapo%20et%20al%20Vol%20037%202014%2056-64.pdf

⁹⁷ Brako, D.E. (2015) Farmers' Willingness to Pay for Cocoa Grafting in the Eastern Region of Ghana. Thesis. Departement of Agricultural Economics and Agribusiness, School of Agriculture, College of Basic and Applied Sciences, University of Ghana, Legon. Available at http://ugspace.ug.edu.gh/bitstream/handle/123456789/8107/DOMPREF%20ERIC%20BRAKO_FARMERS%E2%80%99%20WILLINGNESS%20TO%20PAY%20FOR%20COCOA%20GRAFTING-2015.pdf?sequence=1

⁹⁸ Asante-Poku A., Angelucci F. (2013). Analysis of incentives and disincentives for cocoa in Ghana. Technical notes series, MAFAP, FAO, Rome. Available at <http://www.fao.org/3/a-at551e.pdf>

⁹⁹ Victor, A., Gockowski, J., Agyeman, N., Dziwornu, K. (2010). Economic cost-benefit analysis of certified sustainable cocoa production in Ghana. Available at <https://pdfs.semanticscholar.org/72cc/ce52ecb5a7f894008ea7a547c15ba0df520d.pdf>

¹⁰⁰ Wessel, M., & Quist-Wessel, P. F. (2015). Cocoa production in West Africa, a review and analysis of recent developments. NJAS-Wageningen Journal of Life Sciences, 74, 1-7. Available at <https://doi.org/10.1016/j.njas.2015.09.001>

Table 6.26 Cocoa, varieties, by country

Variety	Ghana	Côte d'Ivoire	pvalue	sig
Tetteh Quarshie	15%	0%	0.00	***
Amazonia (Ghana)	42%	45%	0.10	
Hybrid	66%	7%	0.00	***
Hybride (2nd generation, (Mercédes)	0%	5%	0.00	***
French (Cacao Français)	0%	19%	0.00	***
Tout venant	0%	12%	0.00	***
Other	0%	1%	0.02	**
Don't know	3%	4%	0.07	*

6.5 Summary

Land tenure arrangements in both Ghana and Côte d'Ivoire are rooted in the countries' histories, and have undergone several attempts at reform. In Ghana, the customary system has remained dominant, while in Côte d'Ivoire a shift occurred from communal property to private property. Regardless, a high proportion of households in both countries consider that they 'own' their land. In focus group discussions, there were no reports that participants considered their land ownership to be insecure in either country.

In both Ghana and Côte d'Ivoire, land is becoming scarcer. Focus group participants offer a range of reasons why scarcity is increasing, including a growing population, immigration and other economic activities competing for agricultural land. In the future, access to land in cocoa growing areas is expected to become more difficult still due to population growth. Climate change and desertification are expected to affect marginal lands disproportionately. We note that land scarcity is not a phenomena specific to cocoa growing areas in Ghana and in Côte d'Ivoire, but rather a frequently expressed concern throughout much of sub-Saharan Africa.

However, land scarcity does not appear to be near a crisis point. Although land is harder to come by and is now more expensive, respondents in both countries reported owning and cultivating much larger farms than those typically reported by smallholders in East Africa, where we have conducted many other studies. We also find that households still have a fair amount of fallow land at their disposal in both Ghana (0.76 ha) and Côte d'Ivoire (2.74 ha).

Ivoirian households cultivate all their crops on larger plots of land (5.36 ha) than Ghanaian households (4.77 ha). In addition, Ivorian households have a greater number of land plots (3.3) on which they cultivate crops than Ghanaian households (2.58).

Most households in both Ghana (86%) and Côte d'Ivoire (98%) reported owning at least some land. In Ghana, the average amount of land owned is 4 ha, compared with nearly 8 ha in Côte d'Ivoire.

In both Ghana and Côte d'Ivoire, cocoa households own more land than non-cocoa households. In Ghana, cocoa households own an average of 4.30 ha, compared to 3.30 ha for non-cocoa households. In Côte d'Ivoire, cocoa households owned an average of 8.48 ha, compared to 6.92 ha for non-cocoa households. We hypothesize that this is a two-way relationship – a larger land holding makes it easier to allocate some land for cocoa, and good income from cocoa makes it easier for farmers to invest in more land (including via abunu arrangements).

Female-headed households typically own land, contrary to some narratives. In Ghana, an even higher proportion of female headed households (91%) reported owning land than male headed households (85%). In Côte d'Ivoire, virtually all male and female headed households said they own some land. These findings may suggest that female headed households' access to land is changing, possibly due to legislative changes (e.g. regarding inheritance) and enforcement of women's rights. These findings should not be interpreted more broadly in terms of 'female land ownership'. We are unsure about the extent to which any changes also apply to married women in male headed households.

However, female headed households still own less land than male headed households on average. In Ghana female-headed households own a little less land on average (3.49 ha), compared with male-headed households (4.19 ha). The disparity in Côte d'Ivoire is greater, with 4.54 ha for female headed households, compared with male headed households owning 8.16 ha.

Migrant households in Ghana cultivate approximately the same amount of land as autochthonous households, on average. However, a higher proportion of autochthonous households (91%) own land than migrant households (71%). Migrant households compensate by undertaking abunu arrangements more frequently (45%) than autochthonous households (26%).

Virtually all migrant and autochthonous households in Côte d'Ivoire own some land, and both groups own considerably more land than Ghanaian households. Ivorian migrants own about 1 ha less land than autochthonous households. Ivorian migrant households appear to compensate by cultivating a higher proportion of their own land and leaving a smaller proportion fallow. As a result, migrants in Côte d'Ivoire actually cultivate all their crops on a little more land than autochthonous households.

In terms of land under cocoa, Ghanaian households reported cultivating cocoa on an average of 3.65 ha, with the majority cultivating between 2 ha and 5 ha. Most respondents

said that their household ‘owns’ the cocoa land (82%) with a further 28% reporting that their household is engaged in abunu farming. This means that a considerable proportion of households that own cocoa land are also trying to acquire more land through the abunu system. On average, Ghanaian cocoa households have 0.78 hectares of cocoa under abunu arrangements. (The average of only those doing abunu is 2.82 ha).

Ivorian households have slightly bigger cocoa farms (4.17 ha) than in Ghana, with most households reporting cocoa farms of between 2 and 5 ha. In Côte d’Ivoire, virtually all respondents said that their household ‘owns’ the cocoa land.

In Ghana, male-headed households cultivate a little more cocoa land (3.77 ha) than female-headed households (3.02 ha). However, a higher proportion of female headed households (90%) own some cocoa land than male headed households. We find no statistical difference in the mean amount of cocoa land owned by each group. One reason for the difference in mean cocoa land cultivated has to do with the proportion of male headed (29%) and female headed (19%) households who do abunu farming. In Côte d’Ivoire, we find no statistical differences between male and female headed households because the sample size of female headed households producing cocoa is too small.

Cocoa production is contributing to deforestation in Ghana and Côte d’Ivoire. A fairly high proportion of respondents in Ghana (46%) and in Côte d’Ivoire (35%) reported that their household had increased the amount of land under cocoa in the past five years, with very few reportedly decreasing their land under cocoa. It is concerning that most respondents in Ghana (84%) and Côte d’Ivoire (66%) did so not by clearing bush or a natural area, rather than by converting land under other crops. This is rational economic behaviour – newly cleared land typically has good soil fertility for productive cocoa. Some households may even expand cocoa plantations primarily to strengthen their tenure claims in a context of increasing land scarcity. Based on focus group responses, we believe that this is also driven by generally strong cocoa prices in recent years. We are unsure whether or not the scale of planting could lead to supply outpacing global demand when the cocoa matures in the coming years. A structural surplus on the world market would inevitably depress prices.

The average age of cocoa trees in Ghana was 14 years and in Côte d’Ivoire 16 years. A high proportion of cocoa households in Ghana (71%) and Côte d’Ivoire (48%) reported having at least some trees younger than 5 years old, hinting at an increase in future cocoa supply. As expected, most land is under cocoa of productive age (5-25 years), with roughly the same amount of land with young cocoa phasing in and land with older cocoa phasing out.

‘Hybrid’ cocoa varieties are much more frequently planted in Ghana than in Côte d’Ivoire. This may be explained by support from COCOBOD in Ghana to distribute free or subsidised hybrid cocoa seedlings and pods.



The importance of cocoa

Bymolt, R., Laven, A., Tyszler, M. (2018). Demystifying the cocoa sector in Ghana and Côte d'Ivoire. Chapter 7, The importance of cocoa. The Royal Tropical Institute (KIT).



Cocoa farming is frequently associated with low incomes, low productivity and a high incidence of poverty.^{1,2,3,4,5,6,7} Many reasons have been offered for why these problems persist, including a lack of knowledge, lack of financial resources to invest in good agricultural practices, poor access to credit, poor access to markets, relative land scarcity and limited property rights. Consequently, low and seasonal returns from cocoa are said to constrain household's ability to improve their cocoa yields, diversify their incomes and improve their livelihoods.^{8,9}

Yet, as presented in Chapter 5, a large proportion of respondents in our study considered cocoa to be one of their most important crops. In Ghana, 84% of households cited cocoa as their most important or second most important crop, with 61% of Ivorian households reporting likewise. Whilst there is no doubt that cocoa households face real livelihood challenges, why do so many prioritise cocoa? How do farmers themselves perceive cocoa in their communities?

Previous research has identified various reasons why farmers produce cocoa. For example, some have argued that cocoa provides a means for meeting household subsistence needs, generating capital to invest elsewhere, securing inheritable property, and providing financial security at an older age.^{10,11} Other studies have pointed to better marketing conditions for cocoa compared with other crops. Despite all its challenges, Ghanaian and Ivorian farmers retain a confidence in cocoa because it has a 'guaranteed' market (supported by the marketing boards of both countries) and has offered comparatively stable prices over time.^{12,13,14}

In the first part of this chapter, we share the perceptions of farmers that participated in our study and explain why so many of our respondents stated that cocoa was one of their most important sources of income.

¹ The Lindt & Sprüngli Farming Program. Available at www.farming-program.com.

² MARS website: cocoa, caring for the future. Available at <http://www.mars.com/global/sustainable-in-a-generation/our-approach-to-sustainability/raw-materials/cocoa>

³ Nestlé's Cocoa Plan. Available at <http://www.nestlecocoaplan.com/better-farming/>

⁴ Cargill Cocoa Promise. Available at <https://www.cargill.com/sustainability/cargill-cocoa-promise>

⁵ News release Barry Callebaut (February 22, 2017). New study shows the road to make cocoa a sustainable and high yielding crop is still long; cocoa farmers in Côte d'Ivoire continue to live in poverty. News release available at https://www.barry-callebaut.com/system/files/download/news/press_release_english.pdf

⁶ Fountain, A.C. and Hütz-Adams, F. (2015) Cocoa Barometer 2015-USA Edition. Available at http://www.cocoa-barometer.org/International_files/Cocoa%20Barometer%202015%20USA.pdf

⁷ Lambert, A. (2014) The Fairness Gap: Farmer Income & Solutions to Child Labor in Cocoa. International Labor Rights Forum – ILRF. December 17, 2014, Washington, DC. Available at https://www.laborrights.org/sites/default/files/publications/Fairness%20gap_low_res.pdf

⁸ International Cocoa Organization – ICCO. (2010) Inventory of diversification strategies on cocoa farms. Consultative board on the World Economy, 22nd meeting. London 13th of September 2010. Available at: https://www.icco.org/about-us/international-cocoa-agreements/cat_view/30-related-documents/32-consultative-board-on-the-world-cocoa-economy.html

⁹ Ibid

¹⁰ Aneani, F., Anchirinah, V.M., Owusu-Ansah, F., Asamoah, M. (2011) An analysis of the extent and determinants of crop diversification by cocoa (theobroma cacao) farmers in Ghana. Cocoa Research Institute of Ghana, Social Science and Statistics Unit, New Tafo-Akim, Ghana. In African Journal of Agricultural Research Vol. 6(18), pp. 4277-4287, 12 September 2011. Available at <http://www.academicjournals.org/journal/AJAR/article-full-text-pdf/D36327231736>

¹¹ Baah, F., Anchirinah, V., Badger, E., Badu-Yeboah, A. (2012). Examining the cocoa farmer-purchasing clerk relationship in Ghana. Global Journal of Science Frontier Research, 12(11-D). Available at <https://journalofscience.org/index.php/GJSFR/article/download/552/475/>

¹² Aneani, F., Anchirinah, V.M., Owusu-Ansah, F., Asamoah, M. (2011) An analysis of the extent and determinants of crop diversification by cocoa (theobroma cacao) farmers in Ghana. Cocoa Research Institute of Ghana, Social Science and Statistics Unit, New Tafo-Akim, Ghana. In African Journal of Agricultural Research Vol. 6(18), pp. 4277-4287, 12 September 2011. Available at <http://www.academicjournals.org/journal/AJAR/article-full-text-pdf/D36327231736>

¹³ Ibid.

¹⁴ Ruf, F., and Schroth, G. (2015). Introduction—Economic and Ecological Aspects of Diversification of Tropical Tree Crops. In: Ruf, F. & Schröth, G. (Eds) Economics and ecology of diversification. Springer, Dordrecht. Available at <https://www.springer.com/gp/book/9789401772938>

7.1 Reasons for growing cocoa

In Ghana and Côte d'Ivoire, 37 focus group discussions were each held in which we sought to understand why households give cocoa such high importance. To complement our household survey, male and female participants were asked separately to identify and rank the most important income sources in the community. Men and women sat on opposite sides of the same room from each other.¹⁵ Female participants were asked questions before the male participants in order to mitigate the risk of male participant's responses influencing female participants. The first exercise was a discussion on the 'most important income sources' in the community. In practice, participants almost always discussed their most important income source *derived from crops*, rather than from rearing animals or non-agricultural business. This confirmed that agriculture was indeed the dominant sector in the research areas.

7.1.1 Main reasons for growing cocoa in Ghana

In Ghana, focus group discussion data was found to be consistent with our household survey data, which confirmed that cocoa is indeed perceived to be more important than any other crop. The participants gave three main reasons: good income, traditional and national importance, and land rights.

In the Ghana sample, 79% of respondents said that it was their household's most important crop; 84% of respondents identified cocoa as the 'most important' or 'second most important'. In Ghana, there was found to be little relatively little difference between male and female headed households in the importance of cocoa or any other crop.

7.1.1.1 Income

The most frequently cited reason why households grow cocoa is that it generates relatively higher income than any other crop option. Participants frequently described income from cocoa as 'good', 'high', or 'higher than other crops', and noted that prices had been increasing in recent years. Participants often mentioned how cocoa income allows them to 'take care of the household', including meeting costs such as food and healthcare for household members. Many participants specifically discussed how income from cocoa enables them to pay school fees, which were often cited as one of the household's highest expenditure items (Chapter 4).

"The price of cocoa is better than other crops, such as food crops." (Male FGD participants, Ashanti Region)

¹⁵ Due to resource and space constraints we could not hold separate focus group discussions with male and female participants

"Cocoa provides farmers with an income to pay for their children's school fees. Besides, cocoa has a guaranteed price set by the government. Farmers always have a safe income when growing cocoa." (Male FGD participants, Western Region)

"Revenue from cocoa can take care of the whole family, pay for food, and pay school fees." (Male FGD participants, Ashanti Region)

"You can use cocoa money to build a house, you can use cocoa money to take care of your children, you can use cocoa money to buy a vehicle." (Female FGD participants, Western Region)

"Cocoa provides money to take care of the children, hire labourers for our farms, send children to school, and build houses." (Male FGD participants, Brong Ahafo Region)

"With cocoa you can move forward in life, it gives more revenue than other crops. With cocoa, when you get money you can do many things, you can build houses, buy vehicles, and take care of your whole household." (Male FGD participants, Central Region)

"We get bulk cash from the sale of cocoa and we can settle our debt for paying school fees, you can build your own house, and take care of your health." (Female FGD participants, Eastern Region)

Apart from the amount of income cocoa brings into a household, participants discussed how they like the way cocoa income is received 'in bulk'. On receiving payment in the main cocoa season (from October to December), every cocoa farmer has significantly more money than usual. The large influx of cash is used to buy building supplies and, if necessary, masons to build or renovate houses. Participants said that cocoa was one of the few crops that enabled them to undertake house construction or renovation. This is also the time when debts are settled, inputs and equipment is bought, and money is spent on Christmas gifts and meals.

Male participants in particular mentioned the 'guaranteed price' structure in Ghana. Participants also appreciate that there is always good demand for their cocoa crops, comparing the market for cocoa with other crops.

"The price of cocoa is fixed and increases over time, unlike other crops where the price falls in the main season." (Male FGD participants, Central Region)

"Cocoa brings money to your household. When you plant cocoa, you can always get money from it. It is hard to find buyers for food crops in the main season." (Male FGD participants, Western Region)

"Cassava has no ready market, but every year the government buys cocoa so you know you will sell. There will always be a market. Whatever quantity of cocoa you produce, the government will buy it and there will always be a fixed price. Other crops have lower prices during certain seasons, cocoa does not." (Female FGD participants, Western Region)

7.1.1.2 Tradition and national importance

The second most frequently mentioned reason for growing cocoa in Ghana is ‘tradition and national importance’. Quite a number of participants described cocoa as the backbone of the Ghanaian economy, the biggest source of foreign exchange and a big contributor to the country’s development. Cocoa is also perceived by focus group participants as a ‘national tree’ (or ‘national product’), as it was planted by their ancestors and is tied in with their culture and traditions. Male respondents tended to attach more weight to tradition than female respondents.

“Cocoa is a major source of foreign exchange for Ghana and foreign exchange is good for the country. Also, cocoa money is used for hospitals and roads for the benefit of the country. Cocoa is the backbone of the Ghanaian economy.” (Male FGD participants, Western Region).

“Cocoa is the national tree of Ghana. Everybody depends on cocoa, including outside of Ghana.” (Male FGD participants, Western Region)

“We know cocoa since time immemorial, our great grandparents started it. It is the national product of Ghana.” (Male FGD participants, Brong Ahafo)

7.1.1.3 Land rights

In Ghana, growing cocoa is actually perceived as a way for households to secure land rights. Participants discussed how once a household plants cocoa trees, the land becomes their long-term property as long as the trees remain on the land. Both male and female participants perceive this to be a major benefit compared with other crops. Secure land rights provide a certain stability and security for the future, and allows households to bequeath land to their children.

“A cocoa farm is a guarantee for the future and you can leave it to your children. We can still depend on cocoa when we are old.” (Male FGD participants, Eastern Region)

“Cocoa is a long-term property investment, you can grow cocoa from generation to generation and leave it as a legacy for your children.” (Male FGD participants, Western Region)

“When you plant cocoa, it can last many years, so it is a long-term property investment when you grow it.” (Male FGD participants, Ashanti Region)

“Cocoa is a long-term security, you can even do it when you don’t have the strength. You can also make an abunu or abusa arrangement and still have income (see Chapter 6).” (Female FGD participants, Central Region)

Male participants sometimes mentioned that the cocoa farm can be used as collateral to access credit. The relatively reliable income from cocoa makes it easier for borrowers to repay their loans, and moneylenders have more faith that the loan will be repaid compared to non-cocoa households.

"If you have a cocoa farm you can use it as collateral for loans from the bank or purchasing clerk." (Male FGD participants, Western Region)

"Outside the main and light seasons, when cocoa money is not there, you can secure a loan with cocoa as collateral and pay it back in the main season." (Female FGD participants, Western Region)

7.1.2 Other reasons for growing cocoa in Ghana

Other, less frequently mentioned reasons for growing cocoa were also given by participants. Cocoa households were said to receive more support from the government than households producing other crops. The government institute, Ghana Cocoa Board (COCOBOD), provides support to farmers through trainings (by Cocoa Health and Extension Division - CHED), provision of fertiliser (Hi-Tech), the spraying of pesticide and fungicide (by Cocoa Disease and Pest Control - CODAPEC), and the provision of improved planting material (hybrid seedlings) developed by the Cocoa Research Institute Ghana (CRIG).

"The government supplied us with hybrid cocoa seedlings, which take a maximum of two years¹⁶ to start producing. So we can now get money earlier to take care of our children. COCOBOD also gives scholarships to children who do well in school, so you might not have to pay for school fees." (Male FGD participants, Western Region)

"The government helps cocoa farmers more than other farmers." (Male FGD participants, Western Region)

"Some farmers receive scholarships and the roads to the communities are fixed." (Male FGD participants, Western Region)

Some focus group participants stated that cocoa has lower labour demands than other crops. However, not all participants agreed with this statement, and the researchers suggest this depends on whether a household actively invests in their cocoa farm or are 'harvesters'¹⁷ who give a minimum of attention to their cocoa farm and are satisfied with whatever they yield. 'Harvesters' may be older farmers in retirement or those who focus more on other income generating activities (though not always). Participants did agree that cocoa is advantageous because you do not have to replant it every time you harvest.

"Once you plant cocoa you can harvest it every year, there is no need to replant every year." (Female FGD participants, Brong Ahafo)

¹⁶ Usually it takes around 3 years until the hybrid seedling starts producing cocoa. Perhaps the seedlings were already of a certain age when received by the farmers.

¹⁷ The term 'harvesters' has been used by some companies that the researchers have done prior work with.

"Food crops have a shorter life span than cocoa. It takes a lot of time replanting food crops." (Female FGD participants, Central Region)

"Cocoa is a good source of income, but it requires a lot of work." (Male FGD participants, Ashanti Region)

In a few communities, participants compared cocoa with rubber, noting that cocoa usually takes around three years to start yielding from the time of planting (depending on the variety). Rubber, on the other hand, takes at least five to seven years to mature. This means that farmers who plant cocoa on a new plot face a shorter period without income than if they plant rubber.

"If you compare cocoa with rubber and coconut, the harvest period of cocoa starts earlier." (Male FGD participants, Western Region)

"Cocoa money comes quicker than rubber: three years after planting for cocoa versus seven years for rubber." (Female FGD participants, Western Region)

Very few focus group participants mentioned soil or climate as reasons to grow cocoa, perhaps taking this fact for granted.

"The soil favours cocoa planting." (Male FGD participants, Ashanti Region)

"We have predominantly forest area, which is suitable for cocoa." (Male FGD participants, Central Region)

Finally, a small number of groups mentioned that cocoa is used for certain locally produced and consumed products. For example, some farmers mentioned that they consume locally-made chocolate milk (which they refer to as 'Milo') and produce soap and cocoa butter from the cocoa husk. The soaps and skin products (pomade) are used for household consumption and for local sales. Soap making is an activity that typically involves women.

"You can process cocoa into milo, you can process it into cocoa butter for the skin, you can use the husk of the cocoa pod to dry it and make soap out of it, and it is used to make chocolate." (Male FGD participants, Western Region)

"Cocoa is used to prepare cocoa powder, cocoa drinks (milo), and is used to prepare chocolate. Chocolate gives us strength." (Male participants FGD, Ashanti Region)

7.1.3 Main reasons for growing cocoa in Côte d'Ivoire

In Côte d'Ivoire, 53% of survey respondents reported that cocoa is their household's most important crop, with a further 8% of survey respondents designating it as their household's second most important crop. 61% of survey respondents in Côte d'Ivoire therefore consider cocoa to be their first or second most important crop.

Whilst this is a lower proportion of respondents than in Ghana, this still confirms that cocoa is the most important crop cultivated in the research areas in Côte d'Ivoire. However, in Côte d'Ivoire, gender differences were found to be much more pronounced than in Ghana; only 36% of female-headed households in Côte d'Ivoire actually produce cocoa (Chapter 5). The focus group discussion data confirms the household survey data, which reveals that men play the dominant role in cocoa production and marketing, whilst women more typically play a supporting role or engage more intensively in other crops. This is why male participants mostly engaged in this particular discussion.

The male participants gave three main reasons for growing cocoa: income, traditional and national importance, and social security.

7.1.3.1 Income

As in Ghana, Ivorian participants most often identified cocoa as the crop that earns their household the highest income. Some participants discussed how coffee used to be seen as the traditional crop of their area, but that they switched to cocoa as it generated more income.

"It is the best paying crop in Côte d'Ivoire and you can still harvest a little outside of the seasons. If you do cocoa, you have an easier life." (Male FGD participants, Nawa)

"We get good money from cocoa and that enables us to do a lot of things. The price is good. We can use cocoa money for school, to buy food, to buy clothes, pay for healthcare, build houses, start small shops, and buy bikes/motorbikes." (Male FGD participants, Guémon)

"The price of cocoa is good and we can produce good quantities, leading to a good income." (Male FGD participants, Gontougo)

"We first did coffee, but the price for cocoa became better so we started doing that. The price for cocoa is the highest of all the crops. Producing cocoa is also easier than coffee. Cocoa gives us a lot of money that we use to pay for school, buy food and build houses." (Male FGD participants, Gôh)

"Cocoa does not give enough anymore because of the rains. So we started doing other crops more. However, cocoa is still our most important crop and the harvest of cocoa is stable now. It gives more money than other crops: 1 hectare of cocoa brings a lot more than 1 hectare of rice." (Male FGD participants, Marahoué)

As in Ghana, the Côte d'Ivoire government has, via the Conseil du Café-Cacao, implemented a guaranteed price system since 2012-2013 season. The fixed farm-gate price was appreciated by farmers because it theoretically guarantees a minimum price to farmers, thereby avoiding the price volatility associated with other crops. However, in the period when we conducted the study the world-mark price significantly dropped, and some farmers let us know that they were not receiving the agreed price (Chapter 11). Participants also appreciate that local cocoa buyers are present in, or near, every community, and the money comes in bulk. However, unlike in Ghana, these reasons for prioritising cocoa were mentioned less frequently.

"Cocoa is very sought after, it is always easy to sell." (Male FGD participants, Guémon)

"We get bulk money for the cocoa during the main season, it comes at the holiday season right in time for Christmas." (Male FGD participants, Haut-Sassandra)

"The fixed price for cocoa is supposed to be 1,100 CFA/kg at the moment, but it is not respected by the pisteurs. It is 600-800CFA/kg at the moment." (Male FGD participants, Gôh)

Ivorian farmers see cocoa as a good crop because it provides an opportunity to finance large expenses, such as building projects or purchasing means of transportation (e.g. bikes and motorbikes). Cocoa income also provides a reliable means to cover fixed expenses, such as food costs and educational costs. Other costs covered by cocoa income mentioned by participants are healthcare and farm inputs costs (Chapter 4). Cocoa income is perceived to cover household expenses better than any other crop.

"Cocoa brings large sums of money, enough to save, to cover educational costs, build homes and cover other necessary costs." (Male FGD participants, N'Zi)

"We can use cocoa money for school fees, buy food, buy clothes, pay for healthcare, build houses, start small shops, and buy bikes or motorbikes. We get good money from cocoa that enables us to do a lot of things as the price is good." (Male FGD participants, Gôh)

"We can cover school fees, healthcare costs, the construction of houses, we provide food, clothing, and soap for the household, we pay electricity, cover funeral costs, it allows us to save money, and it makes it easier to marry women as you need money to attract a wife." (Male FGD participants, Cavally)

7.1.3.2 Tradition and the importance for the country

As in Ghana, Ivorian farmers also mentioned the importance of tradition and the importance of cocoa for the country. However, these motives were given less prominence in Côte d'Ivoire. Coffee, not cocoa, was considered to be the 'traditional crop' in a number of communities in the research areas, even though cocoa was said to have overtaken coffee as the most important crop due to its profitability and lower labour demands.

"Cocoa is the backbone of the Ivorian economy and it's the crop that was started by our ancestors. It is a tradition in the village and tradition is important." (Male FGD participants, Gôh)

"Cocoa is the biggest export product for Côte d'Ivoire and therefore important for the country." (Male FGD participants, Guémon)

"In recent years, cocoa overtook coffee. We switched to cocoa as we can harvest it twice a year instead of once a year, the price of cocoa is also better than that of coffee." (Male FGD participants, Cavally)

7.1.3.3 Social security

In Côte d'Ivoire, focus group participants emphasised that cocoa provides a kind of 'social security' because, after planting, households can harvest the cocoa for many years, providing a long-term, secure income.

"You can harvest for 30 years. That is a long time and it gives security of income." (Male FGD participants, Belier, Yamasoukro)

7.1.4 Other reasons for growing cocoa in Côte d'Ivoire

In Côte d'Ivoire, some farmers said that cocoa was less labour intensive compared to other crops. Not everyone agreed with this statement, as some argued that certain activities, such as weeding, require physical strength. Participants often made the comparison to coffee, which requires more weeding and maintenance than cocoa. Some Ivorian farmers stated that cocoa does not require weeding once it has entered into production. (We note that this may reflect some farmers' actual practice, but should not be considered a recommended practice.)

"The production of cocoa is easy to do as you do not need to weed once it is fully grown." (Male FGD participants, Haut-Sassandra)

"Cocoa is favourable for the soil and it is sought after. The work of cocoa is easy as you need to weed fewer times than coffee and you can harvest it faster." (Male FGD participants, Guémon)

"There is no need to weed once cocoa has started producing. It is the least work compared to other cash crops." (Male FGD participants, Guémon)

Farmers often stated that one of the reasons to grow cocoa is the relative short maturation period (36 months for the hybrid variety), which is shorter than for rubber or coffee. Participants also explained that cocoa was advantageous because it can be harvested most months of the year, with surges during the main and light seasons. This was compared to coffee which can only be harvested once a year.

Some farmers also mentioned that the timing of the cocoa harvest is convenient as the main season coincides with Christmas and New Year, so that there is more money to spend at this time.

"Cocoa is good as we can harvest it three years after planting. There is a main and a light season, and we can also harvest small amounts between the seasons as well." (Male FGD participants, Cavally)

"We get bulk money during the cocoa season, and the money comes in time for Christmas." (Male FGD participants, Haut-Sassandra)

In villages located to the north-east of Côte d'Ivoire, the occurrence of cocoa swollen shoot virus disease (CSSVD), soil conditions and climate were often seen as limiting factors for growing cocoa. A minority of respondents in these areas said they had switched from cocoa to rubber, cashew or palm oil, as these cash crops were more resistant to a changing climatic situation (e.g. prolonged dry season, increasing temperatures and changes in rainfall pattern and quantity). In contrast, farmers in villages further to the south and west of Côte d'Ivoire were relatively satisfied with the climatic conditions and soil quality and perceived the environment as an enabling factor for cocoa production.

"Cocoa gives the most revenue. However, we do not produce it only because it's the most lucrative, but also because the soil and climate is really good." (Male FGD participants, Agnéby-Tiassa)

"Cocoa is the primary crop of the region, the earth can produce a lot of cocoa and it lasts for a long time." (Male FGD participants, Région de la Mé)

A small number of respondents mentioned that intercropping of young cocoa with food crops provides shade for the young cocoa trees while simultaneously providing the household with an additional supply of food or income. One group of farmers explained that cocoa offers the possibility to intercrop, while rubber does not. Farmers emphasised that intercropping was only possible during the early stages of cocoa, and not when it is fully matured.

"You can intercrop with cocoa, but not with rubber. You need money to be able to do rubber as you cannot have an income from intercropped food crops in the meantime. You can intercrop yam in cocoa even when it is big." (Male FGD participants, San Pédro)

"Intercropping can only be done at the beginning. It is no longer possible once the cocoa is mature." (Male FGD participants, Haut-Sassandra)

7.2 Summary

In the research areas in Ghana and Côte d'Ivoire, cocoa is perceived to be the most important crop. In Ghana, both female and male household heads prioritised cocoa, while in Côte d'Ivoire male-headed households prioritised cocoa much more frequently than female-headed households. Only 36% of female-headed households in Côte d'Ivoire reported producing cocoa.

In Ghana, the most frequently cited reason why households grow cocoa is that it generates relatively higher income than any other crop option. Many participants specifically discussed how income from cocoa enables them to pay school fees, which were often cited as one of the biggest expenditure items for a household. Generally, participants like the way cocoa income is received 'in bulk'. Cocoa was said to be one of the few crops that allowed households to invest in house construction or renovations. The cocoa season is also the time when debts are settled, inputs and equipment is bought, and money is spent on Christmas gifts and meals.

Likewise, in Côte d'Ivoire, farmers also frequently identified cocoa as the crop that generates the highest income. Cocoa income is perceived to cover household expenses better than any other crop and provides the opportunity to finance large and fixed expenses.

In Ghana and in Côte d'Ivoire, households appreciate the 'guaranteed price' structure of cocoa and emphasised that there is always good demand for cocoa. However, shortly after fieldwork was completed, the world market price dropped significantly, and Ivorian farmers did not receive the price set by their government's marketing board.

In Ghana, tradition and the importance for the national economy were frequently mentioned reasons for producing cocoa. In Côte d'Ivoire, coffee was considered to be the 'traditional crop' in a number of communities in the research areas, even though cocoa was said to have overtaken coffee as the most important crop due to its higher profitability and lower labour demands.

In Ghana, planting cocoa trees is a way for households to secure land rights. Participants explained how once a household plants cocoa trees, the land becomes their long-term property as long as the trees remain on the land. Both male and female participants perceive this to be a major benefit compared with non-tree crops.

In Côte d'Ivoire, participants emphasised that cocoa provides a kind of 'social security'. After planting, households can harvest the cocoa for many years, providing a long-term, secure income.

In Ghana, participants mentioned that the cocoa farm can be used as collateral to access credit. The relatively reliable income from cocoa also makes it easier for borrowers to repay their loans, and moneylenders therefore have more faith that the loan will be repaid compared to non-cocoa households.

In both Ghana and Côte d'Ivoire, some other reasons for producing cocoa include relatively lower labour demands than many crops and faster maturity than other tree crops. Hybrid cocoa takes only around three years to begin yielding compared with rubber, which takes five to seven years.

In Ghana, households receive more support for cocoa farming than for other crops, and this is a recognised benefit. In Côte d'Ivoire, this benefit was not mentioned by participants.

In villages located to the north-east of Côte d'Ivoire, limiting conditions for growing cocoa are the cocoa swollen shoot virus disease (CSSVD), soil conditions and climate. In these areas some respondents said they had switched from cocoa to rubber, cashew or palm oil, as these cash crops were more resistant to a changing climatic situation. In contrast, farmers in villages further to the south and west of Côte d'Ivoire were relatively satisfied with the climatic conditions and soil quality and perceived the environment as an enabling factor for cocoa production.

We suggest that the importance of cocoa, for both economic and non-economic reasons, means that it is unlikely a substantial proportion of farmers will move out of cocoa and into other crops in the short to medium term. Indeed, these reasons explain why more households perceive cocoa to be one of their most important crops than five years ago (Chapter 5).



Photo credit: Nestle, Investment with cocoa farmers



Cocoa production practices

Bymolt, R., Laven, A., Tyszler, M. (2018). Demystifying the cocoa sector in Ghana and Côte d'Ivoire. Chapter 8, Cocoa production practices. The Royal Tropical Institute (KIT).



8.1 Cocoa production activities

Cocoa households undertake various activities on their cocoa farms throughout the course of the year. Each of these activities requires certain investments in labour and inputs to produce good yields. However, many cocoa households in Ghana and Côte d'Ivoire do not consistently apply good agricultural practices (GAP). GAP typically refers to the use of good planting material, proper shade management, maintaining and improving soil fertility, weed and pest control, and post-harvest management practices.¹ Various manuals are available that provide detailed guidance for adoption of these practices.^{2,3,4}

Households make different choices about the amount of capital and labour they are willing to invest in cocoa production. For instance, those with a good supply of household labour may opt to carry out all production activities, as recommended. Those with less household labour may choose to carry out some activities less thoroughly or not at all, while others may be willing to invest in hired labour to make up the difference. Overall, those households that carry out good agricultural practices generate higher cocoa yields, which results in higher income and allows them to re-invest the following year. This is sometimes described as a 'high input-high output' system. Nevertheless, all investments come with a degree of risk. Poor rains, strong Harmattan winds, pests and diseases are just some of the factors that can affect yields and result in a poor return on investment. Some studies suggest that certain types of farmers – lead farmers, trained farmers, certified farmers and male farmers – are relatively better implementers of GAP than other farmers.^{5,6}

In reality, many households in Ghana and Côte d'Ivoire under-invest in GAP, which leads to a 'low input-low output' system (Figure 8.1). Low yields are typically attributed to low input use, inadequate weeding and farm maintenance, insufficient pest and disease control, poor shade management, low rates of fertiliser use, and the old age of some cocoa farms. Various studies have proposed reasons for low

¹ Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C., Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics. Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>.

² ICCO (2009). Manual of Best Known Practices in Cocoa Production. Available at https://www.icco.org/about-us/international-cocoa-agreements/cat_view/30-related-documents/32-consultative-board-on-the-world-cocoa-economy.html

³ CCE Certification Capacity Enhancement Sustainable Cocoa Trainers' Manual – For Access to Certification and Increased Productivity – Ghana Version 2.1 – June 2016. Available at https://www.kakaoforum.de/fileadmin/Redaktion/Downloads/Oeffentliche_Downloads/Infomaterial/CCE_Ghana_Curriculum_v2.1_Juni2016.pdf

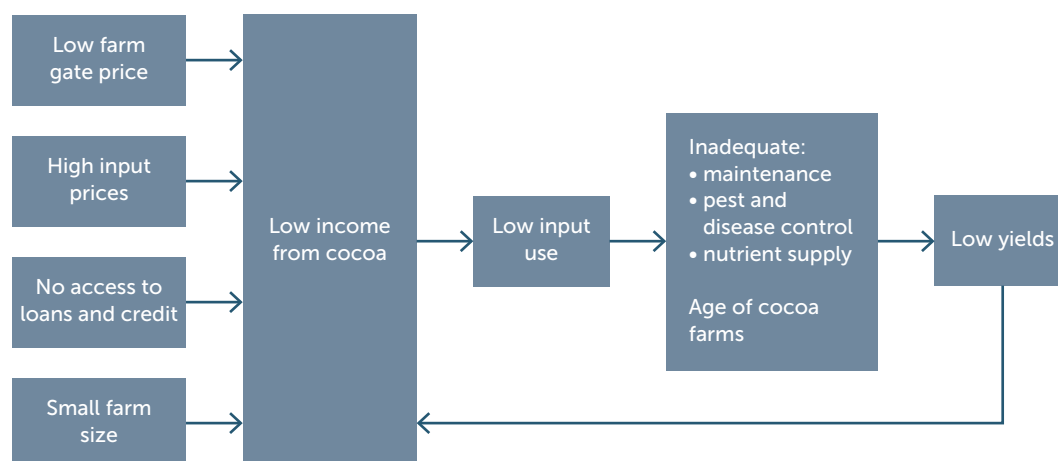
⁴ Roy Bateman (2008/2015). Pesticide Use in Cocoa A Guide for Training Administrative and Research Staff 1st Edition: August 2008 2nd Edition: December 2009 (revised March 2010) 3rd Edition: draft December 2013: revisions finalised September 2015. Available at https://www.icco.org/about-us/international-cocoa-agreements/cat_view/68-icco-workshops-and-seminars/82-sps-africa.html

⁵ Waarts, Y., Ge, L., Ton, G., van der Meen, J. (2013). A touch of cocoa: Baseline study of six UTZ- Solidaridad cocoa projects in Ghana. LEI report 2013-2014. LEI Wageningen UR. Available at <http://edepot.wur.nl/305316>

⁶ Maytak, L. (2014). Discussion and Comparison of Farm Level Data Collection Methods for Five Cocoa Studies in Côte d'Ivoire. Washington, Prepared for Cocoa Collaborative Learning Group facilitated by the Sustainable Food Lab: 26.

GAP adoption rates including the availability, cost or timeliness of input supply;^{7,8} household labour constraints and the relatively high cost of hired labour; a lack of farmer knowledge; a lack of savings or credit to make investments;⁹ and, poor availability of equipment for spraying or pruning.^{10,11}

Figure 8.1 Causes of low yield in farmers' cocoa in West Africa¹²



In our household survey, respondents were first asked whether or not a given activity was carried out in the past year, and if so, more detailed questions followed on labour days, input use, and costs.

In Ghana, a relatively high proportion of respondents reported doing land clearing (48%), land preparation (37%), and cocoa planting (52%) in the past year. This suggests that many households are actively expanding or rehabilitating their land with cocoa, which is further supported by our data presented in the Land chapter. The application of granular fertiliser (39%), liquid fertiliser (53%) herbicides (51%) pesticides (88%) and fungicides (74%) was frequently reported by Ghanaian respondents. Virtually all farmers (95%) reported doing at least some weeding. Weeding is a laborious, yet necessary, task to ensure that the cocoa trees are not

⁷ Barrientos, S.W & Asenso Akyere, K. (2008). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocoalife.org/progress/mapping-sustainable-production-in-ghanaian-cocoa>

⁸ Nelson, V., Opoku, K., Martin, A., Bugri, J., Posthumus, H. (2013). Assessing the poverty impact of sustainability standards: Fairtrade in Ghanaian cocoa. London: DfID UK. Available at <https://www.gov.uk/dfid-research-outputs/final-report-assessing-the-poverty-impact-of-sustainability-standards-fairtrade-in-ghanaian-cocoa>

⁹ Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C., Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics. Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>

¹⁰ Pruning is the removal of unwanted branches from a cocoa tree. It is seen as an important operation and can affect yield for months, even years, as well as affecting the shape and structure of the tree for the rest of its life. Insects and diseases multiply more on unpruned cocoa trees with dense canopies than on trees that have been opened up by pruning and display well-aired canopies. Pruning can also stimulate flowering and pod production. Afouakva, E.O. (2014). Cocoa Production and Processing Technology. CRC Press, Taylor & Francis Group, Boca Raton. Available at <https://books.google.nl/books?isbn=1466598239>

¹¹ Barrientos, S.W & Asenso Akyere, K. (2008). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocoalife.org/progress/mapping-sustainable-production-in-ghanaian-cocoa>

¹² Wessel, M., & Quist-Wessel, P.F. (2015). Cocoa production in West Africa, a review and analysis of recent developments. NJAS-Wageningen Journal of Life Sciences, 74, 1-7. Available at <https://doi.org/10.1016/j.njas.2015.09.001>

competing with weeds for nutrients. A relatively high proportion of Ghanaian farmers reported pruning (82%) their trees, which is important for maintaining good yields. As expected, virtually all cocoa households harvested their cocoa, and carried out pod breaking, fermenting and drying of the beans (Table 8.1).

In Côte d'Ivoire, a notable proportion of cocoa households engaged in land clearing (25%), land preparation (27%) and cocoa planting (32%) in the last season, although at lower rates than those reported in Ghana. Ivorian cocoa households reported lower rates of granular fertiliser (16%), liquid fertiliser (6%), herbicide (32%) and fungicide (15%) application. However, a high proportion reported applying pesticides (75%). Most Ivorian farmers engaged in weeding (91%), although a much lower proportion reported pruning their cocoa trees compared with Ghanaian respondents. Virtually all respondents reported harvesting cocoa, with a similar proportion carrying out pod breaking, fermenting and drying activities. Some farmers may not have harvested their cocoa because young cocoa trees had not begun to yield, or because old trees had been abandoned (Table 8.1).

Table 8.1 Cocoa activities, percent of cocoa households doing each activity, by country

	Ghana	Côte d'Ivoire	pvalue	sig
Land clearing	48%	25%	0.00	***
Land preparation	37%	27%	0.00	***
Planting	52%	32%	0.00	***
Granular fertiliser	39%	16%	0.00	***
Liquid fertiliser	53%	6%	0.00	***
Manure	6%	4%	0.19	
Herbicides	51%	32%	0.00	***
Pesticides	88%	75%	0.00	***
Fungicides	74%	15%	0.00	***
Weeding	95%	91%	0.00	***
Pruning	82%	40%	0.00	***
Harvesting	100%	94%	0.00	***
Pod breaking	99%	96%	0.00	***
Fermenting	100%	95%	0.00	***
Transporting	82%	70%	0.00	***
Drying	100%	95%	0.00	***
N	1,318	908		

Note: p-value from a one-way ANOVA test

For most cocoa production activities, we find no statistically significant difference between the proportion of male and female-headed cocoa households undertaking the activity. However, a slightly higher proportion of male-headed households (54%) reported applying herbicide than female-headed households (39%) (*highly significant*), using fungicides (male-headed 75%, female-headed 66%, *highly significant*) and doing pruning (male-headed 84%, female-headed 72%, *highly significant*).

In Côte d'Ivoire, the only cocoa activity where we find a statistically significant difference between male and female-headed households is in herbicide application, which was carried out by 33% of male-headed households and only 15% of female-headed households (*highly significant*).

8.2 Timing of cocoa activities

In Ghana, most preparatory activities such as land clearing, land preparation and planting take place in the early part of the year. Inputs are applied at various moments prior to the start of the main cocoa season, and some, such as liquid fertilizer are applied multiple times. Most households weed at least twice. Most respondents report that the main season starts in September (even though it officially begins in October) and runs until the end of December. A smaller proportion of respondents indicated that the main season can run into January. The light season runs from about April to July (although some respondents indicated it began in March, with others reporting it finishing in August). In reality, respondents frequently reported harvesting cocoa outside of the main season, though in comparatively lower quantities (Figure 8.2).

Figure 8.2 Timing of cocoa activities, Ghana

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Land/bush clearing												
Land preparation												
Planting cocoa												
Herbicide												
Granular fertiliser												
Liquid fertiliser												
Pesticide												
Weeding												
Pruning												
Harvesting				light season						main season		

Source: Author's interpretation of survey data on timing of activities. Respondents reported doing some activities throughout the year, peaking at certain times.

In Côte d'Ivoire, most preparatory activities are carried out in the early part of the year, and the timing of input application is similar to that in Ghana. Most Ivorian respondents reported that the main harvest season begins in October, a month later than reported in Ghana. Most respondents also said that the main season ends in January, although some indicated that it can run into February. The light season runs from about April onwards, with no clear end point in the middle of the year. As in Ghana, many Ivorian respondents reported also harvesting smaller volumes of cocoa outside of the main season (Figure 8.3).

Figure 8.3 Timing of cocoa activities, Côte d'Ivoire

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Land/bush clearing												
Land preparation												
Planting cocoa												
Herbicide												
Granular fertiliser												
Liquid fertiliser												
Pesticide												
Weeding												
Pruning												
Harvesting												

Source: Author's interpretation of survey data on timing of activities. Respondents reported doing some activities throughout the year, peaking at certain times.

8.3 Inputs – fertiliser, herbicide, pesticide and fungicide

Controlling cocoa diseases is a key element of cocoa farm management. Farmers need to be able to recognise the symptoms of a disease, understand the causes and know what treatments to apply.¹³ The major pests in West Africa are reported to be Cocoa Swollen Shoot Virus Disease (CSSVD), mistletoe, capsids (insects) and black pod disease.^{14,15}

In Ghana, the Cocoa Health and Extension Division (CHED) provides free services for fungicide and pesticide application through the Cocoa Disease and Pest Control (CODAPEC). CODAPEC is also tasked with identifying CSSVD outbreaks and countering the spread of disease by uprooting infected trees. CODAPEC's national spraying programme works with spraying gangs, which are formed of selected community members and who are paid by CODAPEC for the amount of land sprayed. The spraying gangs are given free pesticides (to combat capsids) and fungicides (to combat black pod) as well as fuel to perform the spraying tasks. The spraying gangs are supposed to spray each farm four times a year between July and September. The national spraying programme is paid for through deductions made from the 'Free on Board' (FOB) price received by COCOBOD for cocoa sales. Therefore, it may be argued that cocoa producers indirectly pay the costs of the spraying programme through the lower producer price that they receive from

¹³ Bateman, R. (2009) Pesticide Use in Cocoa. A Guide for Training Administrative and Research Staff 1st Edition: August 2008. 2nd Edition: December 2009 (revised March 2010). London: ICCO. Available at https://www.icco.org/sites/sps/documents/manual_icco_2nded_final.pdf

¹⁴ Barrientos, S.W & Asenso Akyere, K. (2008). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocoalife.org/progress/mapping-sustainable-production-in-ghanaian-cocoa>

¹⁵ N'Guessan, K.F., Kebe, B.I., Aka, A.R., N'Guessan, W.P., Kouakou, K., Tahi, G.M. (2013). Major Pests and Diseases Situations and Damage Assessment. Protocols in Côte d'Ivoire. Integrated Management of Cocoa Pests and Pathogens in Africa project lunch Oak Plaza Hotel, Accra, 15th to 18th April, 2013. Powerpoint presentation, Centre National de Recherche Autonome (CNRA). Available at https://www.icco.org/about-us/international-cocoa-agreements/cat_view/68-icco-workshops-and-seminars/80-pests-and-pathogens-africa-accra-april-2013.html

COCOBOD.¹⁶ The functioning of CODAPEC and the national spraying programme has been assessed in several studies.^{17,18,19,20} Many of these negatively critique the effectiveness, timeliness, and frequency of the spraying programme and the overall impact of the CODAPEC mass spraying programme is unclear. Where CODAPEC has claimed success,²¹ other studies suggest that production increase can be the result of additional private expenditures on spraying or other factors.^{22,23,24,25}

CODAPEC also supports Ghanaian farmers through the Hi-Tech fertiliser distribution programme, which aims to boost cocoa yields.²⁶ To be eligible for free fertiliser, farmers are required to first have their cocoa plantations measured by a CHED field officer.²⁷ Timely fertiliser delivery is important for effective use. Fertiliser needs to be applied before the rainy season so nutrients can be better absorbed by the soil and late application typically results in poorer results. The Cocoa Research Institute Ghana (CRIG) has recommended an application level of 371 kg per ha.²⁸ Like the spraying programmes, the cost of the Hi-Tech programme is deducted from the FOB price received by COCOBOD. Some studies have shown that the Hi-Tech programme has had a positive effect on cocoa yields.²⁹

Ghanaian farmers that do not benefit from the mass spraying or Hi-Tech programmes can buy inputs, either at an input shop, at the market, or from the purchasing clerk. One recent study found that there is a shortage of ‘approved’ chemical inputs, with most input shops found to be stocking counterfeit chemicals.³⁰ In this study major chemical suppliers voiced their dissatisfaction with the current public input distribution system and are trying to develop direct market strategies.

¹⁶ Laven, A. (2010). *The risks of inclusion: Shifts in governance processes and upgrading opportunities for cocoa farmers in Ghana*. Amsterdam: KIT.

¹⁷ *ibid*

¹⁸ Kumi, E., Daymond, A. (2015). Farmers’ Perceptions of the Effectiveness of the Cocoa Disease and Pest Control Programme (CODAPEC) in Ghana and Its Effects on Poverty Reduction. *American Journal of Experimental Agriculture* 7(5): 257-274, 2015, Article no.AJEA.2015.128. Available at http://www.journalrepository.org/media/journals/AJEA_2/2015/Mar/Kumi752015AJEA16388.pdf

¹⁹ Barrientos, S.W & Asenso Akyere, K. (2008). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocoalife.org/progress/mapping-sustainable-production-in-ghanaian-cocoa>

²⁰ Anang, B. T., Adusei, K., Mintah, E. (2011). Farmers’ assessment of benefits and constraints of Ghana’s cocoa sector reform. *Current research journal of social sciences*, 3(4), 358-363. Available at http://www.worldcocoaoundation.org/wp-content/uploads/files_mf/anang2011.pdf

²¹ Laven, A. (2010). *The risks of inclusion: Shifts in governance processes and upgrading opportunities for cocoa farmers in Ghana*. Amsterdam: KIT.

²² Kolavalli, S., Vigneri, M., Gockowski, J. (2016). The Cocoa Coast: the board managed cocoa sector in Ghana. Ghana strategy support program, International Food Policy Research Institute (IFPRI). Available at <http://www.ifpri.org/publication/cocoa-coast-board-managed-cocoa-sector-ghana>

²³ Kumi, E., Daymond, A. (2015). Farmers’ Perceptions of the Effectiveness of the Cocoa Disease and Pest Control Programme (CODAPEC) in Ghana and Its Effects on Poverty Reduction. *American Journal of Experimental Agriculture* 7(5): 257-274, 2015, Article no.AJEA.2015.128. Available at http://www.journalrepository.org/media/journals/AJEA_2/2015/Mar/Kumi752015AJEA16388.pdf

²⁴ Laven, A. (2010). *The risks of inclusion: Shifts in governance processes and upgrading opportunities for cocoa farmers in Ghana*. Amsterdam: KIT.

²⁵ Barrientos, S.W & Asenso Akyere, K. (2008). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocoalife.org/progress/mapping-sustainable-production-in-ghanaian-cocoa>

²⁶ Baah, F., & Anchirinah, V. (2010). Looking for convergence: Stakeholders’ perceptions of cocoa extension constraints in Ghana. *Journal of Science and Technology (Ghana)*, 30(3). Available at <https://www.ajol.info/index.php/just/article/download/64626/52401>

²⁷ Steijn, C. (2016). Towards sustainable cocoa production: a mixed method assessment of the influence of local governance modes on the farm level impact of private cocoa certification standards in Ghana. Master Thesis Sustainable Development, University of Utrecht, KIT. Amsterdam. Available at <https://dspace.library.uu.nl/bitstream/handle/1874/337181/Steijn%205572940%20master%20thesis%20final.pdf?sequence=2&isAllowed=y>

²⁸ Gockowski, J., Sonwa, D. (2010). Cocoa Intensification Scenarios and Their Predicted Impact on CO2 Emissions, Biodiversity Conservation, and Rural Livelihoods in the Guinea Rain Forest of West Africa. *Environmental Management*, DOI 10.1007/s00267-010-9602-3. Available at http://www.worldcocoaoundation.org/wp-content/uploads/files_mf/gockowski2010.pdf

²⁹ Kolavelli *et al.*, 2016 ; Farmers in the Brong Ahafo, Ashanti, and Eastern region that applied fertilisers at the recommended rate reported a mean yield of 619 kg per ha which was, at that time, 381 kg more than the mean yield of farmers that did not use fertiliser. In the Western Region, the yield difference was 239 kg per ha.

³⁰ Laven, A. and Van Heck, P. (2015) Ideation of Small Medium Enterprise (SME) Services in Cocoa Growing Communities in Ghana. M&S, Barry Callebaut, Solidaridad, KIT.

Some studies have shown that there are regional price differences and quality differences for fungicides and pesticides.^{31,32}

In Côte d'Ivoire, input distribution is largely conducted through private channels, and inputs are not provided for free. For instance, fertiliser is mainly accessed through input shops, private spraying gangs, and sometimes through cooperatives.³³ One recent study shows that Ivorian cocoa farmers spend comparatively little on inputs compared with that spent on hired labour.³⁴

8.3.1 Input use

In our household survey, respondents were asked whether or not they used certain inputs on their cocoa farms in the past year, how many times they applied the inputs, the quantity they applied (if known) and whether the inputs were given for free or purchased by the household (Table 8.3).

In Ghana, we find that input use is relatively common among cocoa households. Granular fertiliser was applied by 39% of cocoa households, usually once per year. Most of those who used granular fertiliser were given it for free.

Liquid fertiliser was found to be applied on 53% of Ghanaian cocoa farms. Many of these farms received multiple sprayings, with an average of nearly three times per year. Again, most of those using liquid fertiliser were given it free. A small proportion of farmers are purchasing additional amounts of fertiliser than that provided by COCOBOD.

Ghanaian respondents reported applying herbicides in 51% of cases. Of these, many used herbicides more than once, with an average of two applications per year. Farmers do not receive herbicides for free from COCOBOD programmes, and so all respondents using herbicide purchased these themselves.

Most Ghanaian farmers use pesticides (88%) to cope with pests and diseases on the farm which reduce yields. Of those using pesticides, most sprayed three per year. Just over half of all respondents reported being given some pesticides for free, while two-thirds reported purchasing them. The high proportion of respondents purchasing inputs suggests that they are perceived to be an important productivity boosting input and that the number of free sprayings is perceived to be insufficient to meet farmer needs.

³¹ Nelson, V., Opoku, K., Martin, A., Bugri, J., Posthumus, H. (2013). Assessing the poverty impact of sustainability standards: Fairtrade in Ghanaian cocoa. London: DFID UK. Available at <https://www.gov.uk/dfid-research-outputs/final-report-assessing-the-poverty-impact-of-sustainability-standards-fairtrade-in-ghanaian-cocoa>

³² Waarts, Y., Ge, L., Ton, G., van der Meen, J. (2013). A touch of cocoa: Baseline study of six UTZ- Solidaridad cocoa projects in Ghana. LEI report 2013-2014. LEI Wageningen UR. Available at <http://edepot.wur.nl/305316>

³³ Varlet, F. & Kouamé, G. (2013). Étude de la production de cacao en zone riveraine du parc national de Taï. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and Ministère de l'Agriculture de la Côte d'Ivoire.

³⁴ Maytak, L. (2014). Report on Farm Level Sustainability of Cocoa in Côte d'Ivoire: A Synthesis of Five Studies. International Finance Corporation, New York. Available at https://www.uni-goettingen.de/de/document/download/133209052e4238ff6de0f471ff51abb.pdf/GlobalFood_DP103.pdf

Ghanaian cocoa farmers also frequently report using fungicides (74%). Those who did so applied fungicides twice per year. More respondents reported receiving fungicides for free than any other input. Again, a small proportion of households purchased additional amounts over and above those received for free. Only 12% of Ghanaian cocoa households reported purchasing inputs of any kind on credit.

We find no statistical difference in the proportion of male and female-headed households in Ghana using granular fertiliser, liquid fertiliser or pesticides. We do, however, see small but statistically significant differences in the proportion of female-headed households using herbicides (39%) compared with male-headed households (54%) and a slightly lower proportion of female-headed households using fungicides (66%) compared with male-headed households (75%).

In Côte d'Ivoire, a smaller proportion of respondents report using inputs compared with Ghanaian cocoa farmers. The main reason for this difference is that most Ivorian farmers do not receive any inputs for free.

Granular fertiliser was applied by only 16% of respondents, and only 6% use liquid fertiliser. However, 32% of Ivorian cocoa farmers reported using herbicide, all of whom bought it themselves. Most Ivorian farmers apply pesticides (75%), which are seen to be vital to preventing crop losses. Most Ivorian farmers who use pesticides purchase them themselves, although a substantial proportion also received some pesticides for free. Nevertheless, Ivorian farmers still spray pesticides less frequently than Ghanaian cocoa farmers, averaging two applications per year. Only 15% of Ivorian cocoa farmers reported using fungicides, which is much lower than that reported by Ghanaian farmers. Only 7% of Ivorian cocoa farmers reported purchasing any kind of inputs on credit.

Table 8.2 Percent of cocoa households using inputs, by country

	Ghana	Côte d'Ivoire	pvalue	sig
Granular fertiliser	39%	16%	0.00	***
Liquid fertiliser	53%	6%	0.00	***
Manure	6%	4%	0.19	
Herbicides	51%	32%	0.00	***
Pesticides	88%	75%	0.00	***
Fungicides	74%	15%	0.00	***
N	1,318	908		

Note: p-value from a one-way ANOVA test

Table 8.3 Percent of cocoa households given and purchasing inputs (of those using inputs), by country

	Ghana given	Ghana purchased	Côte d'Ivoire given	Côte d'Ivoire purchased
Granular fertiliser	82%	27%	3%	96%
Liquid fertiliser	81%	38%	11%	93%
Herbicide	1%	99%	1%	97%
Pesticide	64%	76%	38%	88%
Fungicide	84%	47%	55%	56%

Note: p-value from a one-way ANOVA test.

8.3.2 Input services

In focus group discussions, participants were asked about their satisfaction with input services in their area.

In Ghana, the institutional support provided to cocoa farmers by COCOBOD and its departments is greater than that provided to farmers of other crops. Nevertheless, focus group participants were quite critical of CODAPEC, and 9 of the 11 groups expressed low satisfaction with the delivery of services. The main issue was an insufficient supply of inputs, and farmers not receiving all the spraying rounds they need. This finding is in line with previous studies, and is supported by our survey data which shows that many cocoa households do not receive inputs, and those who do so tend to receive fewer applications than recommended.

"We get spraying only once, while they should come 3-4 times a year." (FGD, Central Region, Ghana)

"You need to be registered, show your passbook and be present when inputs are distributed. It doesn't always work well." (FGD, Brong Ahafo, Ghana)

Other complaints included late timing of the spraying, general lack of available spraying equipment, and a lack of maintenance support for the spray machines.

"I don't believe they use the list, they just pick a location and spray that particular area." (FGD, Ashanti Region, Ghana)

"Instead of bringing the chemicals, they keep some for themselves. The selection for hiring sprayers is a bit corrupt." (FGD, Central Region, Ghana)

"They refuse to spray my farm because I did not have money to pay them." (FGD, Central Region, Ghana)

"Sometimes the spraying gangs come with excuses that the machines are spoiled and they want money from the farmers." (FGD, Ashanti Region, Ghana)

"The government doesn't pay the sprayers enough. Sometimes farmers need to pay sprayers something in addition." (FGD, Ashanti Region, Ghana)

Only one community involved in the focus group discussions expressed satisfaction with the spraying services they received, although still they indicated they would like more pesticides and fungicides as the quantities provided were believed to be insufficient. When the current availability of inputs is compared with five years ago, some participants complained that they receive fewer inputs from CODAPEC than before. Participants perceived this to be due to smuggling of inputs to neighbouring countries, or inputs being sold on the black market for profit and therefore not reaching the farmers.

"There were more inputs available and the price was lower five years ago. The government was doing the supply of inputs free of charge. We have a problem of shortage at the moment, most approved chemical are smuggled. It seems the government is not aware of smuggling." (FGD, Ghana, Western Region)

Ten out of 12 focus groups were also not satisfied with the way fertiliser was being provided by CHED. The most frequent complaints were that fertiliser was supplied in insufficient amounts and too late. Another problem was that not every farmer gets the fertiliser as the farm has to be first measured, and they need to be member of a farmer group.

"If your farm is very far, they don't come for measurement." (FGD, Ashanti Region, Ghana)

"They will not tell you when they visit your farm. If you are not around, you will miss out." (FGD, Brong Ahafo, Ghana)

Some Ghanaian participants indicated that they prefer granular over liquid fertiliser because, it was explained, liquid fertiliser requires the use of a machine, money is needed for fuel and it requires more applications. However, the household survey data collected in this study does not support this view as more Ghanaian cocoa households reported using liquid fertiliser than granular fertiliser (Table 8.2).

Ghanaian focus group participants were also not satisfied with private input suppliers. In 13 communities, input shops were discussed by focus groups. In 12 of the 13 groups, participants said an input shop was present and, in 10 out of 12 cases, participants were not satisfied with the main reason stated that it was due to the lack of input availability, including those products recommended by CRIG. Participants also perceive that input prices in local shops are too high, which is a common complaint in rural value chains across sub-Saharan Africa. Participants said that input prices keep increasing, especially prices of recommended brands. One group blamed rising import prices for increasing prices, while another group claims that the input price correlates with the cocoa price. (This may be an effect of national inflation, which has hovered between 10-20% per annum for most of the last decade, or currency fluctuations). In response to high prices, farmers said they sometimes

switch to cheaper brands, use fewer inputs, or stop using inputs altogether. Inputs sold by private input suppliers are sometimes thought to be counterfeit, or diluted. However, an assessment of input quality would require a separate study to ascertain the extent of the problem. Finally, it was stated that the people that sell the products are not always sufficiently knowledgeable.

“The ones that sell the products do not have technical expertise (they can only sell it). It is better to go to extension officers, they also sell inputs.” (FGD, Ashanti Region, Ghana)

“If the prices were lower, we would buy more.” (FGD, Eastern Region, Ghana)

“It was better 5 years ago concerning the price. The prices have increased. As government increases the price of cocoa, prices of inputs also increase. We buy fewer inputs because of price increases.” (FGD, Ashanti Region, Ghana)

In Côte d’Ivoire, most focus group participants discussed private input distribution, although a few farmers also said that they received some inputs from the Conseil du Café-Cacao (CCC). In terms of private spraying, participants made a distinction between private spraying gangs and mechanised spraying. Private spraying gangs are paid CFA 5,000 per day (without lunch) and are active in most communities. However, focus group participants had mixed views on their functioning. Spraying gangs were discussed in 11 focus group locations, and were found to be active in nine of these communities (they were not available in two communities). In three communities farmers expressed satisfaction with the service, two had mixed views, and four were not satisfied for a variety of reasons. Reasons for being dissatisfied included: “It is not enough”; “It is not for free”; “We have to pay for the fuel”; and, “There are no trained people to do the spraying.” Some positive experiences about private spraying gangs were: “We are happy that the groups are there”; “The groups have the right skills”; and, “The results of spraying are noticeable.”

Ivorian participants also gave their views on private liquid fertiliser spray services. These services were found to be present in only six of eleven communities visited, with the level of satisfaction varying across communities. In two communities, participants were generally satisfied because they believe the sprayers do a good job and it saves them from having to do the work themselves. Some said that the sprayers have received the necessary training, while others said they have not. When farmers believe the sprayers lack skills, they hire them less often. Other groups had mixed or negative views due to the cost of the service and their belief that, as cooperative members, they should receive the service for free.

Ivorian focus group participants also discussed their views of local input shops. Input shops were found to be present near to nine of the eleven communities where inputs were discussed. Most of these groups expressed their dissatisfaction with the local input shop and frequently mentioned that prices are too expensive. Less frequently

participants complained that the product quality is bad, or that products have already expired. Sometimes farmers said they feel ‘cheated’ as the input shops re-label expired products or counterfeit products. The distance the farmers have to travel is also a factor, as this incurs additional transport costs which make the inputs relatively more expensive. Participants in only two communities said they were positive about their local input shop.

“The prices of inputs have gone up while the quality has gone down. The products are killing our plants. We are being cheated by the sellers; they re-label cheap brands to make us think we buy good quality, but it is actually a cheap knock-off.” (FGD, Guémon, Côte d’Ivoire)

“We cannot buy inputs in the village; we need to go 26 km to the nearest town to buy. The costs of the inputs are high and we also need to pay for transport for ourselves as well as for the products.” (FGD, Cavally, Côte d’Ivoire)

Ivorian participants also explained that another way of procuring inputs is through *pisteurs* (cocoa traders). While some participants said this is more expensive than going to town themselves, *pisteurs* occasionally provided inputs on credit, with a 100% interest rate to be repaid in the main season.

“Some of the pisteurs help you to get access to inputs and they respect the price fixed by the CCC.” (FGD, Cavally, Côte d’Ivoire)

Compared with 5 years ago, Ivorian participants in all 10 focus groups perceive a negative change relating to inputs. The main reason given was that prices have been increasing, sometimes adding that accessibility has not improved in rural areas.

“The inputs are available, but they are expensive. The price increases every year. We still use the same amounts, though we just pay more. We are forced to buy inputs to make our cocoa work.” (FGD, Bélier, Côte d’Ivoire)

“The prices of inputs increases with the price of cocoa, but when the cocoa price drops the inputs stay the same price.” (FGD, Cavally, Côte d’Ivoire)

8.4 Labour activities

Cocoa households employ a combination of household labour, hired labour and communal labour. A recent study commissioned by the International Cocoa Initiative (ICI) reported that, in Ghana, households use an average of 120 labour days per hectare of cocoa, including household, hired and communal labour. The same study reported quite some variation in the number of labour days used per hectare in

Côte d'Ivoire, ranging from 73 labour days/ha in Haut-Sassandra, 120 days/ha in Loh Djiboua, and 154 days/ha in Nawa.³⁵

In our household survey, respondents were first asked whether or not they knew the number of labour days spent per activity for all of their cocoa land. Only those respondents who answered affirmatively were asked further questions about the number of labour days used. This question had the function of excluding inaccurate estimations from the dataset, since labour days can be difficult for farmers to estimate.

In Ghana, across all activities, between 40% and 55% of respondents reported knowing how many labour days were used, depending on the activity. In Côte d'Ivoire, between 50% and 80% of respondents reported likewise. This confirms that many farmers do not know the amount of labour invested on their farms, and therefore efforts to calculate labour days require extreme care in data collection.

In Ghana and Côte d'Ivoire, only around a third of all cocoa households keep records of any kind (Table 8.4). Of those who do keep records, most record the volume sold, the price, and the amount of income received (Table 8.5).

Table 8.4 Percent of households keeping written records for cocoa last year, by country

	Ghana	Côte d'Ivoire	pvalue	sig
Percent keeping records	32%	36%	0.05	**
std.error	1%	2%		
N	1,318	907		
cocoa_records_yn				

Note: p-value from a one-way ANOVA test

Table 8.5 Percent of households recording each type of information (of those who reported keeping any records)

Record type	Ghana	Côte d'Ivoire	pvalue	sig
The volume sold, the price and money received	91%	98%	0.00	***
Money spent on inputs	46%	2%	0.00	***
The volume produced	35%	61%	0.00	***
Money spent on hired labourers	24%	1%	0.00	***
Number of days household members spent labouring	16%	0%	0.00	***
Don't know	1%	1%	0.72	
N	422	327		

Note: p-value from a one-way ANOVA test

³⁵ Vigneri, M. and Serra, R. (2016). Researching the Impact of Increased Cocoa Yields on the Labour Market and Child Labour Risk in Ghana and Côte d'Ivoire. ICI Labour market research study. Available at: http://www.cocoinitiative.org/wp-content/uploads/2016/12/market_research_full_web.pdf

8.4.1 Labour days per activity

In Ghana and Côte d'Ivoire, we find a lower number of labour days committed per activity than in most studies. We hypothesise several reasons for our figures being lower than other studies. We hypothesise several reasons for this.

In our study, we find that many cocoa households do not carry out all cocoa activities (Table 8.1). Those who do not carry out the activity are assigned '0 days', which pulls down the average number of days for the activity. However, some other studies calculate the average of *those doing* the activity (i.e. excluding those who should be assigned 0 days), which results in a higher average. Some other studies also base their figures on 'expert' estimates, or expected labour days if good practices have been followed. Our approach has been to calculate, as accurately as possible, actual practices across the entire sample of respondents. Another reason that our figures may be lower than some studies is because we have not included labour days for fermenting and drying cocoa, as there is little labour involved while the cocoa is lying fermenting or drying. If asked, respondents usually report the number of days the cocoa is lying fermenting and drying, giving an incorrect impression of actual labour used.

In Ghana, we find cocoa households spend, on average, 53 labour days per hectare (Table 8.4). The majority of these days are household labour days, although these are averages. In reality, different households invest different combinations of household and hired labour. The main activity for which communal labour is used is pod breaking. Weeding was found to take the most labour days per hectare, because it is a laborious task and because most households do it 2-3 times per year. Harvesting and pod breaking were also reported take a relatively high number of labour days.

Table 8.6 Mean labour days per cocoa activity, per hectare, Ghana

	Household days	Hired days	Communal days	Total days
Land clearing	0.57	1.51	0.02	2.09
Land preparation	0.67	0.31	0.04	1.02
Planting	2.30	0.23	0.15	2.68
Granular fertilizer application	0.74	0.15	0.03	0.92
Liquid fertilizer application	1.08	0.79	0.07	1.94
Manure/compost application	0.12	0.04	0.00	0.16
Herbicides application	2.13	0.60	0.03	2.75
Pesticides application	2.20	1.80	0.12	4.12
Fungicides application	2.19	0.60	0.19	2.97
Weeding	4.06	7.73	0.15	11.94
Pruning	2.19	0.77	0.07	3.03
Harvesting	6.36	1.56	0.09	8.02
Pod breaking	2.55	0.21	5.98	8.75
Fermenting				-
Drying				-
Transporting	1.64	0.58	0.56	2.78
Total labour days/ha	28.80	16.88	7.50	53.17

Note: The number of observations (N) varies between activities and is not reported in the table for ease of reading. The N values for Ghana are as follows: land clearing 309; land preparation 203; planting 290; granular fertiliser 256; liquid fertiliser 344; manure 38; herbicides 247; pesticides 528; fungicides 372; weeding 449; pruning 415; harvesting 462; pod breaking 496; transporting 382.

In Côte d'Ivoire, we find that cocoa households spend, on average, 32 labour days per hectare (Table 8.7), which is considerably lower than that reported in Ghana. The main reason why we find lower labour days in Côte d'Ivoire is because relatively few households apply inputs (Table 8.1), and thus do not require labour for these activities. There are also other contributing reasons. Ivorian households do weeding less frequently, which lowers the total number of labour days. Ivorian cocoa households also tend to have larger cocoa plots and so spread their household labour over more land. They also have lower yields than Ghanaian cocoa households, which means they need fewer labour days for harvesting and pod breaking. Few Ivorian households reported the use of hired labour.

There was found to be no statistically significant difference in the number of labour days used per hectare by male and female-headed households.

In general, we are reasonably confident about the average number of labour days reported across the sample, even though individual respondents may have estimated a little higher or a little lower. Accuracy is helped by the approach to only include responses from those who believed they knew how many labour days were used per activity. Furthermore, we also removed a few extreme outlier values (farther than 4 standard deviations from the mean) which we consider very likely to be erroneous data entry errors.

Table 8.7 Mean labour days per cocoa activity, per hectare, Côte d'Ivoire

	Household	Hired	Communal	Total
Land clearing	0.65	0.18	0.15	0.99
Land preparation	1.05	0.17	0.14	1.37
Planting	1.55	0.03	0.02	1.61
Granular fertilizer application	0.32	0.04	0.00	0.37
Liquid fertilizer application	0.03	0.03	0.00	0.06
Manure/compost application	0.11	0.00	0.00	0.12
Herbicides application	0.78	0.08	0.03	0.89
Pesticides application	0.29	0.50	0.02	0.81
Fungicides application	0.08	0.08	0.01	0.16
Weeding	6.08	1.55	1.89	9.51
Pruning	0.95	0.58	0.13	1.66
Harvesting	6.67	0.48	0.55	7.71
Pod breaking	1.74	0.12	4.47	6.32
Fermenting				-
Drying				-
Transporting	0.41	0.22	0.13	0.76
Total labour days/ha	20.71	4.05	7.56	32.32

Note: The number of observations (N) varies between activities and is not reported in the table for ease of reading. The N values for Côte d'Ivoire are as follows: Land clearing 129; land preparation 128; planting 153; granular fertiliser 76; liquid fertiliser 46; manure 21; herbicides 154; pesticides 443; fungicides 91; weeding 353; pruning 92; harvesting 390; pod breaking 526; transporting 455.

Besides the average number of labour days used per hectare for each activity among all farmers, it is of research value to know the typical number of labour days used for an activity among those doing that activity. Table 8.8 presents the median number of labour days used per activity, considering only the farmers who did each activity. The table includes all household, hired and communal labour. We advise against making a summation of these labour days since a summation would not accurately represent the total labour days used per hectare by a typical cocoa household.

Table 8.8 Median labour days per cocoa activity, per hectare, (of those doing the activity only), by country

	Ghana	N	Côte d'Ivoire	N
Land clearing	5	290	4	124
Land preparation	3	190	5	125
Planting	5	270	4	145
Granular fertiliser	2	251	2	75
Liquid fertiliser	4	335	1	46
Manure	3	37	2	21
Herbicides	7	230	2	142
Pesticides	5	513	1	433
Fungicides	4	357	1	90
Weeding	15	420	14	336
Pruning	4	395	3	92
Harvest	9	423	9	368
Pod breaking	9	464	6	501
Fermenting				
Drying				
Transporting	4	364	1	434

Note: The following table should be used for reference only for each activity, as it excludes households that have not done the activity. The columns should not be summed to generate a total, as this does not represent the total median labour days.

8.4.2 Labour availability and affordability

Cocoa households rely on a combination of household, hired and communal labour for the various cocoa activities that need to be carried out through the year. In general, households rely on their own household labour for the majority of cocoa activities. However, for certain labour intensive activities, additional labourers may need to be hired to supplement household efforts. Of course, in reality, cocoa farmers take many different approaches. For example, some absentee landowners or 'retirees' may hire more labourers than average. On the other hand, poorer households may choose not to hire additional labour and try to make do with household labour, even if it means they use sub-optimal labour inputs for some activities.

The availability and affordability of hired labour go hand in hand. As the supply of hired labourers decreases, the cost of labour naturally increases.³⁶ The scarcity of

³⁶ Barrientos, S.W & Asenso Akyere, K. (2008). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocoalife.org/progress/mapping-sustainable-production-in-ghanaian-cocoa>

hired labourers can also be seasonal, fluctuating with labour demand for certain cocoa activities, and interacting with labour demands for other crops at the same time.³⁷ Some studies have attributed labour scarcity to the emergence of alternative income-generating activities, such as palm oil, rubber tree agriculture, gold mines, vegetable production or trade.³⁸ Other studies have argued that labour shortages are driven by an absence of youth, who have migrated to urban areas to look for education or better employment opportunities.^{39,40} In Côte d'Ivoire, it has been argued that migrant Burkinabé labourers have now become landowners, which has reduced the supply of labour and simultaneously increased demand.⁴¹ While the availability of hired labourers is a problem for cocoa households, it also suggests that local economies are growing stronger and presenting more diversified employment opportunities to the wider population. Indeed, some studies have pointed out that labour availability is not so much the problem, but rather the affordability of hired labour. People will work as hired labourers provided the wage is better than their alternative options, and will also take into account the intensity of the work.^{42,43} The difficulty is that labouring on a farm is relatively hard work, and cocoa households may be reluctant to meet labourers' wage demands.

In our study, participants discussed changes in labour availability and affordability during focus group discussions.

In Ghana, all focus groups agreed that labour availability and affordability is getting worse and offered a range of reasons for this. The most frequently cited reason was that labourers were moving to districts where they can engage in goldmining and potentially earn more money than farm labouring. The second most frequently cited reason is that 'youth' are staying in school longer. This suggests that sensitization efforts to eliminate child labour and improve educational opportunities are working, although the side-effect is that it reduces labour supply and thus raises the cost of hired labour. Another common reason is that people (including migrants) are busy trying to establish and improve their own farms (including via *abunu* land tenure arrangements) and this is seen as more valuable than working as a labourer. Less prominently, respondents occasionally mentioned that youth are disinterested in cocoa farming and have moved to the towns and cities. In focus group discussions,

³⁷ Tano, M.A. (2012). Crise cacaoyère et stratégies des producteurs de la sous-préfecture de Meadji au sud-ouest ivoirien (Doctoral dissertation, Université Toulouse le Mirail-Toulouse II). Available at <https://tel.archives-ouvertes.fr/tel-00713662/document>

³⁸ *ibid*

³⁹ Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C., Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics. Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>

⁴⁰ Wessel, M., & Quist-Wessel, P.F. (2015). Cocoa production in West Africa, a review and analysis of recent developments. *NJAS-Wageningen Journal of Life Sciences*, 74, 1-7. Available at <https://doi.org/10.1016/j.njas.2015.09.001>

⁴¹ Ruf, F., Agkpo, J. (2008). Etude sur le revenu et les investissements des producteurs de café et de cacao en Côte d'Ivoire. Available at <http://agritrop.cirad.fr/548837/>

⁴² Vigneri, M. and Serra, R. (2016). Researching the Impact of Increased Cocoa Yields on the Labour Market and Child Labour Risk in Ghana and Côte d'Ivoire. ICI Labour market research study. Available at: http://www.cocoinitiative.org/wp-content/uploads/2016/12/market_research_full_web.pdf

⁴³ Ruf, F., Agkpo, J. (2008). Etude sur le revenu et les investissements des producteurs de café et de cacao en Côte d'Ivoire. Available at <http://agritrop.cirad.fr/548837/>

we observed that participants sometimes discussed the increased cost of hired labour alongside higher costs of living generally. It is possible that participants are unaware of inflation, which has ranged between 12% and 17% in recent years.

"You cannot even hire labours because of illegal mining. All labourers rather choose to work in illegal mining because it pays more. If you have money, you can get some people, but it is expensive. The quality of labour has also decreased, mostly because labourers work fewer hours." (FGD, Ashanti Region, Ghana)

"It is difficult to get labour, because everybody wants their own farm instead of doing day labour. Youth are not interested in farming; most of them go to mining activities. (FGD, Ashanti Region, Ghana)

Ghanaian focus group participants discussed how they cope with increasing labour costs in different ways. Some said they hire less labour and rely more on inputs (e.g. use herbicides for weeding instead of machete) whilst other said that they try to rely more on household labour or the system of shared labour even though we find few such cases in the household survey data. Some participants complained that they have less household labour availability as the government does not allow them to use their children on the farm.

"Labour is available, but expensive. As the cost of living increases, day labourers ask for more. During the main cocoa season, there is competition for labour. Who pays the highest price wins. Most of the farmers are using herbicide so they don't have to use labour for weeding." (FGD, Eastern Region, Ghana)

In Côte d'Ivoire, focus group participants also said that labour availability and affordability has become worse over the last five years. Participants argued that labour costs have increased over recent years, in line with the increasing price received for cocoa. Participants suggested that when the price of cocoa increases, labourers start asking more money for the same task. This may be an inflationary effect, which participants have difficulty articulating and describing in inflation-adjusted terms.

"The prices have increased for labour. The increase in the price of cocoa leads to increases in the price of labour, but also of inputs and even of food." (FGD, Gôh, Côte d'Ivoire)

Participants also discussed how labour has become scarcer since the remaining labourers have started to negotiate for higher wages. It was said that more labourers have become landowners themselves and have chosen to invest their labour on their own land. Some focus groups mentioned that there is now less migrant labour and little child labour. One group noted that youth are less interested in working as labourers and stay at school longer, which means that households depend more on their own labour resources.

"We can hardly find labourers anymore as everyone has their own farm now. They are busy with their own farm. Labour is expensive as it is rare so we now use abusa sharecroppers on cocoa to have labour." (FGD, Haut-Sassandra, Côte d'Ivoire)

"The government has stopped the trafficking of child labour – in the past there were more migrant labour." (FGD, Me, Côte d'Ivoire)

8.4.3 Labour types – household, hired and communal

Most cocoa households make extensive use of family labour as there is no perceived cost (although there is an opportunity cost), and household labourers have an interest in maintaining the quality of their activities. As discussed above, hired labour can be prohibitively expensive for some households, and tends to be avoided unless there is additional work to be done, or skilled labour is needed for certain activities. Another labour source is communal labour. In Ghana, these labour exchange groups are known as *nnoboa*.

In our household survey, respondents were asked "Who did [activity] – household, hired or communal labour?" Table 8.9 presents the proportion of cocoa households using household, hired and communal labour per activity.

In Ghana, a higher proportion of respondents reported using household labour than hired labour for nearly all activities. The exceptions were land clearing and weeding – both heavy and laborious tasks. Households also tended to use more hired labour for the application of liquid fertiliser, pesticides and fungicides. This may be explained by the fact that the spraying and safety equipment may not be owned by the household and is a skilled task. For most activities, respondents reported using either household or hired labour – not both. We found that a substantial proportion of households combined both labour types only for harvesting (25%) and weeding (27%), presumably due to the high labour requirements of these activities. Pod breaking was the only activity which employed a substantial amount of communal labour.

In Côte d'Ivoire, household labour is also more commonly used than hired labour for most cocoa production activities. Compared with Ghana, there were lower rates of hired labour use for most activities with the exception of liquid fertiliser, pesticide and fungicide application. However, as discussed above, a relatively low proportion of Ivorian households apply these inputs at all. Few cocoa households combine household and hired labour, usually opting for one type or another. Communal labour is mainly used alongside household labour for pod breaking. Around a fifth of respondents said communal labour is also used for land clearing and weeding activities.

Table 8.9 Percent of households using household, hired and communal labour (of those doing the activity), by country

	Ghana Household	Ghana Hired	Ghana Communal	Côte d'Ivoire Household	Côte d'Ivoire Hired	Côte d'Ivoire Communal
Land clearing	40%	71%	3%	71%	35%	20%
Land preparation	80%	36%	7%	85%	24%	12%
Planting	92%	24%	10%	97%	7%	4%
Granular fertiliser	85%	34%	9%	77%	28%	5%
Liquid fertiliser	55%	54%	6%	47%	60%	4%
Manure	78%	40%	4%	95%	18%	3%
Herbicides	75%	38%	6%	80%	24%	4%
Pesticides	55%	57%	5%	37%	70%	3%
Fungicides	62%	40%	6%	48%	59%	8%
Weeding	55%	71%	4%	70%	44%	21%
Pruning	68%	39%	5%	88%	18%	5%
Harvest	81%	43%	7%	83%	26%	11%
Pod breaking	82%	15%	77%	91%	19%	80%
Fermenting	92%	8%	17%	86%	20%	3%
Transporting	66%	44%	28%	46%	51%	13%
Drying	96%	7%	1%	86%	20%	1%

Note: Table 8.9 is a summary of data compiled from each activity. After indicating that their household had undertaken the activity in the last year, survey respondents were asked "Who did [activity] for cocoa – household, hired or communal labour?". Multiple responses could give be provided so percentages may add up to more than 100%. A more detailed summary is provided below.

Figure 8.4 Cocoa, percent of households using household, hired and communal labour per activity, Ghana

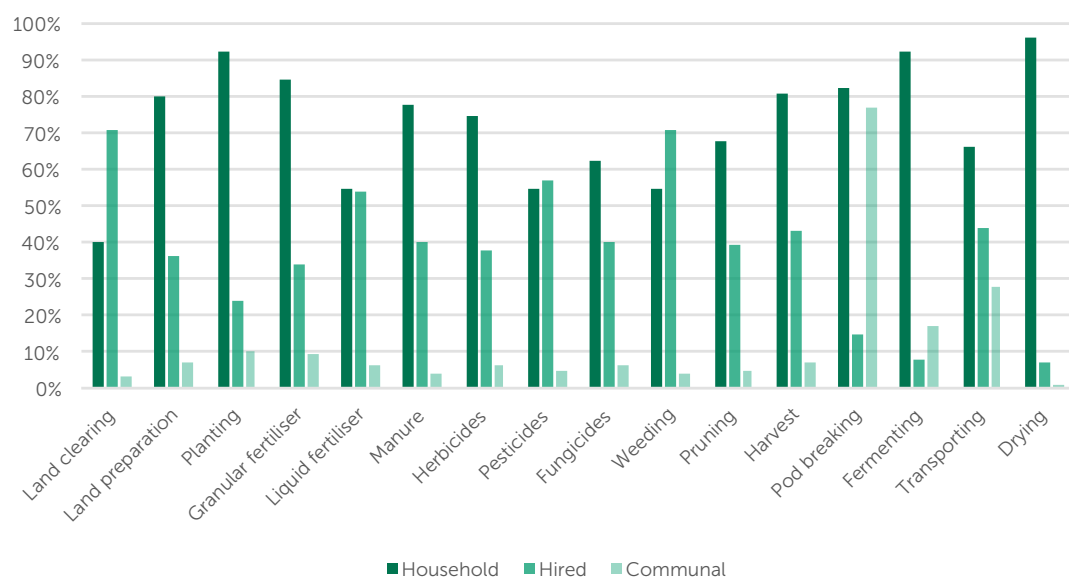
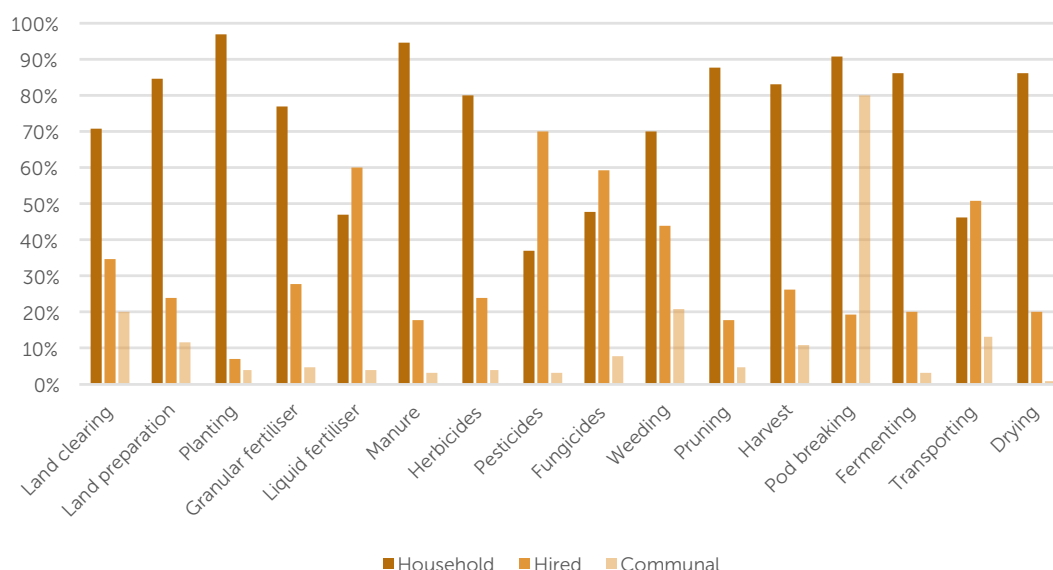


Figure 8.5 Cocoa, percent of households using household, hired and communal labour per activity, Côte d'Ivoire



In Ghana, for many activities there was found to be no statistically significant difference in hired labour use between male and female-headed cocoa households, or differences were quite small. However, around 20% more female-headed households used hired labourers than male-headed households for the application of liquid fertiliser, herbicide, pesticide and fungicide. Female-headed households also hire labourers for pruning much more frequently (Table 8.10). This suggests that the hypothesis that female-headed households need to hire more labour is valid, but should not be overstated.⁴⁴ One reason for this difference is that female-headed households tend to be slightly smaller, and therefore it is likely that they have a greater need for hired labour. Some women may also feel they lack the strength for heavier activities – something they frequently mentioned in focus group discussions – and hire labourers for these tasks.

Gender disaggregated data on hired labour for Côte d'Ivoire is not presented here due to the low number of female-headed households producing cocoa as one of their most important crops.

⁴⁴ Barrientos, S.W & Asenso Akyere, K. (2008). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocoalife.org/progress/mapping-sustainable-production-in-ghanaian-cocoa>

Table 8.10 Cocoa, proportion of female and male-headed households using hired labour, per activity, Ghana

	Ghana female head	Ghana male head	pvalue	sig
Land clearing	75%	71%	0.46	
Land preparation	43%	35%	0.19	
Planting	23%	25%	0.68	
Granular fertiliser	40%	32%	0.22	
Liquid fertiliser	74%	49%	0.00	***
Manure	47%	38%	0.54	
Herbicides	53%	36%	0.00	***
Pesticides	72%	54%	0.00	***
Fungicides	55%	38%	0.00	***
Weeding	78%	70%	0.02	**
Pruning	57%	35%	0.00	***
Harvest	53%	41%	0.00	***
Pod breaking	17%	15%	0.37	
Fermenting	12%	8%	0.05	*
Transporting	41%	45%	0.29	
Drying	10%	6%	0.04	**

Note: p-value from a one-way ANOVA test. This table shows the proportion of male and female-headed households hiring labour for each activity. It does not show the intensity with which hired labour was used alongside household labour. Côte d'Ivoire data is not presented because of the very low number of observations.

8.4.4 Hired labour costs

The hired labour rate varies from activity to activity depending on how laborious the task is and whether it requires specific expertise or equipment.⁴⁵ Labour costs can also fluctuate within a season depending on labour scarcity, which partly explains why labour costs vary from location to location.⁴⁶

In our household survey, farmers who had hired labour for a particular activity were asked if they knew how much they paid per day, and, if so, how much. The rate for a hired labour differs slightly per activity in both countries (Table 8.11). In Ghana, hired labourers earn between US\$4.91 and US\$7.05 per day, while those in Côte d'Ivoire earn between US\$2.20 and US\$6.42 per day. Hiring labourers for activities that require heavy work, such as transporting, typically costs more than for lighter activities, such as planting, harvesting. Pod breaking typically costs the least of all activities. Activities that require some basic technical skills, such as chemical spraying, also cost more than most cocoa activities. We consider the Ghana figures to be more robust than the Côte d'Ivoire figures because the sample size of Ivorian respondents growing cocoa, hiring labour and knowing the price they paid is a quite low.

⁴⁵ Selten, M. (2015). Certification and wage labour in the cocoa sector in Ghana. Wageningen University, Master: Management, Economics and Consumer Sciences, Department: Agricultural Economics and Rural Policy Analysis (AEP), LEI. Available at <http://www.cocoaconnect.org/sites/default/files/publication/selten%20thesis%20wage%20workers%20ghana%2008122015.pdf>

⁴⁶ Vigneri, M. and Serra, R. (2016). Researching the Impact of Increased Cocoa Yields on the Labour Market and Child Labour Risk in Ghana and Côte d'Ivoire. ICI Labour market research study. Available at: http://www.cocoinitiative.org/wp-content/uploads/2016/12/market_research_full_web.pdf

These reported daily rates for hired labourers are more than many studies report cocoa farmers earning per day.^{47,48} It would be unusual if this was the case. If labouring for others was more profitable than farming cocoa on one's own land, then we would expect more households to opt to be 'professional' labourers instead. However, in our demographics chapter, we showed that few respondents reported household income from labouring on other peoples farms. There are several possibilities that could explain this finding. First, survey respondents may have reported daily labour rates that are too high. However, as these rates were corroborated in focus group discussions this seems unlikely. Another possibility is that estimations of household cocoa income in other studies is too low, something we discuss when we present our cocoa profitability model in Chapter 13. Alternatively, opportunities to labour on other household's land may be too infrequent to be a reliable source of income. Working as a farm labourer is also often said to be longer and harder work than labouring on one's own farm.

Table 8.11 Average of regional median daily rates, Ghana and Côte d'Ivoire

	Ghana		Côte d'Ivoire	
	Cedis	US dollar	CFA	US dollar
Land clearing (USD/ha)	22	\$5.63	3,234	\$5.37
Land preparation (USD/ha)	22	\$5.76	2,116	\$3.51
Planting (USD/ha)	19	\$4.91	1,500	\$2.49
Granular Fertiliser application (USD/ha)	22	\$5.76	1,994	\$3.31
Liquid Fertiliser application (USD/ha)	27	\$7.05	3,869	\$6.42
Manure/compost application (USD/ha)	22	\$5.77	-	-
Herbicides application (USD/ha)	21	\$5.46	2,104	\$3.49
Pesticides application (USD/ha)	25	\$6.54	3,598	\$5.97
Fungicides application (USD/ha)	23	\$6.04	3,254	\$5.40
Weeding (USD/ha)	21	\$5.61	2,078	\$3.45
Pruning (USD/ha)	26	\$6.85	-	-
Harvesting (USD/ha)	22	\$5.76	1,326	\$2.20
Pod breaking (USD/ha)	22	\$5.64	-	-
Fermenting (USD/ha)				
Drying (USD/ha)				
Transporting (USD/ha)	27	\$7.17	3,319	\$5.51

Note: Exchange rate used from January 2016. Calculations were made as follows: i) outliers were removed at country level ii) the median hiring cost is computed per country region iii) the above table reports the average of the regional median.

⁴⁷ Fountain, A.C. and Hütz-Adams, F. (2015) Cocoa Barometer 2015-USA Edition. Available at <http://www.cocoabarometer.org/>

⁴⁸ Balineau, B., Bernath, S., Pahuatini, V. (2016). Cocoa farmers' agricultural practices and livelihoods in Côte d'Ivoire. Insights from cocoa farmers and community baseline surveys conducted by Barry Callebaut between 2013 and 2015. AFD and Barry Callebaut. Available at <https://www.afd.fr/fr/cocoa-farmers-agricultural-practices-and-livelihoods-cote-divoire>

8.4.5 Labour – male and female roles

In the household survey, respondents were asked, “Who did [the activity] – men, women or both?”

In Ghana, male and female respondents reported that men participate in virtually all cocoa production activities at very high rates (98-100%). Male and female respondents also agreed – in the household survey and in focus group discussions – that women typically engage in cocoa production activities at lower rates than men (Table 8.12). In Ghana, the most common activities that women participate in are planting, granular fertiliser application, manure application, pod breaking, transporting and drying. These are almost always done alongside men. Women rarely participate in heavy, labour intensive activities such as land clearing and weeding, and have much lower participation in the application of inputs.

In Côte d’Ivoire, men were reported have very high participation rates (97-100%) for virtually all cocoa production activities. Women engage in cocoa production activities much less frequently than women in Ghana. In Côte d’Ivoire, the main activity where women play a substantial role is pod breaking (Table 8.12).

Table 8.12 Cocoa, percent of respondents who reported that men, women or both usually do the activity, by country

	Ghana		Côte d’Ivoire		Sig (men)	Sig (women)
	Men	Women	Men	Women		
Land clearing	100%	6%	100%	3%		*
Land preparation	98%	47%	98%	19%		***
Planting	95%	75%	97%	31%		***
Granular fertiliser	98%	50%	97%	15%		***
Liquid fertiliser	100%	23%	100%	0%		***
Manure	90%	55%	100%	15%	**	***
Herbicides	98%	35%	100%	2%	**	***
Pesticides	100%	22%	99%	2%		***
Fungicides	99%	26%	99%	2%		***
Weeding	99%	17%	99%	5%		***
Pruning	99%	8%	99%	2%		***
Harvest	98%	44%	100%	14%	***	***
Pod breaking	99%	71%	100%	50%		***
Fermenting	96%	48%	99%	5%	***	***
Transporting	98%	60%	98%	13%		***
Drying	93%	79%	99%	18%	***	***

Note: For each activity, respondents were asked “Who did land clearing for cocoa – men, women or both?” In the case that both men and women contributed labour to the activity, this is reflected in the percentages ascribed to each. Therefore, figures may add up to more than 100%.

Figure 8.6 Who does each cocoa activity, men women or both, Ghana

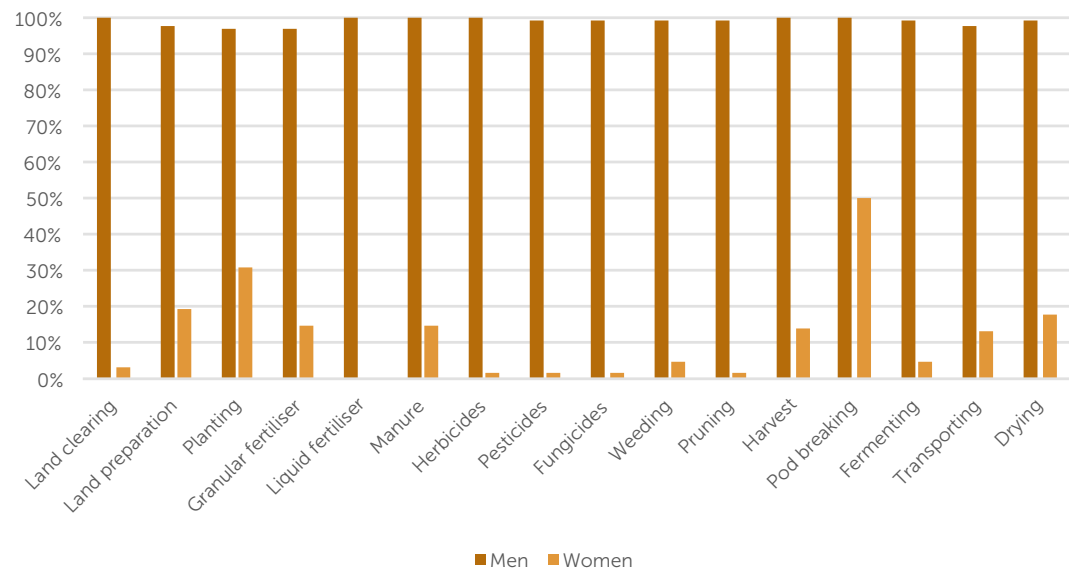
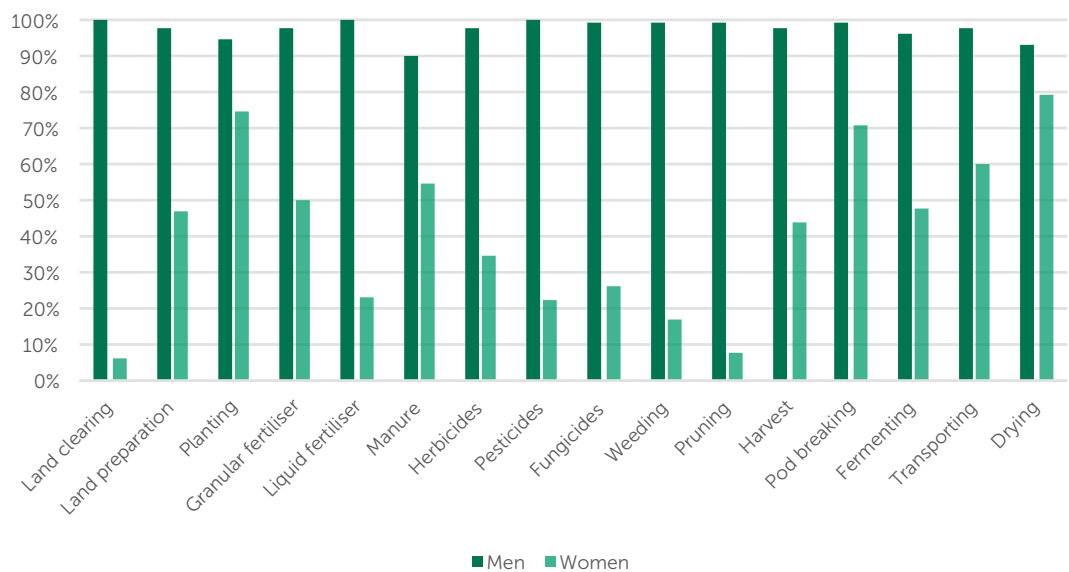


Figure 8.7 Who does each cocoa activity, men women or both, Côte d'Ivoire



During focus group discussions, participants discussed the distribution of roles in cocoa production tasks.

In Ghana, focus group participants confirmed that men participate in all cocoa activities, with women sometimes accompanying them. Virtually all focus group participants said that men usually spend more time working on cocoa farms than women (one group said both). It was often said that men “take the lead”, and go to the farm earlier in the morning. As the head of the household, men assume responsibility for maintaining the cocoa farm well and “ensuring the household has a good income”. Participants discussed how cocoa activities are physically demanding

and require strength, (e.g. land clearing and spraying) and are difficult (e.g. pruning) and therefore primarily involve men, as “men have the strength” and “men have the knowledge”. Married women are seen more as supporters, helping out their husbands. Typical women’s tasks were described as food preparation for the men that were working on the cocoa farm, and fetching water for spraying. Women may help to take care of the young cocoa farms in the first few years, which are usually intercropped with food crops, such as plantain and cassava.

In Côte d’Ivoire, focus group participants also confirmed that men play the dominant role in all cocoa activities, for the same reasons expressed in Ghana. The main difference is that Ivorian women play a smaller role in cocoa activities than women in Ghana, which is consistent with the finding that a smaller proportion of Ivorian female-headed households opt to produce cocoa than Ghanaian female-headed households.

We are aware that these findings on gender roles in cocoa production may run counter to some narratives. One commonly cited statistic is that “women provide 68% of the labour” for cocoa.^{49,50,51} This statistic can be traced back to an African Development Bank report.⁵² However, we have confidence in our findings on the roles of men and women in cocoa production because there was good agreement between male and female respondents in the household survey,⁵³ and this was corroborated in focus group discussions by male and female participants.

8.5 Losses

In our household survey, respondents reported their cocoa losses from cocoa pests and diseases. It is important to note that, in some cases, respondents had difficulty with the difference between diseases and pests, and determining between on farm and post-harvest losses. Therefore, the figures presented below should be viewed as an approximation only. Furthermore, disease and pest conditions are highly likely to change from year to year.

⁴⁹ ICI. (2018). Recognising women’s work in cocoa production, today and every day. Available at <https://cocoainitiative.org/news-media-post/recognising-womens-work-in-cocoa-production-today-and-every-day/>

⁵⁰ Marston, a. (2016). Women’s rights in the cocoa sector, examples of emerging good practice. Oxfam discussion papers. Available at <https://oxfamilibrary.openrepository.com/bitstream/handle/10546/600528/dp-womens-rights-cocoa-sector-good-practice-100316-en.pdf>

⁵¹ Nieburg, O. (2017). A long way to go’ to equality for women cocoa farmers. Confectionary News. Available at <https://www.confectionarynews.com/Article/2017/11/02/Women-cocoa-farmers-A-long-way-to-go-to-equality>

⁵² African Development Bank. (2015). Economic Empowerment of African Women through Equitable Participation in Agricultural Value Chains. Available at https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Economic_Empowerment_of_African_Women_through_Equitable_Participation_in_Agricultural_Value_Chains.pdf. Other papers have also cited this figure including Oxfam. (2016). Women’s rights in the cocoa sector, examples of emerging good practice. Available at <https://policy-practice.oxfam.org.uk/publications/womens-rights-in-the-cocoa-sector-examples-of-emerging-good-practice-600528>. However, the original source was not able to be traced beyond the African Development Bank paper where on page 48 this quotation was cited as Fair Labour Association, ESI 2015. We have found an executive summary of the what is possibly the intended citation, but this does not reference the statistic. An attempt to contact the authors via the given email address was unsuccessful.

⁵³ For example, female respondents in male headed households also reported that men engage in cocoa production activities more frequently than women.

In Ghana, a little over half of cocoa households reported experiencing losses from cocoa diseases (52%) in the past year. Black pod was the most frequently reported disease, followed by CSSVD (Table 8.15). Most respondents reported either no or mild/low effects of disease on their cocoa farms, with 12% saying the problem was 'severe' (Table 8.16). In Ghana, 57% reported losses from pests, with capsids being the most frequently reported pest. Most households experiencing pests also said the effect was none or mild/low, with 16% reporting severe problems.

In Côte d'Ivoire, a significantly lower proportion of respondents reported cocoa diseases than Ghanaian respondents (31%). This is an interesting finding given that a smaller proportion of Ivorian farmers use chemical inputs overall, and with fewer applications on average per year. Compared with Ghana, a similar proportion reported CCSVD, while substantially fewer reported black pod disease (Table 8.14).

The effect of diseases on those experiencing them was most frequently reported to be none or mild/low, with only 7% reporting severe problems (Table 8.16); 45% of Ivorian cocoa households reported some losses from pests. The most commonly reported pests were *Foreurs de tige* (stem borer), *Akate* (capsids), mirids and mistletoe. Of those experiencing pests, most reported no or mild/low effects, with only 7% reporting the problem to be severe (Table 8.16).

Table 8.13 Cocoa, percent of respondents experiencing cocoa losses from diseases, pests, and during storage

	Ghana	Côte d'Ivoire	pvalue	sig
Cocoa diseases	52%	31%	0.00	***
Cocoa pests	57%	45%	0.00	***
Losses during storage	16%	2%	0.00	***
N	1,318	908		

Table 8.14 Percent of cocoa households experiencing losses from types of disease, by country

Disease	Ghana	Côte d'Ivoire	pvalue	sig
Black pod disease	44%	12%	0.00	***
Swollen shoot disease (CSSVD)	14%	16%	0.25	
Other	9%	4%	0.00	***
Blight thread	5%	1%	0.00	***
Le chancre		4%		
N	1,318	910		

Table 8.15 Percent of cocoa households experiencing losses from types of pest, by country

Pest	Ghana	Côte d'Ivoire	pvalue	sig
Akate (capsids)	50%	26%	0.00	***
Mistletoe	16%	21%	0.00	***
Mirids	15%	24%	0.00	***
Rodents	13%	9%	0.00	***
Black ants	8%	4%	0.00	***
Termites	5%	11%	0.00	***
Other	4%	1%	0.00	***
Foreurs de tige (stem borer)	0%	30%	-	-
Mousse verte	0%	10%	-	-
Don't know	0%	1%		
N	1,318	910		

Table 8.16 Disease and pest severity, by country

	Ghana Disease severity	Ghana Pests severity	Côte d'Ivoire Disease severity	Côte d'Ivoire Pests severity
None	48%	43%	69%	55%
mild/low	23%	22%	13%	21%
medium	16%	19%	12%	17%
severe	12%	16%	7%	7%
N	1,318	1,318	910	910

8.6 Summary

In Ghana, around half of all cocoa households reported clearing land and planting cocoa in the last year. In Côte d'Ivoire, around a quarter did land clearing and a third planted cocoa. This appears to confirm that land under cocoa is increasing and that planting or (or replanting) is a fairly common practice.

In Ghana, a much higher proportion of cocoa households use fertiliser, herbicide, and fungicide than in Côte d'Ivoire. Both countries have relatively high rates of pesticide use. Ghanaian households also apply pesticides and fungicides a greater number of times per year than Ivorian households, though still below recommended frequencies.

In Ghana and Côte d'Ivoire, respondents have difficulty estimating the number of labour days spent per activity in cocoa. For many activities, only around half of respondents said they knew how many labour days they spent per activity, due to poor record-keeping on hired labour costs and household labour days.

In Ghana and Côte d'Ivoire, records are only kept by one third of cocoa households. Of those keeping records, most only keep records on volume produced and sold, the price, and amount of money received. A much smaller proportion of respondents in Ghana kept records of money spent on inputs and hired labour, while in Côte d'Ivoire records were not kept on these items.

On average, households in Ghana reported spending 53 labour days per hectare on cocoa production activities. In Côte d'Ivoire, only 32 labour days are used per hectare. These averages do not include labour days for cocoa fermentation and drying. In Ghana and Côte d'Ivoire, the cocoa activities that require the highest number of labour days are weeding and harvesting.

In Ghana and Côte d'Ivoire, the availability and affordability of hired labour is perceived to be getting worse. In Ghana, this was most frequently attributed to farm labourers moving to other sectors (gold mining, work in the towns). In both countries, participants said that young people are staying in school longer instead of working as labourers, and that more people are working to establish their own cocoa farms instead of selling their labour. However, focus group participants often noted that increases in hired labour costs were broadly in line with increases in other costs and in the price of cocoa. This suggests that inflation also plays a role.

In Ghana, household labour is the predominant source of labour for most cocoa activities, as there is no perceived cost (although there is an opportunity cost). Ghanaian households more frequently use hired labour for heavy and laborious tasks (land clearing and weeding), and for the spray application of fertiliser, pesticides and fungicides. Most often, households use either household labour or hired labour, rather than a combination of both.

In Côte d'Ivoire, households rarely hire labour for cocoa production. When they do, it is usually for the spray application of fertiliser, pesticides and fungicides. Less frequently, labourers may be hired for weeding and transport.

In Ghana and Côte d'Ivoire, communal labour is very rarely used, except for pod breaking alongside household labour. In Côte d'Ivoire, a small proportion of households also involve communal labour for weeding and land clearing.

Female-headed households and male-headed households use similar rates of hired labour for most cocoa activities. The main exceptions are the spray application of liquid fertiliser, herbicides, pesticides and fungicides, for which about 20% more female-headed households hire labour than male-headed households. This suggests that female headed households do hire labourers at a higher rate, but that differences with male-headed households should not be overstated.

In Ghana, respondents reported that men nearly always engage in all cocoa activities. Male and female respondents agreed that women generally engage in cocoa production activities at lower rates than men. In focus group discussions, women were often described as ‘supporters’. Women usually participate in lighter work, such as planting, pod breaking, fermenting and drying. Women also participate in complementary activities, such as food preparation for the labourers, fetching water for spraying, and taking care of the young cocoa farms.

In Côte d’Ivoire, men participate in all cocoa activities, while women participate at much lower rates, even compared with Ghanaian women. The main cocoa activity where women contribute alongside men is ‘pod breaking’.

The cost of hired labour varies per activity, as some activities are heavier and more physical and some require more technical skill or equipment. In Ghana, the cost of hired labour ranges from US\$ 4.91 to US\$ 6.85 per day, depending on the activity, while in Côte d’Ivoire it ranges from US \$2.20 to US \$5.97.

In Ghana, the use of granular fertiliser (39%) and liquid fertiliser (53%) to boost yields is common. Farmers also frequently use herbicides (51%) to control weeds, and pesticides (88%) and fungicides (74%) to control pests and diseases. The relatively high rates of input use can be largely attributed to COCOBOD programmes, which provide free inputs to many cocoa households. However, focus group participants often perceived the government’s input supply services to be worse than 5 years ago. The amount and timeliness of inputs supplied were frequently mentioned concerns.

In Côte d’Ivoire, fertiliser, herbicides and fungicides are applied by a much smaller proportion of cocoa households than in Ghana. However, the majority of cocoa households (75%) do apply pesticides. The difference in input use with Ghana can largely be attributed to the fact that most Ivorian households do not receive inputs for free through government programmes or other sources.

In Ghana, 52% of cocoa households reported experiencing losses from cocoa diseases in the past year compared with 31% in Côte d’Ivoire. This is interesting considering a smaller proportion of Ivorian farmers use chemical inputs. In Ghana, the highest proportion reported losses from black pod disease (44%) with only 14% reporting CSSVD. In Côte d’Ivoire, much fewer respondents reported black pod (12%) with 16% reporting CSSVD. In Ghana, 12% said they had a severe problem compared with 7% in Côte d’Ivoire.

In Ghana, 57% reported losses from pests, with capsids being the most frequently reported pest. In Côte d’Ivoire, 45% of cocoa households experience some losses from pests with the most commonly reported being *Foreurs de tige* (stem borer), *Akate* (capsids), mirids and mistletoe. In Ghana, 16% reported severe problems compared with only 7% in Côte d’Ivoire.



Photo credit: Nestle, Investment with cocoa farmers



Cocoa producer groups, certification, training and credit

Bymolt, R., Laven, A., Tyszler, M. (2018). Demystifying the cocoa sector in Ghana and Côte d'Ivoire. Chapter 9, Cocoa producer groups, certification, training and credit. The Royal Tropical Institute (KIT).



9.1 Cocoa producer groups

NGOs and companies generally believe in the importance of organising cocoa farmers into producer groups. These may be formal farmer organisations, such as cooperatives and associations, or informal labour exchange groups.¹

In Ghana, it is well documented that only a small proportion of cocoa farmers are organised in formal groups.^{2,3,4} A study done in 2010 suggests reported that only 15% of the farmers encountered were members of a farmer association.⁵ Nevertheless, studies do suggest that the number of formal cocoa producer groups has increased over the last decades.⁶ Frequently mentioned benefits of being a member of a cocoa producer group are access to training,^{7,8,9} access to inputs and mechanised farm-equipment (e.g. motorised spraying machines),¹⁰ market information and better access to buyers.¹¹ Some previous studies suggest that being a member of a farmer organisation or group is correlated with higher yields¹² and incomes.¹³ A number of less tangible benefits were also mentioned in the literature, such as better social contacts and increased knowledge exchange between farmers, and the opportunity to discuss common problems during meetings.¹⁴

In Côte d'Ivoire, the cooperative is the most common type of cocoa producer group. There are over 1,500 registered cooperatives but, according to the Ivorian Ministry of Agriculture, most of them are not functioning.¹⁵ And there are conflicting reports on the percentage of farmers that are cooperative members. According to the Conseil du

¹ Laven, A. (2010). The risks of inclusion: Shifts in governance processes and upgrading opportunities for cocoa farmers in Ghana. Amsterdam: KIT. Available at: https://pure.uva.nl/ws/files/1437472/77981_18.pdf

² Laven, A. and Boomsma, M. (2012) Incentives for sustainable cocoa production in Ghana. Moving from maximizing outputs to optimizing performance. KIT Royal Tropical Institute. Funded under the Multi-Annual Strategic Plan 2012-2015 of the Netherlands Embassy to Ghana. Available at http://www.worldcocoafoundation.org/wp-content/uploads/files_mf/laven201297.pdf

³ Baah, F., & Anchirinah, V. (2010). Looking for convergence: Stakeholders' perceptions of cocoa extension constraints in Ghana. *Journal of Science and Technology (Ghana)*, 30(3). Available at <https://www.ajol.info/index.php/just/article/download/64626/52401>

⁴ Barrientos, S.W & Asenso Akyere, K. (2008). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocoalife.org/progress/mapping-sustainable-production-in-ghanaian-cocoa>

⁵ Baah, F., & Anchirinah, V. (2010). Looking for convergence: Stakeholders' perceptions of cocoa extension constraints in Ghana. *Journal of Science and Technology (Ghana)*, 30(3). Available at <https://www.ajol.info/index.php/just/article/download/64626/52401>

⁶ E.g. Salifu, A. and Funk, R. (2012). Farmer Based Organizations in Ghana. Available at <https://gssp.ifpri.info/files/2012/04/FBOs-in-Ghana.pdf>

⁷ Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C., Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics. Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>

⁸ Steijn, C. P. A. (2016). Towards sustainable cocoa production: a mixed method assessment of the influence of local governance modes on the farm level impact of private cocoa certification standards in Ghana (Master's thesis). Available at: <https://dspace.library.uu.nl/handle/1874/337181>

⁹ Waarts, Y., Ge, L., Ton, G., van der Meen, J. (2013). A touch of cocoa: Baseline study of six UTZ- Solidaridad cocoa projects in Ghana. LEI report 2013-2014. LEI Wageningen UR. Available at <http://edepot.wur.nl/305316>

¹⁰ Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C., Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics. Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>

¹¹ Waarts, Y., Ge, L., Ton, G., van der Meen, J. (2013). A touch of cocoa: Baseline study of six UTZ- Solidaridad cocoa projects in Ghana. LEI report 2013-2014. LEI Wageningen UR. Available at <http://edepot.wur.nl/305316>

¹² Calkins, P., & Ngo, A. (2005). The Impacts of Farmer Cooperatives on the Standard of Living Of Cocoa Producing Villages in Côte d'Ivoire and Ghana. Canada: Societe de Cooperation pour le Developpement International. Available at: <http://socodevi.org/contenu/prospecteur/uploads/Cocoa-Cooperatives-and-Well-being-20051130.pdf>

¹³ Barrientos, S.W & Asenso Akyere, K. (2008). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocoalife.org/progress/mapping-sustainable-production-in-ghanaian-cocoa>

¹⁴ Waarts, Y., Ge, L., Ton, G. & van der Meen, J. (2013). A touch of cocoa: Baseline study of six UTZ- Solidaridad cocoa projects in Ghana. LEI report 2013-2014. LEI Wageningen UR. Available at <http://edepot.wur.nl/305316>

¹⁵ GEFAC. (no date). Study on the state of farmer cooperatives in the cocoa sector of Côte d'Ivoire. DRAFT Final report. As part of the future collaboration between cocoa farmers and the GISCO-planned project PRO PLANTEURS in Côte d'Ivoire. Available at: https://www.kakaoforum.de/fileadmin/Redaktion/Studien/GISCO_COOP_Report_GEFAC_final.pdf

Café-Cacao (CCC), around 50% of cocoa farmers are members of a cooperative,¹⁶ while another study points to a much lower percentage (around 20%).¹⁷ Most cooperatives – some of which participate in certification programmes – are exclusive suppliers to exporters. In the literature, the most frequently mentioned benefits of being a cooperative member in Côte d'Ivoire are better payment terms (such as prompt payment, or a price premium),^{18,19} and access to inputs, information and services.²⁰

Despite the potential benefits of being a producer group member, why are most cocoa farmers in Ghana and Côte d'Ivoire not formally organised? Some studies have argued that the most important reason is simply an absence of cooperatives in the area,²¹ although this doesn't explain why farmers have not self-organised. Other studies have suggested that the benefits of collective action may be mitigated in a regulated cocoa sector, where being organised does not provide any tangible benefits in terms of price negotiation or economies of scale.^{22,23} Some research suggests that a lack of trust between farmers can be an issue,²⁴ whilst another paper argues that regional differences are also relevant.²⁵

In our study, survey respondents were asked, “Is someone in your household a member of a cocoa producers group?”. This could involve membership of a cooperative, association or ‘functional group’.²⁶ Not surprisingly, the researchers found relatively low rates of cocoa group membership in Ghana (11%) and in Côte d'Ivoire (21%) (Table 9.1).

Table 9.1 Percent of cocoa households with a member of a cocoa producers group, by country

	Ghana	Côte d'Ivoire	pvalue	sig
mean	11%	21%	0.00	***
std.error	1%	1%		
N	1,318	908		
cocoa_progroup_hhmem				

Note: p-value from a one-way ANOVA test. The survey question asked, “Is someone in your household a member of a cocoa producers group?”

¹⁶ *ibid*

¹⁷ Kapoor, A. (2016). *Children at the Heart: Assessment of Child Labour and Child Slavery in Côte d'Ivoire's Cocoa Sector and Recommendations to Mondelēz International*. Embody. Available at: https://www.cocoalife.org/~media/CocoaLife/Files/pdf/Library/FULL_REPORT_Cote_Ivoire_Mondelez_Embode_ChildrenattheHeart.pdf

¹⁸ Varlet, F. & Kouamé, G. (2013). *Étude de la production de cacao en zone riveraine du parc national de Taï*. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and Ministère de l'Agriculture de la Côte d'Ivoire.

¹⁹ Calkins, P., & Ngo, A. (2005). *The Impacts of Farmer Cooperatives on the Standard of Living Of Cocoa Producing Villages in Côte d'Ivoire and Ghana*. Canada: Societe de Cooperation pour le Developpement International. Available at: <http://socodevi.org/contenu/prospecteur/uploads/Cocoa-Cooperatives-and-Well-being-20051130.pdf>

²⁰ Ingram V., Waarts Y., van Vugt S.M., Ge L., Wegner L., Puister-Jansen L. (2013). *Towards sustainable cocoa: Assessment of Cargill and Solidaridad cocoa farmer support activities in Côte d'Ivoire 2008-2012*. LEI, Wageningen UR. Wageningen. Available at: <http://edepot.wur.nl/314177>

²¹ Varlet, F. & Kouamé, G. (2013). *Étude de la production de cacao en zone riveraine du parc national de Taï*. Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) and Ministère de l'Agriculture de la Côte d'Ivoire.

²² Laven, A. (2010). *The risks of inclusion: Shifts in governance processes and upgrading opportunities for cocoa farmers in Ghana*. Amsterdam: KIT. Available at: https://pure.uva.nl/ws/files/1437472/77981_18.pdf

²³ Blackmore & Heilbron (2015). *Case study report: Cocoa in Ghana*. Available at: <http://sectortransformation.com/wp-content/uploads/2015/03/cocoaighana.pdf>

²⁴ Laven, A. (2010). *The risks of inclusion: Shifts in governance processes and upgrading opportunities for cocoa farmers in Ghana*. Amsterdam: KIT. Available at: https://pure.uva.nl/ws/files/1437472/77981_18.pdf

²⁵ Hainmueller, J., Hiscox, M., Tampe, M. (2011). *Sustainable development for cocoa farmers in Ghana*. MIT and Harvard University. Available at <https://www.theigc.org/wp-content/uploads/2015/02/Hainmueller-Et-Al-2011-Working-Paper.pdf>

²⁶ Membership of a cocoa producer group does not refer to participation in informal exchange labour groups.

Male-headed cocoa households reported slightly higher rates of cocoa producer group membership than female-headed households, although these differences were not statistically significant in either country (Table 9.2).

Table 9.2 Percent of cocoa households with a member of a cocoa producers group, by sex of household head

	Ghana female head	Ghana male head	pvalue	sig	Côte d'Ivoire female head	Côte d'Ivoire male head	pvalue	sig
mean	7%	11%	0.07	*	13%	22%	0.14	
std.error	2%	1%			5%	1%		
N	232	1,086			47	860		
cocoa_progroup_hhmem								

Note: p-value from a one-way ANOVA test

In focus group discussions, we asked about the presence of cocoa producer groups in the communities and the extent to which participants were satisfied with their services.

In Ghana, participants typically confirmed that cocoa producer group members get access to training about farming techniques, such as spraying and pruning, and access to seedlings. Participants generally expressed their satisfaction with producer groups in the area and said that they were a good platform for discussing problems with each other and sharing knowledge. In cases where participants expressed their dissatisfaction, they often discussed how the producer group was badly managed and eventually stopped functioning.

In Côte d'Ivoire, when discussing formal cooperatives, participants were often negative. The main reasons were financial mismanagement or embezzlement of funds by cooperative leaders. This understandably causes mistrust among community members and hampers the establishment of new cooperatives. Participants also said that it was not particularly easy to set up a cooperative without support from local actors (i.e. governments and NGOs). Being a formal cooperative member can improve a household's access to inputs and credit, and possibly a bonus from *traitants* on top of the fixed price.

In both countries, during the focus groups, participants discussed benefits and challenges of informal exchange labour groups. In Ghana, they discussed how informal exchange labour groups ease the labour burden and do not involve any costs, except food to workers. Participants did, however, mention that tensions sometimes arise when some farmers in exchange labour groups do more or less work than others, which may depend on their strength or motivation. In Côte d'Ivoire, focus group participants often said the number of labour exchange groups has been increasing in recent years. Informal exchange labour groups make farm work easier for any household that does not have access to enough household labour and cannot afford the

required hired labour. A few participants mentioned that, as a spinoff, labour exchange groups also contribute to social cohesion in the village. Some participants were not satisfied with the labour exchange groups and argued that they lack enough labourers, and that some members refuse to help others after benefiting themselves.

9.2 Cocoa certification

Certification standards for sustainable cocoa production are increasingly present in the Ghanaian and Ivorian cocoa sectors. Organisations, such as UTZ/ Rainforest Alliance²⁷ and Fairtrade prescribe a set of sustainability standards that, if met by farmers, result in a price premium on top of the producer price. Certified farmers typically receive training on good agricultural practices and farm management.

In Ghana, Fairtrade reported the highest number of certified producers in 2015, but the lowest cocoa volumes produced under the three standards. UTZ reported the most hectares certified and also the highest volumes. In Côte d'Ivoire, UTZ was easily the largest certifier, in terms of numbers of producers, hectares certified and total volumes of certified cocoa (Table 9.3).²⁸

Table 9.3 Estimated production volumes and number of producers for each certifier in Ghana and Côte d'Ivoire (2015)²⁹

	Number of producers, Ghana	Hectares, Ghana	Volumes (MT) Ghana	Number of producers, Côte d'Ivoire	Hectares, Côte d'Ivoire	Volumes (MT) Côte d'Ivoire
UTZ	92,671	298,000	169,057	193,444	827,500	486,842
RA/SAN	57,825	138,000	103,954	96,448	453,000	297,325
Fairtrade International	109,229	241,000	79,678	32,494	173,000	111,300

In our study, survey respondents were asked whether or not their household's cocoa was certified and, if so, to what standard. In Ghana, 24% of respondents reported that their household's cocoa is certified. We suggest this figure is high, given that only 11% earlier reported being a farmer group member, and certified farmers are usually organised in groups. In fact, 42% of respondents said that they "didn't know" if they were certified. Among those who claimed to be certified, UTZ and Rainforest were the most common certifications and often double certification was reported

²⁷ In January 2018, UTZ and Rainforest Alliance merged forming a new organization; a new certification programme will be available in 2019. Source: <https://utz.org/merger/>. This merger makes UTZ/Rainforest Alliance by far the largest voluntary sustainability standard in the cocoa sector, both in terms of production volumes and numbers of producers. <https://utz.org/merger/>

²⁸ Lemoud, J., Potts J., Sampson, G., Garibay, S., Lynch, M., Voora, V., Willer, H., Wozniak, J. (2017). The State of Sustainable Markets – Statistics and Emerging Trends 2017. International Trade Centre (ITC), Geneva. Available at http://www.intracen.org/uploadedFiles/intracenorg/Content/Publications/State-of-Sustainable-Market-2017_web.pdf

²⁹ *ibid*

(Table 9.5). In Côte d'Ivoire, only 7% of all respondents reported that their household is certified (Table 9.4); we suggest this figure is low.

As so many respondents stated “don't know”, we suggest that the concept of certification is not well understood by many. In fact, when cross-checking responses in the field, some farmers believed they were certified because they had received a certificate of participation for a training. Therefore, we advise against making strong conclusions about certification from this data.

Table 9.4 Percent of cocoa households that are certified, by country

	Ghana	Côte d'Ivoire	pvalue	sig
Yes	24%	7%	0.00	***
No	35%	62%		
Don't know	42%	31%		
N	1,318	908		
cocoa_certification_yn				

Note: p-value from a Chi-squared test

Table 9.5 Type of certification held (of those certified), by country

	Ghana	Côte d'Ivoire	pvalue	sig
UTZ	96%	76%	0.00	***
Rainforest Alliance	87%	27%	0.00	***
FLO / Fairtrade	1%	12%	0.00	***
Organic	0%	0%	0.72	
N	326	41		

Note: p-value from a one-way ANOVA test

9.3 Training

Government agencies, companies and NGOs all agree that transferring knowledge of modern farming techniques to farmers is an important way of improving productivity levels.^{30,31,32}

In Ghana, the ‘new cocoa extension’ programme was launched in 2010 as the Cocoa Extension Public-Private Partnership (CEPPP). The programme aims to provide an efficient and cost-effective extension service to cocoa farmers to increase their

³⁰ Cargill (2017). Cargill Cocoa Promise global report. Available at: <https://www.cargill.com/sustainability/cocoa-promise/cocoa-farmer-training>

³¹ World Cocoa Foundation (2016). Learning as we grow. Putting CocoaAction into Practice. Cocoa Action Annual Report 2016. Available at http://www.worldcocoaoundation.org/wp-content/uploads/2016-CocoaActionReport-English_WEB_10-30.pdf.

³² Mondelez International (2015). Cocolife progress report 2015. Available at <https://www.cocolife.org/~media/cocolife/Files/pdf/Library/Cocoa%20Life%20Progress%20Report>

productivity, improve income and enhance their livelihoods.³³ CEPPP is made up of public and private partners who, together, provide funds for recruitment, remuneration, and training of extension agents and also jointly provide for training materials, publications and the cost of training farmers. Public partners include COCOBOD and its subsidiaries, such as the Cocoa Health and Extension Division (CHED). The private sector partners include Mondelêz (Cadbury), Solidaridad (West Africa), World Cocoa Foundation/Cocoa Livelihoods Programme (WCF/CLP) and allied agencies, Armajaro Ghana Limited (AGL), Rainforest Alliance and farmers. GIZ-Sustainable Cocoa Business, in collaboration with the other partners, provides support in the training of farmers in the Farmer Business School.³⁴

In Côte d'Ivoire, ANADER is the main body that provides training on good agricultural practices for cocoa and for other crops. ANADER is an independent organisation supported by partners from in and outside Côte d'Ivoire, including CCC, the cocoa regulating institute. ANADER training focuses primarily on cocoa, but also on a variety of other crops (e.g. rice, cashew, coffee, cassava, oil palm). ANADER's capacity to provide quality training to all cocoa farmers is said to be more limited than in Ghana.³⁵ Other organisations that provide training for cocoa farmers are (certified) cooperatives and companies.

In our household survey, respondents were asked “Did you yourself receive any training related to cocoa farming in the past 5 years?” Around half of Ghanaian respondents reported having had some cocoa training in the past five years (Table 9.6). Male respondents reported higher rates of training (56%) compared with female respondents (34%) (*highly significant*). This may be due to the fact men are often the head of the household, and because men play a larger role than women in cocoa production activities and marketing. In Côte d'Ivoire, fewer than a fifth of Ivorian respondents reported receiving any cocoa-related training in the past five years. Around 20% of male respondents reported having received training, compared with only 5% of female respondents.

Table 9.6 Percent of respondents who have received cocoa training in the past 5 years

	Ghana	Côte d'Ivoire	pvalue	sig
Mean	49%	17%	0.00	***
std.error	1%	1%		
N	1,318	908		
cocoa_training_5years_yn				

Note: p-value from a one-way ANOVA test. The survey question was, “Did YOU yourself receive any training related to cocoa farming in the past 5 years?”

³³ An extensive list of objectives can be found on the Ministry website: Ministry of Food and Agriculture (2017). Cocoa Health and Extension division. Available at <http://www.e-agriculture.gov.gh/index.php/cocoa-sub-sector/cocoa-health-and-extension-division>

³⁴ *ibid*

³⁵ FLA (2015). Évaluer la situation actuelle des femmes et des jeunes agriculteurs et l'état nutritionnel de leurs familles dans deux communautés productrices de cacao en Côte d'Ivoire. Rapport préparé par Fair Labour Association, Juillet 2015.) Available at http://www.fairlabor.org/sites/default/files/documents/reports/femmes_et_des_jeunes_nutrition_dans_communautes_de_dacao_juillet_2015.pdf

Trainings can vary considerably, in terms of frequency, quality and the types of topics covered. In Ghana, most respondents (74%), who reported receiving some training, only had contact with trainers for 1-2 days. We would suggest that such low intensity training is unlikely to be sufficient to drive a change to undertake improved practices. Only 16% of respondents reported receiving between 3-5 days of training. Nevertheless, in most focus group discussions, participants said that there were more opportunities to participate in training now compared with five years ago.

In Côte d'Ivoire, the situation appears quite different. Training was received by a smaller proportion of respondents than in Ghana, but those receiving training benefited from more intensive support. Of the Ivorian respondents who had received at least some training, 35% reported receiving more than 10 days of support. These patterns of training between Ghana and Côte d'Ivoire hold regardless of the sex of the respondent (Table 9.7). In focus group discussions, around half of the communities said there were fewer opportunities now than five years ago, while half the communities discussed how there was now more training.

Table 9.7 Number of cocoa training days received in the past 5 years?

	Ghana	Côte d'Ivoire	pvalue	sig
none	0%	1%	0.00	***
1-2 days	74%	21%		
3-5 days	16%	28%		
5-10 days	4%	16%		
10+ days	5%	35%		
N	643	151		
cocoa_training_days_cat				

Note: p-value from a Chi-squared test

In addition, we asked respondents about the type of training they received. In Ghana and Côte d'Ivoire, 93% of respondents who received training said they received training on good agricultural practices. Other topics that gained a lot of attention in training were pest and disease management, child labour, good environmental practices and health and safety (Table 9.8).

Table 9.8 Types of training received in the past 5 years, by country

	Ghana	Côte d'Ivoire	pvalue	sig
Good production practices	93%	93%	0.96	
Pest and disease management	78%	66%	0.00	***
Child labour	53%	60%	0.13	
Good environmental practices	51%	59%	0.09	*
Post-harvest storage and processing	39%	34%	0.25	
Health and safety	34%	42%	0.07	*
Record-keeping and business management	26%	18%	0.04	**
Savings and loans	12%	20%	0.01	***
Gender	4%	21%	0.00	***
Other	4%	5%	0.54	
Cooperative management	1%	26%	0.00	***
N	643	151		

Note: p-value from a one-way ANOVA test

In both countries, respondents reported that government extension is the main training provider (even though the private sector often financially supports public extension).

In Ghana, the private sector was reported to be more engaged in the direct provision of training than in Côte d'Ivoire. In Ghana, 26% of respondents who received training said they got training from a Licenced Buying Company (LBC) (Table 9.9).

Table 9.9 Training source, by country

	Ghana	Côte d'Ivoire	pvalue	sig
Government extension	78%	73%	0.20	
Company, LBC	26%	9%	0.00	***
Farmer organisation	9%	15%	0.07	*
NGO	5%	3%	0.15	
Other	1%	5%	0.00	***
Don't know	1%	3%	0.00	***
Trader	0%	0%		
N	643	151		

9.4 Credit

Access to credit allows cocoa households to take advantage of their training and invest in their farms.^{36,37,38} However, we know from previous studies that credit is not always used to make on-farm investments. For example, credit can be used by cocoa farmers to support their households during the off-season when there is less money available,³⁹ or used to pay for education, health expenditures and family emergencies.^{40,41}

Farmers often have difficulties accessing a loan from a bank because they are perceived to be unreliable borrowers.⁴² Additionally, banks typically require their clients to have a bank account and some savings, and few farmers fulfil this requirement.⁴³ Farmers are also put off by the long distances to town centres where banks are based,⁴⁴ as well as high interest rates.⁴⁵ In our focus group discussions, participants often mentioned these same issues, and added that some banks require a farmer to be a member of a farmer organisation. Participants noted that banks have real concerns that borrowers will not repay their loans and so try to mitigate the risk by offering group loans, which make the group accountable for each other. However, farmers discussed how they were also wary of taking on this group risk.

In practice, the easiest way for cocoa farmer to get access to a small loan is through a local cocoa buyer instead of through banks. In Ghana, these are the LBCs and local purchasing clerks (PCs); in Côte d'Ivoire these are called the *pisteurs*. Fellow farmers, relatives or friends are other main providers of credit.^{46,47,48} In Côte d'Ivoire, farmers also access loans from farmer organisations.⁴⁹ Moneylenders, who normally

³⁶ World Cocoa Foundation (2016). Learning as we grow. Putting CocoaAction into Practice. Cocoa Action Annual Report 2016. Available at http://www.worldcocoaoundation.org/wp-content/uploads/2016-CocoaActionReport-English_WEB_10-30.pdf.

³⁷ Mondelēz International, Cocolife progress report 2015. Available at <https://www.cocolife.org/-/media/cocolife/Files/pdf/Library/Cocoa%20Life%20Progress%20Report>

³⁸ Cargill (2017). Cargill Cocoa Promise global report. Available at <https://www.cargill.com/sustainability/cocoa-promise/cocoa-farmer-training>

³⁹ Barrientos, S.W & Asenso Akyere, K. (2008). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocolife.org/progress/mapping-sustainable-production-in-ghanaian-cocoa>

⁴⁰ Waarts, Y., Ge, L., Ton, G. & van der Meen, J. (2013). A touch of cocoa: Baseline study of six UTZ- Solidaridad cocoa projects in Ghana. LEI report 2013-2014. LEI Wageningen UR. Available at: <http://library.wur.nl/WebQuery/wurpubs/fulltext/305316>

⁴¹ Balineau, G., Bernath, S., Pahuatini, V. (2017). Cocoa farmers' agricultural practices and livelihoods in Côte d'Ivoire. Insights from cocoa farmers and community baseline surveys conducted by Barry Callebaut between 2013 and 2015. Technical Reports, No. 24. AFD, Paris. Available at <http://www.afd.fr/en/cocoa-farmers-agricultural-practices-and-livelihoods-cote-divoire>

⁴² Baah, F., & Anchirinah, V. (2010). Looking for convergence: Stakeholders' perceptions of cocoa extension constraints in Ghana. Journal of Science and Technology (Ghana), 30(3). Available at: <https://www.ajol.info/index.php/just/article/view/64626>

⁴³ Balineau, G., Bernath, S., Pahuatini, V. (2017). Cocoa farmers' agricultural practices and livelihoods in Côte d'Ivoire. Insights from cocoa farmers and community baseline surveys conducted by Barry Callebaut between 2013 and 2015. Technical Reports, No. 24. AFD, Paris. Available at <http://www.afd.fr/en/cocoa-farmers-agricultural-practices-and-livelihoods-cote-divoire>

⁴⁴ Mensima Macnally-Boateng, A. (2016) Financial inclusion in Ghana: how has the use of akuafo cheques introduced cocoa farmers to banks? International Institute for Social Studies/Erasmus: The Hague/Rotterdam. Available at https://thesis.eur.nl/pub/37284/AMacNally_MA_2015_16_GPPE.pdf

⁴⁵ Ibid.

⁴⁶ Tano, M. A. (2012). Crise cacaoyère et stratégies des producteurs de la sous-préfecture de Méadji au Sud-Ouest ivoirien (Doctoral dissertation, Université Toulouse le Mirail-Toulouse II). Available at: <https://halshs.archives-ouvertes.fr/tel-00713662/>

⁴⁷ Barrientos, S.W & Asenso Akyere, K. (2008). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocolife.org/progress/mapping-sustainable-production-in-ghanaian-cocoa>

⁴⁸ Balineau, G., Bernath, S., Pahuatini, V. (2017). Cocoa farmers' agricultural practices and livelihoods in Côte d'Ivoire. Insights from cocoa farmers and community baseline surveys conducted by Barry Callebaut between 2013 and 2015. Technical Reports, No. 24. AFD, Paris. Available at <http://www.afd.fr/en/cocoa-farmers-agricultural-practices-and-livelihoods-cote-divoire>

⁴⁹ Ingram, V., Waarts, Y., Ge, L., van Vugt, S., Wegner, L., Puister-Jansen, L., Ruf, F., Tanoh, R. (2014). Impact of UTZ certification of cocoa in Ivory Coast: Assessment framework and baseline. Wageningen, LEI Wageningen UR (University & Research centre), LEI Report 2014-010. Available at: <http://edepot.wur.nl/307584>

charge high interest rates, are another source of credit.⁵⁰ In focus group discussions, many participants said they prefer to take small loans from a cocoa PC, rather than from a bank or microfinance institution (MFI). Loans from PCs are based on trust and can be provided as long as the farmer sells all of their cocoa to the same PC. Farmers, who have proven themselves to be trustworthy in previous seasons, have easier access to loans. Unfortunately, participants added that farmers who have been unable or unwilling to repay their loans may try to avoid the PC and sell to another PC. Therefore, the high risk of lending to farmers is well known by banks, small lenders and farmers themselves, and explains why responsible farmers face barriers to accessing credit, and why interest rates are so high.

In our study, we asked cocoa households whether or not they borrowed money in the past year from any source. In both countries, more than one quarter of respondents said they had done so. In Ghana, there was no significant difference in the rate of borrowing between cocoa and non-cocoa households (Table 9.10). In Côte d'Ivoire, the proportion of cocoa households that borrowed money was only slightly higher than non-cocoa households.

Perhaps surprisingly, we found no statistical difference in the proportion of male-headed and female-headed households borrowing money in either country in the past year. This suggests that barriers to accessing credit faced by female-headed households are not dissimilar to those faced by smallholders generally.

Table 9.10 Credit, percent of respondents who borrowed money last year from any source

	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
mean	27%	26%	0.81		26%	21%	0.01	**
std.error	1%	3%			1%	2%		
N	1,318	242			908	575		
loan_lastyear_yn								

Note: The question was asked: "Last year, did you yourself borrow any money from anyone, including friends, banks, money lenders or others?"

In Ghana and Côte d'Ivoire, we see that cocoa households most often access loans through local buyers, such as LBCs or *pisteurs*. Non-cocoa households rely on friends or relatives to borrow money more frequently than cocoa households. In Côte d'Ivoire, cooperatives were also mentioned as a source of credit, whereas in Ghana they were not (Table 9.11). These findings are broadly in line with other research and confirm that cocoa households have more options to take small loans, even if they borrow at similar rates to non-cocoa households.

⁵⁰ Balineau, G., Bernath, S., Pahuatini, V. (2017). Cocoa farmers' agricultural practices and livelihoods in Côte d'Ivoire. Insights from cocoa farmers and community baseline surveys conducted by Barry Callebaut between 2013 and 2015. Technical Reports, No. 24. AFD, Paris. Available at <http://www.afd.fr/en/cocoa-farmers-agricultural-practices-and-livelihoods-cote-divoire>

Table 9.11 Sources of credit in Ghana and Côte d'Ivoire, by cocoa household versus non-cocoa households

	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
LBC or PC	37%	5%	0	***	0%	0%		
Family or friends	30%	37%	0.29		24%	42%	0	***
Bank	19%	33%	0.01	**	2%	1%	0.53	
Village money lender	7%	2%	0.1	*	8%	8%	0.98	
MFI	3%	3%	0.78		0%	0%	0.48	
SACCO/credit union	2%	8%	0.01	***	5%	8%	0.33	
Trader	1%	2%	0.58		8%	14%	0.1	*
Company	1%	8%	0	***	0%	0%	0.48	
Other	1%	3%	0.32		5%	5%	0.85	
VSLA/ISLC	0%	0%	0.67		2%	3%	0.58	
Church/mosque/ religious group	0%	0%			0%	1%	0.61	
Pisteurs	0%	0%			30%	5%	0	***
Cooperative/producer group	0%	0%			18%	16%	0.58	
Don't know	0%	0%			0%	0%	0.48	
N	353	238			118	63		

Abbreviations: LBC: licensed buying company; PC: purchasing clerk; MFI: Microfinance institution; SACCO: Savings and Credit Cooperative; VSLA: village savings and loans group (informal); ISLC: Informal Susu Loan Club (susu means 'small small')

In Ghana, most borrowers took out loans of between US\$100 and US\$400 in the past year, with no statistical difference in loan amounts between cocoa and non-cocoa households (Table 9.12). The average loan size of cocoa households is around US\$290. In Côte d'Ivoire, borrowers took smaller loans, which ranged between US\$50 and US\$250. Cocoa households tended to borrow larger amounts than non-cocoa households (*highly significant*), with the average loan being around US\$175.

Table 9.12 Amount of money borrowed in the past year (of those borrowing) (US\$), by cocoa and non-cocoa household

	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
mean	290.37	260.46	0.42		175.78	100.67	0.00	***
std.error	13.81	32.38			12.30	10.69		
N	330	52			228	115		
loan_amount_usd								

Note: Exchange rate: 31 December, 2016

We find that collateral is not often required when accessing a loan or, if it is, the value of a household's crops can be used as a guarantee (Table 9.13). Very few households reported using land for collateral, which should dispel the myth that a lack of formal title is a serious barrier to accessing small loans.

Table 9.13 Credit, type of collateral used

	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
None	41%	49%	0.37		46%	65%	0.00	***
Crops	30%	21%			37%	25%		
House	12%	10%			0%	0%		
Other	7%	8%			5%	6%		
Land	5%	2%			1%	2%		
Cash deposit	5%	11%			0%	0%		
Furniture	0%	0%			0%	0%		
Livestock	0%	0%			0%	1%		
Vehicle/motorbike	0%	0%			0%	0%		
Plantation	0%	0%			10%	1%		
N	353	63			238	118		
loan_repayment_c								

In Ghana and Côte d'Ivoire, nearly half of all households used their loans for school fees/educational costs, which is consistent with our earlier finding that school related costs are one of the biggest and most important households expenditure items. In Ghana, cocoa households more frequently used loans to purchase farm inputs than non-cocoa households.

In Côte d'Ivoire, it was found to be relatively uncommon for loans to be used to purchase inputs or to hire labour. This data suggests that a lack of credit availability is not the main reason for low on-farm investments in Côte d'Ivoire since Ivorian households borrow at the same rate as Ghanaian households but are more likely to use the credit for other purposes.

Table 9.14 Credit, how did your household use the credit borrowed last year

Seedlings	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
School fees/educational costs	44%	38%	0.41		47%	41%	0.23	
Inputs (fertiliser, herbicides, pesticides)	34%	17%	0.01	***	11%	7%	0.26	
Hired labourers	19%	30%	0.05	*	2%	14%	0.00	***
Other	15%	16%	0.91		32%	20%	0.03	**
Food for consumption	13%	14%	0.79		4%	5%	0.57	
Farm tools	9%	16%	0.12		2%	3%	0.58	
Seedlings	9%	10%	0.91		0%	2%	0.22	
Small business/trade	7%	10%	0.50		2%	10%	0.00	***
Funeral costs	6%	2%	0.14		10%	6%	0.23	
Wedding costs	5%	2%	0.28		0%	1%	0.61	
Transport costs	2%	2%	0.83		1%	0%	0.32	
Clothes	1%	5%	0.08	*	0%	2%	0.22	
Buy or lease land	1%	5%	0.04	**	0%	0%	0.48	
Car or motorbike	1%	5%	0.02	**	0%	0%	0.48	
Machinery, tractor	1%	0%	0.55		0%	0%		
Hire machinery, tractor	0%	2%	0.17		0%	1%	0.16	
Repair machinery	0%	0%	0.67		0%	0%		
Storage	0%	0%			0%	0%		
Processing	0%	0%			2%	3%	0.79	
Farmer organisation membership fees	0%	0%			0%	0%		
Don't know	0%	0%			0%	2%	0.04	**
N	353	63			238	118		

In Ghana, most households were able to repay the loan within the agreed repayment period, although 10% reported not being able to do so. In Côte d'Ivoire, loan repayment difficulties appear to be more acute, particularly among non-cocoa households. We find that 23% of cocoa households and 36% of non-cocoa households were not able to pay back their loan within the agreed repayment period (*highly significant*) (Table 9.15). This finding provides a partial explanation as to why some households are unable to access credit, and why interest rates can be prohibitively high. We also note that the most common loan purpose – school related costs – does not generate a short-term return on investment, and would not help households to make repayments in the way farm investments might.

Table 9.15 Percent of borrowers able to repay the loan within the agreed repayment period

	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
no	10%	8%	0.09	*	23%	36%	0.00	***
yes	67%	56%			71%	45%		
repayment period is ongoing	24%	37%			6%	19%		
N	353	63			238	118		
loan_repayment_success								

In Ghana, the main reasons for not taking a loan were “not wanting to be in debt” and “no need” (Table 9.10). Respondents also sometimes mentioned that loans were “not available in the community” or that the “interest rate is too high”. In Côte d’Ivoire, an even higher proportion said that they “didn’t need a loan”. This contributes to our impression that poor access to credit is not the main reason why such a low proportion of Ivorian farmers use inputs and hire labour.

Table 9.16 Credit, if your household did not take a loan last year, why not?

	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d’Ivoire cocoa	Côte d’Ivoire non-cocoa	pvalue	sig
I don’t want to be in debt	38%	35%	0.41		40%	43%	0.33	
I didn’t need a loan	30%	27%	0.41		42%	35%	0.02	**
Not available in the community	17%	23%	0.06	*	12%	13%	0.63	
Interest rate too high	14%	15%	0.76		1%	1%	0.68	
Other	11%	17%	0.03	**	9%	16%	0.00	***
Lack of collateral / security	3%	6%	0.14		3%	2%	0.50	
Repay period too short	3%	2%	0.53		1%	1%	0.81	
Spouse refused	2%	3%	0.55		1%	2%	0.63	

9.5 Summary

In both countries the majority of cocoa farmers are not formally organised. In Ghana, only 11% said that someone in their household was a producer group member compared with 21% in Côte d’Ivoire.

There is no significant difference between male-headed households and female-headed households with regards to producer group membership. Overall, we find the household head is nearly always the cocoa producer group member, irrespective of gender.

A large proportion of respondents in Ghana (42%) and Côte d’Ivoire (31%) do not know if their household is certified to a standard. Sometimes respondents confuse receiving a training certificate with being certified to a standard.

A higher proportion of households in Ghana have received some cocoa training than in Côte d’Ivoire. In Ghana, 49% of respondents said they had received training related to cocoa farming in the past five years, compared with only 17% in Côte d’Ivoire.

However, those who received trainings in Côte d’Ivoire typically received more days of training than farmers in Ghana. Of those receiving training, most Ghanaian

respondents only participated in 1-2 training days in the past five years (74%). Such low training intensity is unlikely to be sufficient to drive a change in practices.

In both countries, a higher proportion of men than women reported receiving training in the past five years. In Ghana, male respondents reported higher rates of training (56%) compared with female respondents (34%). Likewise, in Côte d'Ivoire, 20% of male respondents reported having received training in the past five years, compared with only 5% of female respondents.

In both countries, around one quarter of cocoa households borrowed money in the past year. A similar proportion of cocoa and non-cocoa households reported borrowing money, even though focus group participants suggested that it was easier for cocoa households to borrow.

We find no statistical difference in the proportion of male-headed and female-headed households borrowing money in either country in the past year. This suggests that barriers to accessing credit faced by female-headed households are not dissimilar to those faced by smallholders generally.

The most common way cocoa households access small loans is through local buyers (LBCs, PCs and *pisteurs*) or family and friends, rather than banks. Loans from local buyers are usually based on trust and are provided so long as the household agrees to sell all of their cocoa to the buyer.

In Ghana, cocoa households borrowed an average of US\$290 last year compared with around US\$175 in Côte d'Ivoire (of those borrowing). Generally, collateral is not required to access such small loans or, if it is, the value of a household's crops can be used as a guarantee. A lack of formal title is not a barrier to accessing small loans.

In Ghana and Côte d'Ivoire, nearly half of all households used their loans for school fees. In Ghana, cocoa households more frequently used loans to purchase farm inputs than non-cocoa households. In Côte d'Ivoire, it was found to be relatively uncommon for loans to be used to purchase inputs.

In Ghana, 10% of cocoa households reported not being able pay back their loan within the period agreed compared with 23% in Côte d'Ivoire. This finding goes some way to explaining why some households are unable to access credit, and why interest rates can be prohibitively high.

In Ghana and Côte d'Ivoire, the main reasons for not taking a loan were “not wanting to be in debt” and “didn't need a loan”. This contributes to our impression that poor access to credit is not the main reason why such a low proportion of Ivorian farmers use inputs and hire labour.



10

Production and yield

Bymolt, R., Laven, A., Tyszler, M. (2018). Demystifying the cocoa sector in Ghana and Côte d'Ivoire. Chapter 10, Production and yield. The Royal Tropical Institute (KIT).

10.1 Production and yield

Total cocoa production and yield are important factors that determine household income in cocoa growing areas.

A number of earlier studies have reported average cocoa yields in Ghana, which typically range between 400 and 530 kg/ha (Table 10.1). It is important to note that some of these studies involve farmers that have been involved in projects that have tried to boost productivity, and thus may present higher yield figures than an unbiased random sample of cocoa farmers. Some studies have suggested that there are regional differences, with highest yields in Western region.^{1,2,3} However, we also note that studies that attempt to show regional differences often have small sample sizes which are vulnerable to sampling bias.

Table 10.1 Recent yield estimates for Ghana, means in kg/ha

Yield	Source
+/- 400 kg/ha	Barrientos & Akyere (2012) ⁴
>400 kg/ha	Asamoah <i>et al.</i> (2013) ⁵
500 kg/ha	Lambert <i>et al.</i> (2014) ⁶
400 kg/ha	Wessel & Quist-Wessel (2015) ⁷
400 kg/ha	Kumi & Daymond (2015) ⁸
420 kg/ha	Oomes <i>et al.</i> (2016) ⁹
400-530 kg/ha	Donovan <i>et al.</i> (2016) ¹⁰
402 kg/ha	Vigneri and Serra (2016) ¹¹

In Côte d'Ivoire, average yields are also reported to be quite low in most studies, and fairly similar to those in Ghana. Averages tend to vary between 300 and 500

¹ Kolavalli, S., Vigneri, M., Gockowski, J. (2016). The Cocoa Coast: the board managed cocoa sector in Ghana. Ghana strategy support program, International Food Policy Research Institute (IFPRI). Available at <http://www.ifpri.org/publication/cocoa-coast-board-managed-cocoa-sector-ghana>

² Waarts, Y., Ge, L., Ton, G., van der Meen, J. (2013). A touch of cocoa: Baseline study of six UTZ- Solidaridad cocoa projects in Ghana. LEI report 2013-2014. LEI Wageningen UR. Available at <http://edepot.wur.nl/305316>

³ Vigneri, M. and Serra, R. (2016). Researching the Impact of Increased Cocoa Yields on the Labour Market and Child Labour Risk in Ghana and Côte d'Ivoire. ICI Labour market research study. Available at: http://www.cocoainitiative.org/wp-content/uploads/2016/12/market_research_full_web.pdf

⁴ Barrientos, S.W., Asenso Akyere, K. (2012). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocoalife.org/progress/mapping-sustainable-production-in-ghanaian-cocoa>

⁵ Asamoah, M., Ansah, F. O., Anchirinah, V., Aneani, F., Agyapong, D. (2013). Insight into the standard of living of Ghanaian Cocoa Farmers. *Greener Journal of Agricultural Sciences*, 3(5), 363-370. Available at <http://www.gjournals.org/GJAS/GJAS%20Pdf/2013/May/031313522%20Asamoah%20et%20al.pdf>

⁶ Lambert, A., Gearhart, J., McGill, A., Wrinkle, H. (2014). The Fairness Gap: Farmer incomes and root cause solutions to ending child labor in the cocoa industry. International Labour Rights Forum, Washington D.C. Available at https://laborrights.org/sites/default/files/publications/Fairness%20gap_low_res.pdf

⁷ Wessel, M., Quist-Wessel, P. F. (2015). Cocoa production in West Africa, a review and analysis of recent developments. *NJAS-Wageningen Journal of Life Sciences*, 74, 1-7. Available at https://www.researchgate.net/publication/282316360_Cocoa_production_in_West_Africa_a_review_and_analysis_of_recent_developments

⁸ Kumi, E., Daymond, A. J. (2015). Farmers' perceptions of the effectiveness of the Cocoa Disease and Pest Control Programme (CODAPEP) in Ghana and its effects on poverty reduction. *American Journal of Experimental Agriculture*, 7(5), 257-274. Available at http://www.journalrepository.org/media/journals/AJEA_2/2015/Mar/Kumi752015AJEA16388.pdf

⁹ Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C., Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. *SEO Amsterdam Economics*. Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>

¹⁰ Donovan, J., Stoian, D., Foundjem, D., Degrande, A. (2016). Fairtrade Cocoa in Ghana: Taking Stock and Looking Ahead. *Sweet Vision*, Vol. 61(3), 14-17. Available at <https://www.bioversityinternational.org/e-library/publications/detail/fairtrade-cocoa-in-ghana-taking-stock-and-looking-ahead/>

¹¹ Vigneri, M. and Serra, R. (2016). Researching the Impact of Increased Cocoa Yields on the Labour Market and Child Labour Risk in Ghana and Côte d'Ivoire. ICI Labour market research study. Available at: http://www.cocoainitiative.org/wp-content/uploads/2016/12/market_research_full_web.pdf

kg/ha (Table 10.2). One study by Vigneri and Serra (2015), commissioned by the International Cocoa Initiative (ICI), estimated that 41% of cocoa farmers were ‘low yield’ farmers, producing less than 250 kg/ha, with a further 44% belonging to the ‘medium yield farmers’, with averages of 250-600 kg/ha. The remaining 15% were so-called ‘high-yield farmers’, producing on average more than 600 kg/ha.¹²

Table 10.2 Recent yield estimates for Côte d’Ivoire, means in kg/ha

Yield	Source
447 kg/ha	Tano (2012) ¹³
493 kg/ha	Ingram <i>et al.</i> (2013) ¹⁴
300-500 kg/ha	Ingram <i>et al.</i> (2014) ¹⁵
500 kg/ha	Lambert <i>et al.</i> (2014) ¹⁶
500 kg/ha	Barry Callebaut (2014) ¹⁷
300-400 kg/ha	FLA (2015) ¹⁸

In Ghana and Côte d’Ivoire, studies report that average farmer yields are well below potential yields, which are often cited as between 1,000 kg/ha and 1,900 kg/ha.^{19, 20, 21, 22} The differences between potential and actual yields have given an impetus for researchers, companies, NGOs and policymakers to look for reasons for low yields, and ways to unleash the potential of cocoa farmers (Chapter 8).

In most research, an underlying assumption is that cocoa households would want to invest their labour and invest their capital in inputs to increase yields. While the assumption appears reasonable, we note that some households can be regarded as ‘harvesters’²³ rather than active farmers. Harvesters may, for instance, have other more important income sources or be retirees. They may be relatively content harvesting whatever cocoa is produced with the least cost and effort, and may be

¹² Vigneri, M. and Serra, R. (2016). Researching the Impact of Increased Cocoa Yields on the Labour Market and Child Labour Risk in Ghana and Côte d’Ivoire. ICI Labour market research study. Available at: http://www.cocoainitiative.org/wp-content/uploads/2016/12/market_research_full_web.pdf

¹³ Tano, M.A. (2012). Crise cacaoyère et stratégies des producteurs de la sous-préfecture de Meadji au sud-ouest ivoirien (Doctoral dissertation, Université Toulouse le Mirail-Toulouse II). Available at <https://tel.archives-ouvertes.fr/tel-00713662/document>

¹⁴ Ingram V., Waarts Y., van Vugt S.M., Ge L., Wegner L., Puister-Jansen L. (2013). Towards sustainable cocoa: Assessment of Cargill and Solidaridad cocoa farmer support activities in Côte d’Ivoire 2008-2012. LEI, Wageningen UR. Wageningen. Available at <http://edepot.wur.nl/314177>

¹⁵ Ingram, V., Waarts, Y., Ge, L., van Vugt, S., Wegner, L., Puister-Jansen, L., Ruf, F., Tanoh, R. (2014). Impact of UTZ certification of cocoa in Ivory Coast; Assessment framework and baseline. Wageningen, LEI Wageningen UR (University & Research centre), LEI Report 2014-010. Available at <https://utz.org/wp-content/uploads/2016/03/Impact-of-UTZ-certification-of-cocoa-in-Ivory-Coast-2014.pdf>

¹⁶ Lambert, A., Gearhart, J. McGill, A., Wrinkle, H. (2014). The Fairness Gap: Farmer incomes and root cause solutions to ending child labor in the cocoa industry. International Labour Rights Forum, Washington D.C. Available at https://laborrights.org/sites/default/files/publications/Fairness%20gap_low_res.pdf

¹⁷ Barry Callebaut (2014). Cocoa Sustainability Report 103/2014. Available at https://www.barry-callebaut.com/system/files/download/barry_callebaut_cocoa_sustainability_report_2014_web.pdf

¹⁸ FLA (2015). Evaluer la situation actuelle des femmes et des jeunes agriculteurs et l’état nutritionnel de leurs familles dans deux communautés productrices de cacao en Côte d’Ivoire. Rapport préparé par Fair Labour Association, Juillet 2015. Available at http://www.fairlabor.org/sites/default/files/documents/reports/femmes_et_des_jeunes_nutrition_dans_communautes_de_dacao_juillet_2015.pdf

¹⁹ Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C., Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics. Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>

²⁰ Aneani, F., Anchirinah, V., Owusu-Ansah, F., Asamoah, M. (2012). Adoption of Some Cocoa Production Technologies by Cocoa Farmers in Ghana. Sustainable Agriculture Research Vol. 1, No. 1; February 2012. Available at <http://www.ccsenet.org/journal/index.php/sar/article/view/14550>

²¹ Kumi, E., Daymond, A. (2015). Farmers’ Perceptions of the Effectiveness of the Cocoa Disease and Pest Control Programme (CODAPEP) in Ghana and Its Effects on Poverty Reduction. American Journal of Experimental Agriculture 7(5): 257-274, 2015, Article no.AJEA.2015.128. Available at http://www.journalrepository.org/media/journals/AJEA_2/2015/Mar/Kumi752015AJEA16388.pdf

²² Vigneri, M. and Serra, R. (2016). Researching the Impact of Increased Cocoa Yields on the Labour Market and Child Labour Risk in Ghana and Côte d’Ivoire. ICI Labour market research study. Available at: http://www.cocoainitiative.org/wp-content/uploads/2016/12/market_research_full_web.pdf

²³ This term comes from companies that the researchers have previously worked with.

disinterested in replanting cocoa trees as they age. Nevertheless, surveys like ours capture their data, which tends to pull down the overall average. For this reason, a distribution of cocoa yields provides a better impression of farmer yields than a simple mean.

In our household survey, care was taken to only record data from respondents who were confident that they knew their household's cocoa production. Respondents were first asked what unit of measurement they used (such as bags or kilogrammes) and then were asked 'Do you know how many [bags or KGs] of cocoa your household produced last year?' Only respondents who answered 'yes' were asked further questions about their production levels. As Table 10.3 indicates, In Ghana, 95% of male respondents said that they knew how much cocoa their household produced, compared with 82% of female respondents. In Côte d'Ivoire, only 67% of male respondents said they knew how much they produced, compared with 21% of female respondents. A similar process was also used to test a respondent's knowledge of their household's land size used in yield calculations. 93% of Ghana respondents knew their total land under cocoa while 89% of the respondents in Côte d'Ivoire knew how much land was under cocoa. These simple checks of respondent's knowledge is important for establishing reliable figures.

Box 10.1 Methodological considerations when including only respondents who confidently know their production

We have considered whether the sample of respondents who 'don't know' their land size and/or production are significantly different from those who do know. Our concern was whether excluding observations from respondents who don't know might in itself introduce a selection bias.

To understand the meaning of this bias we have looked into how 'knowledge' is correlated. For example, out of the 9% of farmers that do not know the size of their cocoa land, 60% also do not know their cocoa production figures, compared to only 20% that do not know production figures if they do know the size of their cocoa land. In both countries, respondents that don't know their production have slightly smaller land sizes than those that do know. Female-headed households are also less likely to know their production figures, as are households where the head has no formal education.

Nevertheless, we believe that our calculation methodology allows a good indication about the population of interest, and comparative statistics between groups remain valid. We believe that it would be more problematic to include data from respondents who are essentially guessing their land size or production.

Table 10.3 Cocoa, percent of respondents who said they know how much cocoa their household produced in the 2015-2016 season

	Ghana female respondent	Ghana male respondent	pvalue	sig	Côte d'Ivoire female respondent	Côte d'Ivoire male respondent	pvalue	sig
mean	82%	95%	0.00	***	21%	67%	0.00	***
std.error	2%	1%			3%	2%		
N	435	883			214	694		
cocoa_prod_known_yn								

Note: p-value from a one-way ANOVA test

Note: In our household survey, farmers were first asked what unit they preferred to discuss production, such as bags or kilogrammes.

Respondents were then asked 'Do you know how many \$(cocoa_prod_unit) of cocoa your household produced in the 2015-2016 cocoa season?' (where \$(cocoa_prod_unit) was the value for the unit of measurement previously entered in digital survey form.)

Yield figures are calculated from total production (main season + light season) divided by the amount of land under productive cocoa (over 5 years old). It is important to note that respondents were able to answer questions in any unit they liked for both production (usually bags or kilogrammes) and land size (usually acres, poles or hectares) to enhance data quality and accuracy. The data was then re-calculated by researchers as kilogrammes per hectare. Data has also been cleaned, removing a few extreme outlier values more than 4 standard deviations from the mean.

In Ghana, respondents reported an average production of 806 kg in the main season and 281 kg in the light season on all household land under cocoa. This amounts to an average of 1,087 kg of cocoa produced per household per year (Table 10.4). From this we calculate a mean annual yield of 423 kg/ha (Table 10.5). We also find a median yield of 369 kg/ha and a yield distribution between 100 and 1,400 kg/ha, with the majority between 100 and 800 kg/ha (Figure 10.2).

In Côte d'Ivoire, respondents reported producing an average of 1,222 kg per year on all cocoa land (Table 10.4). This is a little higher than Ghanaian respondents reported because Ivorian households produce cocoa on more land, on average, than Ghanaian cocoa farmers. However, yields were found to be lower in Côte d'Ivoire, with an average of 352 kg/ha (Table 10.5) (*significant difference with Ghana*), with a median of 312 kg/ha. In terms of distribution, Côte d'Ivoire farmers also typically yielded between 100 and 1,000 kg/ha, with the majority grouping between 100 and 600 kg/ha (Figure 10.2). We remind the reader that these figures are derived from a random sample of cocoa households, and therefore yield figures may be lower than those recorded in projects or programmes that focus on improving farmer productivity.

Table 10.4 Mean cocoa production (all cocoa land) in main and light seasons 2015-2016 (kg), by country

	Ghana			Côte d'Ivoire		
	Main season	Light season	Year production	Main season	Light season	Year production
mean	806	281	1087	934	288	1222
std.error	23	8	29	43	16	55
N	997	997	997	442	442	442

Note: Differences between Ghana and Côte d'Ivoire were highly significant for the main season (pvalue 0.00) and not significant for the light season (pvalue 0.25). Main season + light season do not add up because not all respondents either reported harvesting cocoa in both seasons, or did not know their production levels in one of the seasons.

Figure 10.1 Cocoa production (all land) (kg), Ghana and Côte d'Ivoire

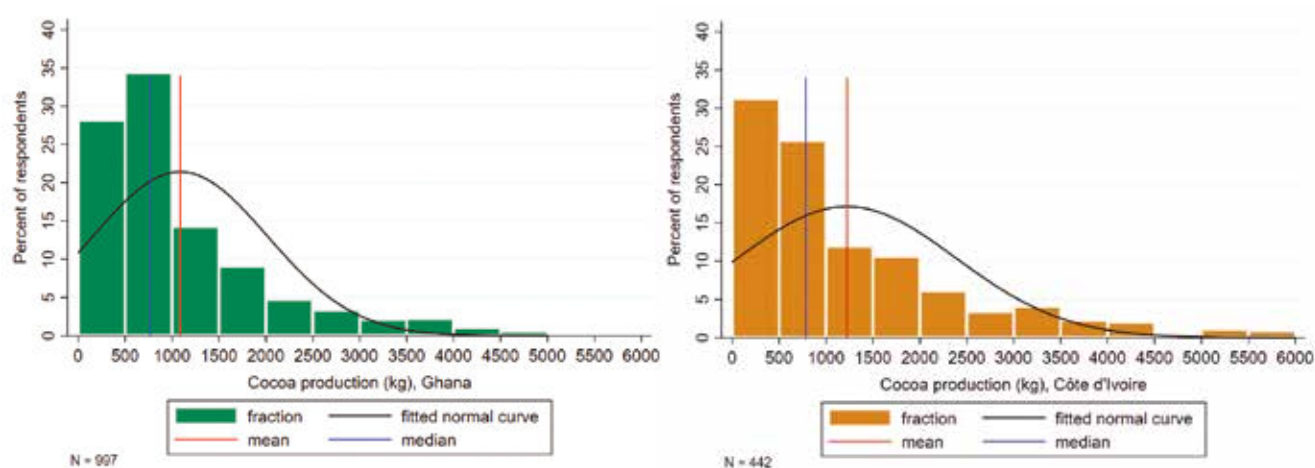
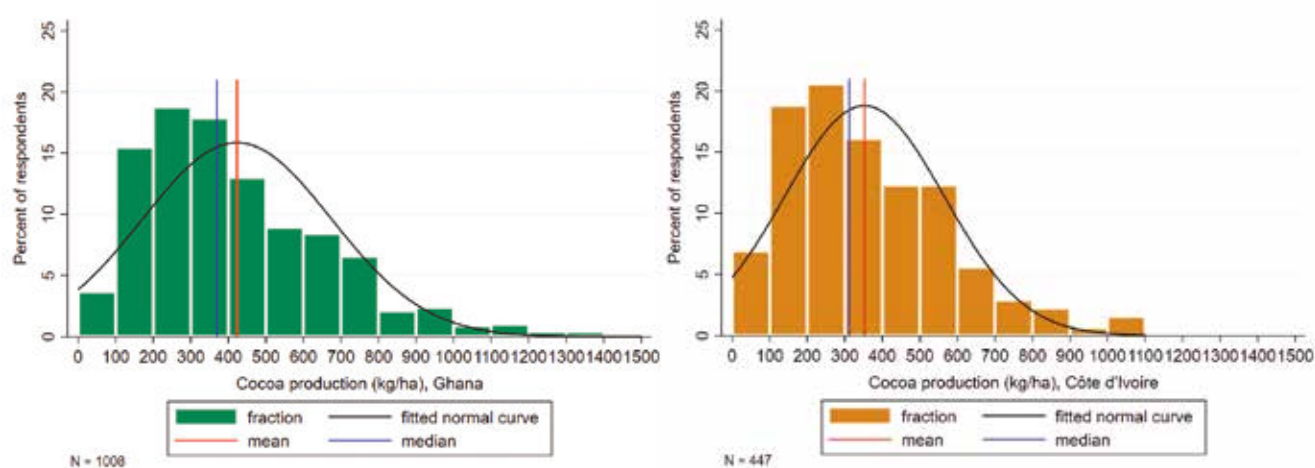


Table 10.5 Mean cocoa yield in main and light seasons 2015-2016 (kg/ha), by country

	Ghana			Côte d'Ivoire		
	Main season	Light season	Year	Main season	Light season	Year
mean	311	112	423	271	82	352
std.error	6	3	8	8	3	10
N	1,008	1,008	1,008	447	447	447

Note: Differences between Ghana and Côte d'Ivoire are highly significant (pvalue 0.00) for main season, light season and total yield for the 2015-2016 season. Main season + light season do not add up because not all respondents either reported harvesting cocoa in both seasons, or did not know their production levels in one of the seasons.

Figure 10.2 Cocoa yields (kg/ha), Ghana and Côte d'Ivoire



In Ghana, a difference of around 58 kg/ha was found between male and female-headed households (*highly significant*). However, it is important to consider what differences in practices are actually driving differences in yields. Determinants of yield are analysed in the regression analysis below.

In Côte d'Ivoire, we find no statistically significant differences in yield between male-headed and female-headed households. However this is also due to the very low number of female observations (due to many respondents who did not know either their production or land size).

Table 10.6 Cocoa, yield (kg/ha) for 2015-2016 season, by sex of household head

	Ghana female head	Ghana male head	pvalue	sig	Côte d'Ivoire female head	Côte d'Ivoire male head	pvalue	sig
mean	374	432	0.01	***	386	351	0.53	
std.error	19	9			46	10		
N	162	846			15	437		
cocoa_prod_total_kgsha								

Note: p-value from a one-way ANOVA test

In Ghana, significant differences in yield were also found across regions, although we must take care not to draw too precise conclusions from a small sample size in some regions. The Central and Western regions recorded the highest mean yields, which may reflect environmental conditions (such as soil and rainfall) as much as differences in farming practices.

In Côte d'Ivoire, the greater number of regions and the relatively high proportion of respondents who reported 'don't know', has left us with too few observations to provide an accurate regional disaggregation.

Table 10.7 Cocoa, yield (kg/ha) for 2015-2016 season, by Ghana region

	Ashanti	Brong Ahafo	Central	Eastern	Western	pvalue	sig
mean	360	367	538	390	468	0.00	***
std.error	16	18	34	16	13		
N	197	141	53	209	414		
cocoa_prod_total_kgsha							

Note: p-value from a one-way ANOVA test

No significant differences in yield were found between youth and non-youth in either country, and no significant differences in yield were found between migrant and non-migrants in Ghana. Migrants were found to have a larger yield than non-migrants in Côte d'Ivoire (*significant*) but, due to the small sample size, we do not have strong

confidence in this finding. We also observe a significant yield difference between leaders (458 kg/ha) and non-leaders (403 kg/ha) in Ghana. However, we also find the reverse relationship in Côte d'Ivoire where non-leaders (376 kg/ha) have a higher average yield than leaders (339 kg/ha), although this is only significant at the 10% level.

10.2 Regression analysis of yield

Linear regression analysis was conducted to understand which independent variables are significantly correlated with the dependent variable 'yield (kg/ha)'. Two regressions were run with the results shown in Column 1 and Column 2 (Table 10.8). These are essentially the same (we will discuss column 1 in the description), with the difference being that, in column 1, we analyse the dependent variable yield with the likelihood of being under the \$1.25/day poverty line.²⁴ In column 2, we include the dependent variable 'DHS index' which is a composite wealth index that measures a household's living standard.²⁵

In Ghana, we find that households with a farmer group member produce approximately 85 kg/ha more than households that do not (*highly significant*). The question is then how being a member of a farmer group contributes to an increase in yield. It is possible that there is a two-way relationship here – more professional farmers seek to organise themselves, and being part of a farmer organisation helps one to professionalise. The regression model already controls for the use of inputs and access to training, but we hypothesise that being a member of a farmer group may improve access to greater quantities of inputs, and/or more timeliness of application. These farmers may also have greater exposure to ongoing discussion (both formally and informally) on GAP. In Chapter 9 we showed that of the cocoa households in Ghana only 11% was member of a cocoa producer group.

Those who consider themselves to be a 'leader' in their community yield around 34 kg/ha more than non-leaders (significant). Previous research confirms this finding (Chapter 3), showing in Ghana there is a significant positive correlation between leadership, ownership and productivity levels,²⁶ which suggests that social relations can play a major role in facilitating or constraining farmers in accessing inputs and services. In addition, we hypothesise that community leaders have better access to knowledge, inputs and services, or that they are more conscientious in their application of labour to GAP.

²⁴ For this we use the Poverty Probability Index (PPI) likelihood of being under \$1.25/day PPP 2005. We describe the PPI in detail in our chapter on poverty, wealth and income. See: PPI. (2016). About the PPI: A Poverty Measurement Tool. Available at <https://www.povertyindex.org/about-ppi>

²⁵ We describe the Demographic and Health Survey (DHS) in detail in our chapter on poverty, wealth and income. See DHS (2016). What is the DHS wealth index? Available at <https://www.dhsprogram.com/topics/wealth-index/index.cfm>

²⁶ Laven, A. (2010). The risks of inclusion: Shifts in governance processes and upgrading opportunities for cocoa farmers in Ghana. Amsterdam: KIT. Available at: https://pure.uva.nl/ws/files/1437472/77981_18.pdf

In Ghana, we find that female-headed households yield, on average, approximately 63 kg/ha less than male-headed households after controlling for all other variables (*highly significant*). The model cannot explain exactly what combination of factors has caused female-headed households to have lower yields (many variables are already controlled for), but there are a number of reasonable factors to consider including amount of inputs used, number of labour days invested, quality of labour used, and knowledge and application of good practices, as well as factors such as reporting bias (female respondents reported ‘don’t know’ at a significantly higher frequency than men). We also note that, after excluding ‘don’t know’ respondents from our sample, we only have 163 female-headed households (or less than 10% of the total number of cocoa farmers) left in the model so, while the finding is highly significant, it is not necessarily robust.

Regional differences in Ghana were found to be highly significant, with the reference region as Ashanti. Yields in Central (around 172 kg/ha) and Western (around 113 kg/ha) regions were found to be significantly higher, after controlling for other factors in this model. We are particularly confident in the robustness of this finding for Western region, as it had the largest sample size of more than 400 respondents, however the Central region sample lacks power for drawing robust conclusions. Our analysis on regional differences confirms findings of earlier studies.^{27,28,29} The cause of regional differences are likely to be environmental factors, including soil quality, rainfall and climate. It may also be caused by farmers utilising a greater amount and quality of labour and/or inputs, which we have not included in this model due to the small sample of respondents who accurately know their costs of production.

A significant negative correlation was found between yield and the amount of productive land under cocoa. The model shows that, for every additional hectare under cocoa, yields fall by approximately 71 kg (*highly significant*). Of course, this is not a linear relationship. The independent variable, ‘productive land under cocoa squared’ shows a parabolic effect that curves and levels off as land size under cocoa increases (*highly significant*). This finding is not uncommon in smallholder agricultural systems, and is usually attributed to a shortage of household labour and higher total hired labour costs resulting in fewer labour days invested per hectare. It is also commonly associated with lower input investments per hectare because, as cultivated land size increases, farmers may be unable or unwilling to meet the cost of optimal input application and instead may apply inputs sparingly or only on some plots.

²⁷ Kolavalli, S., Vigneri, M., Gockowski, J. (2016). The Cocoa Coast: the board managed cocoa sector in Ghana. Ghana strategy support program, International Food Policy Research Institute (IFPRI). Available at <http://www.ifpri.org/publication/cocoa-coast-board-managed-cocoa-sector-ghana>

²⁸ Waarts, Y., Ge, L., Ton, G., van der Meen, J. (2013). A touch of cocoa: Baseline study of six UTZ- Solidaridad cocoa projects in Ghana. LEI report 2013-2014. LEI Wageningen UR. Available at <http://edepot.wur.nl/305316>

²⁹ Vigneri, M. and Serra, R. (2016). Researching the Impact of Increased Cocoa Yields on the Labour Market and Child Labour Risk in Ghana and Côte d'Ivoire. ICI Labour market research study. Available at: http://www.cocoainitiative.org/wp-content/uploads/2016/12/market_research_full_web.pdf

In Ghana, the application of granular fertiliser is an important predictor of yields. Applying granular fertiliser increases yields by an average of 95 kg/ha (*highly significant*). (We do not use volumes of fertiliser in the model due to a high proportion of ‘don’t know’ responses and high variation in fertiliser estimates). Interestingly, we do not find significance for liquid fertiliser application. The application of pesticides boosts yields by around 63 kg/ha (*significant*). The model shows that the use of herbicides actually reduces yields by 39 kg/ha (highly significant). We are not sure whether this finding is a direct effect of herbicide application, or if this reflects lower labour inputs for weeding which affects yields.

We also find that Ghanaian households with lower poverty and higher relative wealth have higher productivity. In the first column, this is reflected in the PPI ‘likelihood of being under \$1.25/day PPP 2005’. This is difficult to interpret without an understanding of the PPI index. However, it suggests that, as households become more likely fall into poverty, their yield falls (by 5 kg/ha per percentage point of likelihood) and, conversely, households with a lower likelihood of being in poverty have a higher yield. In the second column, we can see these same dynamics in the DHS wealth index. Those in the 2nd quintile have a slightly higher yield compared with those in the poorest bottom quintile (significant at 10%). However, those in the 3rd quintile produce around 127 kg/ha more than those in the bottom quintile (*highly significant*). This is likely to be a two-way relationship, as those who are better off are more able to make the investments to achieve higher cocoa yields, and those who achieve better yields are likely to be better off. For more details on the PPI and DHS the reader should refer to the Poverty, Wealth and Income chapter.

We do not find any statistical significance for a number of variables including: education level of the household head, whether the head is a migrant, the number of household members, the number of crops produced by the household, whether the land is owned or under an *abunu* land tenure arrangement, whether a household is certified, and whether the household has received training in the past 5 years.

Table 10.8 Determinants of yield (regression), Ghana

	1 Cocoa yield (kg/ha)	2 Cocoa yield (kg/ha)
Borrowed money last year: yes	3.36 (16.69)	7.09 (16.72)
Household is member of a farmer group: yes	84.67 (25.42)***	75.69 (25.47)***
Leader: yes	34.09 (16.63)**	32.15 (16.60)*
Head: Sex: female	-63.39 (22.07)***	-66.90 (21.97)***
Head: Education level: Primary school	16.11 (26.32)	19.77 (26.29)
Head: Education level: Junior high school (JHS) / middle school	-0.99 (20.77)	-3.66 (20.64)
Head: Education level: Senior high school (SHS) A/O level	-8.42 (29.75)	-16.72 (29.73)
Head: Education level: University	-31.52 (45.45)	-58.84 (45.31)
Head: Education level: Technical college/vocational	-3.44 (48.25)	-14.05 (49.16)
Head: Education level: Other	40.27 (94.42)	36.73 (102.31)
Region: Central	172.69 (36.53)***	172.62 (36.46)***
Region: Brong Ahafo	-35.51 (26.79)	-7.83 (27.22)
Region: Western	113.30 (21.69)***	111.22 (21.66)***
Region: Eastern	16.58 (23.86)	11.29 (23.92)
Age group (head): 26-35	-1.20 (58.42)	6.17 (58.15)
Age group (head): 36-45	65.06 (56.29)	63.05 (55.95)
Age group (head): 46-55	32.01 (55.76)	36.48 (55.48)
Age group (head): 56-65	28.00 (56.11)	35.16 (55.93)
Age group (head): 66-older	-5.26 (57.02)	-0.05 (56.77)
Migrant: yes	7.08 (18.92)	13.22 (18.87)
Number of household members living in the compound	0.17 (3.26)	-2.47 (2.91)
Number of crops produced	2.11 (3.09)	4.03 (3.07)
Productive land under cocoa(ha)	-71.28 (9.66)***	-69.21 (9.65)***
Productive land under cocoa (ha) squared	4.48 (0.87)***	4.30 (0.87)***
Owned land: yes	33.98 (26.97)	32.14 (26.94)
Leased land: yes	-59.76 (80.18)	-37.44 (80.25)
Abunu: yes	-4.48 (22.74)	-4.65 (22.68)
Granular fertiliser: Yes	94.74 (15.97)***	90.48 (16.00)***
Liquid fertiliser: Yes	18.75 (15.42)	17.96 (15.40)
Herbicides: Yes	-38.97 (16.11)**	-34.63 (16.16)**
Pesticides: Yes	63.28 (24.52)**	60.62 (24.47)**
Fungicides: Yes	29.34 (18.15)	32.18 (18.11)*
Pruning: Yes	-4.36 (20.51)	-6.75 (20.45)
Certification: yes	-22.94 (23.41)	-17.76 (23.54)
Certification: don't know	-28.30 (20.23)	-31.29 (20.26)
Received training in the last 5 years: yes	-2.56 (18.18)	-5.43 (18.27)
Likelihood of being under \$1.25/day PPP 2005	-4.63 (1.51)***	
According to DHS Wealth Index: 2nd quintile		35.54 (18.56)*
According to DHS Wealth Index: 3rd quintile		126.76 (23.46)***
According to DHS Wealth Index: 4th quintile		93.90 (53.39)*
Constant	375.16 (71.45)***	313.19 (71.81)***
N	957	950
R2	0.22	0.24

* p<0.1; ** p<0.05; *** p<0.01
Robust se in parenthesis

In Côte d'Ivoire, fewer variables significantly correlate with yield compared with Ghana. This may be due partly to the smaller sample of cocoa farmers within the overall sample, and the higher proportion of respondents who replied that they 'don't know' their cocoa land size or production and were therefore not included in the model.

In Côte d'Ivoire, the strongest predictor of higher productivity was pesticide use, which increases yields by around 105 kg/ha (*highly significant*). While the use of fertiliser and other inputs trends towards higher yields, these were not found to be statistically significant in Côte d'Ivoire. Many reasons could be hypothesised for this, including the volumes of inputs supplied, or their timeliness, frequency of application or quality. Another consideration could be that respondent estimations of land size are less precise than in Ghana, because of the larger unit of hectares, rather than acres, being used. As yield is a function of total production /productive cocoa land (ha), this estimation bias could obscure the variables that drive higher yields.

In Côte d'Ivoire, we also find that households with lower poverty and higher relative wealth have higher productivity. In the first column, this is reflected in the PPI 'likelihood of being under \$1.25/day PPP 2005'. Households that are more likely to be below the poverty line have lower yields (significant at 10% level). In the second column, we include the DHS wealth index and can more clearly see the relationship between wealth and yields. Those in the 2nd quintile produce 85 kg/ha more than those in the poorest bottom quintile (*highly significant*), and this same effect is evident in all other quintiles. For more details on the PPI and DHS the reader should refer to the Poverty, Wealth and Income chapter.

Table 10.9 Determinants of yield (regression), Côte d'Ivoire

	1 Cocoa yield (kg/ha)	2 Cocoa yield (kg/ha)
Borrowed money last year: yes	-31.08 (24.16)	-35.29 (25.01)
Household is member of a farmer group: yes	5.16 (28.97)	-2.99 (29.97)
Leader: yes	-23.92 (24.21)	-28.92 (24.93)
Head: Sex: female	52.55 (68.80)	46.64 (74.46)
Head: Education level: Primary school	-34.76 (32.07)	-21.40 (32.33)
Head: Education level: Junior high school (JHS) / middle school	-37.45 (35.48)	-39.16 (36.16)
Head: Education level: Senior high school (SHS) A/O level	-24.19 (48.35)	-28.53 (49.98)
Head: Education level: University	-106.53 (90.04)	-125.46 (105.53)
Head: Education level: Technical college / vocational	-99.48 (130.96)	-122.27 (130.87)
Head: Education level: Other	-40.23 (78.26)	-44.99 (82.67)
Region: Lacs	47.75 (131.28)	25.62 (131.84)
Region: Montagnes	168.48 (134.49)	158.51 (135.13)
Region: Bas-Sassandra	180.06 (133.16)	184.51 (134.73)
Region: Goh-Djiboua	164.42 (133.88)	141.94 (134.70)
Region: Zanzan	22.94 (140.98)	-4.83 (141.36)
Region: Sassandra-Marahoue	171.72 (130.53)	166.14 (131.42)
Region: Comoe	198.88 (134.08)	201.54 (134.62)
Region: Lagunes	180.15 (133.26)	181.11 (133.89)
Age group (head): 26-35	45.01 (98.45)	3.54 (107.90)
Age group (head): 36-45	99.08 (96.25)	58.03 (105.61)
Age group (head): 46-55	74.49 (96.86)	43.89 (105.99)
Age group (head): 56-65	66.98 (96.99)	27.39 (106.74)
Age group (head): 66-older	69.79 (103.56)	44.02 (112.97)
Migrant: yes	14.05 (33.03)	15.52 (34.42)
Number of household members living in the compound	13.22 (4.75)***	6.06 (3.45)*
Number of crops Produced	7.30 (3.51)**	7.50 (3.59)**
Productive land under cocoa(ha)	-20.41 (15.57)	-18.03 (15.77)
Productive land under cocoa (ha) squared	0.83 (1.35)	0.52 (1.37)
Owned land: yes	-129.73 (134.55)	-132.12 (135.41)
Leased land: yes	22.30 (188.41)	5.09 (189.14)
Abunu: yes	-157.69 (131.99)	-175.27 (132.37)
Granular fertiliser: Yes	48.90 (32.03)	37.67 (33.30)
Liquid fertiliser: Yes	15.20 (40.59)	19.51 (41.65)
Herbicides: Yes	-31.42 (24.57)	-33.47 (25.16)
Pesticides: Yes	105.01 (29.74)***	96.29 (30.60)***
Fungicides: Yes	51.15 (31.95)	45.10 (32.51)
Pruning: Yes	29.53 (23.19)	20.91 (23.76)
Certification: yes	10.93 (45.55)	16.01 (46.75)
Certification: don't know	-62.66 (26.20)**	-73.86 (26.96)***
Received training in the last 5 years: yes	33.74 (35.05)	15.36 (35.92)
Likelihood of being under \$1.25/day PPP 2005	-2.02 (1.05)*	
According to DHS Wealth Index: 2nd quintile		85.18 (37.30)**
According to DHS Wealth Index: 3rd quintile		48.87 (43.32)
According to DHS Wealth Index: 4th quintile		190.32 (44.09)***
According to DHS Wealth Index: 5th quintile		57.13
Constant	186.47 (205.31)	164.51 (208.50)
N	417	397
R2	0.24	0.28

10.3 Summary

Not all farmers know how much cocoa they produce per year. In Ghana, 95% of male respondents said that they knew how many bags of cocoa they produced last season, compared with 82% of female respondents. In Côte d'Ivoire, 67% of male respondents said they knew how much cocoa they produced, compared with only 21% of female respondents.

In Ghana, average cocoa yields were estimated to be 423kg/ha in 2015-2016, with a median yield of 369 kg/ha. The distribution shows that farmers typically yield between 100 and 1,000 kg/ha, with the majority between 100 and 500 kg/ha. This is well below potential yields commonly cited between 1,000 and 1,900 kg/ha.

In Côte d'Ivoire, average yields were estimated to be 352 kg/ha, with a median of 312 kg/ha. In terms of distribution, Côte d'Ivoire farmers also typically yielded between 100 and 1,000 kg/ha, with the majority grouping between 100 and 500 kg/ha. Compared with Ghana, the main difference is that there is a slightly higher proportion of farmers with a very low yield of 0-100 kg/ha and a lower proportion of farmers with more than 500 kg/ha.

In Ghana, a regression analysis shows that several variables are significantly correlated with yield. Controlling for other variables, we find that farmer group members produce 85 kg/ha more than non-members, female-headed households yield approximately 63 kg/ha less than male-headed households, and Central and Western regions yield more than other regions. Input use was also significantly correlated, with fertiliser use increasing yields by 95 kg/ha, and pesticide use boosting yields by 65 kg/ha. However, herbicide use is negatively correlated with yields. A significant negative correlation was also found between the amount of productive land under cocoa and yield. The model shows that, for every additional hectare under cocoa, yields fall by approximately 71 kg. We also find that Ghanaian households with lower poverty and higher relative wealth have higher productivity.

In Côte d'Ivoire, a regression analysis shows fewer variables significantly correlate with yield compared with Ghana. The strongest predictor of higher productivity was the use of pesticides, which increases yields by around 105 kg/ha. While the use of fertiliser and other inputs trends towards higher yields, these were not found to be statistically significant. The fact so few Ivorian cocoa households use fertiliser may have influenced this result. As in Ghana, we find that Ivorian households with lower poverty and higher relative wealth have higher yields.



Photo credit: Nana Kofi Acquah / Nestlé

11

Cocoa marketing and prices

Bymolt, R., Laven, A., Tyszler, M. (2018). Demystifying the cocoa sector in Ghana and Côte d'Ivoire. Chapter 11, Cocoa marketing and prices. The Royal Tropical Institute (KIT).



11.1 Marketing

11.1.1 Marketing structures

Marketing structures in Ghana

In Ghana, the government has considerable involvement in virtually all facets of the cocoa sector. The country is quite unique amongst cocoa producing countries in the way that it gradually, and only partially, introduced marketing reforms from the 1990s onwards. The Cocoa Marketing Company (CMC), a subsidiary of the state-owned marketing board COCOBOD, is the only entity legally permitted to sell Ghanaian cocoa onto the world market. The government's monopoly on cocoa sales has led to cocoa being described as a 'political crop'. The reluctance to introduce fully-fledged market reforms appears to be related to the Ghanaian government's dependence on export revenues from cocoa. Each year, COCOBOD sells around 70% of the crop for the coming season on the international futures markets.¹ Hedging, in this way, is a prudent risk management strategy in case the cocoa price falls during the season.

In the 1990s, reforms by the Ghanaian government did allow for some competition in internal marketing, through the introduction of Licensed Buying Companies (LBCs). Private LBCs act as competitors to the state-owned Produce Buying Company (PBC), which provides buying services for which they receive a fixed margin of the 'Free on Board' (FoB) price. PBC employs a district manager on a commission basis who, in turn, hires a number of purchasing clerks on commission to purchase cocoa beans from cocoa growing communities.^{2,3} In our study, PBC was found to be the largest buyer in our sample, with 57% of households selling to them, followed by Kuapa Kokoo (18%), AGL/Armajaro (15%) and Olam (12%) (Table 11.1). This is not necessarily representative of all of Ghana as LBCs are present to varying degrees in each region and the figures we report are partly an outcome of our random sampling approach. Through their local purchasing clerks, LBCs are well embedded in cocoa growing communities.

¹ Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C., Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics. Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>

² Laven, A. (2010). The risks of inclusion: Shifts in governance processes and upgrading opportunities for cocoa farmers in Ghana. Amsterdam: KIT. Available at: https://pure.uva.nl/ws/files/1437472/77981_18.pdf

³ Kolavalli, S., Vigneri, M. & Gockowski, J. (2016). The Cocoa Coast: the board managed cocoa sector in Ghana. Ghana strategy support program, International Food Policy Research Institute (IFPRI), p.45. Available at <http://www.ifpri.org/publication/cocoa-coast-board-managed-cocoa-sector-ghana>

Table 11.1 Cocoa marketing, types of buyers, Ghana

	Ghana
PBC/Produce Buying Company	57%
KKL/Kuapa Kokoo	18%
AGL/Armajaro	15%
OLAM	12%
AAMC/Akufo Adamfo	7%
ABL/Adwumapa	5%
Other licenced buying company (LBC)	5%
FCL/Fedco	4%
TGL/Transroyal	3%
CMGL/Cocoa Merchants	2%
RCL/Royal Commodities	1%
Other buyer (e.g. pisteurs)	1%
Cooperative/ groupement /association de producteurs	0%
CEMOI	0%
Barry Callebaut / SACO	0%
Cargill	0%
Don't know	5%
N	1,200

Marketing structures in Côte d'Ivoire

In Côte d'Ivoire, the cocoa sector was liberalised between 1999 and 2011. However, in 2011, new reforms were launched which re-regulated the sector, with the Conseil du Café-Cacao (CCC) responsible for the management, regulation, development and price stabilisation of cocoa. The reforms were promoted as a way to raise and guarantee minimum farm-gate prices on a sustainable basis, boost output, and apply stricter controls on bean quality. Sales in cocoa take place in auctions. During these auctions, about 70 to 80% of the coming year's expected crop are sold to exporters.⁴ The CCC allocates the export-licenses.

Ivorian cocoa producers typically sell their unprocessed cocoa beans through local buyers (*pisteurs*) or farmer cooperatives. These, in turn, sell to larger buyers (*traitants*), processors and exporters, who sell to international traders. Private sector multinationals such as Barry Callebaut, Cargill, Cémoi, and Olam also provide marketing support and training to *pisteurs* and cooperatives to improve efficiency and reduce marketing costs, while strengthening their supply chain.⁵ In our study, 65% of respondents reported selling through *pisteurs*, with 36% selling through a cooperative (Table 11.2). Producers may, of course, sell their cocoa through more than one avenue.

⁴ Laven, A., Buunk, E., Amerlaan, T. (2016). Determination of Cocoa Prices in Cameroon, Nigeria, Ghana, Côte d'Ivoire, and Indonesia. Appendix to Report: Market Concentration and Price Formation in the Global Cocoa Value Chain. SEO Amsterdam Economics. P.33 Available at http://www.seo.nl/uploads/media/2016-79A_Bijlage_A_bij_Market_Concentration.pdf

⁵ Ibid

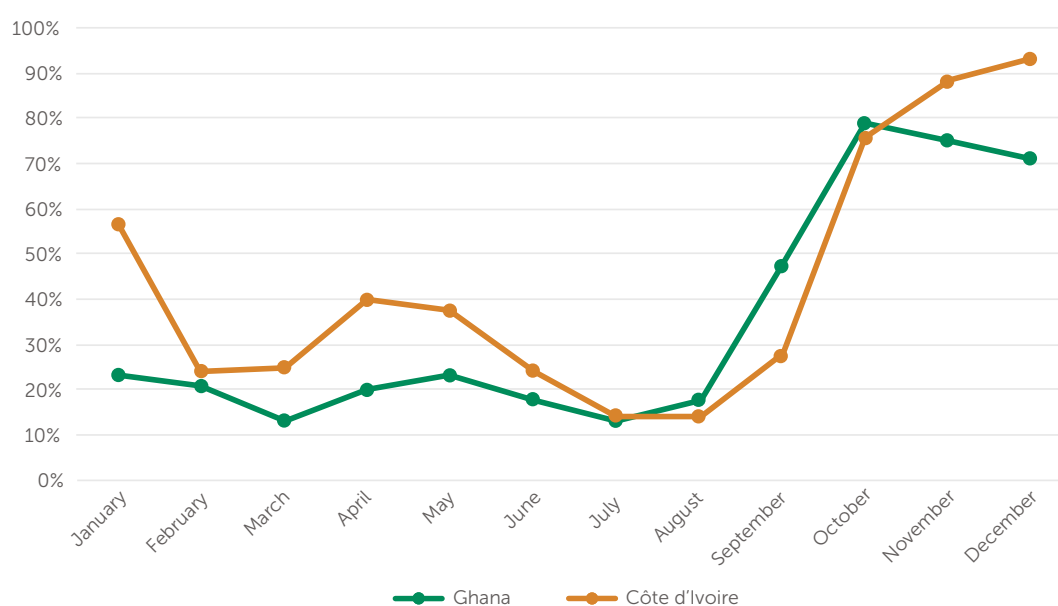
Table 11.2 Cocoa marketing, types of buyers, Côte d'Ivoire

	Côte d'Ivoire
Other buyer (e.g. pisteurs)	65%
Cooperative/ groupement /association de producteurs	36%
Don't know	0%
N	505

11.1.2 Seasonality

Cocoa is predominantly sold on several occasions during the 'main season'. In our household survey, cocoa households indicated that the main season runs from around October to December in Ghana, and until January in Côte d'Ivoire (Figure 11.1). A smaller proportion of respondents also reported selling cocoa in the 'light season' which occurs around April to May, and some households also manage to sell a little cocoa outside of these seasons.

Figure 11.1 Months in which cocoa is sold, percent of cocoa households



11.1.3 Producer prices 2015/2016

In our household survey, respondents reported a price of US\$1.73/kg in Ghana (GHS 6.64/kg, based on GHS 425 per bag of 64kg) and US\$1.66 in Côte d'Ivoire (CFA 1000/kg) for the 2015/16 season. Because the marketing boards of Ghana and Côte d'Ivoire set the producer price at the start of the season in October, no variation was found in the reported cocoa price within each country. Furthermore, there is little difference in the producer price between countries after conversion to USD/kg. It is in each country's interest to offer similar prices to producers to discourage smuggling across their shared border. The small calculated difference between the countries in US dollars may be the result of our chosen exchange rates.

11.2 Producer price formation

11.2.1 Producer price formation in Ghana

In Ghana, the price that producers receive for their cocoa is determined by a multi-stakeholder platform known as the Producer Price Review Committee (PPRC). The PPRC fixes producer prices annually at the start of the cocoa harvesting season in October, and these prices are expected to be maintained for the period of one year.⁶

Fixed producer prices mean there is no room for farmers to negotiate prices or for prices to be differentiated based on quality. (However, premium payments for certified cocoa are possible). Fixed prices can be advantageous for Ghanaian cocoa farmers when the world market price is falling during the season. On the other hand, in a bullish market, Ghanaian cocoa farmers do not benefit from price increases within a season.

For the 2017/2018 season, the producer price is set at 75% of net FoB price. The remaining 25% of the net FoB value is used for cost items such as a buyers' margin, crop finance, hauliers cost, storage and shipping, disinfection and grading, inspection and government/COCOBOD revenue.

The use of a 'net' FoB price is somewhat controversial because it implies that certain costs are deducted before allocating a share of the price to the producer. To arrive at the net FoB price, the PPRC first deducts an amount from the gross FoB for disease and pest control, fertiliser application (hi-tech), operational input costs, and rehabilitation (nurseries and seedlings). Some have argued that some service provision (e.g., fertiliser procurement and distribution) would be better handled by the private sector, as there are frequent complaints that inputs do not reach farmers on time or are vulnerable to corruption⁷ or patronage.⁸ A small amount of the gross FoB price is also deducted for a scholarship fund and child education support.

According to International Cocoa Organization (ICCO) data, the fixed prices that Ghanaian farmers receive are typically lower than what producers in most other liberalised countries receive (Figure 2). For the period 2000/2001 to 2014/2015, Ghanaian producers received 57% of the ICCO daily price. By fixing the prices, the

⁶ COCOBOD has, on occasion, revised producer prices mid-season if the actual prices turn out to be much higher than projected, partly to discourage smuggling to Côte d'Ivoire if prices there are higher. See Kolavalli, S., Vigneri, M., Gockowski, J. (2016). The Cocoa Coast: the board managed cocoa sector in Ghana. Ghana strategy support program, International Food Policy Research Institute (IFPRI). p.45. Available at <http://www.ifpri.org/publication/cocoa-coast-board-managed-cocoa-sector-ghana>

⁷ Ibid p.100

⁸ Laven, A., Buunk, E., Amerlaan, T. (2016). Determination of Cocoa Prices in Cameroon, Nigeria, Ghana, Côte d'Ivoire, and Indonesia. Appendix to Report: Market Concentration and Price Formation in the Global Cocoa Value Chain. SEO Amsterdam Economics. p.25. Available at http://www.seo.nl/uploads/media/2016-79A_Bijlage_A_bij_Market_Concentration.pdf

marketing board effectively applies a tax on cocoa producers. In the past, it has been suggested that COCOBOD attempts to maximise the effective tax on producers while ensuring they remain sufficiently interested in producing cocoa.⁹

An advantage of the more regulated cocoa sector in Ghana is that the international market prefers the Ghana model over fully liberalised sectors. Buyers appreciate a semi-organised sector that is capable of delivering large quantities of high-quality cocoa, and Ghana's cocoa sector is widely considered to be the best managed in Africa.^{10,11,12}

While some public goods are necessary, it is important to consider whether the amount that cocoa farmers are effectively taxed is fair and equitable. There appears to be scope to improve the efficiency of the marketing board and service delivery, and to improve transparency in price-setting processes. Improved efficiency and greater transparency and accountability is believed to be the basis for cocoa producers in Ghana receiving a higher share of the international price.¹³

Table 11.3 Producer prices in US dollars expressed as a percentage of the ICCO daily price¹⁴

Year	Côte d'Ivoire	Ghana	Cameroon	Nigeria	Brazil	Ecuador	Dominican Republic	Malaysia
2000/01	51%	51%	60%	88%	90%	77%	53%	89%
2001/02	55%	39%	58%	70%	97%	77%	62%	88%
2002/03	58%	54%	90%	55%	97%	82%	55%	92%
2003/04	43%	66%	86%	69%	94%	75%	56%	91%
2004/05	41%	63%	82%	75%	94%	74%	54%	87%
2005/06	41%	63%	74%	86%	92%	90%	52%	86%
2006/07	41%	54%	68%	75%	100%	99%	54%	87%
2007/08	42%	39%	67%	75%	106%	95%	72%	80%
2008/09	48%	51%	70%		105%	83%	58%	70%
2009/10	65%	49%	73%		99%	83%		
2010/11	54%	60%	83%		101%	78%		
2011/12	57%	85%	104%		104%	79%		
2012/13	61%	76%	97%		94%	88%		
2013/14	52%	51%	85%		99%	87%		
2014/15	50%	52%	80%		83%	92%		

⁹ Ibid p.59

¹⁰ Ecobank. (2014). Ghana: Cocoa Sector Is Facing New Challenges. Middle Africa Briefing Note, Soft Commodities, Cocoa. Lomé, Togo. Available at <https://www.ecobank.com/upload/20140723100236691535ay7ctp5kPP.pdf>

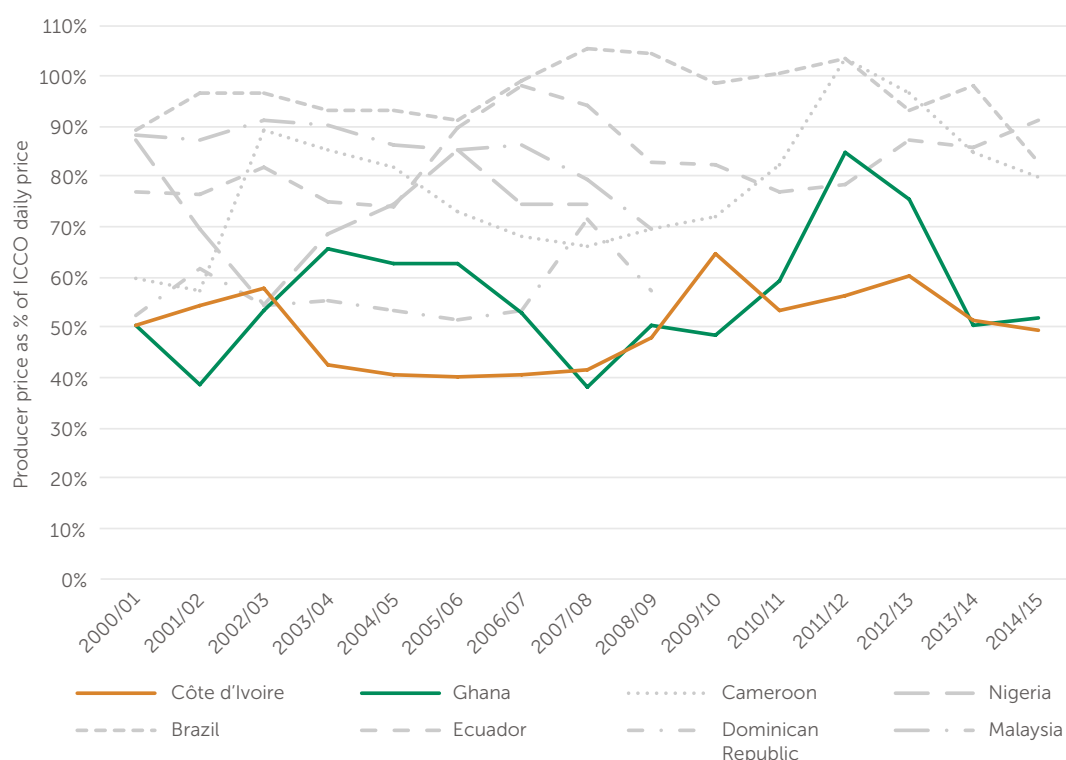
¹¹ Gilbert, C. L. (2007). Value Chain Analysis and Market Power in Commodity Processing with Application to the Cocoa and Coffee Sectors. In Governance, Coordination and Distribution along Commodity Value Chains, 267–295. FAO Commodities and Trade Proceedings 2. Rome: Food and Agriculture Organization of the United Nations. Available at <http://www.fao.org/docrep/pdf/010/a1487e/a1487e00.pdf>

¹² Laven, A. (2010). The risks of inclusion: Shifts in governance processes and upgrading opportunities for cocoa farmers in Ghana. Amsterdam: KIT. Available at: https://pure.uva.nl/ws/files/1437472/77981_18.pdf

¹³ Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C., Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics. Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>

¹⁴ ICCO. (2012). The World Cocoa Economy: Past and Present. International Cocoa Organization, Abidjan. Additional data from private database of ICCO figures up to 2014/15. Some data not available.

Figure 11.2 Producer prices in US dollars expressed as a percentage of the ICCO daily price¹⁵



11.2.2 Producer prices in Côte d'Ivoire

Since the latest reforms in 2011, the producer price is fixed by the government. The annual producer price is fixed through a PVAM (Programme of Anticipated Sales) at around 60% of the value at which the CCC is able to make its forward sales.¹⁶

As in Ghana, fixed producer prices mean farmers cannot negotiate prices and prices to be differentiated based on quality, although premium payments for certified cocoa are possible. In theory, fixed annual prices are a guarantee to producers, regardless of market movements within the year. To ensure the stabilisation of the farm-gate price for cocoa farmers, a reserve fund has been set up by CCC to protect against possible drops in cocoa prices in the future.

Ivorian cocoa farmers receive some of the lowest prices in the world (Figure 11.2). Between 2000/2001 and 2014/2015, Ivorian farmers received an average of 51% of the ICCO daily price, although this has improved slightly to 55% since reforms in 2011. This reflects a highly effective government tax on producers, for which farmers do not receive comparable services as Ghanaian producers do from COCOBOD. How taxes

¹⁵ ICCO. (2012). The World Cocoa Economy: Past and Present. International Cocoa Organization, Abidjan. Additional data from private database of ICCO figures up to 2014/15. Some data not available.

¹⁶ This is the Cost, Insurance, Freight (CIF) price. Laven, A., Buunk, E., Amerlaan, T. (2016). Determination of Cocoa Prices in Cameroon, Nigeria, Ghana, Côte d'Ivoire, and Indonesia. Appendix to Report: Market Concentration and Price Formation in the Global Cocoa Value Chain. SEO Amsterdam Economics. p.24. Available at http://www.seo.nl/uploads/media/2016-79A_Bijlage_A_bij_Market_Concentration.pdf

from cocoa are being used and how that translates into benefits for farmers is not transparently reported.¹⁷

Unfortunately, in 2016, a considerable drop in global cocoa prices was experienced, which was caused by an 18% increase in global cocoa production. As the world's largest cocoa producer, Côte d'Ivoire contributed substantially to this annual increase in production.¹⁸ Although the government had forward sold a large proportion of the expected crop, many national traders who bought the forward contracts prior to the fall in prices did not also hedge (or presell) their cocoa. When the world market price fell sharply, local traders declined to buy the cocoa from producers at the fixed price and defaulted on their contracts with the government. The stabilisation fund was not large enough to maintain the guaranteed producer price, as some had previously predicted.¹⁹ The Ivorian government responded by lowering the producer price by 36%, angering producers.²⁰ This naturally raised many questions about the sustainability and functioning of such an institutional arrangement for price regulation.

Box 11.1 Price terminology

FoB 'Free-on-Board' price: Term of sale under which the price invoiced or quoted by a seller includes all charges up to placing the goods on board a ship at the port of departure specified by the buyer. Also called collect freight, freight collect, or freight forward.²¹

CIF price: 'Cost, Insurance, Freight' price is a trade term requiring the seller to arrange for the carriage of goods by sea to a port of destination and provide the buyer with the documents necessary to obtain the goods from the carrier.²²

ICCO price: The ICCO price for cocoa beans is the average of the quotations of the ICE Futures Europe and ICE Futures U.S markets.²³ This is also commonly called the world market price.

Producer price: Also known as the farm-gate price, this is the price farmers receive for their cocoa.²⁴

¹⁷ Laven, A., Buunk, E., Amerlaan, T. (2016). Determination of Cocoa Prices in Cameroon, Nigeria, Ghana, Côte d'Ivoire, and Indonesia. Appendix to Report: Market Concentration and Price Formation in the Global Cocoa Value Chain. SEO Amsterdam Economics.p.34. http://www.seo.nl/uploads/media/2016-79A_Bijlage_A_bij_Market_Concentration.pdf

¹⁸ In Côte d'Ivoire, cocoa production increased from 1,580,000 MT in 2015/16 to 2,019,000 MT in 2016/17, an increase of 438,000 MT. See: ICCO. (2018). Quarterly Bulletin of Cocoa Statistics Volume XLIV No. 1 Cocoa Year 2017/18

¹⁹ Ibid. p.34

²⁰ Fountain, A.C. and Hütz-Adams, F. (2018) Cocoa Barometer 2018. P.7. Available at <http://www.cocoaabrometer.org/>

²¹ Laven, A., Buunk, E., Amerlaan, T. (2016). Determination of Cocoa Prices in Cameroon, Nigeria, Ghana, Côte d'Ivoire, and Indonesia. Appendix to Report: Market Concentration and Price Formation in the Global Cocoa Value Chain. SEO Amsterdam Economics.p.2. http://www.seo.nl/uploads/media/2016-79A_Bijlage_A_bij_Market_Concentration.pdf

²² Ibid. p.2

²³ ICCO. (2018). Quarterly Bulletin of Cocoa Statistics Volume XLIV No. 1, Cocoa Year 2017/18, International Cocoa Organization, Abidjan

²⁴ Laven, A., Buunk, E., Amerlaan, T. (2016). Determination of Cocoa Prices in Cameroon, Nigeria, Ghana, Côte d'Ivoire, and Indonesia. Appendix to Report: Market Concentration and Price Formation in the Global Cocoa Value Chain. SEO Amsterdam Economics.p.34. Available at http://www.seo.nl/uploads/media/2016-79A_Bijlage_A_bij_Market_Concentration.pdf

11.3 World market prices

The price of cocoa on the world market is often a contentious topic. Frequently expressed concerns are that the world market price is too low, and that farmers are not receiving a 'fair' price.²⁵ The worry is that low world cocoa prices are keeping farmers poor. If farmers struggle to cover their costs of production and are unable to make sufficient on-farm investments they will be stuck in a low input, low output poverty trap.²⁶

We analysed the ICCO dataset from 1960/61 to 2016/17 in an attempt to identify long-term price trends and the presence of an underlying logic in world cocoa price movements.²⁷ We have also contrasted two periods therein: 1960/61 to 1989/90 and 1990/91 to 2016/17.

The period of 1960/61 to 1989/90 can be loosely characterised by nascent independence in many producing countries, non-democratic governmental systems, and regulated marketing structures. By the mid-1970s, a large structural cocoa deficit had sent cocoa prices soaring. At the same time, producer countries suffered from extremely high domestic inflation. The world economy was also still reeling from the effect of the oil crisis, with historically high inflation in the United States affecting the value of the dollar. Initially, the high cocoa prices of the mid-1970s depressed demand, but they also drove massive investment in cocoa production. As the cocoa trees from this investment matured, supply outpaced demand through the 1980s. To try to contain the global supply glut, the ICCO attempted to establish a 'buffer stock' policy. The world market, in a state of structural over-supply, experienced falling prices from the late 1970s until the early 1990s.

The period of 1990/91 to 2016/17 can be loosely characterised by democratic reforms and (partial) liberalisation in many cocoa producing countries, which was part of a wider trend towards a more liberalised global economy. Inflation in both producing (exporting) and importing countries was also much better under control during this period. Through much of the 1990s, prices showed signs of recovery due to a better balanced global demand and supply, which allowed the ICCO to phase out buffer stocks. However, in 1999/00, world prices touched a new low (in real terms) due, in part, to back to back surpluses and fears of a return to structural oversupply. From 2000/01 onwards, prices have been trending upwards, due to a small structural deficit. In 2009/10, the average ICCO price hit a 20 year high (in real terms) and,

²⁵ Fountain, A.C. and Hütz-Adams, F. (2018) Cocoa Barometer 2018. Available at <http://www.cocoabarometer.org/>

²⁶ Wessel, M., & Quist-Wessel, P. F. (2015). Cocoa production in West Africa, a review and analysis of recent developments. *NJAS-Wageningen Journal of Life Sciences*, 74, 1-7. P.5. Available at <https://doi.org/10.1016/j.njas.2015.09.001>

²⁷ For a reading on historical perspectives see Gilbert, C.L. (2012) The long term trend in cocoa prices, University of Trento. A power point presentation of his work is available at <https://mfe.be/choconomics/cplt-gilbert.pptx>

in most years, prices have remained fairly solid. However, 2016/17 was marked by a considerable price drop, which was largely caused by a surge in production as a result of favourable weather conditions in major producing countries. We are most interested in the period from 1990/91 onwards because market structures generally resemble those of today and those likely to be present in the immediate future. Also, this is the period during which the vast majority of farmers in our study planted most of their cocoa trees (See Chapter 6 Land, Cocoa tree ages).²⁸

11.3.1 Analysis of world market prices

All data presented in this section is sourced from the ICCO (Table 11.4), unless otherwise stated. Global cocoa production and grinding has increased roughly four-fold between 1960/61 to the present day (Figure 11.3). However, growth has not been linear. Relatively low market growth was seen between 1960 and 1980 before an acceleration from the early 1980s to the present day.

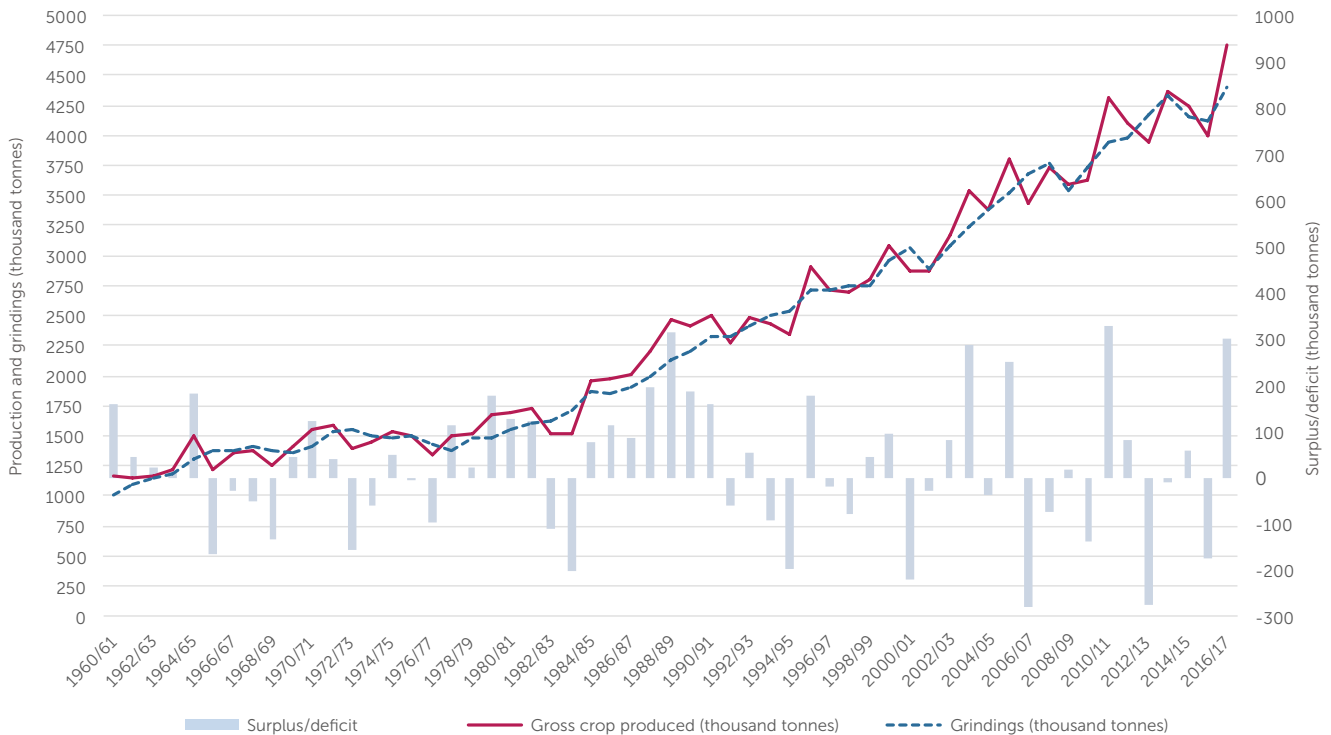
²⁸ We find that the average tree age in Ghana is 14 years and 16 years in Côte d'Ivoire

Table 11.4 World cocoa bean production, grindings and stocks²⁹

Year ³⁰	Gross crop produced (thousand tonnes)	Crop produced change %	Grindings (thousand tonnes)	Grinding change %	Surplus/deficit ³¹ (produced-grindings) (thousand tonnes)	Total end of season stocks ³²	ICCO buffer stocks	Stocks to grinding ratio ³³	US/tonne nominal ³⁴	US/tonne real (US\$ in 2016) ³⁵	Price change
1960/61	1172		1002		158	461	-	46	493	3997	
1961/62	1149	-2.0%	1095	9.3%	43	504	-	46	477	3829	-3.2%
1962/63	1172	2.0%	1140	4.1%	20	524	-	46	522	4148	9.4%
1963/64	1210	3.2%	1186	4.0%	12	536	-	45.2	522	4094	0.0%
1964/65	1505	24.4%	1305	10.0%	180	716	-	54.9	389	3012	-25.5%
1965/66	1221	-18.9%	1377	5.5%	-168	548	-	39.8	491	3741	26.2%
1966/67	1364	11.7%	1381	0.3%	-31	517	-	37.4	569	4215	15.9%
1967/68	1371	0.5%	1408	2.0%	-51	466	-	33.1	644	4628	13.2%
1968/69	1258	-8.2%	1377	-2.2%	-132	334	-	24.3	913	6297	41.8%
1969/70	1416	12.6%	1356	-1.5%	46	380	-	28	730	4774	-20.0%
1970/71	1557	10.0%	1418	4.6%	123	503	-	35.5	586	3625	-19.7%
1971/72	1584	1.7%	1527	7.7%	41	544	-	35.6	583	3455	-7.0%
1972/73	1399	-11.7%	1544	1.1%	-159	385	-	24.9	1014	5822	58.7%
1973/74	1452	3.8%	1497	-3.0%	-60	325	-	21.7	1455	7865	39.8%
1974/75	1538	5.9%	1477	-1.3%	51	376	-	25.4	1331	6480	-9.8%
1975/76	1499	-2.5%	1495	1.2%	-6	369	-	24.7	1655	7383	31.0%
1976/77	1342	-10.5%	1429	-4.4%	-96	274	-	19.1	3632	15320	119.0%
1977/78	1504	12.1%	1379	-3.5%	115	388	-	28.2	3283	13002	-14.3%
1978/79	1509	0.3%	1478	7.2%	21	409	-	27.7	3504	12899	1.2%
1979/80	1672	10.8%	1485	0.5%	175	584	-	39.3	2825	9339	-20.2%
1980/81	1695	1.4%	1558	4.9%	125	709	-	45.5	2098	6111	-19.9%
1981/82	1734	2.3%	1601	2.8%	121	831	100	51.9	1868	4932	-4.6%
1982/83	1525	-12.1%	1628	1.7%	-113	717	100	44.1	1949	4847	9.6%
1983/84	1512	-0.9%	1704	4.7%	-202	515	100	30.2	2412	5812	27.8%
1984/85	1956	29.4%	1864	9.4%	78	593	100	31.8	2222	5133	-3.7%
1985/86	1975	1.0%	1849	-0.8%	112	705	100	38.1	2149	4793	-15.4%
1986/87	2011	1.8%	1910	3.3%	87	792	175	41.5	2023	4430	-15.0%
1987/88	2197	9.2%	1986	4.0%	196	988	250	49.8	1707	3606	-21.0%
1988/89	2464	12.2%	2133	7.4%	314	1302	248	61	1344	2727	-18.4%
1989/90	2406	-2.4%	2202	3.2%	187	1489	245	67.6	1193	2309	-12.9%
1990/91	2506	4.2%	2331	5.9%	158	1647	242	70.7	1193	2191	-4.3%
1991/92	2278	-9.1%	2325	-0.3%	-63	1584	233	68.1	1166	2055	-3.7%
1992/93	2485	9.1%	2415	3.9%	53	1637	230	67.8	1051	1798	-9.6%
1993/94	2436	-2.0%	2511	4.0%	-91	1545	179	61.5	1370	2276	28.9%
1994/95	2348	-3.6%	2532	0.8%	-200	1346	128	53.1	1440	2332	-1.4%
1995/96	2915	24.1%	2719	7.4%	176	1522	77	56	1438	2265	3.0%
1996/97	2710	-7.0%	2711	-0.3%	-20	1502	26	55.4	1556	2380	13.6%
1997/98	2693	-0.6%	2752	1.5%	-78	1424	-	51.8	1711	2559	13.6%
1998/99	2808	4.3%	2744	-0.3%	45	1469	-	53.5	1298	1911	-25.6%
1999/00	3077	9.6%	2960	7.9%	96	1564	-	52.9	919	1324	-27.4%
2000/01	2865	-6.9%	3065	3.5%	-220	1344	-	43.9	990	1380	13.1%
2001/02	2877	0.4%	2886	-5.8%	-29	1315	-	45.6	1580	2141	58.8%
2002/03	3179	10.5%	3077	6.6%	80	1395	-	45.3	1873	2499	11.2%
2003/04	3548	11.6%	3237	5.2%	287	1682	-	52	1534	2001	-23.5%
2004/05	3378	-4.8%	3382	4.5%	-38	1644	-	48.6	1571	1996	0.2%
2005/06	3808	12.7%	3522	4.1%	248	1892	-	53.7	1557	1913	1.8%
2006/07	3430	-9.9%	3675	4.3%	-279	1613	-	43.9	1854	2207	14.9%
2007/08	3737	9.0%	3775	2.7%	-75	1538	-	40.7	2516	2912	28.2%
2008/09	3592	-3.9%	3537	-6.3%	19	1557	-	44	2599	2897	8.5%
2009/10	3634	1.2%	3737	5.7%	-139	1418	-	37.9	3246	3631	23.9%
2010/11	4309	18.6%	3938	5.4%	328	1746	-	44.3	3105	3418	-6.9%
2011/12	4095	-5.0%	3972	0.9%	82	1828	-	46	2396	2557	-20.9%
2012/13	3943	-3.7%	4180	5.2%	-276	1552	-	37.1	2359	2466	-0.4%
2013/14	4370	10.8%	4335	3.7%	-9	1543	-	35.6	3009	3100	26.2%
2014/15	4251	-2.7%	4152	-4.2%	56	1599	-	38.5	3057	3099	10.0%
2015/16	3993	-6.1%	4127	-0.6%	-174	1425	-	34.5	3093	3132	2.7%
2016/17	4748	18.9%	4401	6.6%	300	1725	-	39.2	2142	2142	-29.6%

²⁹ ICCO. (2018). Quarterly Bulletin of Cocoa Statistics Volume XLIV No. 1, Cocoa Year 2017/18, International Cocoa Organization, Abidjan. p.50³⁰ Cocoa year: 1 October to 30 September.³¹ Surplus/deficit: Current net world crop (gross crop adjusted for loss in weight) minus grindings.³² Total end-of-season stocks: Computed by ICCO on the basis of yearly surplus/deficit³³ Stocks-to-grindings ratio: Total end-of-season stocks as a percentage of grindings.³⁴ ICCO daily price is the average of the quotations of the nearest three active futures trading months on ICE Futures Europe and on ICE Futures U.S.³⁵ Figures calculated in US dollars in 2016, using the inflation calculator at <http://www.in2013dollars.com/>. Inflation figures are derived from <https://www.minneapolisfed.org/community/financial-and-economic-education/cpi-calculator-information/consumer-price-index-and-inflation-rates-1913>, the Bureau of labour statistics at <https://www.bls.gov/cpi/> and using inflation conversion factors at <http://liberalarts.oregonstate.edu/spp/polisci/research/inflation-conversion-factors>

Figure 11.3 Global increases in production and grinding



Price analysis during 1960/61 to 1989/90

The ‘stocks to grindings’ ratio³⁶ is an important determinant of price because it represents the global cocoa supply more broadly than single season production volumes.³⁷

From 1960/61 to 1964/65, the stocks to grindings ratio was around 46%, which is approximately the historical average.³⁸ However between 1965/66 and 1976/77, global demand for cocoa (indicated by ‘grindings’) began increasing. The world cocoa economy quickly shifted to a structural deficit, with demand outpacing supply by an average of 2% per annum in this period.³⁹ This supply deficit sent the stocks to grindings ratio plunging to an all-time low of 19% in 1976/77 (Table 11.4). Fear of supply shortages drove up nominal market prices to record highs (Figure 11.4).

³⁶ The ‘stocks to grinding’ ratio is the most important indicator of global cocoa stores. It is a more important indicator than total end of season stocks, (expressed in thousand tonnes) because total stocks will always increase in tonnes as the market grows regardless of supply/deficit (im) balance. Specifically, the stocks to grindings ratio is the total end-of-season stocks as a percentage of grindings. For example, for the year 2016/17 we can divide total end of season stocks of 1,725 thousand tonnes by total grindings of 4,401 thousand tonnes which gives us a ratio of 39.2.

³⁷ It is possible that ICCO stock figures are not precise or that certain companies may have higher stocks than those registered. However, for our time-based analysis, the most important consideration is the methodology and practice for reporting ICCO stock figures has good consistency from year to year.

³⁸ The long-term average of the stocks to grindings ratio (1960–2017) is 43%.

³⁹ This represents a deficit of 442 thousand tonnes of cocoa, or an average of 37 thousand tonnes per annum.

Figure 11.4 Global cocoa prices US\$/tonne (nominal and real 2016), and stocks to grinding ratio 1960/61-2016/17

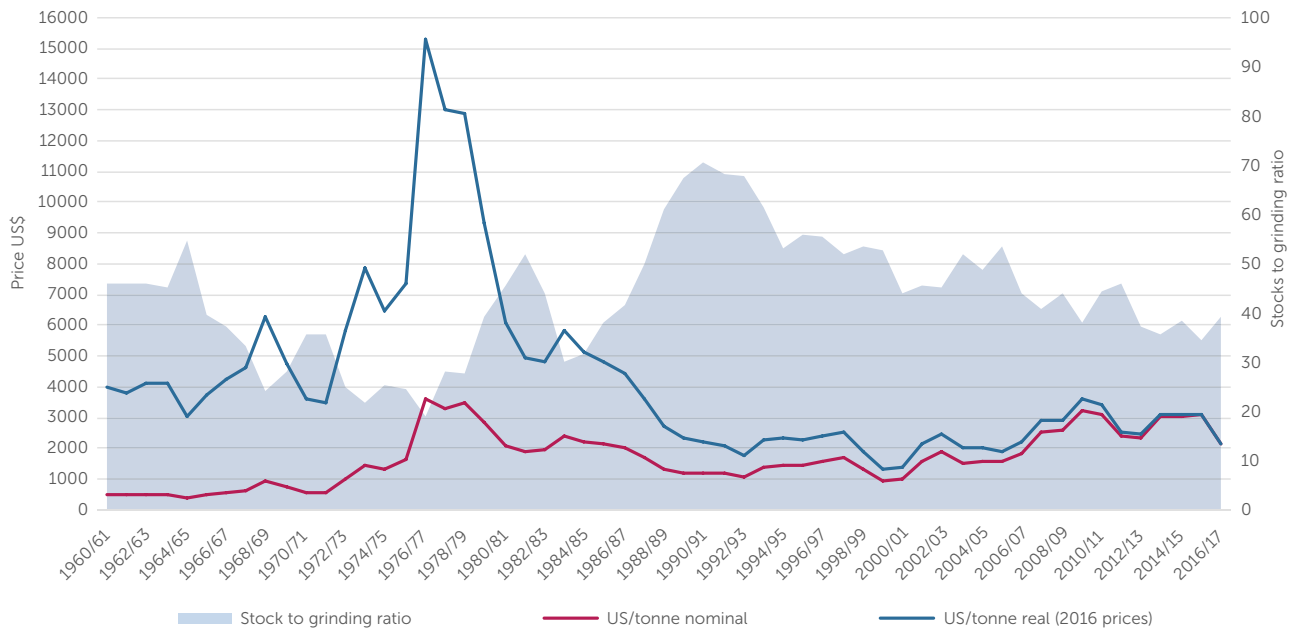
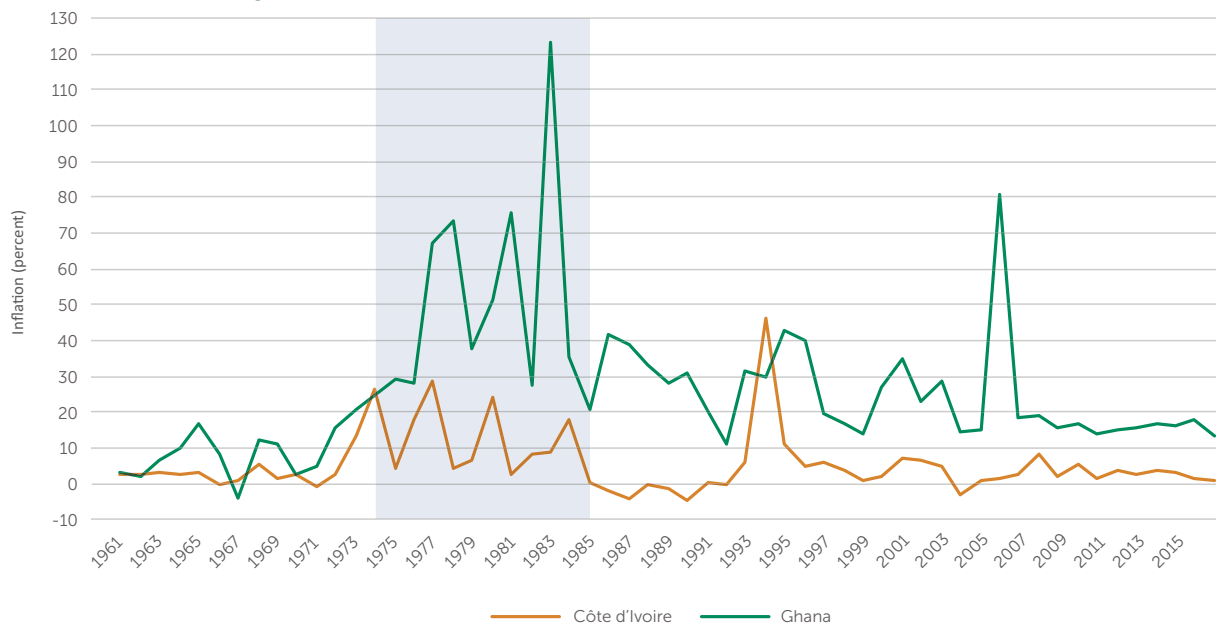


Figure 11.5 Annual inflation, Ghana and Côte d'Ivoire⁴⁰



Around this time, the global economy was in some difficulties, with the effect of the 1973 oil crisis still reverberating around the world. Inflation in the United States reached record highs driving devaluation of the US dollar. This is reflected in the substantial difference between the nominal (US\$/tonne) and real prices (US\$/tonne inflation adjusted to 2016 prices) of cocoa in the mid-late 1970s (Figure 11.4). At the

⁴⁰ World Bank. (2018). Inflation, GDP deflator (annual %) for Ghana and Cote d'Ivoire. Available at <https://data.worldbank.org/indicator/NY.GDP.DEFL.KD.ZG?locations=GH-CI>

same time, inflation in cocoa producing countries also hit new highs. In Ghana, annual inflation rose from single digits at the start of the decade to around 70% in 1977. Likewise, in Côte d'Ivoire, inflation rose from close to zero to 30% in 1977.⁴¹ These were exceptional times by today's standards and the rapid rise in cocoa prices (both nominal and real) quickly proved to be unsustainable. It is difficult to judge the extent to which cocoa producers benefited from these high prices because much of the value was lost to high inflation and currency devaluation.

The sharp price increases in the 1970s did two things: first, the increase in prices dampened demand, with grindings falling by around 11% between 1972/73 and 1977/78) (Table 11.4); second, the high prices spurred considerable investment in cocoa planting in Ghana and Côte d'Ivoire, as well as in other producing countries. The delayed result of this investment became apparent by the mid-1980s as the cocoa trees matured and production growth far outstripped demand. The world cocoa economy swung from a large structural deficit to a large structural surplus (Figure 11.6).

In a period from the late 1970s to the early 1990s, 11 out of 13 years were marked by an annual cocoa surplus, which quickly swelled the stocks to grindings ratio from record lows to a record high of 71% in 1991 (Table 11.4). As a result, world market prices fell most years from the late 1970s to early 1990s.⁴² The sector was effectively in crisis, as demonstrated by the ICCO's attempt to halt the slide in prices through a 'Buffer Stock Fund', which tried to absorb some of the excess supply. However, the attempt at price stabilisation through the Buffer Stock Fund was unsuccessful⁴³ and expensive to manage. The ICCO accumulated large cocoa inventories, which then took years to sell off before it was abandoned. Finally, in the early 1990s, some semblance of supply/demand equilibrium began to return.

The period of 1960 to 1990 bears little resemblance to the cocoa market of today, but it does offer some instructive lessons: As predicted by the main model of supply and demand,⁴⁴ we observe a relationship between supply (indicated by the stocks to grindings ratio) and demand (indicated by grindings), and world market prices. In the short run, high price shocks dampened demand and also stimulated higher rates of cocoa planting. Increased planting had a delayed impact on global supply because cocoa trees take time to mature.⁴⁵ When the growth in cocoa production outpaced growth in demand, a structural surplus was observed (i.e. over-supply across multiple

⁴¹ World Bank. (2018). Inflation, GDP deflator (annual %) for Ghana and Cote d'Ivoire. Available at <https://data.worldbank.org/indicator/NY.GDP.DEFL.KD.ZG?locations=GH-CI>

⁴² World market prices fell from a high of US\$15,320 in 1976/77 (real 2016) to a low of US\$1,798 (real 2016) in 1992/93, a fall of more than 700%. In this period, annual average prices only rose in three out of 16 years.

⁴³ The 'Buffer Stock Fund' failed to stabilise world cocoa prices because: (i) it was economically too difficult to determine the equilibrium price; (ii) it was politically too difficult for member countries to cut production when this was needed for price stabilisation. As a result, the fund accumulated enormous inventories of cocoa that then took years to sell off as a gradual approach was deemed necessary to not disturb the market. See Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C. & Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics. Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>

⁴⁴ Marshall, A. (1890). Principles of Economics. Available at <http://www.econlib.org/library/Marshall/marPCover.html>

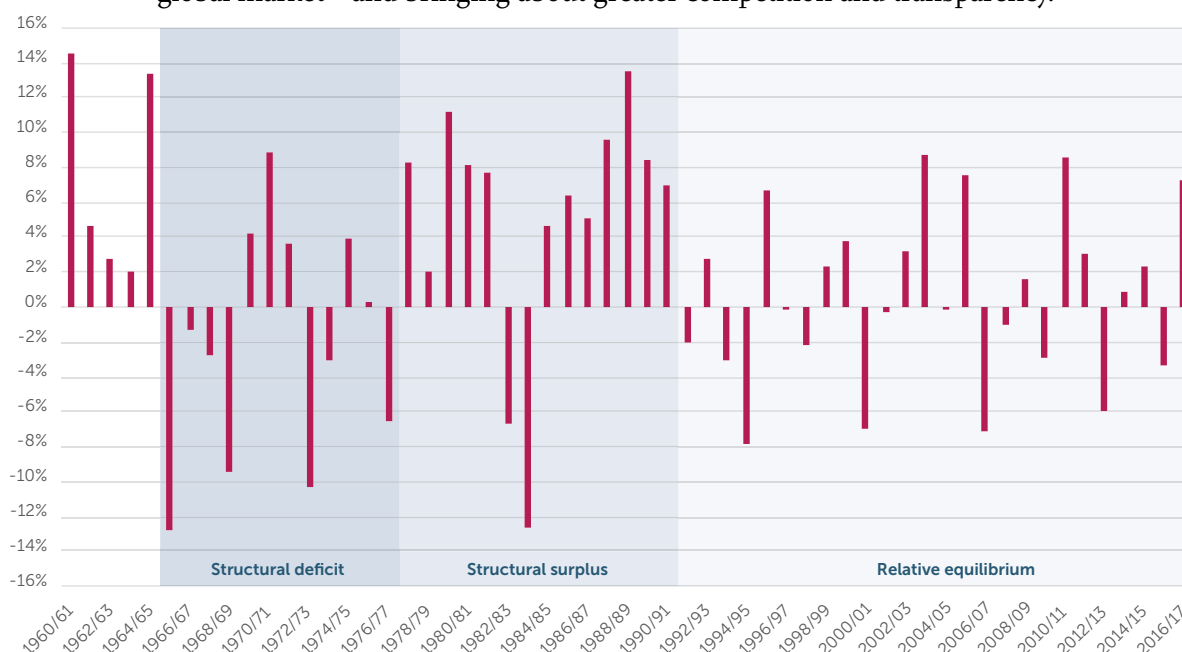
⁴⁵ Gilbert, C. (2016). The dynamics of the world cocoa price, in *The Economics of Chocolate*, pp. 307-338.

years), driving an increase in the stocks to grindings ratio (supply) and an associated fall in prices. These interactions are explored in greater detail in the following section.

Price analysis 1990/91 to 2016/17

In the early 1990s, the cocoa sector began to turn a corner. The period from 1990 onwards is marked by democratic reforms, partial liberalisation in Ghana and Côte d'Ivoire, and further liberalisation in other cocoa producing countries. The ICCO also played its role through a number of reforms aimed at achieving a sustainable world cocoa economy. This 'more liberalised' period from 1990/91 to the present may be compared with the 'more regulated' period from 1960/61 to 1989/90.

The period from 1990 onwards is characterised by a measurable reduction in volatility in a range of indicators. First, there has been much lower volatility in annual cocoa surplus/deficits with smaller surplus/deficits in percentage terms.⁴⁶ Also, a pattern of relative supply/demand equilibrium has been established, with 13 years in surplus and 14 in deficit (Figure 11.6). As a result, changes in world cocoa stocks (measured by the stocks to grindings ratio) is also less volatile.⁴⁷ Finally, average annual prices are much less volatile as a result,⁴⁸ providing relatively greater certainty for all actors within the supply chain. Reduced volatility has even been achieved while rapidly growing the global market⁴⁹ and bringing about greater competition and transparency.⁵⁰



⁴⁶ We look at the standard deviation for annual surplus/deficit expressed as a percent. For the period 1960/61 to 1989/90, the standard deviation of the sample is 0.077 compared with a standard deviation of 0.049 for the period 1990/91 to 2016/17.

⁴⁷ For the period 1960/61 to 1989/90, the standard deviation of the stocks to grindings ratio was 0.214, compared with a standard deviation of 0.109 for the period 1990/91 to 2016/17.

⁴⁸ We look at the standard deviation for annual price change expressed as a percent. For the period 1960/61 to 1989/90, the standard deviation of the price change was .311 compared with a standard deviation of 0.201 for the period 1990/91 to 2016/17.

⁴⁹ For example, between 1960 and 1980, the change in global demand (grindings) was just under 50%. In the 1980s, production rapidly increased creating global surpluses. However, since 1990, supply and demand have kept pace with each other. Between 1990 and 2016, global demand grew nearly 90%.

⁵⁰ Many sector actors from governments to companies and NGOs are working to improve transparency. Specifically, improving market transparency falls under the mandate of the ICCO.

Figure 11.6 Annual cocoa surplus/deficit (1960/61 to 2016/17)

The 1990s could be described as a rebuilding decade with relatively low prices. In 1993/94, the first positive change in price was recorded for more than a decade and a minor price recovery can be observed until 1998/99 (Figure 11.7). In this period, the ICCO was finally able to sell off its buffer stocks. Unfortunately, average global prices hit a new low in 1999/2000 in inflation-adjusted terms (US\$ 2016) due to back-to-back years of surplus, and fears that the world cocoa economy could return to a structural supply surplus. Nevertheless, the 1990s did achieve a recalibration of the stocks to grindings ratio, which fell from the record high of 71% at the start of the decade to a more historically normal level of 53% by the end of the decade.

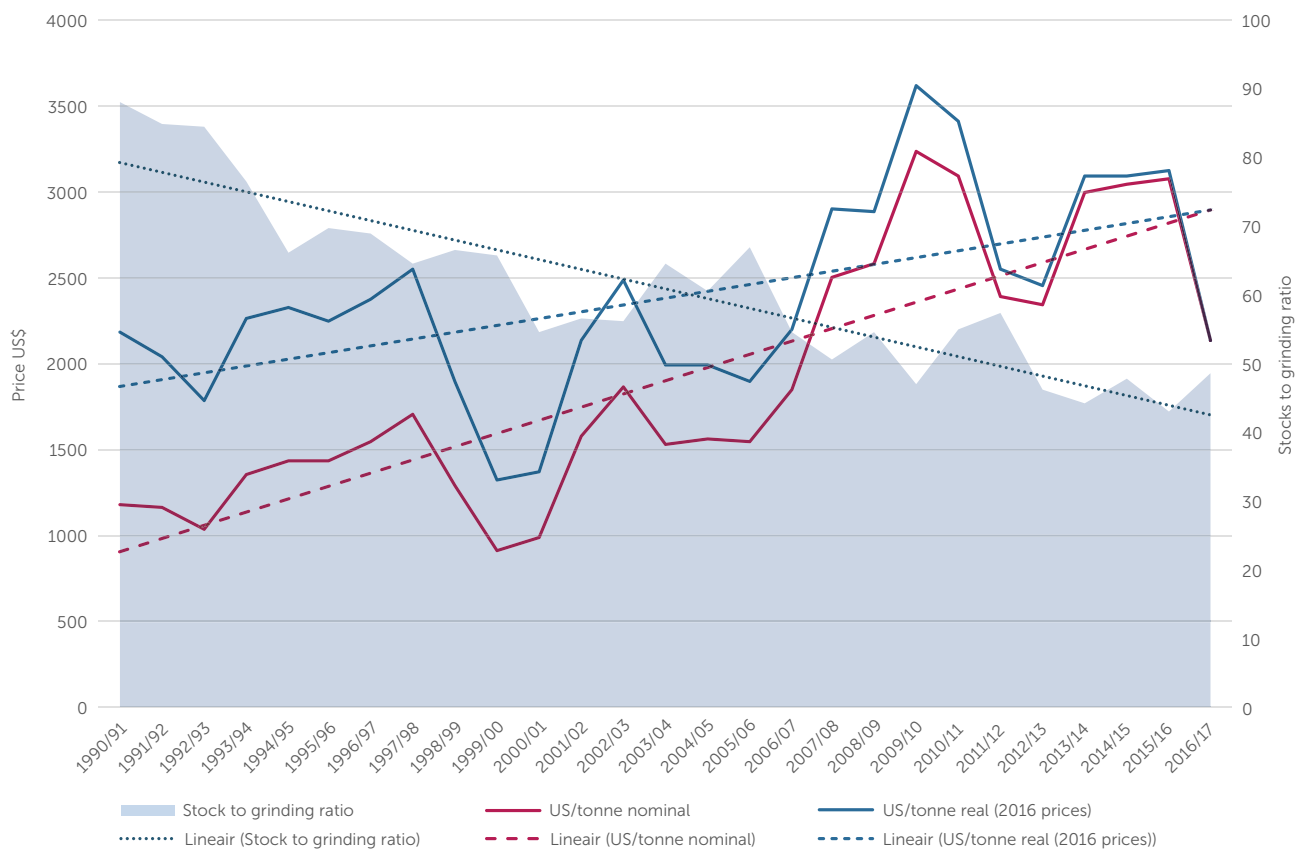
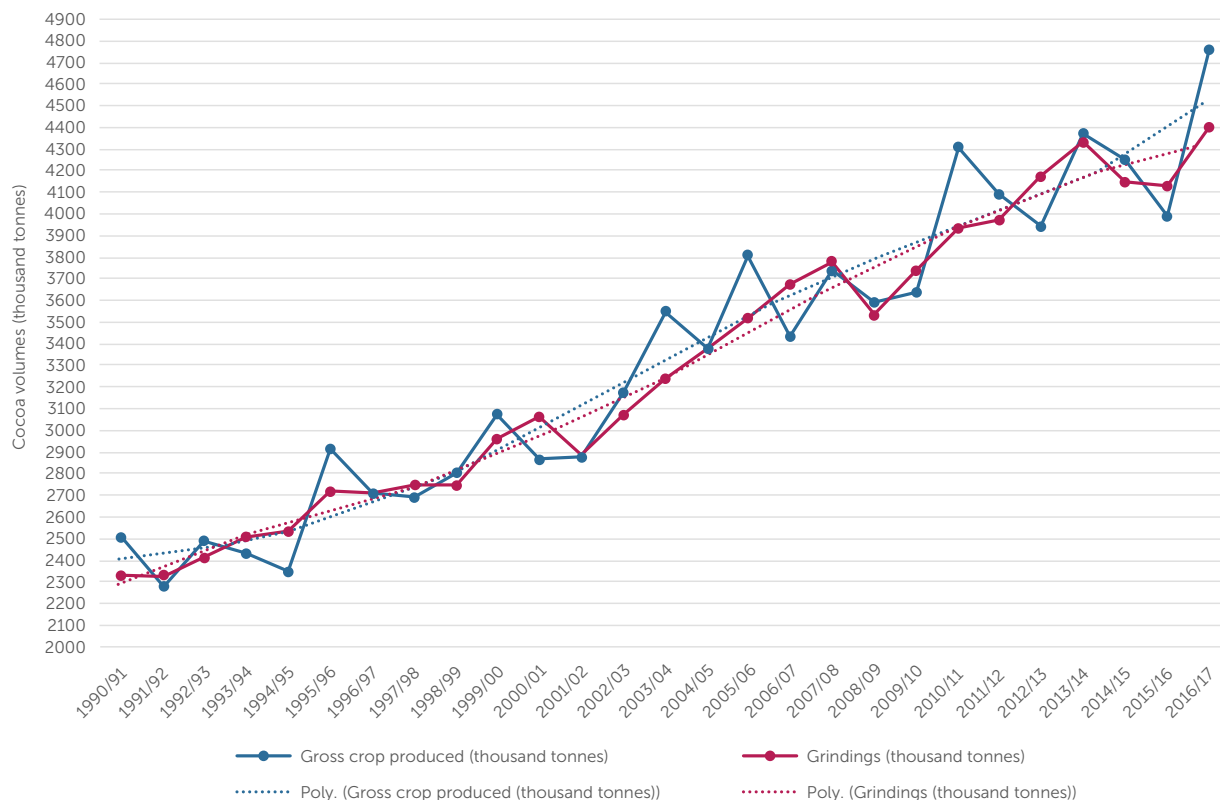


Figure 11.7 Global cocoa prices US\$/tonne (nominal and real 2016), and stocks to grinding ratio 1990/91 to 2016/17

From 2000 onwards, average global prices have steadily strengthened in most years (in both nominal and real terms), due to a relatively balanced global cocoa economy. The stocks to grinding ratio has gradually declined to around 35-40% due to reasonably consistent global demand. A peak average annual price of US\$3,246 was reached in 2009/2010 (US\$3,631 in real terms), reflecting a 24-year high. Good prices have been maintained in a number of subsequent years, including average prices of around US\$3,100 in 2013/14 through 2015/16 (in nominal and real terms).

Supply and demand trends have more or less tracked each other through the period, regardless of year to year production volatility driven by weather conditions or changes in grindings resulting from price fluctuations. It is notable that production growth steadily increased even during periods of lower prices in the 1990s and early 2000s (Figure 11.8).

Figure 11.8: Production and grindings volumes (1990/91-2016/17)



The trendline used above is polynomial to 5 orders, and shows production and grindings tracking each other. The gap opening up in 2016/17 is due to an exceptional year of production, and should not be interpreted as a trend (at least, not yet). If this single outlier year is removed, no discernable trend of supply/demand imbalance is evident.

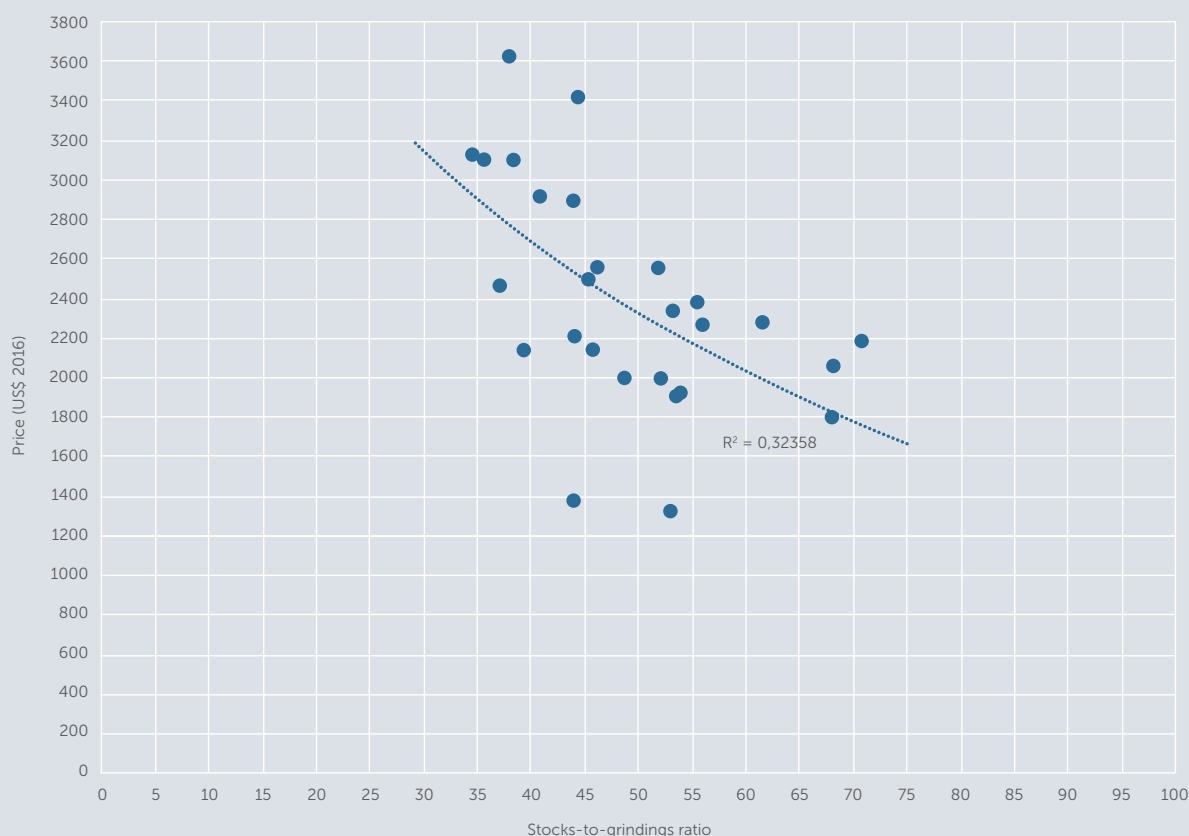
Analysis of price levels

A clear relationship can be observed when we plot the stocks to grindings ratio and price (whether nominal or real US\$2,016) for the period 1990/91 to 2016/17 (Figure 11.9). Using ICCO data, the stocks to grindings ratio is the strongest indicator of price trends and price levels⁵¹ and may be thought of as the market's interpretation of the relative scarcity of cocoa both in the present and in the near future. When running an OLS regression analysis we find the relationship between the stocks-to-grindings ratio and price (US\$ in 2016) is highly significant. For every percent point change in the stocks-to-grindings ratio the price per tonne shifts around \$31 in the opposite direction. Our analysis is consistent with that of the ICCO, who argue that "world market prices have, in general, continued to reflect adequately the degree of imbalance between supply and demand across time."⁵²

It is important to note that this is a two-way relationship. While the stocks to grindings ratio affects average annual prices, price levels also influence annual demand (grindings) and investments in future cocoa production (i.e. tree planting).

Of course, the relationship between the stocks to grindings ratio and price is also affected by other factors such as changes in annual production and trader confidence in the cocoa market.

Figure 11.9 Relationship between stocks to grindings ratio and real price (US\$ 2016) (logarithmic trendline) (1990/91 to 2016/17)



⁵¹ This relationship also holds for the period 1960/61 to 1989/90 despite the greater annual volatility in demand and supply.

⁵² ICCO. (2012). The World Cocoa Economy: Past and Present. International Cocoa Organization, Abidjan. P.6

Analysis of volatility and annual price changes

While the stocks-to-grindings ratio is a good predictor of price levels and price trends, changes in average annual prices are also affected by changes in annual production levels (supply) and grindings (demand) (Table 11.4).

First, we compare the volatility of the annual change in 'Gross crop produced' (supply) and 'Grindings' (demand) using the coefficient of variation (CV).⁵³ Since 1990/91, the change in 'Gross crop produced' has a CV of 317 compared with a CV of 143 for 'Grindings'. This indicates that there is more than twice the volatility in annual changes in production than in grindings.

Annual changes in the gross crop produced are largely driven by weather conditions in the main producing countries, although there can also be external influences which affect supply chains, such as geopolitical tensions. Since 1960/61, only five times has the change in gross crop produced exceeded 15%. (Table 11.4). The most recent spike in production occurred in 2016/17, which was the largest ever annual increase in cocoa production (in metric tonnes). On average, global production has increased by around 3% per annum since 1990/91.

By contrast, grindings (demand) is fairly inelastic because processors are constrained by their technical capacity within a single year, and by the capacity of their own markets to absorb additional volumes of cocoa products. Between 1990/91 and 2016/17, grindings has also increased by around 3% per annum, which has been made possible through investments in additional processing capacity to meet long-term demand from brands and consumers. Since 1990, there have been roughly an equal number of surplus and deficit years, thereby maintaining something of an equilibrium (Figure 11.6).

When running a simple OLS regression we find a highly significant positive correlation between the percent change in production and percent change in grindings (demand). In other words, when annual production increases by more than the trend, demand also increases more than the trend. We expect this is due to the ongoing interactions between supply expectations, price and demand. For instance, in 2016/17 there was a 19% increase in production which contributed to a drop in prices, but which stimulated a 6.6% increase in grindings. This is an important dynamic, as an increase in grindings can limit the annual surplus/deficit and prevent the stocks-to-grinding ratio from growing too quickly, which affects price levels in subsequent seasons (Figure 11.9).⁵⁴

We also ran a OLS regression to explore the correlation between the annual cocoa trade balance (surplus/deficit) and change in price from the previous year. As expected, we find a significant negative correlation between these variables. This suggests that cocoa prices typically increase when there is a deficit in a given year and decrease when there is a surplus, as was seen in 2016/17. This is in-line with standard economic theory.

We further investigated whether annual average prices are more volatile now or in the past. For the period 1990/91 to 2016/17 we find a coefficient of variation (CV) of 5.14 compared with 5.53 for the period 1960/61-1989/90. This suggests the average annual price is not more volatile now than in the past, and perhaps less so.

⁵³ A coefficient of variation (CV) is the ratio of the standard deviation to the mean multiplied by 100. The CV for a single variable aims to describe the dispersion of the variable in a way that does not depend on the variable's measurement unit. This allows CVs to be compared to each other in ways that other measures, like standard deviations or root mean squared residuals, cannot be.

⁵⁴ More sophisticated econometric modelling is required to describe these interactions precisely.

11.3.2 Global markets

Futures markets

Technically, the world cocoa price is established on the cocoa futures market. Cocoa futures prices are based on the ICE Futures Europe exchange in London and on the ICE Futures US exchange in New York. The marketing boards of Ghana and Côte d'Ivoire opt to auction most of their cocoa on these markets. This is partly because the futures market allow marketing boards and traders alike to hedge their risks as it fixes the price for future delivery. The exchanges thus play a crucial role in reducing price uncertainty in the market and provide a price insurance function to the cocoa market as traders are able to hedge open positions in the market. Futures markets also make the price 'discovery' process on spot markets much more visible and transparent.⁵⁵

The world cocoa market can be described as 'efficient' in that they operate like markets with full competition. The price therefore is 'right' in the sense that prices are discovered through high volumes of trading with a high amount of competition which makes it extremely difficult for any one trader to affect prices.

Speculation

Some market participants believe that speculators move commodity futures away from their fundamentals of supply and demand, thereby distorting prices and exacerbating volatility⁵⁶ and 'failing farmers'.⁵⁷ While speculative trading in cocoa futures has increased by more than 400% over the past three decades, several studies have concluded that there is no evidence that the prices in the cocoa market are distorted by speculators.^{58,59} ICCO has also previously conducted an econometric test on the relationship between price changes in the futures and spot markets. It found that price changes in the futures market run ahead of the spot market and that speculation in the cocoa market actually *reduces* price volatility rather than increases it.⁶⁰ A large number of buyers (i.e. more competition) and high volumes of trade make it virtually impossible for any one buyer or seller to affect international market prices because the volumes that a single entity trades are small in relation to the total market size.

Given that prices are fixed annually by the respective marketing boards of Ghana and Côte d'Ivoire, daily, weekly and monthly price changes should not directly affect farmers in these countries. Nevertheless, it is important to note that changes in price

⁵⁵ Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C., Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics. p.31 Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>

⁵⁶ Ibid. p.31

⁵⁷ Fountain, A.C. and Hütz-Adams, F. (2018) Cocoa Barometer 2018. P.53 Available at <http://www.cocoabarometer.org/>

⁵⁸ Ohomeng, W., B. Sjo and M. Danquah (2016), Market efficiency and price discovery in cocoa markets, Journal of African Business. Abstract available at <https://www.tandfonline.com/doi/abs/10.1080/15228916.2016.1142801>

⁵⁹ Bohl, S., and P. M. Stephan (2013), Does futures speculation destabilize spot prices? New evidence for commodity markets, Journal of Agricultural and Applied Economics, vol. 45(4): 595-616. Available at <https://pdfs.semanticscholar.org/9e41/22e2c570407c81fd41a67cde63bf53bd7b2c.pdf>

⁶⁰ Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C., Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics. p.34 Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>

from year to year are much larger than changes in price from month to month (or week to week). Therefore, while speculators' fears or optimism may lead to cocoa being over-sold or under-sold in a given month, the underlying fundamentals of supply and demand still hold.

Prices paid by companies

Prices paid by companies are also often under scrutiny. It is important to note that, in Ghana and Côte d'Ivoire, companies are not legally able to buy cocoa directly from producers. Therefore, prices paid by companies are determined by the futures market (described above).

In the past, regulators have also looked at whether there is too high of a market concentration of buyers in the market which could affect prices. Recent mergers and acquisitions of companies in the cocoa sector assessed by the European Commission were not considered to be above the level of anti-competitive concentration from the point of view of European anti-trust law. To date, there is a lack of clear evidence that market concentration among processors has artificially reduced the world cocoa price below the level that equalises supply and demand.⁶¹

11.4 Summary

The governments of both Ghana and Côte d'Ivoire closely regulate their country's cocoa sector. While both have enacted certain reforms in recent decades, the COCOBOD in Ghana and the CCC in Côte d'Ivoire regulate the prices and coordinate the marketing. In Ghana, the Cocoa Marketing Company, maintained a monopoly over external marketing. In Côte d'Ivoire, the CCC allocates the licenses for export.

In Ghana, LBCs are permitted to act as competitors to the state-owned PBC for internal marketing purposes only. LBCs provide buying services for which they receive a fixed margin of the FoB price. In our study, PBC remains the largest buyer in our sample, with 57% of households selling to them. Kuapa Kokoo (18%), AGL/ Armajaro (15%) and Olam (12%) were also found to have a notable market share.

In Côte d'Ivoire, cocoa producers typically sell their unprocessed cocoa beans through local buyers (*pisteurs*) or farmer cooperatives. These in turn sell to larger buyers (*traitants*), processors and exporters, who sell to international traders. In our study, 65% of respondents reported selling through *pisteurs*, with 36% selling through a cooperative.

⁶¹ Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C., Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics. p.i. Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>

In Ghana, producer prices are set by the PRRC, and in Côte d'Ivoire by the CCC, fixed for a period of one year. Fixed prices can be advantageous for farmers if the world market price falls during the season but is guaranteed by the government. On the other hand, in a bullish market, cocoa farmers do not benefit from price increases within a season. Fixed prices also mean that price differentiation for better quality is not possible in Ghana and Côte d'Ivoire.

Ghana and Côte d'Ivoire both forward sell a large proportion of the expected production as a hedge against market volatility. Both countries also operate a stabilisation fund to help them maintain the announced producer price should world prices fall during the season. Unfortunately, this was not enough to protect Ivorian producers from falling prices in 2016/17, which raises questions about the institutional framework.

There is no evidence that regulated price mechanisms in Ghana and Côte d'Ivoire lead to higher prices for cocoa farmers than liberalised price mechanisms in other countries. Through their monopoly positions on external marketing, COCOBOD and CCC are able to effectively tax producers at rates that contribute to farmers receiving consistently lower prices than those in liberalised markets. For the period 2000/2001 to 2014/2015, Ghanaian producers received an average of 57% of the ICCO daily price, while Ivorian farmers received an average of 51% of the ICCO daily price.

Part of the cocoa revenues received by the marketing boards in Ghana and Côte d'Ivoire are reinvested in the sector and in general public goods. However, there is a perceived lack of transparency in decision-making and the efficiency of the allocated public reinvestments (e.g. input distribution) has been questioned. Farmers in Ghana receive considerably more institutional support than farmers in Côte d'Ivoire.

Between 1965/66 and 1976/77, global demand for cocoa began increasing and the world cocoa economy quickly shifted to a structural deficit, which plunged the stocks to grindings ratio to an all-time low of 19%. Fears of scarcity drove up nominal market prices to record highs, which was compounded by very high inflation in Ghana, Côte d'Ivoire and internationally. It is difficult to judge the extent to which producer countries benefited from these high prices because much of the value would have been lost to high inflation and currency devaluation.

The sharp price increases in the 1970s lowered demand in the short term and spurred considerable investment in cocoa production. The delayed effect of this investment in production led to a structural surplus through the 1980s and early 1990s, and associated falling prices throughout the period.

The period from 1990/91 to 2016/17 is characterised by greater stability and lower volatility. A pattern of relative supply/demand equilibrium was established during this period, with smaller annual imbalances in supply and demand.

Since 2000, average global prices have trended upwards (in both nominal and real terms). On several occasions, average annual prices have pushed above US\$3,000/tonne in real terms (US\$2,016), reflecting price levels not seen for two decades. It is in this context that we must consider the narrative that current prices are 'too low'.

Across years, price levels and trends are closely correlated with the 'stocks to grindings' ratio. The 'stocks to grindings' ratio represents the global supply of cocoa more broadly than single season production volumes. In recent times, the stocks to grinding ratio has gradually declined from a high of around 70% in 1990 to around 35-40% today, due to reasonably strong and consistent global demand. This has had a generally positive effect on price trends.

Changes in average annual prices are also affected by the annual (expected) surplus or deficit of cocoa. Global cocoa production (supply) is much more volatile than grinding (demand) with changes in annual production volumes largely driven by weather conditions in major producing countries. Processors are constrained by their technical and storage capacity to absorb a year on year increase in production, and by demand in their own markets.

Since 1990, growth in cocoa production volumes and grinding volumes have more or less tracked each other, increasing by around 3% per annum. This represents increased investment in cocoa production (i.e. planting and yield improvements), increased investment in storage and processing capacity, and increased demand from existing and new markets. Annual changes in production rarely exceed +/-15%, the most recent time being in 2016/17. Annual changes in grinding have not exceeded +/-8% in this period.

Change in grindings (demand) negatively correlates with changes in annual price. In a year where there is a large increase in production, over-supply puts downward pressure on prices which can, in turn, increase demand in the short term. This is important because the increased demand helps to offset any increase in the stocks to grindings ratio, which is correlated with price levels for subsequent seasons.

The year 2016/17 was an outlier in terms of production volume, and there is no evidence that it is a sign of a new trend. 2016/17 was marked by the largest ever change in production volumes (tonnes) and the fourth largest change as a percent of production. This led to a single year fall in prices, and much uncertainty in the market. Most of the production increase can only be attributed to weather conditions, as most other factors influencing production levels (e.g. production improvements, tree planting etc.) take place over several years and we would be able to observe trends if this was the case.

Cocoa prices paid by companies are determined by the international futures market and spot markets. Therefore, critique of prices that companies pay should be directed

to how prices are formed on international futures markets. It is important to note that Ghana and Côte d'Ivoire opt to sell most of their cocoa on the futures market for reasons of efficiency, high competition, price transparency and the ability to hedge.

There is a lack of evidence that speculation in future markets is able to appreciably affect cocoa prices one way or the other. Speculation may, in fact, reduce price volatility because more buyers and sellers aid the process of price discovery, informed by futures markets.

In the past, high cocoa prices have stimulated higher rates of production growth, which leads to structural surpluses and falling prices. This effect can be seen from the late 1970s through to the early 1990s. The fact that high prices can spur investment in cocoa planting is an important consideration in today's market, given that prices have been trending upwards for some time, growth in demand is relatively constant, and ongoing concerns about deforestation in both Ghana and Côte d'Ivoire (see Chapter 6 Land).

There is a lack of evidence that low world prices slowed growth in cocoa production in recent decades. From a global perspective, farmers have continued to expand production even when cocoa prices hit record lows in the late 1990s and early 2000s, although production rates varied across countries. No delayed effect is clearly evident. This suggests that, even in periods of low cocoa prices, cocoa has remained relatively competitive compared with other crop options and/or there are other factors that motivate farmers to expand cocoa production (such as land tenure security) (see Chapter 7 The importance of cocoa).

From a policy perspective, trends are more important than annual figures. As with any agricultural commodity, weather conditions (favourable or unfavourable) in major producing countries can have a considerable effect on prices, and therefore demand. Trends allow us to understand changes through time, whereas some individual years can be outliers caused by weather conditions and bias interpretations of cause and effect.

From a policy perspective, it is important that arguments for and against market interventions (particularly price interventions) are based on a good analysis of market dynamics. Our analysis illustrates that the market is a system that generally follows economic principles of supply and demand, if imperfectly. It is not possible to intervene in one aspect without triggering effects in other aspects. For those entertaining the idea of a cocoa cartel, supply management (buffer stocks), or guaranteed (minimum) prices, there should be good evidence that the intervention will, as a minimum, do no harm to farmers over time.⁶² Good intentions to increase prices to farmers can also harm them if a supply/demand imbalance results.

⁶² Oomes, N., Tieben, B., Laven, A., Ammerlaan, T., Appelman, R., Biesenbeek, C. & Buunk, E. (2016). Market concentration and price formation in the global cocoa value chain. SEO Amsterdam Economics. P.97. Available at <http://www.seo.nl/en/page/article/marktconcentratie-en-prijsvorming-in-de-mondiale-waardeketen-voor-cacao/>

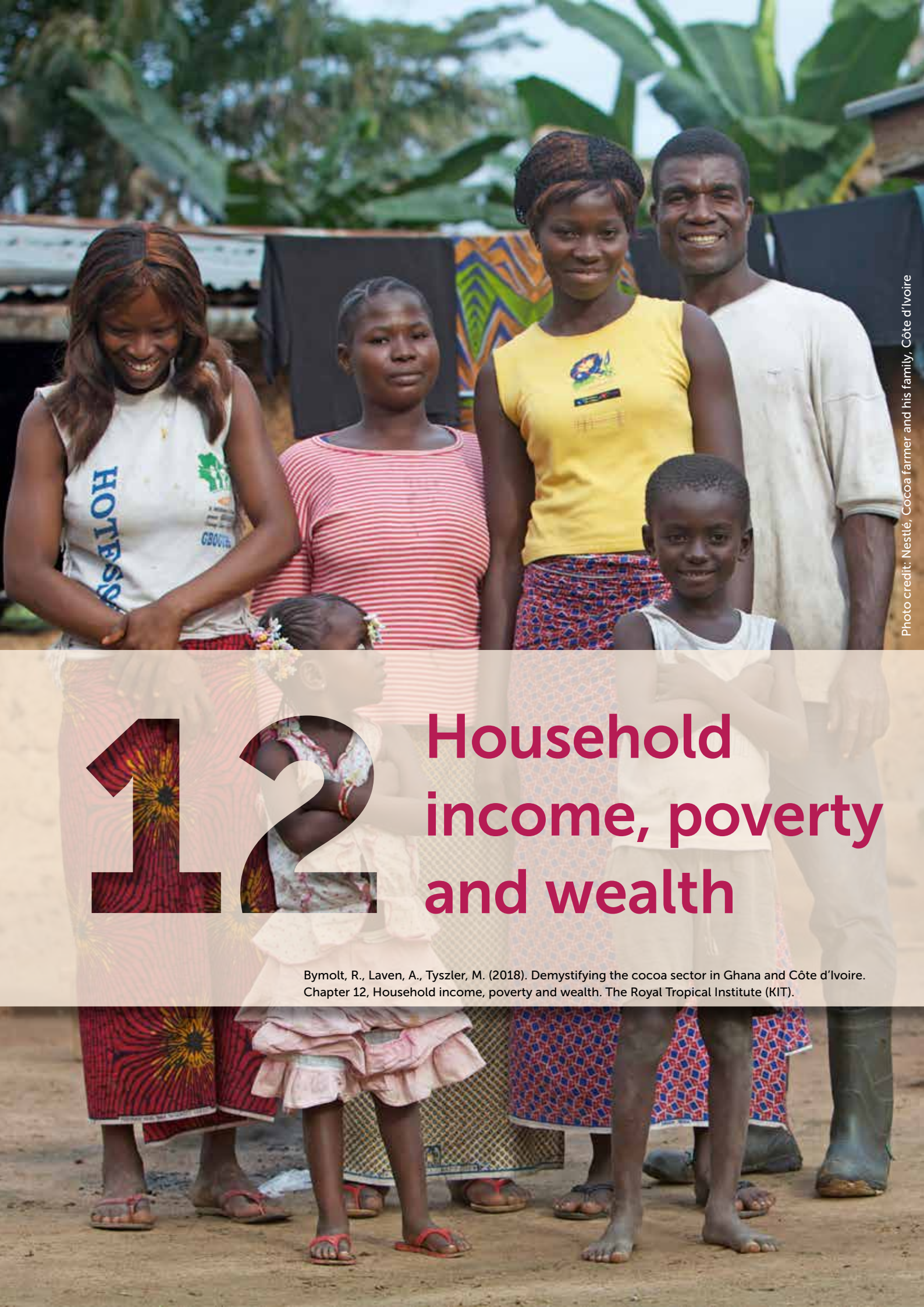


Photo credit: Nestlé, Cocoa farmer and his family, Côte d'Ivoire

12

Household income, poverty and wealth

Bymolt, R., Laven, A., Tyszler, M. (2018). Demystifying the cocoa sector in Ghana and Côte d'Ivoire. Chapter 12, Household income, poverty and wealth. The Royal Tropical Institute (KIT).

Despite decades of investment in West Africa, cocoa is still often referred to as a ‘poor man’s crop’.¹ Many stakeholders believe the poverty situation of cocoa households is untenable and must improve. Furthermore, some perceive poverty itself to be a threat to the future of the cocoa industry. If households are unable to earn sufficient income, they will not be able to make the necessary investments to maintain and improve their cocoa farms. Households will then be trapped in a low input-low output cycle and unable to contribute enough to the expected future demand for cocoa. In some cases, if farmers are unable to sufficiently support their families, they may leave cocoa for other crop options, further risking future supply.

Previous research^{2,3,4} has identified a variety of issues pertaining to the poverty status of cocoa households, both on the supply and demand side. Additionally, it has been observed that the enabling environment (including institutions and physical infrastructure) is sub-optimal for supporting the cocoa value chain (Table 12.1).

Table 12.1 Summary of potential issues affecting the poverty status of cocoa households

Supply side	Demand side	Enabling environment
Land tenure is not sufficiently secure	Low prices, fluctuating prices	Insufficient physical infrastructure (roads, hospitals, schools, transport costs)
Position of farmers without land	Limited access to market information	Lack of access to credit
Small size of farms	Lack of collective bargaining	Gender inequality
Aging cocoa trees, many beyond their most fertile age	Speculation on the futures markets	Lack of healthcare
Low yields (productivity per unit of land)		Lack of farmer associations and collective bargaining, and farmer organisation
Low use and investment in inputs such as fertilisers and pesticides		Food security and nutrition risks
Low knowledge and training		Unsafe working conditions with spray pesticides and fertilisers
Low quality cocoa beans		Corruption
Human rights, child labour		Environmental impact of fertilisers and pesticides
Monoculture		Rising costs of living/inflation
Deforestation, decreasing biodiversity		Lack of transparency and accountability
Cocoa tree diseases such as stem borer, cocoa swollen shoots virus (CSSV)		Unstable political environment

As researchers, we agree that, in the context of West Africa, the issues presented in Table 12.1 are often present, and that the cocoa sector is not performing optimally at many levels. However, identifying the underlying causes of sub-optimal performance is simpler than assessing the prevalence or magnitude of each issue, let alone formulating and implementing solutions at scale.

¹ v.d. Kooij, S. (2015). De McDonaldisatie van de cacaosector. Vice Versa. Available at <http://hetnieuwe.viceversaonline.nl/blog/de-mcdonaldisatie-van-de-cacaosector/>

² Fountain, A.C. and Hütz-Adams, F. (2015). Cocoa Barometer 2015-USA Edition. Available at http://www.cocoabarometer.org/International_files/Cocoa%20Barometer%202015%20USA.pdf

³ Fountain, A.C. and Hütz-Adams (2018) Cacao Barometer 2018. Available at http://www.cocoabarometer.org/Cocoa_Barometer/Download_files/2018%20Cocoa%20Barometer.pdf

⁴ Balineau, B., Bernath, S., Pahuatini, V. (2016). Cocoa farmers' agricultural practices and livelihoods in Côte d'Ivoire. Insights from cocoa farmers and community baseline surveys conducted by Barry Callebaut between 2013 and 2015. AFD and Barry Callebaut. Available at <https://www.afd.fr/fr/cocoa-farmers-agricultural-practices-and-livelihoods-cote-divoire>

As noted in a recent Agence française de développement (AFD) and Barry Callebaut report,⁵ good data and statistics on farmers' well-being, yields, access to finance, diseases and agricultural practices are scarce, which is a serious constraint to the efficient design and implementation of programmes and policy. The lack of quality data and data availability has made it difficult for researchers to reliably estimate income, wealth and poverty levels in cocoa growing regions. What adds to the challenge is that there are different approaches to measuring poverty, and each approach has its drawbacks.

Despite these difficulties, there have been a number of attempts to estimate cocoa farmer incomes. For example, in 2015, the Cocoa Barometer estimated, based on a variety of secondary data for its calculations, that cocoa farmers were earning USD 0.84 per person per day in Ghana and USD 0.50 per person per day in Côte d'Ivoire.⁶ In their calculations, the authors estimated 78% of household income in Ghana comes from cocoa and 90% in Côte d'Ivoire. To calculate the income per household member, they used the figure of 10 members per household in Côte d'Ivoire. The researchers divided a calculation of household income by the total number of people in the household to arrive at a 'per person, per day' income. The Barometer did not include the 'in-kind' value of household's agricultural production (typically production consumed by the household).

In AFD and Barry Callebaut report, the researchers involved provide a 'rough estimate' of a per capita daily cocoa income of USD 1.17 for farmers in Côte d'Ivoire.⁷ The key survey question to respondents was "How much did you earn from cash crops last year/last month/over the last seven days?". The study reported that "all in all, 25% of households have another source of cash income than cocoa, mainly from sales of food crop surpluses." The study appears to have insufficiently accounted for income received by all household members from all crops and other non-farm income sources.

Before we present data from our study on the household income, poverty and wealth of cocoa farmers we first elaborate on the different approaches to measuring poverty (income, expenditure and wealth), including some methodological pitfalls, followed by an explanation of how this was measured in this study. In separate boxes, we make reference to what poverty lines are, how they are calculated, and their relevance for this analysis.

⁵ Balineau, B., Bernath, S., Pahuatini, V. (2016). Cocoa farmers' agricultural practices and livelihoods in Côte d'Ivoire. Insights from cocoa farmers and community baseline surveys conducted by Barry Callebaut between 2013 and 2015. AFD and Barry Callebaut. Available at <https://www.afd.fr/fr/cocoa-farmers-agricultural-practices-and-livelihoods-cote-divoire>

⁶ Fountain, A.C. and Hütz-Adams, F. (2015). Cocoa Barometer 2015-USA Edition. Available at http://www.cocoabarometer.org/International_files/Cocoa%20Barometer%202015%20USA.pdf.

⁷ Balineau, B., Bernath, S., Pahuatini, V. (2016). Cocoa farmers' agricultural practices and livelihoods in Côte d'Ivoire. Insights from cocoa farmers and community baseline surveys conducted by Barry Callebaut between 2013 and 2015. AFD and Barry Callebaut. Available at <https://www.afd.fr/fr/cocoa-farmers-agricultural-practices-and-livelihoods-cote-divoire>

12.1 Approaches to measuring poverty – income, expenditure or wealth?

12.1.1 Expenditure

Most rich countries measure poverty using income because it is comparatively easy to measure, with much of it coming from wages and salaries. However, most poorer countries use expenditure to measure poverty because measuring income at a national scale is hard to measure (much of it comes from self-employment). Expenditure is also the basis from which national (and hence international) poverty lines are calculated; specialised surveys with a detailed focus on expenditure are important in this regard.⁸

However, when embedded in household surveys with a broader focus, we have previously found that collecting expenditure data is at least as difficult as collecting income data for the following reasons:

- Expenditure lists are long and take considerable time for respondents to answer;
- Recall periods are typically short (often the past week or month) and therefore misleading when expenditure amounts may vary greatly throughout the year;
- Respondents have difficulty recalling the value of many items; and,
- Expenditure data typically fails to account for value derived from one's own production (in-kind).

For these reasons, we followed most other cocoa researchers and chose not to collect detailed expenditure data in our household survey, as much as we would have liked to.

12.1.2 Income

For large agricultural or self-employed populations, income tends to be seriously understated for several reasons:⁹

- People forget, particularly when asked in a single interview, about items they may have sold, or money they may have received, up to a year before;
- People may genuinely not know how much income they have earned throughout the year due to poor record keeping;

⁸ Examples include the Living Standard Measurement Survey (LSMS) supported by the World Bank, Household Budget Surveys (HBS), Income and Expenditure Surveys (IES) and Socio-economic Surveys (SES).

⁹ Many of these reasons are included in the following: World Bank. (2009). Handbook on Poverty and Inequality - ISBN: 9780821376133. Chapter 2, p.23. Available at <http://documents.worldbank.org/curated/en/488081468157174849/Handbook-on-poverty-and-inequality>

- Different household members may earn income from different sources and the respondent may not be sufficiently informed of income derived from these other sources and by each other person in the household;
- People may be reluctant to disclose the full extent of their income lest the tax collector or a neighbour learns the details;
- People may be reluctant to report income earned illegally, for instance, from smuggling, corruption, or prostitution;
- Some income is typically not calculated, such as the extent to which livestock has risen in value or the in-kind value of food produced and consumed by the household.

Much of the previous cocoa research that has tried to analyse poverty has taken an income approach. However, we note that respondents should not be asked, “How much income did you earn from X source”, as this is too inaccurate and vulnerable to bias. Rather, the respondents need to be asked a series of questions to ascertain the income derived from each source. For cocoa, this would require a calculation based on all relevant labour costs, inputs costs, production volume for both seasons, and the farm-gate price. Since it is practically impossible to accurately calculate household income received from every sources, and from every household member, the estimation of cocoa income needs to be accompanied by an estimate of the share of household income derived from cocoa in relation to all other sources.

12.1.3 Wealth and assets

Calculating wealth through the value of durable goods can also be very difficult. For example, if a respondent owns their own house or apartment, a satisfactory way to gauge the value is to ask how much you would have to pay if they had to rent it. In practice, the valuing of household assets is seldom done because it can take a long time and responses can be rather inaccurate. However, since the possession of assets is an indicator of wealth, an asset-based approach to measuring household socioeconomic position is an alternative to income and consumption expenditure.

Demographic and Health Surveys (DHS) wealth index

This approach is based on the Demographic and Health Surveys (DHS),¹⁰ which collect information on ownership of a range of durable assets (e.g. car, refrigerator, television), housing characteristics (e.g. material of dwelling floor and roof, toilet facilities), and access to basic services (e.g. electricity supply, source of drinking water). These items were all originally included in surveys within the scope of their influence on health but researchers decided to use the assets to develop living standards indicators and have sought to construct wealth indices for that purpose.

¹⁰ The Demographic and Health Surveys (DHS) Program has become one of the principal sources of international data on fertility, family planning, maternal and child health, nutrition, mortality, and HIV/AIDS. The relationship between these indicators and economic status is of utmost importance to researchers and policymakers worldwide. See <https://dhsprogram.com/>

The Filmer-Pritchett principal component methodology¹¹ was used to determine the relative weights of items used in the index.

The main advantage of the DHS approach to measuring wealth is that it can be more reliable than income or consumption expenditure, since it uses simple questions or direct observation by the interviewer and should therefore suffer from less respondent recall or social desirability bias. However, some studies have challenged this claim.¹²

Assets are also more stable than income across time and change more slowly. Depending on the application or goal of the analysis, this can be an advantage or a disadvantage.

The main disadvantage is that the DHS Wealth Index is constructed as a relative index within each country. Each wealth index has a mean value of zero and a standard deviation of one. Thus, specific scores cannot be directly compared across countries or over time. In this research, this means that we cannot compare Ghana and Côte d'Ivoire. Nevertheless, to measure relative wealth within each country from data collected in our survey, we have used the DHS Wealth Index.

Poverty Probability Index (PPI)

The Poverty Probability Index¹³ (formally the Progress out of Poverty Index) is another index that builds on the logic of indices such as the DHS. The PPI's main advantage is its simplicity as survey questions are reduced to a set of 10 easy-to-answer multiple choice questions such as "What material is your roof made out of?", "How many of your children are in school?". This simplicity saves time and money in poverty data collection. The PPI also claims similar targeting accuracy to that of alternative approaches.¹⁴

Each answer is given a value, and the total value of all answers is the survey respondent's PPI score. The researcher then uses a PPI look-up table to convert the PPI score to a likelihood that the respondent's household is living below a poverty line. The look-up table allows the researcher to determine the household's likelihood of living below multiple national and international poverty lines.

The disadvantages of the PPI are that it is a likelihood model and is, therefore, a less precise estimation than the DHS Wealth Index. Another problem is that, for some

¹¹ Filmer, D. and Pritchett, L. (2001). Estimating Wealth Effects Without Expenditure Data—Or Tears: An Application To Educational Enrolments In States Of India. *Demography*, Volume 38-Number 1, Available at <http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.581.7223&rep=rep1&type=pdf>

¹² Howe, L., Hargreaves, J., Huttly, S. (2008). Issues in the construction of wealth indices for the measurement of socioeconomic position in low income countries. *Emerg Themes Epidemiol.* 2008; 5:3. Available at <https://doi.org/10.1186/1742-7622-5-3>

¹³ Poverty Probability Index. (2017). About the PPI: A Poverty Measurement Tool. Available at <https://www.povertyindex.org/about-ppi>

¹⁴ Poverty Probability Index. (2012). Ghana 2012 Poverty Probability Index (PPI): Design Memo. Available at <https://www.povertyindex.org/node/5668/download>

countries, the scorecards (and data on which they are based) are in need of updating.¹⁵ Finally, older households tend to obtain higher scores. We have used the PPI Index to measure poverty likelihood from our survey data.

12.2 How income, poverty and wealth was measured in this study

We have attempted to take multiple approaches to measuring income, poverty and wealth in this study. We are aware of how sensitive these issues are and, therefore, we feel that triangulating our findings from different approaches is important for the robustness of conclusions. We were also aware of the limitations of each individual approach.

To mitigate potential data collection errors, the household surveys were programmed in XLSForm and deployed on digital tablets running Open Data Kit. This allowed us to generate live error and warning messages on screen when enumerators entered unexpected values. Certain detailed survey questions were prefaced with ‘do you know’ questions. Skip logic programming then allowed us to skip asking certain detailed questions to insufficiently informed respondents, thereby enhancing data quality (See Chapter 2, Methodology).

With regards to the calculation of income data, respondents were asked to identify all income sources from each individual household member of working age, grouped in general categories.¹⁶ On the next screen, the programmed survey presented respondents with only those income sources identified as being present among household members. The respondent was then asked to estimate the proportion of income derived from each source. In practice, this meant respondents typically had to estimate the proportion of income derived from only a few income sources.¹⁷

There are a few limitations here: first, respondents typically gave estimates to the nearest five or ten percent. Second, it is difficult to judge whether or not the respondent is able to make a highly accurate judgement of the share of household income derived from different sources, and if they were able to differentiate between gross and net income and combination thereof. Third, respondents were considering cash income and therefore in-kind income or value of own production was not

¹⁵ While the Ghana PPI was created in 2015 using data from the 2012/2013 Living Standards Survey, the Côte d'Ivoire scorecard was published in 2013 using data from 2008.

¹⁶ These were: sale of cocoa; sale of other crops; own small business or trading; remittances from friends and family living away from the household; sale of livestock or livestock products; salary employment in government job; salary employment with a company; labouring for other people on their farms; sale of fish; labouring for other people non-agriculture; sale of bush products; (bush meat, charcoal, wood etc.); sale or lease of land; other.

¹⁷ For example, they might estimate cocoa 60%, other crops 30%, small business 10%

accounted for. Fourth, we know it matters how questions are asked. In hindsight, we wish we had used a set of closed yes/no questions to identify the presence or absence of different sources of income among household members.¹⁸ We are particularly concerned that we have not sufficiently captured income from remittances, which was reported at quite low rates.¹⁹ These limitations mean that the reported share of household income derived from different sources should be seen more as a useful indication than a firm figure. It is likely, in our view, that we have an over-estimation of the share of household income derived from cocoa (most frequently identified as the largest household income source). If so, it follows that we will have an under-estimation of other non-cocoa household income, resulting in an under-estimation of total household income.

To calculate actual household income, we collected detailed information for each household's two most important crops. In most cases, cocoa was one of the two most important crops in both countries. Detailed questions were asked about production volumes for each season, input use and costs, labour use and costs, and prices. From this data, crop models were developed, which give us a good picture of cocoa revenues and profitability. Since the sale of cocoa is the major income source for most cocoa households, we base our estimation of total household annual income on cocoa income.

More specifically, our technical approach to compute total household annual income was as follows:

- We considered only the households which reported knowing their own production figures. (91% of cocoa producing households in Ghana and 56% in Côte d'Ivoire).
- We calculated the total cocoa production (kg/year) per household.
- We calculated the total value of production (Local Currency Unit (LCU)/year) per household by applying a fixed price of 6.64 GHS/kg and 1,000 CFA/kg.
- We calculated the annual input cash expenses (LCU/year) per household for granular fertiliser, liquid fertiliser, herbicides, pesticides and fungicides.
 - ▶ For households who reported not doing the activity related to the inputs above, an expense of 0 LCU/year was assumed.
 - ▶ For households who reported doing the activity related to the inputs above, but for whom the value was missing, the median expenses per ha per household of the male- or female-headed households in each country was used to estimate the annual input cash expenses.

¹⁸ The actual question for each household adult was "Last year, did this household member also receive any income from anywhere?" which was followed by a list that the enumerator could tick.

¹⁹ Remittances was near the bottom on the list of income sources, so we are concerned that it was not sufficiently probed by enumerators. This is an issue because, in previous studies, we have noted that respondents often do not consider remittances to be income as such. We note a recent CGAP study in Côte d'Ivoire, which reports that remittances are the second largest source of household income, whereas, in our study, remittances were reported at very low rates. CGAP. (2016). Côte d'Ivoire - CGAP Smallholder Household Survey 2016, Building the Evidence Base on the Agricultural and Financial Lives of Smallholder Households. Report available at <http://www.cgap.org/sites/default/files/Working-Paper-Survey-and-Segmentation-Smallholders-Coted%27Ivoire-Jul-2017.pdf>

- We calculated the annual hired labour expenses (LCU/year) per household for land clearing, land preparation, planting, granular fertiliser application, liquid fertiliser application, manure/compost application, herbicide application, fungicide application, weeding, pruning, harvesting, pod breaking and transporting.
 - ▶ For households who reported not doing an activity above, or only doing with household or communal labour, a hired labour expense of 0 LCU/year was assumed.
 - ▶ For households who reported doing a cocoa production activity, but for whom the hired labour expenditure was missing (i.e. unknown), the median expenses per ha per household male- or female-headed households in each country was used to estimate the annual hired labour expenses.
- Net income from cocoa per household was calculated as the value of annual production, minus annual expenses in inputs, minus annual expenses in hired labour.
- Total household income was extrapolated using the estimated contribution of cocoa sales to the total household income.
- Conversions to USD were made using the exchange rate of USD 0.26116 per GHS and USD 0.00166 per CFA, as in January 2016.
- Conversions to 2016 International dollars²⁰ (2016 PPP) were made using the exchange rate of \$ 0.71225 PPP (2016) per GHS and \$ 0.00425 PPP (2016) per CFA.

The calculation of total household income aims at estimating total net cash income earned by the household. This therefore excludes the in-kind value of household production (agriculture and livestock) consumed at home. First of all, we did not collect enough data on livestock edible production. Secondly, we were not able to produce reliable crop models for crops other than cocoa, because our sample size was too small, or because respondents frequently had difficulty estimating yields for produce not sold in bags or kg units (e.g. cassava, plantain, yam, rubber, palm). One alternative option would be to assign a proxy value to other crops planted on the household's cultivated land, assuming that it yields some intrinsic value, but less so than cocoa (e.g. 50% of the value). The other option we considered was using rough calculations for maize as a proxy value for other crops (as maize is typically one of the lowest value crops produced by the household). We are reluctant to include calculations that we are not confident about and so have chosen not to incorporate in-kind values in our income calculations.

²⁰ International dollar is a currency conversion rate that is adjusted to reflect the purchasing power parity (PPP) and average relative commodity prices within each country. The PPP conversion factors were obtained from <https://data.worldbank.org/indicator/PA.NUS.PRVT.PP?locations=GH-CI>

Box 12.1 Purchasing power parity (PPP)

Due to large differences in price levels across economies, market exchange rate-converted GDP does not accurately measure the relative size of economies and the levels of material well-being. PPPs make it possible to compare the output of economies and the welfare of their inhabitants in 'real' terms, thus controlling for price level differences across countries. PPPs measure the total amount of goods and services that a single unit of a country's currency can buy in another country. The PPP between countries A and B measures the amount of country A's currency required to purchase a basket of goods and services in country A compared to the amount of country B's currency to purchase a similar basket of goods and services in country B. PPPs can thus be used to convert the cost of a basket of goods and service into a common currency while eliminating price level differences across countries. In other words, PPPs equalise the purchasing power of currencies. A PPP could also be thought of as an alternative currency exchange rate, but based on actual prices.²¹

The PPP exchange rate will typically be different to market exchange rates. For example, in relation to our study, while the market exchange rate is USD 0.26116 per GHS, the International dollar exchange rate is \$ 0.71225 PPP (2016) per GHS. This means that while 1 GHS can only be exchanged to USD 0.26, it has a relative purchasing power of USD 0.71, which is almost 3 times stronger.

Further, by applying an equivalence scale to household members, we are then able to calculate a 'per person, per day' income.

To analyse poverty and wealth from other angles, we also included the DHS Wealth Index questions in our survey and calculated DHS Wealth Index scores. We also included PPI questions to estimate the likelihood that households fall under different national and World Bank poverty lines.

Box 12.2

Poverty lines

National poverty lines typically reflect the line below which a person's minimum nutritional, clothing, and shelter needs cannot be met in that country. National poverty lines are typically lower in poorer countries and higher in richer countries. The World Bank advises that, if you are interested in a particular country, you should use national poverty lines which are defined according to each country's specific economic and social circumstances. However, if you are

²¹ World Bank (n.d.). Fundamentals of Purchasing Power Parities. The International Comparison Program (ICP). Available at <http://pubdocs.worldbank.org/en/332341517441011666/PPP-brochure-2017-webformat-rev.pdf>

interested in comparing poverty measures across countries, you could use international poverty lines. The World Bank international poverty lines attempt to hold the real value of the poverty lines consistent across countries and over time by accounting for differences in purchasing power across countries.

How are international poverty lines calculated?

The World Bank poverty lines aim to be a poverty line 'yardstick'. In 1990, a group of independent researchers and the World Bank examined national poverty lines from some of the poorest countries in the world, and converted the lines to a common currency by using purchasing power parity (PPP) exchange rates. The PPP exchange rates are constructed to ensure that the same quantity of goods and services are priced equivalently across countries. Once converted into a common currency, they found that, in six of these very poor countries, the value of the national poverty line was about \$1 per day per person, and this formed the basis for the first dollar-a-day international poverty line. After a new round and larger volume of internationally comparable prices were collected in 2005, the international poverty line was revised based on 15 national poverty lines from some of the poorest countries in the World. The average of these 15 lines was \$1.25 per person per day (again in PPP terms), and this became the revised international poverty line. In 2015, the World Bank again used the poverty lines of those same 15 poorest countries from 2005 to determine the new global poverty line of \$1.90 in 2011 PPP.²²

A common pitfall in poverty calculations is to not correct the value of money over time or use only market exchange rates. A comparison of more recent data to a poverty line requires either the updating of the PPP poverty threshold or the correction of the recent data to 2011 PPP. Using the United States Consumer Price Index,²³ the value of \$1.90 in 2011 is equivalent to \$2.03 in 2016. Any comparison to an international poverty line is more accurate if the local currency is converted using PPP exchange rates instead of market exchange rates.

Equivalence scales

It is important to note that some of the national poverty lines and, therefore indirectly, the World Bank poverty lines use the concept of a 'male adult equivalent'. This means that \$1.90 PPP (2011) per person per day actually means \$1.90 PPP (2011) per male adult equivalent per day. When one is interested in per capita income (or consumption/expenditure), equivalence scales are needed to adjust household income (or expenditure) for the composition of the household. An equivalence scale typically measures the number of adult males to which that household is deemed to be equivalent. Each household member counts as some fraction of an adult male. Effectively, household size is the sum of these fractions and is not measured in numbers of persons but in numbers of adult equivalents. There are two main assumptions underlying equivalence scales.

²² World Bank. (2018). How is the global poverty line derived? How is it different from national poverty lines? Available at <https://datahelpdesk.worldbank.org/knowledgebase/articles/193310-how-is-the-global-poverty-line-derived-how-is-it>

²³ <https://data.worldbank.org/indicator/FP.CPI.TOTL?locations=US>

First, children tend to consume less than adults. Therefore, lower weights are assigned for children residing in a household. Second, larger households can benefit from economies of scale.

Another common pitfall is to divide a calculation of household income by the total number of people in the household, rather than by their 'adult equivalent'. This inaccurately gives a higher proportion of households below the poverty lines.

Unfortunately, there is no universal consensus on the right equivalence scale to use. Often the equivalence scales are based on the different calorie needs of individuals of different ages. OECD equivalence scales are among the most well-known.²⁴

OECD equivalence scale (old): This assigns a value of 1 to the first household member, 0.7 to each additional adult and 0.5 to each child. This scale (also called the "Oxford scale") was mentioned by OECD (1982) for possible use in "countries which have not established their own equivalence scale". For this reason, this scale is sometimes labelled "(old) OECD scale".

OECD-modified scale: The Statistical Office of the European Union (EUROSTAT) adopted in the late 1990s the so-called "OECD-modified equivalence scale". This scale, first proposed by Hagenaars et al. (1994)²⁵, assigns a value of 1 to the household head, 0.5 to each additional adult member and 0.3 to each child.

Square root scale: Recent OECD publications comparing income inequality and poverty across countries use a scale which divides household income by the square root of household size. This implies that, for instance, a household of four persons has needs twice as large as one composed of a single person.

Table 12.2 OECD equivalence scales

Household size	Per capita income	OECD scale (old)	OECD modified scale	Square root scale	Household income
1 adult	1	1	1	1	1
2 adults	2	1.7	1.5	1.4	1
2 adults, 1 child	3	2.2	1.8	1.7	1
2 adults, 2 children	4	2.7	2.1	2	1
2 adults, 3 children	5	3.2	2.4	2.2	1
Elasticity ¹	1	0.73	0.53	0.5	0

¹ Using household size as the determinant, equivalence scales can be expressed through an 'equivalence elasticity', i.e. the power by which economic needs change with household size. The equivalence elasticity can range from 0 (when unadjusted household disposable income is taken as the income measure) to 1 (when per capita household income is used). The smaller the value for this elasticity, the higher the economies of scale in consumption.

²⁴ OECD. (2009). What are equivalence scales? OECD Project on Income Distribution and Poverty. Available at <http://www.oecd.org/eco/growth/OECD-Note-EquivalenceScales.pdf>

²⁵ Hagenaars, A., Vos, K. de, M.A. Zaidi (1994), Poverty Statistics in the Late 1980s: Research Based on Micro-data, Office for Official Publications of the European Communities. Luxembourg.

12.3 Results of poverty and wealth analysis

12.3.1 Household income

In our household survey, respondents were asked to identify all household income sources from all household members. Nearly all households have multiple income sources, and multiple household members typically engage in income generating activities to support the household (Table 12.3). We have split ‘sale of cocoa’ and ‘sale of other crops’ into distinct categories to contrast the two. Income from cocoa and other crops are the most frequently cited sources of household income. It should be recalled from Chapter 5 on Crop choices and diversification that, on average, households sell on average 3.33 different crops per year in Ghana and 2.81 different crops in Côte d’Ivoire.

Around half of all respondents in Ghana reported that someone in the household earns income from a small business or trading. In Côte d’Ivoire, a lower proportion of respondent households reported additional income from a small business or trading, but the relatively high percent of ‘other’ income suggests to us that this may also be income from trading activities. The main takeaway from Table 12.3 is that multiple income sources from multiple members needs to be accounted for when considering household income.

Table 12.3 Income sources from all household members, by cocoa and non-cocoa households

Income source	Ghana cocoa	Ghana non-cocoa	pvalue	sig	Côte d’Ivoire cocoa	Côte d’Ivoire non-cocoa	pvalue	sig
Sale of cocoa	99%	31%	0.00	***	98%	16%	0.00	***
Sale of other crops	83%	90%	0.00	***	77%	93%	0.00	***
Own small business or trading	50%	56%	0.06	*	21%	28%	0.00	***
Sale of livestock or livestock products	21%	13%	0.01	***	2%	2%	0.58	
Remittances	16%	14%	0.53		4%	8%	0.00	***
Salary employment in government job	9%	11%	0.36		2%	1%	0.21	
Salary employment with a company	5%	3%	0.22		1%	3%	0.07	*
Other	4%	8%	0.01	***	16%	19%	0.14	
Sale of fish	2%	3%	0.23		3%	3%	0.91	
Labouring for other people on their farms	2%	11%	0.00	***	2%	2%	0.26	
Labouring for other people non-agriculture	1%	2%	0.5		2%	3%	0.66	
Sale of bush products (bush meat, charcoal, wood etc.)	0%	0%	0.94		2%	2%	0.89	
Sale or lease of land	0%	0%			1%	1%	0.43	
N	1,318	242			910	575		

Table 12.4 shows the mean proportion of income that households derive from cocoa sales and other categories. In Ghana, cocoa households²⁶ derive, on average, 61% of their income from cocoa, with a further 20% coming from the sale of other crops. Non-cocoa households in Ghana reported a fractionally higher proportion of other non-farm income sources than cocoa households. In Côte d'Ivoire, the data shows a similar pattern. Cocoa households report obtaining 66% of their income from cocoa and a further 24% from the sale of other crops. As in Ghana, non-cocoa households reported obtaining a slightly higher share of income from various other sources, including 'small business', than cocoa households.

Table 12.4 Percent of household income from difference sources (average), by cocoa vs non-cocoa households

	Ghana cocoa	Ghana non-cocoa	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa
Sale of cocoa	61%	10%	66%	5%
Sale of other crops	20%	56%	24%	69%
Own small business or trading	10%	16%	4%	10%
Remittances from friends and family living away from the household	2%	3%	1%	3%
Sale of livestock or livestock products	2%	3%	0%	0%
Salary employment in government job (teacher, nurse, police)	2%	4%	1%	1%
Other	1%	3%	4%	8%
Salary employment with a company	1%	1%	0%	1%
Labouring for other people on their farms	0%	1%	0%	1%
Sale of fish	0%	3%	0%	0%
Labouring for other people non-agriculture	0%	1%	0%	1%
Sale of bush products (bush meat, charcoal, wood etc.)	0%	0%	0%	0%
Sale or lease of land	0%	0%	0%	0%

Using our method described earlier, we find that, on average, a cocoa household in Ghana generates cocoa revenues of USD 1,885 per year. After accounting for input and hired labour costs, an average cocoa household earns a net income of USD 1,510 from cocoa alone. In Côte d'Ivoire, an average cocoa household income generates cocoa revenues of USD 2,029 and net cocoa income of USD 1,908 (Table 12.5).

²⁶ As discussed in the Chapter 2 (Methodology), 'cocoa households' are those who reported cocoa to be either their most important or second most important crop. Some 'non-cocoa households' may still produce a small amount of cocoa, even though it is not their most important or second most important crop. This distinction allows us to think of 'cocoa households' as typical cocoa producing households.

Table 12.5 Average household income from cocoa only, by country (USD, 2016)

	Ghana	Côte d'Ivoire
Yield (kg/ha) [Total production / Productive farm]	398 kg	349 kg
Productive farm (ha)	2.7 ha	3.5 ha
Total production (kg/farm)	1,087 kg	1,222 kg
Producer price (USD/kg)	\$1.73	\$1.66
Value of production (USD/farm)	\$1,885	\$2,029
Input costs (USD/ha)	\$41	\$23
Hired labour costs (USD/ha)	\$97	\$12
Total costs (USD/farm)	\$376	\$121
Net cocoa income (USD/farm)	\$1,510	\$1,908

Note: The above table has been calculated with data from cocoa households only

We then calculate cocoa households' average income based on the income percentage they estimated was derived from cocoa. In Ghana, we find that an average cocoa household earns USD 2,487 per annum from all income sources, which is the equivalent to \$ 6,784 PPP (2016). In Côte d'Ivoire, we calculate an average household income of USD 2,900, which is the equivalent to \$ 7,429 PPP (2016). (Table 12.6).

Table 12.6 Average household income from all sources

	Ghana	Côte d'Ivoire
Percentage of household income from cocoa	61%	66%
Total income (2016 USD/household)	\$2,487	\$2,900
Total income (2016 PPP/household)	\$6,784	\$7,429

Note: The above table has been calculated with data from cocoa households only

Our next step is to calculate average household size equivalencies (Table 12.7). We have used all of the OECD equivalence scales to show how the choice of scale affects the effective 'number of persons' in the household by which we will divide to get a per person daily income. Currently, the OECD uses the square root scale.

Table 12.7 Average household size equivalencies (number of persons)

	Ghana	Côte d'Ivoire
Mean household size in our sample	5.9	7.0
OECD (old) equivalence scale	3.9	4.6
OECD modified scale	3.0	3.4
Square root scale (currently used by OECD)	2.4	2.6

Finally, we divide total household income by each of the OECD equivalence scale coefficients, and then by 365 days. This gives us a daily per person income estimate, either in 2016 USD (Table 12.8) or 2016 PPP (Table 12.9). Using market exchange

rates, when no equivalence scale is applied, we estimate a per person per day income of USD 1.16 in Ghana, compared with USD 1.14 in Côte d'Ivoire. Calculations using the square root equivalence scale, provide an estimate of USD 2.89 per person per day in Ghana and USD 3.11 per person per day in Côte d'Ivoire. This does not include in-kind income (i.e. the value of crops produced and consumed by the household).

Table 12.8 Average daily income per person equivalent (2016 USD/day)

	Ghana	Côte d'Ivoire
No equivalence scale	\$1.16	\$1.14
OECD (old) equivalence scale	\$1.73	\$1.73
OECD modified scale	\$2.39	\$2.35
Square root scale	\$2.89	\$3.11

Note: The above table has been calculated with data from cocoa households only

These values are calculated by converting local currency into 2016 USD using the exchange rate. To correctly compare to the World Bank poverty line, we must convert these values into 2016 PPP. As indicated in this chapter previously, the \$ 1.90 PPP (2011) person-per-day poverty line is equivalent to the value of \$2.03 PPP (2016).

Using the PPP conversion rates, when no equivalence scale is applied, we estimate a per person per day income of \$3.18 PPP (2016) in Ghana, compared with \$2.92 PPP (2016) in Côte d'Ivoire. Using the square root equivalence scale, we estimate \$7.89 PPP (2016) per person per day in Ghana and \$7.97 PPP (2016) per person per day in Côte d'Ivoire (Table 12.9).

Table 12.9 Average daily income per person equivalent (2016 PPP/day)

	Ghana	Côte d'Ivoire
No equivalence scale	\$ 3.18	\$ 2.92
OECD (old) equivalence scale	\$ 4.71	\$ 4.44
OECD modified scale	\$ 6.25	\$ 6.02
Square root scale	\$ 7.89	\$ 7.97

Note: The above table has been calculated with data from cocoa households only

By presenting calculations with/without PPP conversion and with/without equivalence scales we have demonstrated that results, and the interpretations on which they are based, are subject to methodological choices. Researchers must always take care to make clear which conversions have been used and which benchmark they are comparing against. We also strongly suggest that researchers clearly describe the process by which the calculations were made so that others can attempt to replicate these. Furthermore, to simplify matters somewhat, we believe that it is better for income to be calculated at the household level, rather than the individual level (per person).

12.3.2 Poverty Probability Index (PPI)

The Poverty Probability Index (PPI) is a simple, yet statistically, sound poverty measurement tool. The answers to 10 questions about a household's characteristics and asset ownership are assigned scores. The scores are then added up and converted to a percent likelihood that individuals of a given household are under certain poverty lines. The average likelihood indicates the estimated share of the sample (and population) that are actually below each poverty line.²⁷

According to the PPI documentation, PPI-calculated poverty rates can be compared between countries, but not perfectly so. Unfortunately, the PPI indices for Ghana and Côte d'Ivoire were developed a few years apart. The Ghana PPI uses 2011 purchasing power parity (PPP) and references the World Bank \$1.90 PPP and \$3.10 PPP poverty lines, whereas the Côte d'Ivoire PPI uses the 2005 PPP, and the \$1.25 PPP, \$2.00 PPP and \$2.50 PPP. For these reasons, we have presented the two countries in separate tables and we advise caution in making cross country comparisons.

In Ghana, we find that, on average, the likelihood of individuals in cocoa households are below the \$1.90 poverty line is 7.5% (2011 PPP), with no statistical difference with non-cocoa households. We find the likelihood of 24.5% of cocoa households to be below the \$3.10 poverty line, again with no statistically significant differences with non-cocoa households (Table 12.10). This suggests that the poverty situation among cocoa growing households is less severe than is sometimes presented.²⁸

Furthermore, we find no statistically significant difference between cocoa and non-cocoa households, which suggests poverty that does exist is a 'rural smallholder' phenomenon, rather than a 'cocoa farmer' phenomenon.

In Ghana, we found no statistically significant differences in PPI poverty likelihood between male and female-headed households. This is consistent with the Ghana Living Standard Survey Round 6 (GLSS6), which found that, "Poverty incidence among male-headed households is higher (25.9%) than female-headed households (19.1%). This follows the same pattern found in 2005/06."²⁹

We also looked at whether significant differences in poverty likelihood could be found between other sub-groups of the sample. In Ghana we find no statistical differences between youth (household head under 35 years) and non-youth households. We do find that migrant households (where the head is born in another region) have

²⁷ Poverty Probability Index. (2017). About the PPI: A Poverty Measurement Tool. Available at <https://www.povertyindex.org/about-ppi>

²⁸ E.g. Fountain, A.C. and Hütz-Adams, F. (2015). Cocoa Barometer 2015-USA Edition. Available at http://www.cocoa-barometer.org/International_L_files/Cocoa%20Barometer%202015%20USA.pdf; Balineau, B., Bernath, s., Pahuatini, V. (2016). Cocoa farmers' agricultural practices and livelihoods in Côte d'Ivoire. Insights from cocoa farmers and community baseline surveys conducted by Barry Callebaut between 2013 and 2015. AFD and Barry Callebaut. Available at <https://www.afd.fr/fr/cocoa-farmers-agricultural-practices-and-livelihoods-cote-divoire>

²⁹ Ghana Statistical Service. (2014). Ghana Living Standard Survey Round 6 (GLSS6). Available at http://www.statsghana.gov.gh/docfiles/glss6/GLSS6_Poverty%20Profile%20in%20Ghana.pdf

a slightly higher poverty rate (10.5%) than non-migrant households (6.5%) (*highly significant for \$1.90/day PPP 2011*). Regionally, the Eastern region has a slightly lower extreme poverty rate than other regions, however, care must be taken in this interpretation because poverty rates for all regions in our Ghana sample are quite low and the effect size is only a few percentage points.

Table 12.10 PPI Ghana, likelihood of individuals in cocoa and non-cocoa households being under \$1.90 PPP (2011) and \$3.10 international poverty lines (PPP, 2011)

	Ghana cocoa	Ghana non-cocoa	pvalue	sig
\$1.90/day PPP 2011	7.55%	7.51%	0.95	
std.error	0.28%	0.61%		
\$3.10/day PPP 2011	24.44%	24.95%	0.73	
std.error	0.58%	1.30%		
N	1,306	239		

Note: p-value from a one-way ANOVA test

Table 12.11 PPI Ghana, likelihood of male and female-headed households being under \$1.90 PPP (2011) and \$3.10 international poverty lines (PPP, 2011)

	Ghana female head	Ghana male head	pvalue	sig
\$1.90/day PPP 2011	8.22%	7.40%	0.21	
std.error	0.62%	0.27%		
\$3.10/day PPP 2011	26.31%	24.14%	0.11	
std.error	1.24%	0.59%		
N	285	1,258		

Note: p-value from a one-way ANOVA test

In Côte d'Ivoire, we find that the likelihood of cocoa households to be below the \$1.25 (2005 PPP) poverty line is 26%. This is directly comparable with the \$1.90 2011 PPP poverty line, since this an update by the World Bank of the \$1.25 PPP (2015). The likelihood to be below the \$2.50 2005 PPP is 68.5% of cocoa households, which roughly equates to the \$3.10 2011 PPP. As in Ghana, we find no statistically significant differences between cocoa and non-cocoa households.

Table 12.12 PPI Côte d'Ivoire, likelihood of individuals in cocoa and non-cocoa households being under \$1.25, \$2.00 and \$2.50 (2005 PPP)

	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
\$1.25 PPP 2005 (~\$1.90 PPP 2011)	26.44%	27.73%	0.15	
std.error	0.54%	0.73%		
\$2.00 PPP 2005	54.46%	55.43%	0.42	
std.error	0.74%	0.98%		
\$2.50 PPP 2005	68.50%	69.04%	0.64	
std.error	0.70%	0.91%		
N	884	563		

Note: p-value from a one-way ANOVA test

As in Ghana, we found no statistically significant differences between male and female-headed households in Côte d'Ivoire. We do find a very small difference in poverty rates between youth (24%) and non-youth headed households (27%) (*highly significant for \$1.90/day PPP 2011*). Also, as in Ghana, we find a slightly higher poverty incidence among migrants (30%) and non-migrants (26%) in Côte d'Ivoire (*highly significant for \$1.90/day PPP 2011*). Only small differences in extreme poverty rates were found between Côte d'Ivoire's administrative districts; the small sample size per district prevents a more detailed analysis.

Table 12.13 PPI Côte d'Ivoire, likelihood of male and female-headed households being under \$1.25, \$2.00 and \$2.50 (PPP 2005)

	Côte d'Ivoire female head	Côte d'Ivoire male head	pvalue	sig
\$1.25/day PPP 2005 (~\$1.90 PPP 2011)	25.93%	27.11%	0.41	
std.error	1.55%	0.45%		
\$2.00/day PPP 2005	52.08%	55.23%	0.10	
std.error	2.07%	0.61%		
\$2.50/day PPP 2005	65.68%	69.14%	0.06	*
std.error	1.96%	0.58%		
N	151	1291		

12.3.3 DHS wealth index

DHS wealth index is an asset-based approach to measuring household socioeconomic status and uses information on ownership of a range of household assets. In our survey, this comprised eight questions on household ownership, size and materials, 32 questions on household assets, and 11 questions on livestock assets.

The index is constructed as a relative index within each country and specific scores cannot be directly compared across countries or over time. For this reason, we have presented Ghana and Côte d'Ivoire data in separate tables. Each wealth index has a mean value of zero and a standard deviation of one. The details on how the DHS methodology was applied can be found in the following footnote.³⁰

We applied DHS wealth index weights for rural areas to compute the base indicator. This indicator is then converted into a national wealth index using the regression equation provided by the DHS program between rural and national values. With the national wealth index values, we can classify each household within a national wealth quintile.

³⁰ DHS. (2004). The DHS Wealth Index, DHS Comparative Reports 6. Available at <https://dhsprogram.com/pubs/pdf/cr6/cr6.pdf>

In Ghana, we find that around half of all households in our sample are in the 2nd quintile, implying that they are reasonably poor on a national level. 25% are in the bottom quintile, and 21% are in the third quintile (Table 12.14). There was found to be no statistically significant differences between cocoa and non-cocoa households, between male and female-headed households, nor between youth and non-youth heads when performing a Chi-squared test.

In all regions in Ghana, around half of all households fall into the second wealth quintile nationally. We do find some statistically significant differences between regions. The Central and Eastern regions appear to be the wealthiest in our sample, each with nearly a third of households falling into the middle quintile. The Central and Eastern regions also have the smallest percent of households falling into the bottom (poorest) quintile. Brong Ahafo appears to be the least wealthy region in our sample, with nearly half of households falling into the bottom (poorest quintile). We have only described these regional differences broadly because our sample size per region is not large enough to make detailed claims about each region.

Finally, in Ghana, we find statistically significant differences between migrant and non-migrant households, consistent with our PPI findings. Just over half of migrant and non-migrant households fall into the second wealth quintile nationally. However, a much higher proportion of migrants (37%) fall into the bottom quintile than non-migrants (21%). It follows from this, that a much higher proportion of non-migrants (24%) fall into the middle wealth quintile than migrants who were born in other regions (11%).

Table 12.14 Wealth quintile, according to DHS wealth index, Ghana

Quintile	Ghana cocoa	Ghana non-cocoa	pvalue	sig
1st quintile (bottom)	25%	26%	0.80	
2nd quintile	52%	54%		
3rd quintile	21%	19%		
4th quintile	2%	2%		
5th quintile (top)	0%	0%		
N	1,150	200		
dhs_quintile				

Note: p-value from a Chi-squared test

In Côte d'Ivoire, we also find that 43% of households are in the 2nd quintile, implying that many are reasonably poor at a national level. However, in contrast to Ghana, a higher proportion of cocoa households are in the third and fourth quintiles than in the bottom quintile. This reflects their relative wealth position within the wider country (Table 12.15).

In Côte d'Ivoire, we found no statistically significant differences between cocoa and non-cocoa households, nor between male and female-headed households.

Furthermore, we found no statistical differences between youth and non-youth heads, nor between migrants and non-migrants when performing a Chi-squared test.

We do find significant differences between administrative districts but, as the sample size is quite low per district, it is difficult to draw firm conclusions. We do find, however, that around one-third of households in Bas-Sassandra fall into the bottom quintile – easily the highest proportion of any administrative district. On the other hand, Comoe district, which lies between Abidjan and Ghana was found to have virtually no households in the bottom quintile and more than half in the fourth and top quintiles combined. District Autonome De Yamoussoukro, Goh-Djiboua, and Lacs also stand out with a relatively high proportion of households in the middle and fourth quintiles.

Table 12.15 Wealth quintile, according to DHS wealth index, Côte d'Ivoire

Quintile	Côte d'Ivoire cocoa	Côte d'Ivoire non-cocoa	pvalue	sig
1st quintile (bottom)	14%	15%	0.21	
2nd quintile	43%	48%		
3rd quintile	24%	19%		
4th quintile	15%	13%		
5th quintile (top)	4%	5%		
N	716	367		
dhs_quintile				

Note: p-value from a Chi-squared test

12.4 Summary

Poverty and wealth calculations are challenging for both methodological and data availability reasons. Methodologically, all main approaches to measuring wealth and poverty (expenditure, income and wealth/assets approaches) have their drawbacks. Furthermore, it is rare for high quality datasets based around cocoa households to be publically available online. Most studies that collect primary data are relatively small and lack the required statistical power to make reasonable estimates of wealth and poverty.

When calculating household income, multiple income sources from multiple household members needs to be accounted for. However, calculating incomes for cocoa households is challenging, as complete data is often not available. The net income from cocoa is challenging to estimate because of bad record-keeping, particularly in what relates to production costs. Total annual incomes were estimated by extrapolating the calculated net income from cocoa production using the reported share of total income coming from cocoa sales. Moreover, the estimations of annual income do not include the value of crops consumed at home, or any other in-kind

income, since these are very challenging to estimate, although we do provide some estimates about the value of crops consumed at home in the report.

Our household income model estimates that, on average, Ghanaian cocoa households earn USD 2,487 per annum from all income sources, which is equivalent to \$6,784 PPP (2016). Applying the current OECD equivalence scale, we calculate an income of USD 2.89 per person per day (in 2016 USD), equivalent to \$7.89 PPP (2016) This does not include in-kind income.

Our household income model estimates that, on average, Ivorian households earn an average of \$2,900 per annum, which is equivalent to \$7,429 PPP (2016). This equates to \$3.11 per person per day (in 2016 USD), or equivalent to \$7.97 PPP (2016) when applying the current OECD equivalence scale. This does not include in-kind income.

We believe our income model can be considered a good estimate of average income in 2015-2016. However, it cannot definitively measure income with high precision, and we would argue that it is virtually impossible to do so due to data limitations at myriad data points. Small changes in values for cocoa yield, cocoa price, input and labour costs, and estimations of the proportion of income derived from cocoa will naturally alter estimations of household income across years and across different studies.

We think we have still under-estimated income in our model. We know, for example, that when estimating income shares from different income sources, respondents only considered cash income. If in-kind income was to be included (e.g. the value of own production consumed by the household), this would result in higher estimated income. This is particularly important when making a comparison with a national or international poverty line. Unfortunately, it would be practically impossible for a respondent to estimate in-kind income with moderate accuracy. We are also concerned that we have insufficiently captured income from remittances. Finally, we were not able to produce models for crops other than cocoa, either because our sample size was too small for other crops, or because respondents had difficulty estimating yields for produce not sold in bags or Kg units (e.g. cassava, plantain, yam, rubber, palm).

We suggest that total annual household income per annum is a more appropriate unit of aggregation than any other. A per person per day income calculation prohibits reasonable estimates and can lead to erroneous conclusions due to choices in equivalence scales and exchange rates. Therefore, we are strongly in favour of calculating incomes per households instead of ‘per person a day’.

Using the Poverty Probability Index (PPI), we estimate 7.5% of Ghanaian cocoa households are under the \$1.90 PPP (2011) poverty line. In Côte d’Ivoire, we estimate 26% of households are under the equivalent poverty line.

Our PPI analysis shows that cocoa households do not suffer from a higher incidence of poverty than non-cocoa farmers. We found no statistically significant differences in poverty rates between these groups in either Ghana or in Côte d'Ivoire. This suggests that poverty is more a 'rural smallholder' phenomenon, rather than a 'cocoa farmer' phenomenon, contrary to the narratives of cocoa being a poor man's crop.

Our PPI analysis shows that female-headed households do not suffer from higher poverty incidence than male-headed households. We found no statistically significant differences in poverty rates between these groups in either Ghana or in Côte d'Ivoire. While this finding may challenge certain gender narratives, it should not be surprising. For example, several recent Ghana Living Standard Surveys find that poverty incidence is, in fact, slightly higher for male-headed households than female-headed households.

Using the DHS wealth index, we find that 25% of Ghanaian households are in the 1st (poorest) quintile nationally, 52% fall into the 2nd quintile, and 21% fall into the third (middle) quintile. In Ghana, our DHS analysis generally agrees with our PPI analysis. Cocoa households are not poorer than non-cocoa households, and female-headed households are not poorer than male-headed households.

Using the DHS wealth index, we find that 14% of Ivorian cocoa households fall into the 1st (bottom) quintile nationally, 43% fall into the 2nd quintile, 24% fall into the middle quintile and even 15% fall into the 4th quintile. This means that cocoa households are relatively wealthier than many households in the country. In Côte d'Ivoire, we also find that our DHS analysis agrees with our PPI analysis. Cocoa households are not poorer than non-cocoa households, and female-headed households are not poorer than male-headed households.

In Ghana and in Côte d'Ivoire, we find some significant regional differences. In Ghana, households in the Central and Eastern regions are wealthier, on average, than those in other regions. Brong Ahafo has the highest proportion of households in the bottom quintile. In Côte d'Ivoire, Bas-Sassandra is the least wealthy administrative district. Comoe district, District Autonome De Yamoussoukro, Goh-Djiboua, and Lacs are among the wealthiest in our sample.

The different approaches used in this chapter to calculate income, poverty and wealth point in the same direction: cocoa households are, like other rural households, fairly poor. However, we find that poverty levels among cocoa households are less severe than projected by other researchers. The difference can be explained, at least partly, by different estimates of household size and the share of cocoa contributing to total household income. Our slightly more positive estimations correspond with the findings we presented in Chapter 7, The Importance of Cocoa, illustrating that cocoa is perceived to be the most important crop for the majority of households in cocoa growing households in Ghana and Côte d'Ivoire.



Photo credit: Nana Kofi Acquah / Nestlé

13

Farmer profiles and cluster analysis

Bymolt, R., Laven, A., Tyszler, M. (2018). Demystifying the cocoa sector in Ghana and Côte d'Ivoire. Chapter 13, Farmer profiles and cluster analysis. The Royal Tropical Institute (KIT).

The idea of ‘farmer profiles’ is a recurring theme in discussions with cocoa research partners, industry representatives and other stakeholders. In a number of recent studies, farmer profiles and segmentation have been addressed in relation to cocoa farming,^{1,2,3,4,5} to other sectors^{6,7,8} and to agriculture in general.⁹

There is an idea that if farmer profiles can be identified, then interventions and policies can be better targeted and therefore more efficient, effective and inclusive.

While there is a good argument for trying to identify farmer profiles, in practice, this is not a simple task. Farming households are different from, and similar to, each other in a multitude of ways. For instance, some households may have a similar land size, but grow different crops, or grow the same crops on different sized land. They may also sell or consume a different proportion of the crops they produce or have other non-agricultural income sources. Another difference could be the composition of the household and the life-stage in which they find themselves, which may affect their behaviour.¹⁰

We argue that a generic set of farmer profiles does not exist. There are, however, two approaches that can be applied to the development of farmer profiles.

One approach is conceptually driven, where the researcher chooses the categories or characteristics of interest, such as the number of crops grown, usage of specific inputs, land size, farmer age, sex, education, etc. The other approach is data-driven. Based on a set of data points and characteristics, there are different statistical techniques to create groups of farmers from which profiles can be derived. Farm, farmer and household characteristics can all form part of the profile. Researchers need to decide whether output characteristics (such as yield or total production) are themselves profiling characteristics, or whether the interest is in how certain characteristics correlate with output variables.

¹ Rijn, F. van, M. Kuit, Y. Waarts and V. Ingram (2015). Cluster analysis among UTZ certified cocoa farmers in Ghana and Ivory Coast. Den Haag, LEI, Wageningen UR.

² Ataa-Asantewaa, M., Derkyi, M., Obeng-Ofori, D., Ros-Tonen, M. (2016). Diversity among Ghanaian cocoa crop farmers in the Ahafo-Ano North District, Ashanti Region. Inclusive Value Chain Collaboration. Infosheet 03 - January 2016. Available at <https://inclusivevcc.files.wordpress.com/2015/07/wotro-inclusive-vcc-info-sheet-03-diversity-among-ghanaian-cocoa-crop-farmers-in-the-ahafo-ano-north-district-ashanti-region.pdf>

³ Laven, A. and Heck, P. van (2016) Ideation of Small Medium Enterprise (SME) services in cocoa growing communities in Ghana. KIT Royal Tropical Institute. This study was commissioned by Solidaridad and Marks & Spencer and supported by Barry Callebaut. Available at <http://www.cocoaconnect.org/publication/ideation-small-medium-enterprise-sme-services-cocoa-growing-communities-ghana>

⁴ Cocoa Research Institute Ghana (2010). Cocoa Manual. A Source Book For Sustainable Cocoa Production. Cocoa Research Institute Ghana.

⁵ Laven, A. and Verhart, N. (2015) Getting to know female cocoa farmers. PPT during WCF Conference, session Innovations in Sustainability PPP. Women in cocoa farming. ‘Bridging the Gap’. Available at http://www.worldcocoaoundation.org/wp-content/uploads/files_mf/womenincocoaafarming_presentations.pdf

⁶ Solano, C., León, H., Pérez, E., Tole, L., Fawcett, R.H., Herrero, M. Solano et al. (2006) Using farmer decision-making profiles and managerial capacity as predictors of farm management and performance in Costa Rican dairy farms. *Agricultural Systems*, Vol. 88, 2-3: 395-428, Elsevier. Available at <https://www.infona.pl/resource/bwmeta1.element.elsevier-cddce103-e05d-3cc3-83dd-ebbd4cb81c58>

⁷ Eckert, E. and Bell, A. (2005). Invisible Force: Farmers’ Mental Models and How They Influence Learning and Actions *Journal of Extension*, Vol. 43: 3. Available at <https://extension.unh.edu/adultlearning/invisibleforce.pdf>

⁸ Djamen, P., Havard, M., Lossaouarn, J. (2006). Transformation of livestock farming in Cameroon: Changes in breeding practices and evolution of farmer profiles. In H. Langeveld and N. Röling (eds) *Changing European farming systems for a better future. New visions for rural areas.*, Publisher: Wageningen Academic Publishers, pp.285 Available at https://www.researchgate.net/publication/236683469_Transformation_of_livestock_farming_in_Cameroon_Changes_in_breeding_practices_and_evolution_of_farmer_profiles

⁹ Peck Christen, R. and Anderson, J. (2013). Segmentation of Smallholder Households: Meeting the Range of Financial Needs in Agricultural Families. CCAP. Available at <https://www.cgap.org/research/publication/segmentation-smallholder-households>

¹⁰ Buurman, B. (2017) Field report, Anthropological Research Ghana 2017. Demystifying the cocoa sector in Ghana and Côte d’Ivoire. KIT Royal Tropical Institute. Available at https://www.kit.nl/wp-content/uploads/2018/10/Field-Report_Anthropological-Research-Ghana-2017-KIT-Buurman.pdf

A conceptual approach is likely to be more suitable when there is a specific usage in mind. For example, an initiative that targets take-up of fertiliser application could group farmers according to current input usage.

A data-driven approach is more of an exploratory approach. This allows profiles to naturally emerge from the data. This is a naturally iterative process, where the researcher chooses characteristics which could potentially differentiate groups and, after groups are created, checks if these characteristics indeed show differentiation. Characteristics that do not prove to be key in creating different groups are removed.

A recent example¹¹ of a data-driven approach identified five main profiles of cocoa farmers in Ghana and Côte d'Ivoire, based on age, farm size, income, farm ownership, costs, agro-ecological zone location, participation in certification and good agricultural practices. Each profile had meaningfully different cocoa production levels.

In our research, we followed a similar data-driven approach. However, our analysis suggests there are three main groups:

- 1 Female-headed household;
- 2 Male-headed households, with typical productive land size;
- 3 Male-headed household with large productive land size.

In our iterative analytical process, other variables, such as family size, age of the household head, share of hired labour were used, but it was our conclusion that the sex of the household head and the size of the productive land were the strongest profiling variables.

Box 13.1

Content from this chapter can also be found in two separate reports, 'Analysis of the income gap of cocoa producing households in Côte d'Ivoire' and 'Analysis of the income gap of cocoa producing households in Ghana'. These two reports were produced with the support of the Living Income Community of Practice.^{12,13} Each report, however, has a clear goal, with different methodological discussions and different monetary value indexation.

¹¹ Rijn, F. van, M. Kuit, Y. Waarts and V. Ingram (2015). Cluster analysis among UTZ certified cocoa farmers in Ghana and Ivory Coast. Den Haag, LEI, Wageningen UR.

¹² Tyszler, M., Bymolt, Laven, A. (2018) Analysis of the income gap of cocoa producing households in Ghana. Comparison of actual incomes with the Living Income Benchmark. Prepared for the Living Income Community of Practice. KIT Royal Tropical Institute. Available at https://docs.wixstatic.com/ugd/0c5ab3_93560a9b816d40c3a28daa686e972a5.pdf

¹³ www.living-income.com

13.1 Grouping of households

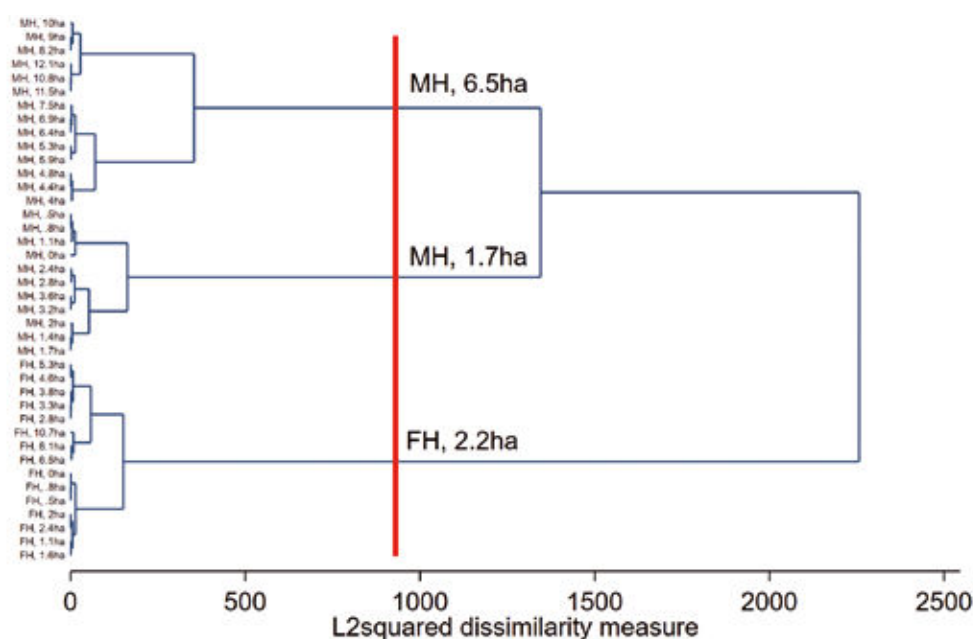
We chose a hierarchical cluster analysis technique to create the groups of farming households. This is a data-driven approach, which does not require the pre-definition of the number of groups. The technique was independently applied to the Ghana and Côte d'Ivoire sub-samples, but returned similar results.

13.1.1 Cluster analysis

Cluster analysis is a technique used to group observations. The goal is to create clusters which are as distinct as possible from each other, whilst cluster members are as similar as possible to each other. For this analysis, we clustered observations on the basis of the sex of the household head and productive cocoa land.¹⁴

In a hierarchical cluster analysis, each observation is initially set to be its own cluster and, in each round, clusters are progressively merged based on how similar they are to each other until there is only one single cluster with all observations. An output of this exercise is a dendrogram (Figure 13.1, Figure 13.2)

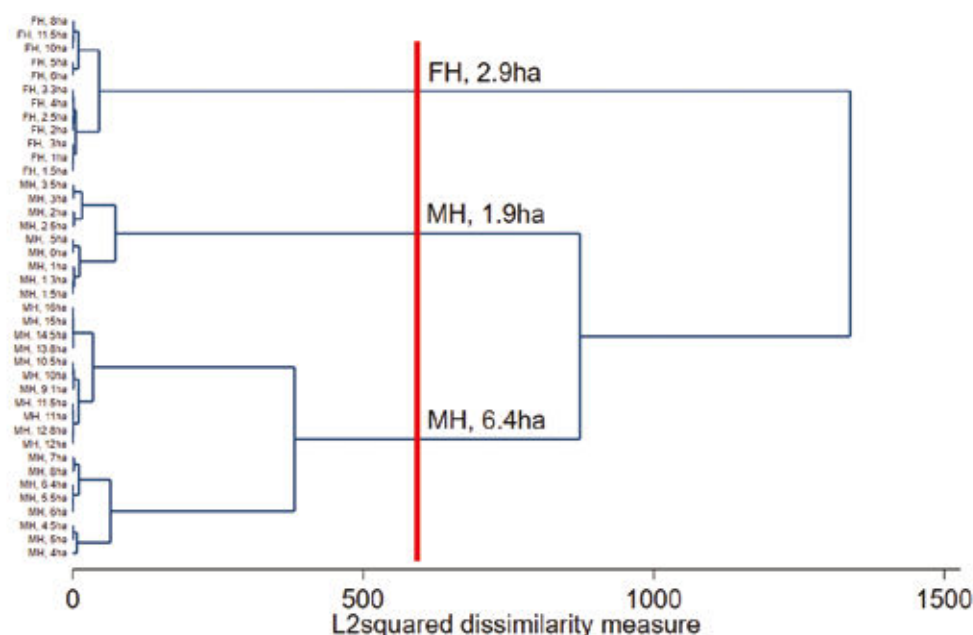
Figure 13.1 Dendrogram, Ghana



Note: FH = Female-headed; MH = Male-headed; X ha indicates the average productive cocoa land size of that cluster

¹⁴ Other variables were also considered, but the strong grouping variables were sex of the household head and productive land.

Figure 13.2 Dendrogram, Côte d'Ivoire



Note: FH = Female-headed; MH = Male-headed; X ha indicates the average productive cocoa land size of that cluster

In the dendrogram, the horizontal axis indicates the threshold to merge clusters. Very similar clusters will be merged with a low threshold (e.g. female-headed households with 1 ha and female-headed households with 1.1 ha), while distinct clusters will require a high threshold to be merged (e.g. female-headed households with 1 ha and male-headed households with 10 ha). The more the threshold has to be raised to merge clusters, the more distinct the clusters are. This is indicated by long horizontal strikes in the dendrogram.

Both dendrograms suggests three clusters from the data set. The first cluster has all female-headed households. The second comprises male-headed households with a typically sized area of productive cocoa land. The third cluster comprises male-headed households with a relatively large productive cocoa farm (Table 13.1 and Table 13.2.)

Table 13.1 Cluster characteristics, Ghana

	All	Cluster 1	Cluster 2	Cluster 3
Observations	1,181	194	744	243
	(100%)	(21%)	(63%)	(16%)
Sex of the household head				
Female	16%	100%	0%	0%
Male	84%	0%	100%	100%
Productive cocoa land (ha)				
Min	0	0	0	3.77
1 st quartile	1.21	1.01	1.01	4.41
Median	2.03	1.62	1.62	5.39
Mean	2.73	2.21	1.74	6.45
3 rd quartile	3.65	2.83	2.43	7.35
Max	12.14	11.3	3.65	12.14

Table 13.2 Cluster characteristics, Côte d'Ivoire

	All	Cluster 1	Cluster 2	Cluster 3
Observations	760	35	474	272
	(100%)	(4%)	(61%)	(35%)
Sex of the household head				
Female	5%	100%	0%	0%
Male	95%	0%	100%	100%
Productive cocoa land (ha)				
Min	0	0	0	3.75
1 st quartile	1.5	1	1	4
Median	3	2	2	5
Mean	3.5	2.9	1.9	6.4
3 rd quartile	4.5	4	2.5	7
Max	16	11.5	3.5	16

13.1.2 Analytical groups

Based on the cluster analysis, we defined three analytical groups for further use in this chapter:

- *Female-headed*: all female-headed cocoa households;
- *Male-headed, typical*: all male-headed households with up to 4 ha of productive cocoa land;
- *Male-headed, large*: all male-headed household with more than 4 ha of productive cocoa land.

The analytical groups differ only slightly from the cluster groups, but have a definition which is easier to identify and, eventually, implement on the field. Most importantly, the *male-headed, typical* is the biggest group, and is most likely to represent the typical household in the sample. In Côte d'Ivoire, the number of observations within the *female-headed* analytical group was found to be too small. Therefore, we do not report statistics from this group, since the confidence level and representativeness is too low and analysis would likely be misleading.

13.1.3 Characteristics of the groups¹⁵

Table 13.3 shows the grouping characteristics of the three analytical groups in Ghana. *Male-headed, typical* households have an average of 1.9 ha and a median of 1.8 ha of productive cocoa land. *Female-headed* households have a slightly higher average, 2.2 ha, but a lower median, 1.6 ha. *Male-headed, large* households start at 4 ha, with an average of 6.3 ha and a median of 5.7 ha of productive cocoa land.

¹⁵ In this section, we include characteristics which directly feed into the annual income analysis.

Table 13.3 Household grouping characteristics, Ghana

	Female-headed	Male-headed, typical	Male-headed, large
Observations	288	705	228
	(24%)	(58%)	(18%)
Sex of the household head			
Female	100%	0%	0%
Male	0%	100%	100%
Productive cocoa land (ha)			
Min	0	0.20	4.05
1 st quartile	1.01	1.21	4.45
Median	1.62	1.82	5.66
Mean	2.22	1.91	6.34
3 rd quartile	2.83	2.45	7.46
Max	11.33	3.97	12.15

Table 13.4 shows the grouping characteristics of the two analytical groups in Côte d'Ivoire. *Male-headed, typical* households have an average of 2.3 ha and a median of 2 ha of productive cocoa land. *Male-headed, large* households start at 4.5 ha, with an average of 7.3 ha and a median of 6 ha of productive cocoa land.

Table 13.4 Household grouping characteristics, Côte d'Ivoire

	Male-headed, typical	Male-headed, large
Observations	514	198
	(72%)	(28%)
Sex of the household head		
Female	0%	0%
Male	100%	100%
Productive cocoa land (ha)		
Min	0.25	4.5
1 st quartile	1.5	5
Median	2	6
Mean	2.3	7.3
3 rd quartile	3	9
Max	4	16

Figure 13.3 shows the detailed distribution of productive cocoa land of each analytical group from Ghana. The distribution suggests that *female-headed* and *male-headed, typical* households are fairly similar with regards to the land area they have under productive cocoa. Figure 13.4 shows the detailed distribution of productive cocoa land of the two distinct analytical groups in Côte d'Ivoire.

Figure 13.3 Distribution of productive cocoa land of the analytical groups in Ghana
(Gaussian kernel smoothed)

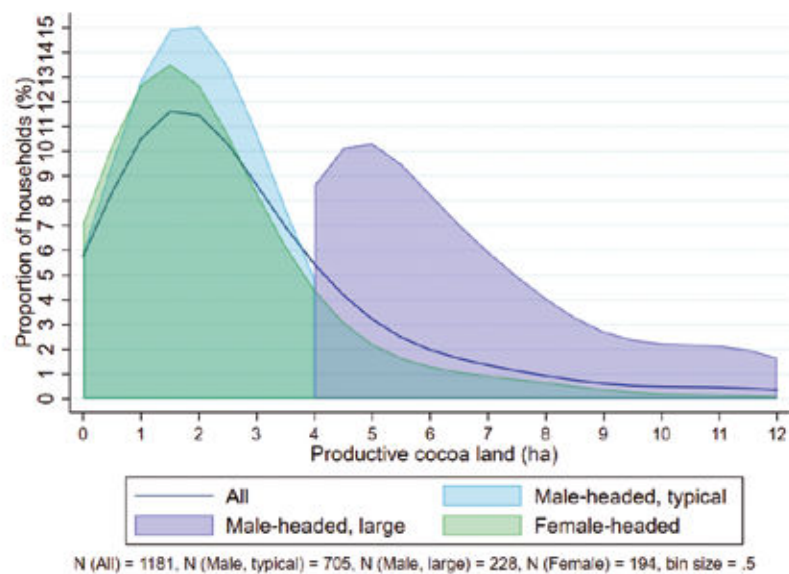


Figure 13.4 Distribution of productive cocoa land of the analytical groups in Côte d'Ivoire
(Gaussian kernel smoothed)

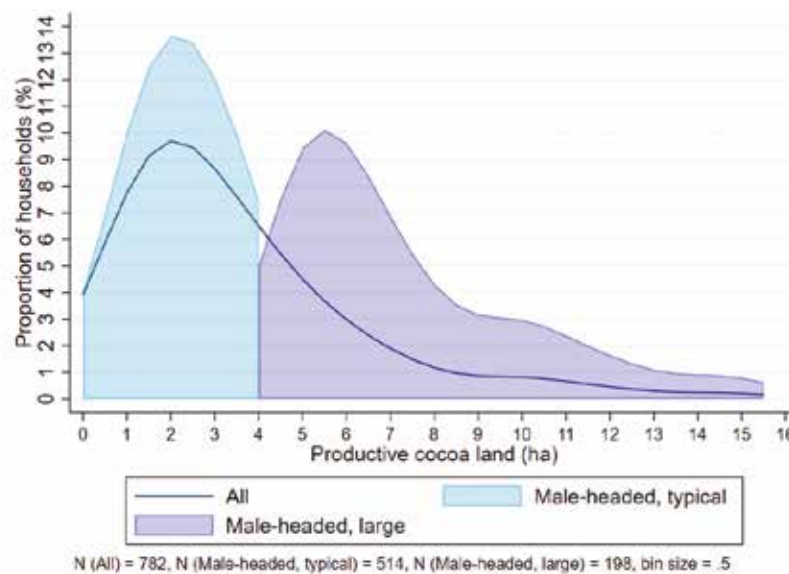


Table 13.5 shows household composition of the analytical groups in Ghana. *Female-headed* households have approximately 0.5 adult males less than *male-headed, typical* households. *Male-headed, large* households have about 0.5 person more than *male-headed, typical* households. This is important to note when considering dependency ratios, or calculating per person income. It is also relevant to note that male-headed households typically comprise women, and *female-headed* households comprise men. Therefore, it would not be correct to think of these analytical groups as representing respectively male and female farmers, but rather should be thought of in terms of the household unit.

Table 13.5 Household composition, Ghana

	All	Female-headed	Male-headed, typical	Male-headed, large
Average household size (number of persons)	5.87	5.13	5.91	6.42
Detailed composition (number of persons)				
Males, children 0 to 17 years old	1.38	1.13	1.45	1.36
Females, children 0 to 17 years old	1.23	0.97	1.28	1.46
Males, 18 to 29 years old	0.55	0.56	0.53	0.62
Females, 18 to 29 years old	0.52	0.53	0.49	0.58
Males, 30 to 60 years old	0.85	0.47	0.90	1.04
Females, 30 to 60 years old	0.91	0.96	0.87	0.97
Males, over 60 years old	0.25	0.07	0.27	0.29
Females, over 60 years old	0.18	0.44	0.11	0.09

Table 13.6 shows household composition of the analytical groups in Côte d'Ivoire. *Male-headed, large* households have about 0.5 person more than *male-headed, typical* households, distributed among male and female household members between 18 and 60 years of age.

Table 13.6 Household composition, Côte d'Ivoire

	All	Male-headed, typical	Male-headed, large
Average household size (number of persons)	6.51	6.41	6.97
Detailed composition (number of persons)			
Males, children 0 to 17 years old	1.75	1.82	1.86
Females, children 0 to 17 years old	1.49	1.53	1.47
Males, 18 to 29 years old	0.54	0.44	0.66
Females, 18 to 29 years old	0.50	0.48	0.54
Males, 30 to 60 years old	0.99	0.97	1.11
Females, 30 to 60 years old	0.89	0.83	0.95
Males, over 60 years old	0.18	0.18	0.22
Females, over 60 years old	0.17	0.16	0.16

It is also interesting to compare the number of income earners and income sources within the household. Table 13.7 shows the average number of income earners per household in Ghana. *Female-headed* households have 2.33 income earners, compared with 2.59 income earners in *male-headed, typical* households. *Male-headed, large* households have around 2.94 income earners. These differences are similar to the differences in household size.

Table 13.7 Income earners per household, Ghana

	All	Female-headed	Male-headed, typical	Male-headed, large
Average number of income earners (number of persons)	2.64	2.33	2.59	2.94
Detailed composition (number of persons)				
Males, children 0 to 17 years old	0.02	0.01	0.02	0.02
Females, children 0 to 17 years old	0.02	0.01	0.02	0.02
Males, 18 to 29 years old	0.27	0.28	0.27	0.31
Females, 18 to 29 years old	0.24	0.22	0.23	0.26
Males, 30 to 60 years old	0.82	0.41	0.87	1.02
Females, 30 to 60 years old	0.86	0.92	0.82	0.94
Males, over 60 years old	0.25	0.06	0.27	0.29
Females, over 60 years old	0.16	0.41	0.10	0.08

Table 13.8 shows the average number of income earners per household in Côte d'Ivoire is similar to that in Ghana. *Male-headed, typical* households have, approximately, 2.37 income earners, whereas *Male-headed, large* households have, approximately, 2.78 income earners.

Table 13.8 Income earners per household, Côte d'Ivoire

	All	Male-headed, typical	Male-headed, large
Average number of income earners (number of persons)	2.56	2.37	2.78
Detailed composition (number of persons)			
Males, children 0 to 17 years old	0.02	0.02	0.02
Females, children 0 to 17 years old	0.02	0.01	0.03
Males, 18 to 29 years old	0.25	0.22	0.28
Females, 18 to 29 years old	0.19	0.19	0.16
Males, 30 to 60 years old	0.89	0.85	0.95
Females, 30 to 60 years old	0.57	0.54	0.57
Males, over 60 years old	0.16	0.16	0.20
Females, over 60 years old	0.05	0.05	0.05

Table 13.9 shows the income sources of cocoa households in Ghana. The sale of cocoa is the leading income source; according to respondents, cocoa sales contribute about 60% of total income, followed by sales of other crops (see also Chapter 5 Crop Choice

and diversification). This is also the same ranking order for the number of income earners per income source, with an average of just over 2.1 persons in a household earning income from cocoa sales, followed by sales of other crops. Income from small businesses is the third most important income source involving, on average, 0.7 persons. Income from small businesses provides about 10% of total household income on average. The largest group within the households earning income from small businesses are females between 30 and 60 years old.

Table 13.9 Income sources, Ghana

	Sale of cocoa	Sale of other crops	Sale of livestock or livestock products	Own small business or trading
Estimated contribution to total household income*	61%	20%	2%	10%
Average number of income earners (number of persons)	2.13	1.70	0.36	0.73
Detailed composition (number of persons)				
Males, children 15 to 17 years old	0.01	0.01	0.00	0.00
Females, children 15 to 17 years old	0.01	0.01	0.00	0.00
Males, 18 to 29 years old	0.18	0.15	0.02	0.05
Females, 18 to 29 years old	0.06	0.05	0.01	0.03
Males, 30 to 60 years old	0.73	0.59	0.15	0.20
Females, 30 to 60 years old	0.67	0.56	0.10	0.33
Males, over 60 years old	0.24	0.18	0.05	0.03
Females, over 60 years old	0.14	0.10	0.02	0.03

Note: Based on perception of respondents in the household survey. Each person may have multiple income sources

Table 13.10 shows the income sources of the cocoa households in Côte d'Ivoire. Similar to Ghana, the sale of cocoa contributes to about 66% of total household income, followed by the sale of other crops (see also Chapter 5: Crop choices and diversification). This is also the same ranking order for the number of income earners per income source, with an average of just under 1.5 persons in a household contributing to income from cocoa sales, followed by sales of other crops. Income from small businesses, with about 3.5%, is the third most important income source involving, on average, 0.3 persons. Income from sale of cocoa is primarily earned by males (see also Chapter 8: Cocoa production practices). Income from other crops is more often earned by men and women (although these may not be the same crops). Income from small businesses is primarily earned by females, 30 to 60 years old.

Table 13.10 Income sources, Côte d'Ivoire

	Sale of cocoa	Sale of other crops	Sale of livestock or livestock products	Own small business or trading
Estimated contribution to total household income*	66%	24%	3%	3.5%
Average number of income earners (number of persons)	1.46	1.50	0.02	0.27
Detailed composition (number of persons)				
Males, children 15 to 17 years old	0.01	0.01	0.00	0.00
Females, children 15 to 17 years old	0.00	0.00	0.00	0.00
Males, 18 to 29 years old	0.16	0.09	0.00	0.02
Females, 18 to 29 years old	0.00	0.04	0.00	0.03
Males, 30 to 60 years old	0.81	0.49	0.01	0.04
Females, 30 to 60 years old	0.13	0.38	0.00	0.13
Males, over 60 years old	0.16	0.09	0.00	0.00
Females, over 60 years old	0.03	0.03	0.00	0.00

Note: Based on perception of respondents in the household survey. Each person may have multiple income sources

Figure 13.5 shows the main income contributors for each analytical group in Ghana. We find that the three groups follow similar patterns with regards to their main income sources. Figure 13.6 shows the main income contributors for each analytical group in Côte d'Ivoire. We also find that the two groups follow similar patterns, although *male-headed, large* households have a slightly higher income share from the sale of cocoa.

Figure 13.5 Main income sources of cocoa households, Ghana

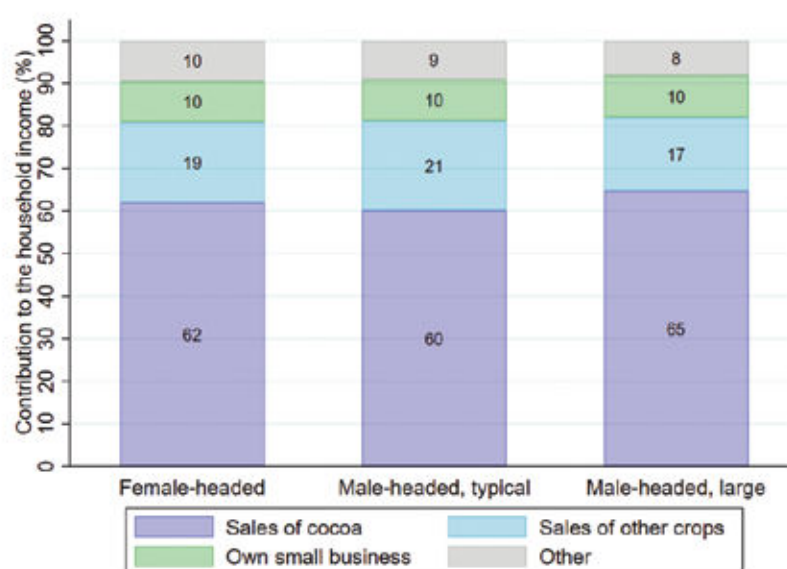
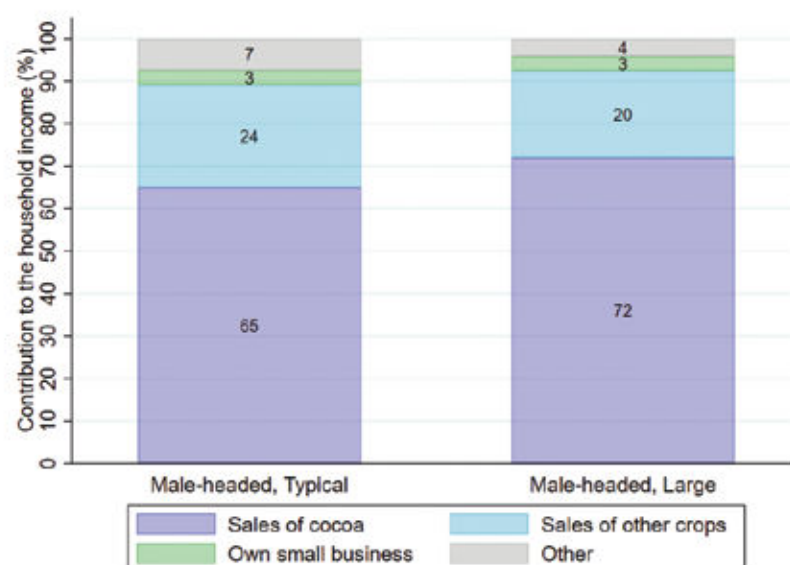


Figure 13.6 Main income sources of cocoa households, Côte d'Ivoire



13.2 Household annual income

13.2.1 How household income was calculated

Chapter 12 (Household income, poverty and wealth) explains in detail how household annual cocoa income and household total income were calculated. In summary, total household cocoa income is based on cocoa production costs and revenue data. Since the sale of cocoa provides the major income source for cocoa households, total household income is extrapolated from the share (proportion) of total household income that comes from sales of cocoa. Conversions to USD were made using the exchange rate of USD 0.26116 per GHS and USD 0.00166 per CFA, as in January 2016.

There is one difference in the calculations in this chapter compared to the calculations presented in chapter 12. As explained in chapter 12, in cases where a respondent mentioned doing a production activity, but where the data was missing, an imputation was made based on the median expenses per ha per household of the *male- or female-headed households* in each country. In this chapter, a similar approach was used but, in case of imputation, we use the median expenses per ha per household of the analytical group in each country. (Because of this, there are some small numerical differences our figures in chapter 12 and chapter 13.)

13.2.2 Net cocoa income

We estimate an average net income from cocoa of GHS 5,829 (USD 1,522) per year per household in Ghana. Table 13.11 shows the details of the averages for each analytical group.

Table 13.11 Calculation of household income from cocoa, Ghana*

	All	Female-headed	Male-headed, typical	Male-headed, large
Revenues				
Productive land (ha/household)	2.7	2.2	1.9	6.3
Total production (kg/year/household)	1,087	748	840	2,096
Land productivity (kg/ha)	398	338	438	331
Price (USD/kg)	\$1.73	\$1.73	\$1.73	\$1.73
Value of production (USD/year/household)	\$1,885	\$1,297	\$1,457	\$3,635
Costs				
Input costs (USD/year/household)	\$96	\$63	\$80	\$200
Hired labor costs (USD/year/household)	\$233	\$327	\$149	\$466
Total costs (USD/year/household)	\$326	\$390	\$226	\$660
Net income				
USD/year/household	\$1,522	\$960	\$1,225	\$2,873
GHS/year/household	5,829	3,677	4,692	11,003

* Each item (row) is calculated per household and the group average is presented in the table. Therefore, differences can occur from calculating totals based on the averages. This is because of a slight difference in number of observations per item, due to removing outliers or missing values that could not be inputted. The net income per year per household is the most relevant and complete number, while other numbers help in understanding the differences between groups.

From the table, it can be noted that *female-headed households* earn less income from cocoa than *male-headed, typical* households. While female-headed households do tend to have slightly more land under cocoa, compared to male-headed, typical households, they tend to have lower yields, on average (Figure 13.7). *Female-headed* households also tend to have higher hired labour costs than *male-headed, typical* households, which is probably due to the lower availability of household labour or because certain tasks are seen more as ‘men tasks’ (Figure 13.8). The *male-headed, large* group earns considerably more than both of the other groups. This group tends to have much more land under cocoa, but does have lower productivity per hectare.¹⁶

¹⁶ The reason why lower productivity correlates with larger land size is discussed alongside a regression analysis in Chapter 10: Production and yield.

Figure 13.7 Distribution of cocoa yield (kg/ha) and revenue in Ghana (Gaussian kernel smoothed)

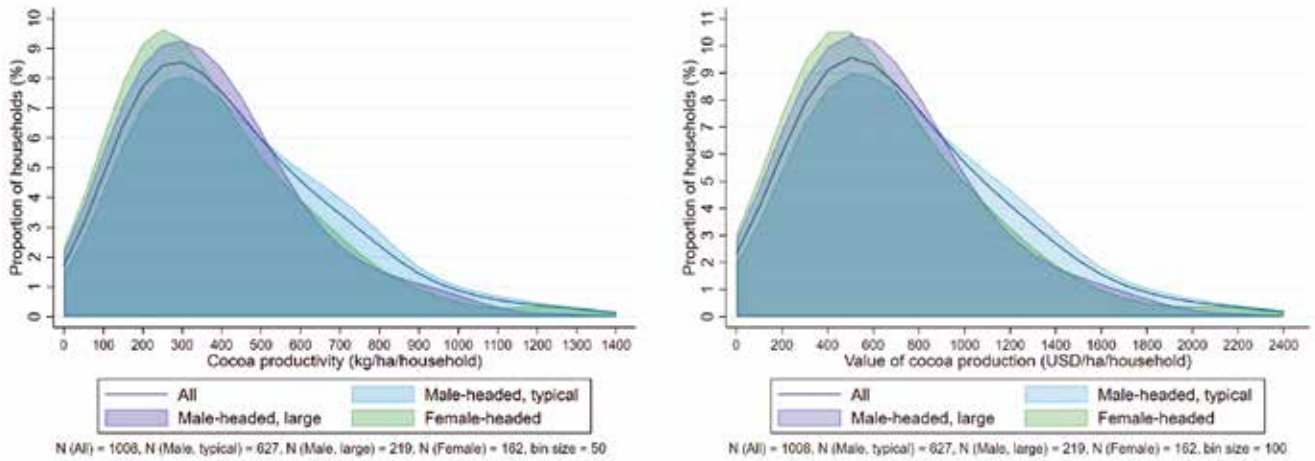
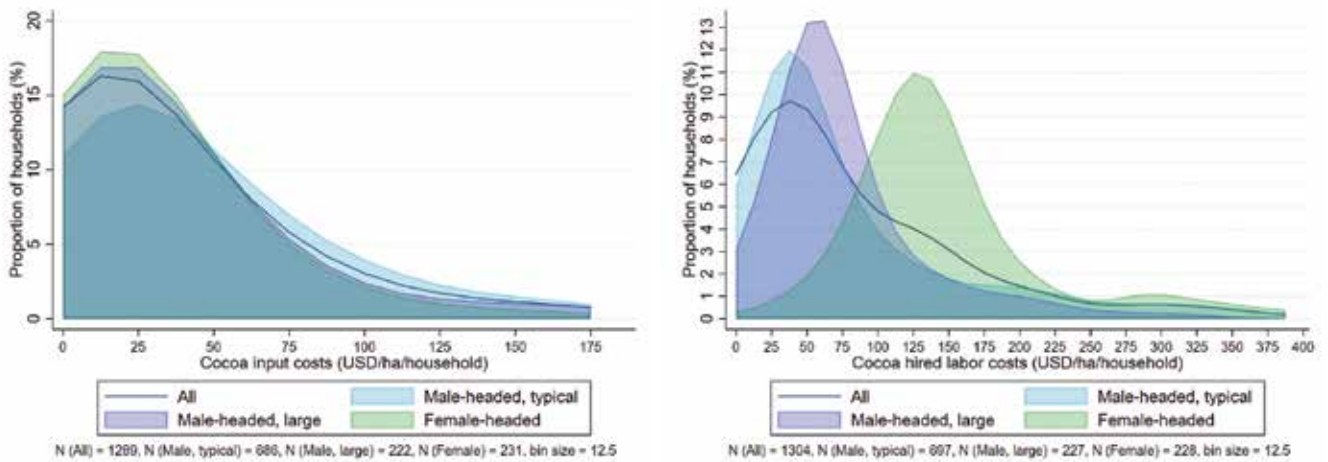


Figure 13.8 Distribution of cocoa input and labour costs in Ghana (Gaussian kernel smoothed)



In Côte d'Ivoire, we estimate an average net income from cocoa of CFA 1,155,190 (USD \$1,918) per year per household. Table 13.12 shows the averages for each analytical group.

Table 13.12 Calculation of household income from cocoa, Côte d'Ivoire*

	All	Male-headed, typical	Male-headed, large
Revenues			
Productive land (ha/household)	3.5	2.3	7.3
Total production (kg/year/household)	1,222	798	2,407
Land productivity (kg/ha)	349	344	331
Price (USD/kg)	\$1.66	\$1.66	\$1.66
Value of production (USD/year/household)	\$2,029	\$1,325	\$3,996
Costs			
Input costs (USD/year/household)	\$71	\$50	\$143
Hired labor costs (USD/year/household)	\$14	\$12	\$24
Total costs (USD/year/household)	\$84	\$60	\$167
Net income			
USD/year/household	\$1,918	\$1,277	\$3,796
CFA/year/household	1,155,190	769,162	2,286,856

* Each item (row) is calculated per household and the group average is presented in the table. Therefore, differences can occur from calculating totals based on the averages. This is because of a slight difference in number of observations per item, due to removing outliers or missing values that could not be inputted. The net income per year per household is the most relevant and complete number, while other numbers help in understanding the differences between groups.

From the Table 13.above, it can be noted that the income from the *male-headed, large* group is about three times as large as the *male-headed, typical* household. Figure 13.9 suggests that net cocoa income differences are not due to differences in household productivity nor value of production. While the *male-headed, large* group will have a higher net income because of their larger land size, Figure 13.10 also suggests that *male-headed, large* households use less hired labour than *male-headed, typical* households.

Figure 13.9 Distribution of cocoa production (kg/ha) and revenue in Côte d'Ivoire (Gaussian kernel smoothed)

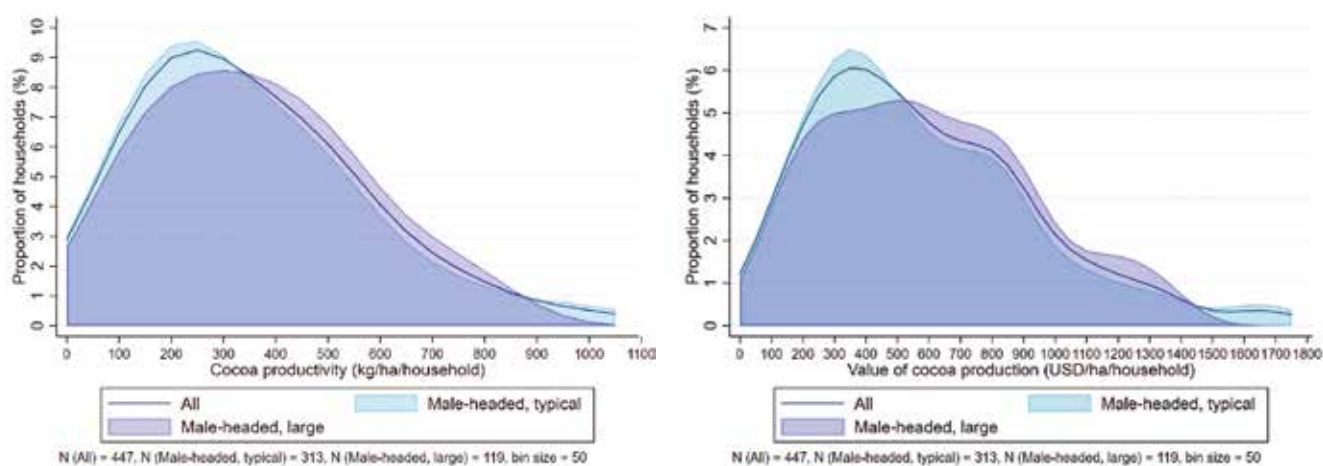
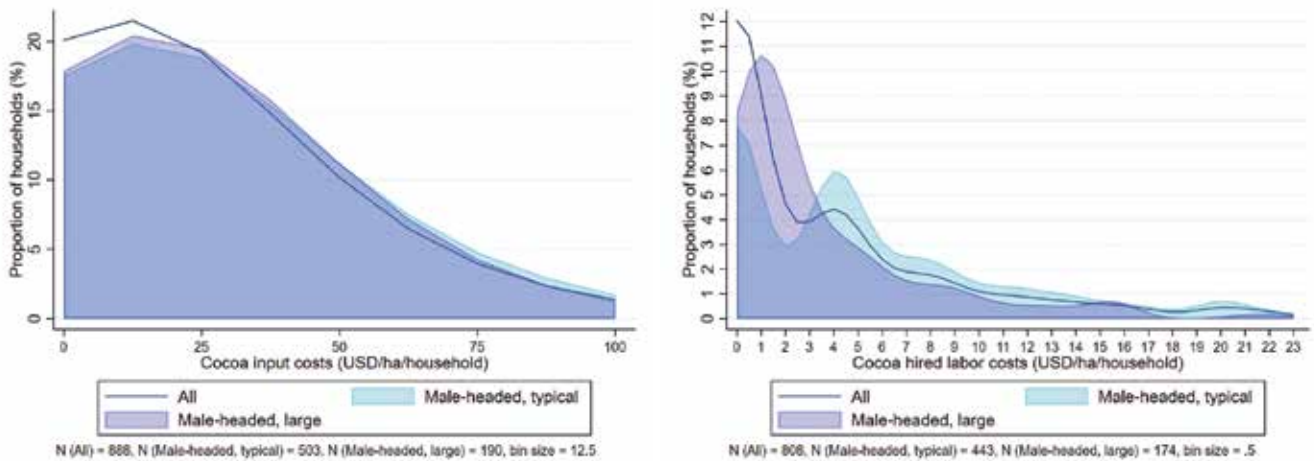


Figure 13.10 Distribution of cocoa input and labour costs in Côte d'Ivoire (Gaussian kernel smoothed)



Finally, Figure 13.11 shows the distribution of the estimated net annual cocoa income per household in Ghana. We find that *female-headed* households are very similar to the *male-headed, typical* household. The *male-headed, large* households have higher income but also higher income variability.

Figure 13.11 Distribution of net cocoa income, Ghana (Gaussian kernel smoothed)

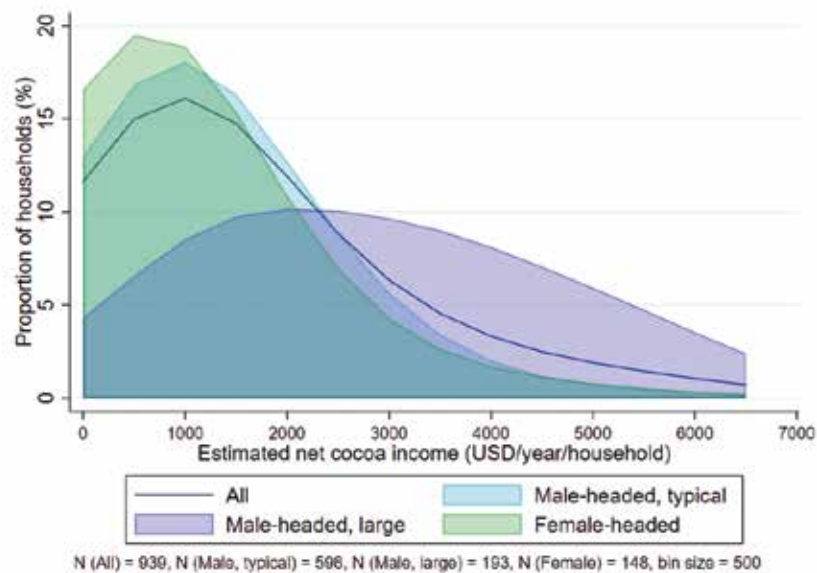


Figure 13.12 shows the distribution of the estimated net annual cocoa income per household in Côte d'Ivoire. As in Ghana, *male-headed, large* households have higher income but there is also greater income variability within this group.

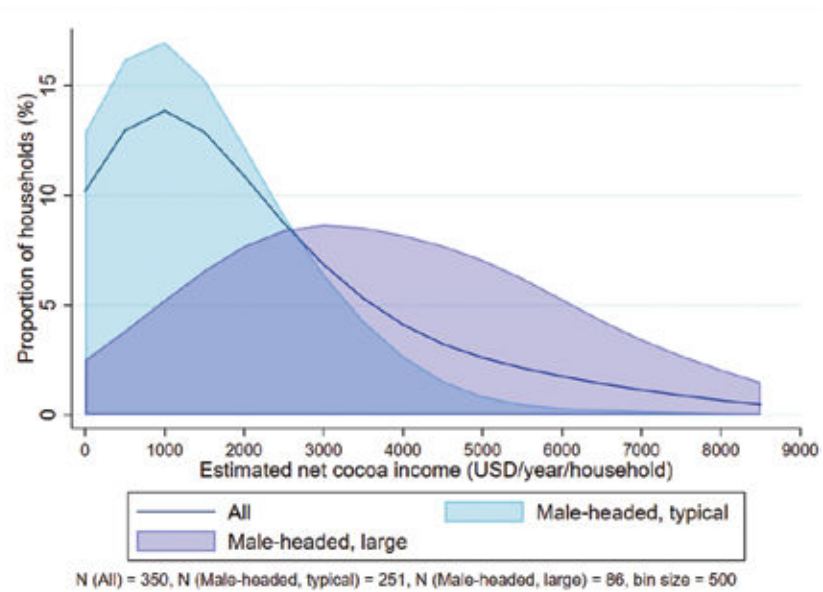
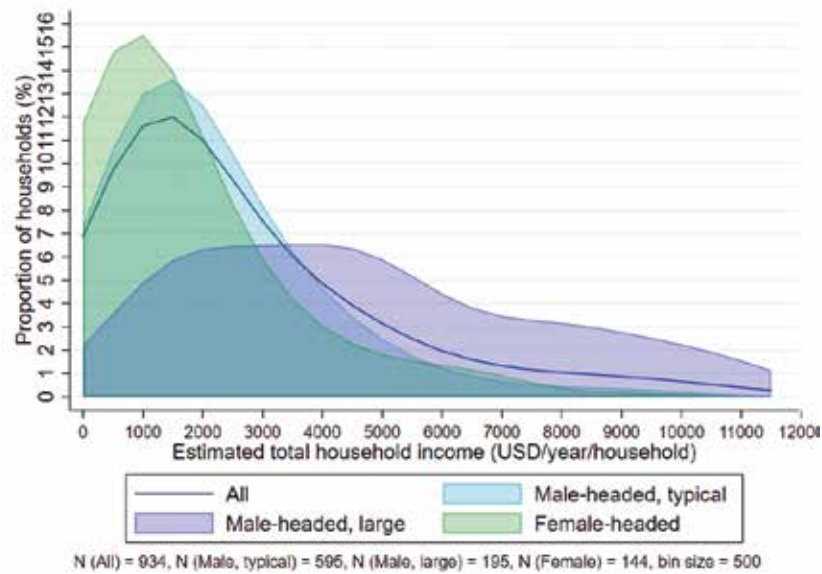


Figure 13.12 Distribution of net cocoa income, Côte d'Ivoire (Gaussian kernel smoothed)



13.2.3 Total annual income estimation

We estimated the total annual household income by using the proportion of cocoa income contributing to the total household income. Given our dataset, we consider this to be the best proxy to cover for other income sources, such as sales of other crops, labouring and ownership of small businesses. We apply this procedure per household and then compute averages.

In Ghana, the distribution shows that *male-headed, typical* and *female-headed* households are quite similar, just as they are for cocoa income. This is because both groups report a similar proportion of their income coming from cocoa compared with other sources (Figure 13.13). We estimate that, on average, *male-headed, typical* households earn GHS 8,149 (USD 2,128) per year. *Female-headed* households earn GHS 6,240 (USD 1,630) per year. Although this is lower, we should also recall that they also have smaller household sizes, on average, and hence lower household expenditures. *Male-headed, large* households earn GHS 18,183 (USD 4,749) per year, on average. However, there is a large variability across this group (Table 13.13).

Figure 13.13 Distribution of annual household income, Ghana (Gaussian kernel smoothed)

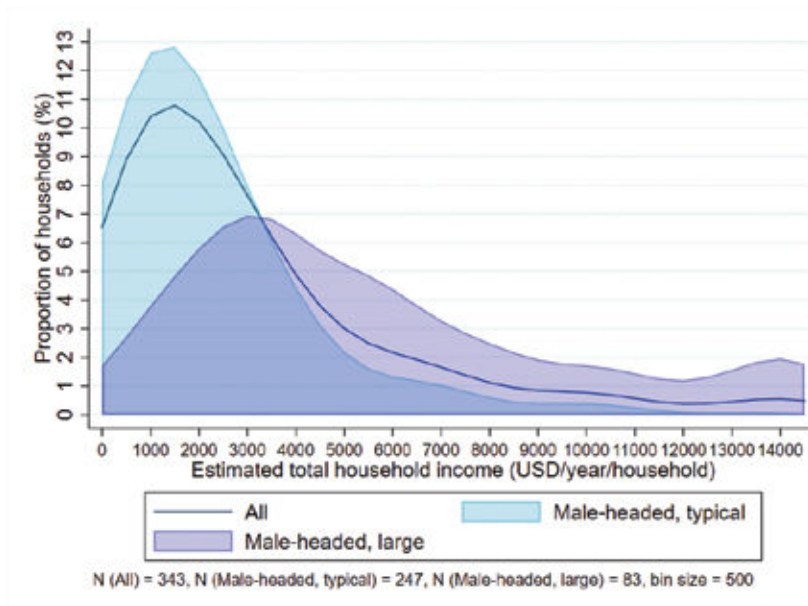


Table 13.13 Annual household income, Ghana

	All	Female-headed	Male-headed, typical	Male-headed, large
Annual household income				
Income from cocoa (USD//year/household)	\$1,522	\$960	\$1,225	\$2,873
Contribution of cocoa income to total income	61%	62%	60%	65%
Total income (USD/ year/household)	\$2,598	\$1,630	\$2,128	\$4,749
Total income (GHS/ year/household)	9,950	6,240	8,149	18,183
Total income (USD/year/household)				
Min	23	23	84	269
1 st quartile	989	501	983	2,352
Median	1,788	1,073	1,619	4,398
Mean	2,598	1,630	2,128	4,749
3 rd quartile	3,520	2,020	2,791	7,059
Max	11,739	9,300	10,062	11,739

For Côte d'Ivoire, we find that, on average, *male-headed, typical* households earn CFA 1,334,540 (USD 2,215) per year and *male-headed, large* households earn CFA 3,426,039 (USD 5,687) per year (Table 13.14). We find that the distribution of total annual household income follows a similar pattern to annual cocoa income (Figure 13.14).

Figure 13.14 Distribution of annual household income, Côte d'Ivoire (Gaussian kernel smoothed)

Table 13.14 Annual household income, Côte d'Ivoire

	All	Male-headed, typical	Male-headed, large
Annual household income			
Income from cocoa (USD//year/household)	\$1,918	\$1,277	\$3,796
Contribution of cocoa income to total income	66%	66%	72%
Total income (USD/ year/household)	\$3,075	\$2,215	\$5,687
Total income (CFA/ year/household)	1,852,165	1,334,540	3,426,039
Total income (USD/year/household)			
Min	18	18	377
1 st quartile	906	793	2,913
Median	2,125	1,694	4,430
Mean	3,075	2,215	5,687
3 rd quartile	3,938	2,772	7,879
Max	14,500	13,588	14,500

13.3 Summary

Our data-driven cluster analysis led us to define three key farmer profiles: *female-headed*, *male-headed, typical* and *male-headed, large* households. *Male-headed, typical* households are characterised by productive cocoa land up to 4 ha (with an average of 1.91 ha in Ghana and 2.3 ha in Côte d'Ivoire), while *male-headed, large* households reported more than 4 ha under cocoa (with an average of 6.34 ha in Ghana and 7.3 ha in Côte d'Ivoire). *Female-headed* households have, on average, 2.22 ha in Ghana. In Côte d'Ivoire, there were too few *female-headed* households producing cocoa and so this group was not included.

In Ghana, *male-headed, typical* comprised 58% of the sample, whilst *female-headed* comprised 24% and *male-headed, large* 18%. In Côte d'Ivoire, *male-headed, typical* comprised 72% of the sample, compared with 28% for *male-headed, large*.

In Ghana, *male-headed, typical* (1.9ha) and *female-headed* (2.2ha) households have similarly sized cocoa farms. However, in Chapter 6: Land, we show that there are significant differences in mean land sizes between male and female-headed households. Our cluster analysis suggests that these differences are actually driven by a relatively small proportion of male-headed households with much larger land sizes (6.3ha), rather than typical cases.

In Côte d'Ivoire, *male-headed, typical* households have an average of 2.3ha under cocoa compared with 7.3 for *male-headed, large* households.

In Ghana, *male-headed, typical* (USD 1,225) and *female-headed* (USD 960) households earn a similar annual net income from cocoa. Nevertheless, *male-headed, typical* and *female-headed* households are different in several respects. Female-headed households have a slightly higher mean land size, but slightly lower mean yield (kg/ha). Female-headed households have 0.5 fewer adult males in the household, which appears to drive higher hired labour costs, leading to lower net cocoa income. In Côte d'Ivoire, *male-headed, typical* households earn a mean annual net income from cocoa of USD 1,277.

In Ghana (USD 2,873) and Côte d'Ivoire (USD 3,796), *male-headed, large* households have much higher net cocoa income than other groups. This difference is primarily driven by their larger productive land size, resulting in higher total production. Their higher net income is not typically due to higher cocoa yields.

In Ghana, *male-headed, typical* households (60%) and *female-headed* households (62%) derive a similar proportion of their total income from cocoa, which leads to a quite similar total household income.

In Ghana, *male-headed, typical* households earn USD 2,128 per year while *female-headed* households earn USD 1,630 on average, from all income sources. We note female-headed households do tend to be smaller and hence have lower household expenditures. *Male-headed, large* households earn USD 4,749 on average, but there is considerable variability within this group.

In Côte d'Ivoire, *male-headed, typical* households earn USD 2,215 per year while *male-headed, large* households earn USD 5,687 per year from all income sources.



Photo credit: Nestlé

14

Gender and cocoa

Bymolt, R., Laven, A., Tyszler, M. (2018). Demystifying the cocoa sector in Ghana and Côte d'Ivoire. Chapter 14, Gender and cocoa. The Royal Tropical Institute (KIT).



As discussed in Chapter 3 (Respondent and household demographics), the sex of cocoa farmers (often discussed in terms of gender) has been a prominent characteristic of analysis by many researchers.^{1,2,3,4,5} Sector organisations and international NGOs alike bring attention to gender inequalities.^{6,7}

In many cocoa studies, we observe that sample sizes tend to be small or the proportion of female respondents in the sample is low, which makes it challenging to draw firm conclusions about how gender differences may affect outcomes for individuals or the household. In our study, in both countries 34% of our respondents were women, which includes women in male-headed households (20% of the respondents) and self-reported female heads (14% of respondents).

In our study, we have usually reported statistically significant differences between male and female-headed *households*, rather than between male and female *respondents*. The reason is that the survey questions were primarily targeted at the household unit. We know that, more often than not, multiple household members, male and female farmers, participate in various farming and supporting activities for the good of the household. It is therefore challenging to derive clear cut distinctions between male and female farmers based on our survey questions.

Our focus group discussions proved to be a better method to elicit individual experiences than the household survey. We used the indicators of the Abbreviated Women's Empowerment in Agriculture Index (A-WEAI) as an organising tool for our qualitative data collection.⁸ During focus group discussions, men and women sat apart.⁹ As explained in Chapter 2 (Methodology), the facilitator took turns prompting first women, and then men to respond during each topic of discussion. This set-up allowed us to identify some gender differences between men and women living in cocoa growing communities.¹⁰

¹ Vigneri, M. and Serra, R. (2016). Researching the Impact of Increased Cocoa Yields on the Labour Market and Child Labour Risk in Ghana and Côte d'Ivoire. ICI Labour market research study. Available at: http://www.cocoainitiative.org/wp-content/uploads/2016/12/market_research_full_web.pdf

² Vigneri, M. and Holmes, R. (2009) Gender pathways out of poverty. Rural Employment. FAO, ILO. Available at http://www.fao-ilo.org/fileadmin/user_upload/fao_ilo/pdf/Papers/20_March/Vigneri-Holmes-final.pdf

³ Barrientos, S.W. & Asenso Akyere, K. (2008). Mapping sustainable production in Ghanaian cocoa, Report to Cadbury. Institute of Development Studies & University of Ghana. Available at <https://www.cocoalife.org/progress/mapping-sustainable-production-in-ghanaian-cocoa>

⁴ Barrientos, S., and Adwoa Owusuua, B. (2016) Promoting Gender Equality in the Cocoa-Chocolate Value Chain: Opportunities and Challenges in Ghana. GDI Working Paper 2016-006. Manchester: The University of Manchester. Available at http://hummedia.manchester.ac.uk/institutes/gdi/publications/workingpapers/GDI/GDI_WP2016006_Barrientos_Bobie.pdf

⁵ Fountain, A.C. and Hütz-Adams, F. (2015) Cocoa Barometer 2015-USA Edition. Available at http://www.cocoabarometer.org/International_files/Cocoa%20Barometer%202015%20USA.pdf

⁶ FAO (2012). Gender inequalities in rural employment in Ghana: an overview. Gender, Equity, and Rural Employment Division of FAO. Available at <http://www.fao.org/docrep/016/ap091e/ap091e00.pdf>

⁷ Fair Labor Association (2015). Evaluer la situation actuelle des femmes et des jeunes agriculteurs et l'état nutritionnel de leurs familles dans deux communautés productrices de cacao en Côte d'Ivoire. Rapport préparé par Fair Labour Association, Juillet 2015. Available at http://www.fairlabor.org/sites/default/files/documents/reports/femmes_et_des_jeunes_nutrition_dans_communautes_de_dacao_juillet_2015.pdf

⁸ The WEAI is a survey-based index designed to measure the empowerment, agency, and inclusion of women in the agricultural sector. The WEAI can also be used more generally to assess the state of empowerment and gender parity in agriculture, to identify key areas in which empowerment needs to be strengthened, and to track progress over time. The A-WEAI is a shorter, more streamlined version of WEAI, which uses the same empowerment domains but a reduced number of indicators. Source: Alkire, S., Malapit, H., Meinzen-Dick, R., Peterman, A., Quisumbing, A., Seymour, G. and Vaz, A. (2015). Instructional Guide on the Women's Empowerment in Agriculture Index. Available at https://www.ifpri.org/sites/default/files/Basic%20Page/weai_instructionalguide_1.pdf

⁹ Time-constraints did not allow us to have separate focus group discussions for only-male and only-female participants.

¹⁰ Although this set-up helped us to tease out gender differences, based on our experience, we believe that it might have led to an over-emphasis on gender differences and less focus on teasing out joint household strategies.

14.1 Differences between male- and female-headed households

In this section we summarise the reported statistically significant differences between male and female-headed *households* presented in the previous chapters, and their relevance.

In Chapter 3 (Respondent and household demographics), we showed that 95% of male respondents in Ghana self-identified as the household head, compared with 45% of female respondents. In Côte d'Ivoire, 90% of male respondents said they were the household head, compared with 26% of female respondents. Some authors have argued that making comparisons between female- and male-headed households introduces a possibly spurious comparison between households that differ in many other ways.¹¹ However, being the head of the household typically implies an important role in decision-making and it is also often related to ownership over assets such as land, and taking responsibility for farm management.¹² Our finding generally corresponds with other studies and reflects cultural norms whereby, in marriage, the male normally self-identifies as the household head.¹³

This also suggests that female-headed households typically will not have a male husband in the house and have a smaller household size than male-headed households. As expected, we found differences in marital status between male and female heads. While male heads are usually married, most female heads are not. Around three quarters of female heads in both countries are single, divorced or widowed. Perhaps unexpectedly, one quarter of female heads reported being married, and it may be that they consider themselves to be the co-head.

We find that the average size of a female-headed household is indeed smaller than that of a male-headed household. In Ghana, female-headed households had an average of 5.10 household members compared with 6.04 members for male-headed households. In Côte d'Ivoire, female-headed households had an average of 5.83 members compared with 7.41 members for male-headed households. Household size determines available household labour, production costs, the cost of living and household income.

In Chapter 3, we showed that a substantial difference was observed in educational attainment between the heads of female- and male-headed households. In both

¹¹ Doss, C.R. (2018) Women and agricultural productivity: Reframing the Issues. Development Policy Review 2018 Jan: 36(1): 35–50. Available at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5726380/>

¹² Garner, E. and O Campos, A.P. de la (2014). Identifying the "family farm". An informal discussion of the concepts and definitions. Food and Agriculture Organization of the United Nations. Available at <http://www.fao.org/3/a-i4306e.pdf>

¹³ Doss, C.R. (2018) Women and agricultural productivity: Reframing the Issues. Development Policy Review 2018 Jan: 36(1): 35–50. Available at <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5726380/>

countries almost half of the female heads reported having attained no formal education, compared to 21% of the male heads in Ghana and 30% of the male heads in Côte d'Ivoire. Given that the average age of the household head is between 45 and 50, this reflects the lack of educational opportunities afforded to particularly girls 30 or 40 years ago.

In Chapter 4 (Food security and nutrition) we compared the household nutritional status of male- and female-headed households by measuring the dietary diversity of women of reproductive age.¹⁴ In Ghana, no statistically significant differences were found between these groups. However, in Côte d'Ivoire, female-headed households have a lower average dietary diversity score than male-headed households. In Côte d'Ivoire, only 19% of female-headed households achieved the minimum dietary diversity score, compared with 40% of male-headed households (*highly significant*). However, the number of observations for female-headed households in Côte d'Ivoire was low (n=57), so this is not a clear finding. For those households that do fall below the minimum dietary diversity score, their member's health, cognitive development and work capacity may be affected.¹⁵

In Chapter 5 (Crop choice and diversification), we presented the crops most frequently produced and discussed the relative importance of each. In Ghana, we found relatively few crops for which there are large, statistically significant differences between male- and female-headed households. Cocoa was produced by a high proportion of both male- (91%) and female-headed (86%) households. Cassava was produced by 84% of both male- and female-headed households. In Côte d'Ivoire, male-headed households were much more likely to produce cocoa (73%) than female-headed households (36%). Male-headed households were also more likely to produce other cash crops such as coffee and rubber, as well as food crops such as maize, plantain and rice. Female-headed households were slightly more likely to produce cassava, eggplant and chilli.

In terms of the 'most important' or 'second most important' crop, in Ghana female-headed households and male-headed households both prioritized cocoa similarly. No particularly striking differences were found for any of the main crops. However, in Côte d'Ivoire, approximately twice as many male-headed households identified cocoa as one of their most important crops compared with female-headed households. Instead, about twice as many female-headed households identified cassava as one of their most important crops as male-headed households. We know from Chapter 7 (The importance of cocoa), that cocoa production has a number of advantages, both in terms of the income it generated and security it provided. Relevant questions are

¹⁴ For the nutrition questions, following the MDD-W methodology, we only collected responses of female respondents between 15-49 years old.

¹⁵ Haas, J. and Brownly, T. (2001). Iron Deficiency and Reduced Work Capacity: A Critical Review of the Research to Determine a Causal Relationship. In the Journal of Nutrition, Volume 131, Issue 2, 1 February 2001, Pages 676-690. Available at <https://doi.org/10.1093/jn/131.2.676>

what explains this lack of interest in cocoa among female-headed households in Côte d'Ivoire, and what are the potential barriers for female-headed households to access cocoa production?

In Chapter 6 (Land), we reported differences in land sizes and ownership between male- and female-headed households. In Ghana and Côte d'Ivoire, both female-headed and male-headed households in cocoa growing areas own a plot of land. In Ghana, a slightly higher proportion of female headed households (91%) reported being a land owner than male headed households (85%) (*significant*). In Côte d'Ivoire, 95% of the female-headed households is a land owner, versus 98% of the male-headed households (*significant*). Our findings suggest that the narrative 'women typically don't own land' is not accurate for female-headed households. However, we did observe differences in terms of the size of the land cultivated and owned by male- and female-headed households.

In terms of all land (both cocoa and non-cocoa land), female-headed households in Ghana own a little less land on average (3.49 ha), compared with male-headed households (4.28 ha). When running a regression analysis and controlling for other variables, female headed households were found to own around half a hectare less land than male headed households. In Côte d'Ivoire, differences in the amount of all land owned were more pronounced. Female-headed households own, on average, 4.54 ha of land, compared with 8.16 ha for male-headed households. When running a regression analysis and controlling for other variables, female headed households were found to own around 2.5 ha less land than male headed households.

In terms of cocoa land only, we find that in Ghana male-headed households cultivate more cocoa land (3.77 ha) than female-headed households (3.02 ha). However, we find no statistical differences in the amount of cocoa land owned between male and female headed households. The additional cocoa land cultivated by male-headed households can be explained by a higher rate of abunu sharecropping. A regression analysis controlling for other variables confirms these findings. In Côte d'Ivoire, we find no statistical differences between male and female headed households in the amount of cocoa land cultivated or the amount of cocoa land owned. This is because the sample size of female headed households producing cocoa in Côte d'Ivoire is too small.

It is important to note that in Chapter 13 (Farmer profiles and cluster analysis), we find that in Ghana differences in land size between male and female headed households are not systematic. Rather, 'male-headed typical' and female-headed households are quite similar. There is, however, a small proportion of (almost exclusively) 'male-headed large' households which have substantially larger plots of land, which pulls up the overall average for male-headed households.

In Chapter 8 (Cocoa production practices) there were found to be no statistical differences between the proportion of male- and female-headed cocoa households undertaking most cocoa production activities. However, a slightly higher proportion of male-headed households (54%) reported applying herbicide than female-headed households (39%) (*highly significant*), using fungicides (male-headed 75%, female-headed 66%, *highly significant*) and doing pruning (male-headed 84%, female-headed 72%, *highly significant*). In Côte d'Ivoire, the only cocoa activity where we find statistically significant differences between male and female-headed households is in herbicide application, which was carried out by 33% of male-headed households and only 15% of female-headed households (*highly significant*). This finding should not be confused with who – men or women – actually provide the labour for each activity, which is discussed below. Furthermore, it should be noted that, while we find little statistical difference between male- and female-headed cocoa households in terms of activities undertaken, the sample size of female-headed cocoa households is quite small. This is due to the relatively small proportion of female-headed households that reported growing cocoa in Côte d'Ivoire. What our findings do suggest is that, particularly for Ghana, male-headed households apply good agricultural practices at a somewhat higher rate than female-headed households, which we would expect to result in higher yields.

In Ghana, for about half of the production activities there was found to be statistically significant differences in hired labour use between male- and female-headed cocoa households, although often the differences were small. Around 20% more female-headed households used hired labourers than male-headed households for the application of liquid fertiliser, herbicide, pesticide and fungicide. Female-headed households also hire labourers for pruning much more frequently. This suggests the hypothesis that female-headed households need to hire more labour is valid, which increases their labour costs. Differences between male- and female-headed household on hired labour for Côte d'Ivoire was not presented due to the low number of female-headed households producing cocoa as one of their most important crops.

In Chapter 9 (Cocoa producer groups, certification, training and credit) we found low membership rates of cocoa producer groups, particularly in Ghana. Male-headed households tend to participate more in such groups than female-headed households (7% versus 11%). We see the same trend in Côte d'Ivoire, where 13% of female-headed households reported that someone within their household was member of a cocoa producer group, versus 22% of the male-headed households. However, this difference was not significant due to the low number of observations.

In Ghana we found significant differences between male- and female-headed households who are certified; 38% of male-headed households reported they were certified compared with only 20% of female-headed households. However, both male- and female-headed households reported 'no certification' at similar rates, with

the difference being the proportion of female-headed households that “didn’t know” whether or not their cocoa was certified. In Côte d’Ivoire, comparisons between male and female-headed households are not particularly valid as so many respondents stated “don’t know”, we suggest that the concept of certification is not well understood by many. In this same chapter, we found no statistical difference in the proportion of male-headed and female-headed households borrowing money in either country in the past year.

In relation to training, we found that in Ghana significantly more male heads received training over the last 5 years than female heads, 53% versus 31% (*highly significant*). In Côte d’Ivoire, a much lower percentage of heads received training. The difference between male and female heads was not significant due to the low number of observations.

In Ghana, 29% of the female-headed households borrowed some money last year, versus 26% of the male-headed households. In Côte d’Ivoire, 26% of female-headed households borrowed some money, versus 24% of the male-headed households. This suggests that current primary barriers to accessing credit faced by female-headed households are not dissimilar to those faced by smallholders generally. In both countries, the amounts of money that female-headed households borrow is lower than male-headed households (*significant*).

In Chapter 10 (Production and yield), we found for Ghana, a difference of around 58 kg/ha in yields, between male-headed households (432kg/ha) and female-headed households (374kg/ha) (*highly significant*). However, it is important to consider what differences in practices are actually driving differences in yields. The regression analysis showed that, in Ghana, female-headed households produce, on average, approximately 63 kg/ha less than male-headed households, after controlling for other variables (*highly significant*). The model cannot explain exactly what combination of factors has caused female-headed households to have lower yields (many variables are already controlled for), but there are a number of reasonable factors to consider including amount of inputs used, number of labour days invested, quality of labour used, and knowledge and application of good practices, as well as factors such as reporting bias (female respondents reported “don’t know” at a significantly higher frequency than men).

In Côte d’Ivoire, we find no statistically significant differences in yield between male-headed (351kg/ha) and female-headed households (386kg/ha). However, this can also be due to the very low number of observations from female-headed households that produce cocoa and who know their land size and total cocoa production.

In Chapter 12 (Household income, poverty and wealth), in both Ghana and Côte d’Ivoire, we found no statistically significant differences between male- and female-

headed households in the Poverty Probability Index (PPI) poverty likelihood nor in the Demographic and Health Service (DHS) wealth index. This suggests that male and female-headed households tend to have a fairly similar poverty and wealth profile.

In Chapter 13 (Farmer profiles and cluster analysis), a cluster analysis of cocoa household revealed that there are essentially three clusters in our sample. These are female-headed households, male-headed typical, and male-headed large households. In Ghana, we find that female-headed households (USD 960) earn less net income from cocoa than male-headed, typical households (USD 1,275) after hired labour and input costs are deducted. While female-headed households do tend to have slightly more land under cocoa than male-headed, typical households, they tend to have lower yields on average. Female-headed households also tend to have higher hired labour costs than male-headed, typical households, which is probably due to the lower availability of household labour or because certain production activities are more physically challenging. The male-headed, large group (USD 2,873) earns considerably more from cocoa than both of the other groups. This group tends to have much more land under cocoa, but does have lower productivity per hectare. From all income sources (cocoa and non-cocoa), we estimate that, on average, male-headed, typical households earn USD 2,128 per year compared with female-headed households who earn an average of USD 1,630 per year. Although the household mean is lower, the distribution of household incomes is quite similar between these groups. We should also recall that female-headed households have fewer household members and hence have lower household expenditures meaning they are not necessarily worse off on a per person basis. Male-headed, large households earn USD 4,749 per year, on average. However, there is large variability across this group.

In Côte d'Ivoire, the number of observations within the female-headed analytical group was found to be too small. Therefore, we were not able to do a similar comparison between female- and male-headed households as was done for Ghana. The cluster analysis instead looked at differences between male-headed, typical, and male-headed, large households.

14.2 Intra-household dynamics – men and women within the same household

Different studies point out the need to recognise that “households do not act in a unitary manner when making decisions or allocating resources” and “women and men within households do not always have the same preferences or pool their

resources”.¹⁶ With respect to access to and control over benefits, a concern is who actually sells farm products, and who decides what happens to the income generated in this way.^{17,18}

In order to understand intra-household dynamics and decision-making processes, in our survey we included questions on labour division and decision-making in relation to cocoa. In focus group discussions, we further probed on which tasks are typically done by men or women, and why. This led to a further discussion on the time involvement of women and men in different income-generating activities, access to and control over key resources and their decision-making power.¹⁹ The focus group discussions gave us additional insight in how cultural norms shape gender differences.

14.2.1 Labour division and decision-making in cocoa

Women in Ghana and Côte d’Ivoire provide a major part of the cocoa workforce, often as supporters of their husbands on family farms.^{20,21} An often cited study by Dalberg (2012) reports that, in West-Africa, women provide 45% of the labour for cocoa production.²²

In the household survey, respondents were asked, “Who did [the activity] - men, women or both?”. In Chapter 8 (Cocoa production practices), we showed that in Ghana both male and female respondents reported that men participate in virtually all cocoa production activities at very high rates (98-100%). Male and female respondents agreed that women typically engage in cocoa production activities at much lower rates than men. In Ghana, the most common activities that women participate in are planting, granular fertiliser application, manure application, pod breaking, transporting and drying. These are almost always done alongside men. Women rarely participate in heavy, labour intensive activities such as land clearing, and have much lower participation in pruning and the application of inputs. Our data does not allow us to measure the actual labour days worked on the cocoa farm by men and women.

¹⁶ Meinen-Dick, R., Quisumbing, A., Behrman, J., Biermayr-Jenzano, P., Wilde, V., Noordeloos, M., Ragasa, C. & Beintema, N. (2011). *Engendering Agricultural Research, Development, and Extension: Priority Setting, Research & Development, Extension, Adoption, Evaluation*. Washington: IFPRI. Available at <http://www.ifpri.org/publication/engendering-agricultural-research-development-and-extension-0>

¹⁷ Eerdewijk, A and Danielsen, K (2015). *Gender matters in farm power – gender dynamics in small-scale mechanization*, KIT Amsterdam. Available at www.kit.nl

¹⁸ Danielsen, K. (2012) *Gender equality, women’s rights and access to energy services - An inspiration paper in the run-up to Rio+20*, Danish Ministry of Foreign Affairs. Available at https://www.kit.nl/wp-content/uploads/2018/08/1975_Gender-Rights-and-Energy-Report-final.pdf

¹⁹ Household roles and decision-making was discussed in total in 25 focus group discussions, in which approximately 1,000 farmers participated.

²⁰ African Development Bank (2015) *Economic Empowerment of African Women through Equitable Participation in Agricultural Value Chains*. Available at https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Economic_Empowerment_of_African_Women_through_Equitable_Participation_in_Agricultural_Value_Chains.pdf

²¹ Barrientos, S. and Bobie, A.O. (2016) *Promoting Gender Equality in the Cocoa-Chocolate Value Chain: Opportunities and Challenges in Ghana*. Global Development Institute Working Paper Series 2016-006 October 2016. University of Manchester. Global Development Institute. Available at http://hummedia.manchester.ac.uk/institutes/gdi/publications/workingpapers/GDI/GDI_WP2016006_Barrientos_Bobie.pdf

²² Dalberg Global Development Advisors (2012) *Analysis of IFPRI (2002) ‘Empowering Women and Fighting Poverty: Cocoa and Land Rights in West Africa’*, Dalberg Global Development Advisors Internal Document.

In Côte d'Ivoire, men were reported to have very high participation rates (97-100%) for virtually all cocoa production activities. Women engage in all cocoa production activities much less frequently than Ivorian men, and also less frequently than women in Ghana. In Côte d'Ivoire, the main activity where women play a substantial role is pod breaking. However, for Côte d'Ivoire, the level of involvement of women and men in cocoa production activities, depend on the type of household. Not surprisingly, in female-headed households the involvement of women is higher than in male-headed households. Comparing to male-headed households, in female-headed households the involvement of women is particularly higher in planting and to a lesser extent, also in land preparation, drying and fermentation.²³ The narrative that, in Côte d'Ivoire, women provide an important share of the labour in cocoa does not seem to be correct.

Virtually all focus group discussions, in both Ghana and Côte d'Ivoire, said that men usually spend more time working on cocoa than women. It was often said that men “take the lead”, and go to the farm earlier in the morning (while women take care of the household). It was argued that men, as the head of the household, assume responsibility for maintaining the cocoa farm well and “ensuring the household has a good income”. There seems to have been agreement that because of the physical nature of the work, cocoa is ‘a man’s job’; women are seen as ‘helpers’.

Besides doing a number of “lighter tasks”, as ‘helpers’ women may contribute to young cocoa farms in the first few years, including manual weeding. In these early stages, the young cocoa plants are often intercropped with food crops, such as plantain and cassava. In addition, women were said to prepare food for the men and workers, and sometimes fetch water for the spraying on the farm.

“Women help the men in almost everything, harvesting, carrying, breaking the pods, fermenting. When the men are doing the work on the farm, the women often prepare the food in the field. The women and men go together to the farm.” (FGD, Ghana)

“During harvest it is the responsibility of the women to gather the pods and bring to the assembly point. During pod breaking women do the cooking for the men, sometimes during harvest the women assist the men, the women also do the extracting of the beans, and drying the beans when men not around.” (FGD, Ghana)

“Women plant food crops at the start of the plantation, women do the weeding for the first 3 years when you can still plant food crops. Women also help with the planting, gathering of the pods, prepare for pod breaking, help drying, as well as transportation of beans to drying point and to selling point.” (FGD, Côte d'Ivoire)

²³ https://cocoalivelihoods-cocoa.kit.nl/#16_production_activities

The difference between Ghana and Côte d'Ivoire is that in Ghana women seem to work more alongside their husbands throughout the season, while in Côte d'Ivoire more emphasis was put on women having a role only at the beginning and end of the production-cycle, while men do “all the hard work”.

“The men do everything. They plant the cacao - they clear and clean, they dig, they apply fertiliser, pesticides and all the other chemicals.” (FGD, Côte d'Ivoire)

“The work is hard, and not done by women. Even the women that own land, hire men to do the work.” (FGD, Côte d'Ivoire)

Survey respondents were also asked ‘Who sells the cocoa - men, women or both?’. This was asked with the assumption that selling the cocoa is a good predictor for having (more) control over the income that is generated with cocoa. Our data suggests that the status of being the household head is the strongest predictor of who sells the cocoa (although sex is also an important predictor of whether or not one is the household head in the first place) (Table 14.1).

Table 14.1 Decision making, who sells the cocoa, by sex of the household head

	Ghana female-headed household	Ghana male-headed household	pvalue	sig	Côte d'Ivoire female-headed household	Côte d'Ivoire male-headed household	pvalue	sig
Men sell the cocoa	63%	97%	0.00	***	50%	100%	0.00	***
Women sell the cocoa	73%	30%	0.00	***	72%	1%	0.00	***
std.error	3%	1%			11%	1%		
N	196	976			18	487		

Note: The question asked was ‘Who sells the cocoa - men, women or both?’

In focus group discussions, “men being the head of the household” and “being land-owner”, were mentioned as the main reason why men sell cocoa. In Ghana, “women cannot read the scales” came up as another reason.

In Ghana, the household survey data shows that general decision-making on cocoa-related issues often involves men and women in the household. In male-headed households, men were virtually always involved in decision-making, but so were women in 68% of the cases. Likewise, in female-headed households, women were nearly always involved in decision-making, but so were men in 50% of the cases. This suggests a reasonable degree of cooperative decision-making.

In Côte d'Ivoire, our survey data shows a greater contrast in terms of male and female decision-making on cocoa-related issues. Men in male-headed households virtually always make decisions related to cocoa, while only a small proportion of women in the household contribute to such decisions. Likewise, in male-headed households,

men almost always sell the cocoa without involvement of women in the household. In female-headed households, women make cocoa-related decisions most of the time; however, we have a low number of such observations in our sample.

Table 14.2: Decision-making on cocoa issues, by sex of the household head

	Ghana female-headed household	Ghana male-headed household	pvalue	sig	Côte d'Ivoire female-headed household	Côte d'Ivoire male-headed household	pvalue	sig
Men make decisions	50%	97%	0.00	***	38%	99%	0.00	***
Women make decisions	91%	68%	0.00	***	83%	13%	0.00	***
std.error	2%	1%			6%	1%		
N	232	1060			47	860		

Note: the survey question asked was 'When decisions are being made about cocoa, who normally takes the decision? Men, women or both?'

For comparable cash or non-food crops, such as coffee and rubber in Côte d'Ivoire, we see similar patterns in terms of decision-making. Generally, the respondents indicate that men are typically the head of the households and the landowner. Men were said to usually participate more actively in the different production activities, spend more time on coffee and rubber production, and are involved in the marketing. This is reflected by men having more to say about these crops.

14.2.1.1 Access to land

Ownership of land goes hand-in-hand with decision-making power and control over the income that comes from cultivating the land. Also, land ownership is usually a requirement to access a farmer organisation, training or other services. In 2015, the African Development Bank reported that, in Ghana, approximately 18% of cocoa farms are owned by women, and only 11% of women owners or labourers in Ivoirian cocoa production participate in agricultural training programmes.²⁴

In Ghana's constitution it is stated that assets jointly acquired during marriage shall be distributed equitably between the spouses upon dissolution of the marriage and a spouse shall not be deprived of a reasonable provision out of the estate of a spouse whether or not the spouse died having made a will.²⁵ In addition, the Intestate Succession Law guarantees the right of succession for the surviving spouse, children, parents and the customary family and a greater portion of the property is shared among the surviving spouse and children. In Côte d'Ivoire, the Rural Land Law officially granting women rights equal to those of men. Despite these provisions in the legal frameworks, in practice discriminatory customary law often prevails.²⁶

²⁴ African Development Bank (2015) Economic Empowerment of African Women through Equitable Participation in Agricultural Value Chains. Available at https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Economic_Empowerment_of_African_Women_through_Equitable_Participation_in_Agricultural_Value_Chains.pdf

²⁵ Aduamoah – Addo, L. (2016) Culture, rural women and land rights in Ghana. WILDAF Ghana. Regional News of Tuesday, 4 October 2016. Available at <https://www.ghanaweb.com/GhanaHomePage/NewsArchive/Culture-rural-women-and-land-rights-in-Ghana-474618#>

²⁶ Elizabeth Kiewisch (2015) Looking within the household: a study on gender, food security, and resilience in cocoa-growing communities, Gender & Development, 23:3, 497-513, DOI: 10.1080/13552074.2015.1095550

Widows and her children are the main sufferers of this tradition, but inheritance practice can vary from community to community.^{27,28}

In our study, during focus group discussions, this tradition was confirmed. In a married situation, the land title (or arrangement) is usually in the man's name.²⁹

"Landowners prefer to give the land to the men as they are afraid that the women lack the strength to take proper care of the farm land and that it would be destroyed or they would get lower revenues from the sharecropper." (FGD, Ghana)

In focus group discussions, a number of specific constraints for women to access land came up. In Ghana, participants emphasised physical constraints, the customary system and the cultural norms. Also, in Côte d'Ivoire, participants highlighted the land-inheritance system and the tradition that land usually belongs to men as main reasons why men usually are the landowner. Sometimes focus group participants mentioned women's financial constraints as reason. In Ghana and Côte d'Ivoire, occasional reference was made to the national laws, allowing women to inherit land when husbands or fathers leave it to her in their will.

"Only in the case where there are no sons, then the land goes to the daughter, otherwise always to sons and not to the daughter." (FGD, Ghana)

"Women are said to follow their husbands as the men is head of the household. This can mean that women leave 'their land' behind." (FGD, Ghana)

"Because men cultivate crops that bring in more money, they can permit themselves to buy land." (FGD, Côte d'Ivoire)

"When the husband or father dies, and he has no sons, the land goes to the uncle or another male member of the family. In no way will the land become the property of a woman." (FGD, Côte d'Ivoire)

"It is a traditional thing that the men own the land." (FGD, Côte d'Ivoire)

Due to these constraints for women to access land, a more common way for married women to access (a small part of) land is through gifting.

Our qualitative data does not explain to what extent women's constraints in ownership of land impacted their participation in producer group and access to services, such as training and access to finance.

²⁷ African Development Bank (2015) Economic Empowerment of African Women through Equitable Participation in Agricultural Value Chains. Available at https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/Economic_Empowerment_of_African_Women_through_Equitable_Participation_in_Agricultural_Value_Chains.pdf

²⁸ Aduamoah – Addo, L. (2016) Culture, rural women and land rights in Ghana. WILDAF Ghana. Regional News of Tuesday, 4 October 2016. Available at <https://www.ghanaweb.com/GhanaHomePage/NewsArchive/Culture-rural-women-and-land-rights-in-Ghana-474618#>

²⁹ In Côte d'Ivoire, officially since 2011, women are joint heads of the households, and the law no longer makes a distinction between men and women for the acquisition of land.

14.2.2 Labour division and decision-making in relation to food crops

The term ‘food crop’ usually refers to crops produced mainly for household consumption, but ‘food crops’ can also be profitably produced and marketed. In Ghana and Côte d’Ivoire, a fairly high proportion of respondents reported selling at least some of their staple food crops, including cassava (Ghana 72%, Côte d’Ivoire 52%), plantain (72%, 38%), maize (62%, 34%), yam (34%, 27%) and rice (80%, 46%).

A recent survey by the Consultative Group to Assist the Poor (CGAP) shows for Côte d’Ivoire that within one household male and female members of the same household are likely to have a different idea on which crops are most important for their family.³⁰ CGAP reports that in Côte d’Ivoire, for female members of male-headed cocoa households cassava and rice are considerably important crops for these female farmers, while being perceived as less important for the family by the male members.

Usually, both men and women are involved in food production, but in different roles, depending also on the crop type. Our study suggests that, 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 to be also more involved in selling the crops at the (local) markets and or local processing of the food crops (e.g. cassava or palm oil).

“Women can do rice farm, she would hire men as labourers. So the men would do the work. It is culturally determined that rice is a man’s crop” (FGD, Ghana)

“Women also do their own rice, but men have some tasks in it as well. All the other food crops are for the women. They intercrop it with cocoa, but also have specific fields for cassava etc.” (FGD, Côte d’Ivoire)

“The men do the land clearing for the cassava. The men plant the yam in the same field while the women do the cassava. The men do harvesting of the yam and they do the cassava together.” (FGD, Côte d’Ivoire)

In discussing food crops, it sometimes came up that cassava is a “woman’s crop”. Cassava production is perceived as easier than cocoa, and requires less labour. Cassava is intercropped with cocoa on young cocoa farms; young cocoa farms are normally managed by women. Men usually support their wives in the land preparation and harvesting.

³⁰ Riquet, C., Musiime, D., and C. Marita (2017) National Survey and Segmentation of Smallholder Households in Cote d’Ivoire. Consultative Group to Assist the Poor (CGAP). Available at <https://www.cgap.org/sites/default/files/researches/documents/Working-Paper-Survey-and-Segmentation-Smallholders-Coted%2527Ivoire-Jul-2017.pdf>

"Cassava does not require much weeding, it is an easier crop for women." (FGD, Ghana).

"The work of cassava is not as difficult as the work of cocoa, so women can do it. When they process into cassava powder, the women have time the time do it, also to prepare the food." (FGD, Ghana)

"She is the mother of this crop [cassava]- she gains from this product" (FGD, Côte d'Ivoire)

"Cassava is our primary food source, but we sell more than we eat. We[women] use the money to support our husbands, pay school fees, lend money to each other, pay health care costs, buy clothing, and we buy food for the household." (FGD, Côte d'Ivoire)

In the focus group discussions, we did not discuss other food crops in great detail. In general, focus group participants talked about 'food crops' as a responsibility for the women, as "they are supposed to feed the family". What was often mentioned is that food crops are easier to grow, "so the women do it". Additionally, in Côte d'Ivoire, it was argued by men that food crops provide women with a source of income ("so the men let the women do it, while they [the men] do the cash crops"). If required, men would still do land preparation (e.g. drilling holes for plantain) and assist women in planting and harvesting. On further analysis, we are not certain what some groups meant when they discussed food crops – either small vegetable gardens or other small plots around the homestead, or larger plots used to produce maize, rice and yams on a reasonable scale.

"The women have the responsibility to do it [food crops]. Because the women are supposed to feed the family, you give the woman the responsibility so she can more easily manage the food crops as she knows what is needed for the household." (FGD, Ghana)

"When it comes to planting pepper, the farm does not need clearing (there is no forest), she can hire labour and do the rest herself." (FGD, Ghana)

"Food crops belong to the women while cash crops belong the men." (FGD, Côte d'Ivoire)

In Ghana, women were seen as contributing to decisions on food crop production by most focus groups. This is predominantly because women are the ones that are perceived to spend most time on food crop production, sell the food at the market and have greater control over the income that is earned with selling food crops. It was also argued that women are more knowledgeable on how to produce and trade food crops, and ensure "good bargain for a good price".

When it comes to marketing of food crops, likewise in Côte d'Ivoire this is mainly seen as a women's task, although it depends on the type of crop. For example, in Côte d'Ivoire, men are actively involved in rice and maize marketing.

"The rice is mostly sold by the men, maize as well. All the other food crops are sold by the women." (FGD, Côte d'Ivoire)

The money earned with selling food crops was said to be for household expenditures. Occasionally, it was put forward that men are not involved in the marketing as they “cannot sit behind the goods on the market” or “a man cannot carry food crops on his head”.

14.2.3 Labour division and decision-making in non-farm economic activities

Women tend to be more actively involved in running small businesses than men. In Ghana and Côte d'Ivoire, the largest group within the households earning income from small businesses are females between 30 and 60 years old. According to male participants, this is partly because women have more time for this, as they are less involved in, for example, cocoa or rubber production.

“Women have more time to do other things that aren't cocoa or rubber.” (FGD, Ghana)

“Women are traditionally declared to be a helper to the men, that is way they help in creating income. Therefore the woman who does extra activities tries to provide as much extra income as possible.” (FGD, Ghana)

“They [women] do these activities to help with income when they have spent the revenue from cocoa.” (FGD, Côte d'Ivoire)

“They [women] do their little business from 6 till 10 am then they go to the field. From 2 till 6 pm, they sell again.” (FGD, Côte d'Ivoire)

In Ghana and Côte d'Ivoire, typical non-farm activities that involve women are trading (e.g. food, cosmetics, second-hand clothes), both in markets and in small shops. Other jobs that were mentioned primarily involving women were soap-making, sewing, hairdressing and food preparation/catering. Typical activities for men involve carpentry and masonry, mainly because these jobs are seen as more physical. A number of other ‘male’ jobs were also mentioned, such as, illegal mining, bicycle repair, tailoring, barbershop, electrical work and taxi driver.

In Ghana and Côte d'Ivoire, men and women were both said to be decision-makers in relation to non-farm economic activities. In Ghana, in some focus groups, the men were seen as the main decision-maker, because, as the head of the household, they are financially responsible for the family.

“When our wives run at a loss, we have to pay their debts.” (FGD, Ghana)

In Côte d'Ivoire, it was generally emphasised that men and women make decisions themselves, but first discuss together what is the best way to make some extra money.

Because these non-farm economic activities are seen as the main source of income for women, it was said to be only logical that women make most of the decisions. However, others argued that it is still common that women need permission, or should at least consult their husbands about what they will sell.

14.2.4 Labour division and decision-making in domestic work

In a study by Vargas Hill and Vigneri (2011), the authors calculated the weekly hours spend on domestic chores by gender for Ghana. They based this on the Ghana Living Standards Survey. According to their calculations, on average women spend 26 hours per week on domestic chores, while men spend around 10 hours per week. It also presents the high labour burden for women, which might affect them in acquiring more income or education and in their well-being.³¹

Table 14.3 Average weekly hours spent on domestic chores by gender³²

Domestic chores:	Women	Men
Fetch wood + water	1.27	0.48
Cleaning	1.32	0.40
Cooking	8.04	1.24
Errands	1.01	0.93
Child care	5.12	2.83
Elderly care and care of the sick	1.46	0.40
Other	0.13	0.98
Total household	26.06	10.22

In Ghana and Côte d'Ivoire, focus group participants agree that women are traditionally the ones who do most domestic work. Household activities involve cleaning, cooking, sweeping, dish washing, washing husbands' clothes, taking care of the children and sending them to school, and fetching water.

"It is not a good job for a man to help."(FGD, Ghana)

"Women do all, and go to the farm." (FGD, Ghana)

"Men do not do household tasks. That is just how it is."(FGD, Côte d'Ivoire)

"Men know how to do all the things they do, but if other men in the community know that you cook and clean, they mock you - so women do it and very few men help."
(FGD, Côte d'Ivoire)

³¹ Vargas Hill, R. and Vigneri, M. (2011) *Mainstreaming gender sensitivity in cash crop market supply chains*. ESA working paper No. 11-08. Available at <http://www.fao.org/3/a-am313e.pdf>

³² Ibid

The traditional task division does not necessarily mean that men do not do anything in the household. In Ghana, for example, men were said to help with “pounding the fufu”. In Côte d’Ivoire, in almost half of the focus group discussions it was mentioned that men gather firewood, and sometimes help their wives with washing their children and other (small) tasks (“when the woman is tired, or the woman has too much work”).

In some of the focus group discussions, particularly in Ghana, it became clear that the current division of tasks was perceived by the women as unfair, and they think men should assist more. During one of the group discussions in Ghana, in the Ashanti Region, participants observed a cultural change, and said that men increasingly help in household activities and women do more and more income-generating activities.

Although in Ghana, the groups generally agreed that women are the ones that do most of the domestic activities, both men and women are involved in the decision-making on how to spend the household money and what to eat. It is common that men provide money for household expenditures.

“The men will give the money and women and children decide what to do with it”
(FGD, Ghana)

“Men don’t do anything, but provide the money.” (FGD, Ghana)

In Côte d’Ivoire, in the majority of groups, women were seen as the one usually making the decisions related to domestic tasks. Normally, keeping track of the household budget and buying food for the households are seen as tasks for women. It was said that it is common that men provide their wives with an allowance (or household budget) that can be used for buying food. In the end the women decide what to do with the money. In some groups it came up that women need to ask permission from their husbands to purchase for example fish, or other more expensive products.

“It’s the women who ‘represents’ the household, she knows what is best, she needs to make the right decisions to make sure the household is doing well” (FGD, Côte d’Ivoire)

“Women are the master of the house.” (FGD, Côte d’Ivoire)

“Once the man has given money to the woman to take care of the household, he does not do anything anymore.” (FGD, Côte d’Ivoire)

“Both discuss big decisions - but women have the final say when it comes to the household - like when to put kids to school, what to buy when it comes to food.” (FGD, Côte d’Ivoire)

14.3 Summary

To statistically analyse differences between male and female-headed cocoa producing households a sufficient sample of respondents is necessary. In our study we involved 34% female respondents. However, for Côte d'Ivoire this turned out to be insufficient to generate statistically significant results because there were so few female-headed cocoa households within the sample of female respondents and within the overall sample.

Gender differences can be analysed both between male- and female-headed households as well as between men and women within the household. It is important for researchers to be clear about their unit of analysis when discussing gender issues.

In marriage, men and women usually recognise the man as the household head. Being the head of the household typically implies an important role in decision-making and is often related to ownership over assets such as land, and taking up a management role on the farm.

Female-headed households typically have a smaller household size than male-headed households. Household size determines available household labour, production costs, the cost of living and household income.

In Ghana, cocoa is produced by a high proportion of both male- (91%) and female-headed (86%) households. Likewise, both male-headed and female-headed households identified cocoa as their first or second most important crop. In Ghana, we find few other crops for which there are large, statistically significant, differences between male- and female-headed households.

In Côte d'Ivoire, a greater proportion of male-headed households (73%) produce cocoa than female-headed households (36%). Twice as many male-headed households identified cocoa as one of their most important crops compared with female-headed households. About twice as many female-headed households identified cassava as one of their most important crops as male-headed households.

The narrative 'women typically don't own land' seems not to be accurate for female-headed households. However, our data does confirm differences in terms of the size of the land cultivated and owned by male- and female-headed households, particularly in Côte d'Ivoire.

Our findings suggest that, particularly for Ghana, male-headed households apply good agricultural practices at a somewhat higher rate than female-headed households, which explains why male-headed households produce, on average, higher yields. In Ghana, we find female heads, on average, approximately 63 kg/ha less cocoa than

male heads after controlling for all other variables (*highly significant*). In Côte d'Ivoire, we find no statistically significant differences in yield between male-headed and female-headed households, possibly due to a very low number of observations.

In Ghana, female-headed households hire more labour, which increases their labour costs, although the differences with male headed-households are rather small. The main differences in hiring behaviour are seen in the spray application of liquid fertiliser, herbicides, pesticides and fungicides, for which about 20% more female-headed households hire labour than male-headed households. Female-headed households also hire labourers for pruning much more frequently. Differences between male- and female-headed household on hired labour for Côte d'Ivoire was not able to be analysed due to the low number of female headed households producing cocoa as one of their most important crops.

In Ghana and Côte d'Ivoire, we find no statistically significant differences between male and female-headed households in the Poverty Probability Index (PPI) poverty likelihood nor in the Demographic and Health Service (DHS) wealth index. This suggests that male- and female-headed households tend to have a fairly similar poverty and wealth profile.

In Ghana we estimate that male-headed, typical households earn USD 2,128 per year from all income sources, compared with USD 1,630 per year for female headed households. We should recall that female-headed households have fewer household members and hence have lower household expenditures meaning they are not worse off on a per person basis. Male-headed, large households earn USD 4,749 per year, on average.

There are **gender differences within households** with regard to participation in cocoa, food crop production, other income generating activities and domestic tasks.

In Ghana, men participate in all cocoa production activities at very high rates and 'take the lead', while women typically do so at lower rates. In Ghana, the most frequently mentioned activities that women participate in are planting, granular fertiliser application, manure application, pod breaking, transporting and drying. These are almost always done alongside men. Women rarely participate in heavy, labour intensive activities such as land clearing and weeding, and have much lower participation in the application of inputs.

In Côte d'Ivoire, women engage in cocoa production activities much less frequently than men, and less frequently than women in Ghana. In Côte d'Ivoire, in male-headed households, the main activity where women play a role is pod breaking. Women in female-headed households are more actively engaged in cocoa production activities. For heavy labour and spraying these women would still hire male labourers.

In Ghana and Côte d'Ivoire, important women's tasks are taking care of the young cocoa farm, including the intercropping with food and the weeding, preparing food for the men and workers, and fetching water for spraying.

In both countries, women are mainly involved in small (food) trade. In Ghana, men and women report a reasonably high a degree of cooperative decision-making on cocoa related issues. The head of the household (either man or women) is typically the one who sells the cocoa.

In Côte d'Ivoire, men in male-headed households virtually always make decisions related to cocoa, while only a small proportion of women in the household contribute to such decisions. Women in male headed households are almost never involved in selling cocoa.

The involvement of men and women in food crop production depends on the crop type. 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 to be also more involved in selling the crops at (local) markets and or local processing of the food crops (e.g. cassava or palm oil), which gives them more control over the income generated with selling food crops.

Women tend to be more than men involved in small businesses and trade. For women, non-farm economic activities are an additional source of revenue, over which they generally have more control.

In Ghana and Côte d'Ivoire, women are traditionally the ones that do domestic work and usually make decisions related to domestic tasks.



15

Conclusions

Bymolt, R., Laven, A., Tyszler, M. (2018). Demystifying the cocoa sector in Ghana and Côte d'Ivoire. Chapter 15, Conclusions. The Royal Tropical Institute (KIT).

‘Demystifying the Cocoa Sector in Ghana and Côte d’Ivoire’ aims to contribute to the cocoa sector’s body of knowledge and provide a solid evidence base to test common assumptions and beliefs. We hope to have set an example for other actors, who commission or implement research in the cocoa sector, by providing everyone with free access to the database and research results.

In Chapter 2 (Methodology), we presented a number of research questions, which we answered in different chapters (Table 15.1).

Table 15.1 Research questions

Research questions	Corresponding chapters
<i>What are the defining demographic and socio-economic characteristics of cocoa and non-cocoa producing households?</i>	Chapter 3. Demographics
<i>What are the dominant crop/livelihood options in the research areas, and why?</i>	Chapter 5. Crop choices and diversification Chapter 7. The importance of cocoa
<i>Are cocoa households leaving cocoa or increasing the share of land under cocoa, and how is the process happening?</i>	Chapter 6. Land
<i>To what extent are cocoa household incomes diversified, and in what ways?</i>	Chapter 5. Crop choices and certification Chapter 12. Household income, poverty and wealth
<i>What is the poverty and wealth status of cocoa households compared with non-cocoa households?</i>	Chapter 12. Household income, poverty and wealth Chapter 13. Farmer profiles and cluster analysis
<i>What is the nutrition and food security status of cocoa households compared with non-cocoa households? What is the availability, affordability of different food groups?</i>	Chapter 4. Food and nutrition security
<i>To what extent do households invest in inputs and apply good agricultural practices for cocoa and other crops?³³</i>	Chapter 8. Cocoa Production Practices
<i>What are the costs, revenues and profitability of cocoa compared with other crops?³⁴</i>	Chapter 10. Cocoa productivity and yield Chapter 12. Household income, poverty and wealth
<i>How do cocoa households sell the cocoa, and how are cocoa prices formed?</i>	Chapter 11. Cocoa marketing and prices
<i>What roles do men and women typically play on the farm and in the household, and why? Who typically makes decisions about investments in cocoa and expenditures on other household items?</i>	Chapter 14. Gender and cocoa
<i>How are cocoa institutions perceived and what can be done to better support sustainable production?</i>	Chapter 8. Cocoa Production Practices Chapter 9. Cocoa producer groups, certification, training and credit Chapter 11. Cocoa marketing and prices

In our study, we made a distinction between ‘cocoa households’ and ‘non-cocoa households’. We defined a ‘cocoa household’ as one where the household reported cocoa to be either their most important or second most important crop. The idea was that making a distinction between cocoa and non-cocoa households would allow us to analyse whether certain phenomena are specific to cocoa households, or whether they are associated more generally with rural smallholders. In addition, we used a cluster analysis to allow for differentiation of cocoa households. We chose a data-driven approach, allowing profiles to naturally emerge from the data. Our analysis suggests there are three main groups: 1) female-headed household; 2) male-headed

³³ We did not collect sufficient data to answer this question for ‘other crops’

³⁴ We did not collect robust data on the net income from other crops

households, with typical productive land size (< 4ha); 3) male-headed household with large productive land size (> 4ha).

In our study, we tested a long list of hypotheses. In this concluding chapter, we return to a number of them, highlighting how our evidence has brought in new perspectives on the status of cocoa households and current trends.

1 The world is not ‘running out of cocoa farmers’

The age of cocoa farmers has, at times, been a contentious discussion in the cocoa sector. There is some concern that cocoa farmers are getting older and could become unproductive or less productive. Furthermore, some authors have suggested that youth are not interested in cocoa farming and may be more drawn to other crop options or non-agricultural livelihood options. The feared implication is that, as one generation passes away, the next generation may not be willing to take over, which would contribute to long-term global supply pressures.

Our findings suggest the average age of cocoa farmers is not increasing over time. This argument is supported by the fact that the mean age of cocoa farmers reported in various studies has remained relatively constant in recent decades. However, we do observe that, in both Ghana and Côte d’Ivoire, the average age of respondents of cocoa households is slightly higher than of non-cocoa households. The average age of survey respondents from cocoa households in Ghana was 51 years and in Côte d’Ivoire, this was 46 years. The analysis of the distribution of respondent ages suggests that the *slightly* higher average age is a result of both a higher proportion of older respondents and a lower proportion of young respondents in cocoa households. However, the data suggests to us that younger farmers continue to step into cocoa at a rate that at least replaces older farmers stepping out. Otherwise, the age distribution of cocoa farmers would have not remained more-or-less unchanged with a mean of around 45-50 years, and Ghana and Côte d’Ivoire would not have been able to maintain their position as the leading global suppliers.³⁵

2 Cocoa is currently the ‘best option’ for most households in cocoa growing regions

Cocoa has remained attractive and important despite long periods of low and declining prices, particularly from the early 1980s to the early 2000s. This is explained by many factors including: a ‘guaranteed’ market, land rights and a sense of ‘social

³⁵ We concluded this in an intermediate paper by A. Laven, R. Bymolt, M. Tyszler, C. Steijn, F. Hütz-Adams, F. Ruf (2017) The importance of cocoa in a diversified farm. 2017 International Symposium on Cocoa Research (ISCR), Lima, Peru, 13-17 November 2017

security', established knowledge and culture, and a comparative advantage over other suitable crop options. Generally, households like how cocoa income is received 'in bulk' at the end of the main season, which enables them to pay school fees and other fixed expenses, and invest in house construction and renovations. The cocoa season is also the time when debts are settled, inputs and equipment is bought, and money is spent on Christmas gifts and meals.

'Cash crops' such as rubber, cashew, palm and coffee are frequently mooted as alternatives to cocoa, but these are all produced by a much smaller number of farmers in both countries (with some regional exceptions). In Chapter 5, we concluded that competing crops are not (yet) perceived to be better than cocoa. On the contrary, the importance of cocoa was said to have increased in the past 5 years in Ghana and Côte d'Ivoire. Presently, there are no signs that households will move out of cocoa in the short to medium term.

In the cocoa growing areas studied in Ghana, cocoa is produced by a high proportion of both male- (91%) and female-headed (86%) households. Likewise, both male-headed and female-headed households identified cocoa as their first or second most important crop. However, in the cocoa growing regions studied in Côte d'Ivoire, a greater proportion of male-headed households (73%) produce cocoa than female-headed households (36%). Twice as many male-headed households as female-headed households identified cocoa as one of their most important crops. Instead, twice as many female-headed households as male-headed households identified cassava as one of their most important crops.

3 Poverty is not a 'cocoa farmer' phenomenon, but rather a 'rural smallholder' phenomenon

A major concern is the livelihood status of cocoa farmers. The Cocoa Barometer 2015 stated that "most cocoa farmers live in destitute poverty".³⁶ National statistics do indeed show that smallholders in developing countries are less well-off than the national averages. However, the extent to which poverty is a cocoa specific issue, rather than a broader smallholder farmer phenomena, has not received a lot of attention until recently.

The different approaches used to calculate income, poverty and wealth point in the same direction: cocoa households are, like other rural households, fairly poor. Using the DHS wealth index, we find that 25% of Ghanaian households are in the 1st (poorest) quintile nationally, 52% fall into the 2nd quintile, and 21% fall into the third (middle) quintile. In Ghana, our DHS analysis suggests that cocoa households

³⁶ Fountain, A.C. and Hütz-Adams, F. (2015). Cocoa Barometer 2015-USA Edition. Available at http://www.cocoabarometer.org/International_files/Cocoa%20Barometer%202015%20USA.pdf

are not poorer than non-cocoa households. In Côte d'Ivoire, we also find that 43% of households are in the 2nd quintile, implying that many are reasonably poor at a national level. However, in contrast to Ghana, a higher proportion of cocoa households are in the third and fourth quintiles than in the bottom quintile, which reflects their relative wealth position within the wider country. In Côte d'Ivoire, we found no statistically significant differences between cocoa and non-cocoa households.

The DHS Wealth Index is constructed as a relative index within each country. Thus, specific scores cannot be directly compared across countries or over time. In this research, this means that we cannot compare Ghana and Côte d'Ivoire. Using the Poverty Probability Index (PPI), we do observe significant differences between the two countries. We find that an estimated 7.5% of Ghanaian cocoa households are under the \$1.90 PPP (2011) poverty line, while in Côte d'Ivoire, we estimate 26% of households are under the equivalent poverty line.

In Ghana and Côte d'Ivoire, we find no statistically significant differences between male- and female-headed households in the PPI poverty likelihood nor in the DHS wealth index. This suggests that male- and female-headed households tend to have a fairly similar poverty and wealth profile.

4 Poverty levels among cocoa households are less severe than projected by other researchers

The lack of quality data and data availability has made it difficult for researchers to reliably estimate income, wealth and poverty levels in cocoa growing regions. What adds to the challenge is that there are different approaches to measuring poverty, and each approach has its drawbacks. Despite these difficulties, there have been a number of attempts to estimate cocoa farmer incomes.

Our household income model estimates that, on average, Ghanaian cocoa households earn US\$2,487 per annum from all income sources, which is equivalent to US\$6,784 PPP (2016). Applying the current OECD equivalence scale, we calculate an income of US\$2.89 per person per day (in 2016 US\$), equivalent to \$7.89 PPP (2016). This does not include in-kind income. Our household income model estimates that, on average, Ivorian households earn an average of US\$2,900 per annum, which is equivalent to \$7,429 PPP (2016). This equates to US\$3.11 per person per day (in 2016 US\$), or equivalent to \$7.97 PPP (2016) when applying the current OECD equivalence scale. This does not include in-kind income.

In Ghana, we estimate that male-headed, typical households earn US\$2,128 per year from all income sources, compared with US\$1,630 per year for female-headed households. We should recall that female-headed households have fewer household

members and hence have lower household expenditures meaning they are not worse off on a per person basis. Male-headed, large households earn US\$4,749 per year, on average.

We believe our income model can be considered a good estimate of average income in 2015-2016. The differences with the other studies can be explained, at least partly, by different estimates of household size and the share of cocoa contributing to total household income.

We suggest that total annual household income is a more appropriate unit of aggregation than any other. A per person per day income calculation prohibits reasonable estimates and can lead to erroneous conclusions due to choices in equivalence scales (to recalculate, say, consumption differences between adult males and small children), exchange rates (to calculate purchasing power parity) and estimates of household size. Therefore, we are strongly in favour of calculating incomes per household instead of ‘per person per day’.

5 Cocoa households already diversify their crops and with that their income

One of the recent shifts in the discourse is to encourage households to diversify into other crops (and even other non-agriculture incomes) to help reduce household dependence on cocoa and make them more resilient. Our findings confirm some well-known practices such as the systematic intercropping of plantain and tubers in young cocoa farms. Our findings highlight that cocoa is not the sole source of revenues; farmers clearly diversify, especially in Côte d’Ivoire. Nevertheless, cocoa remains at the core of the vast majority of cocoa farmers’ concerns and priorities. Among cocoa producing households in Ghana, the average share of income from cocoa is 61%; in Cote d’Ivoire, this share is 66%. Other income comes mainly from selling other crops and, to a lesser extent, from small business/trade.

On average, Ivorian households produce a greater diversity of different crops (6 crops) than Ghanaian households (5 crops). Both of these findings are linked to land size. Cocoa households have, on average, slightly larger areas of cultivated land than non-cocoa households, and Ivorian households have larger plots of land than Ghanaian households.

6 Cocoa production does not have a negative effect on food consumption, however there are periods of relative food insecurity

Our survey challenges the ‘myth’ of cocoa production compromising household food security. Our findings suggest that cocoa households are slightly better off in

terms of food security and nutrition levels, compared with non-cocoa households. Ghanaian cocoa households appear to be more 'food secure' than Ivorian households. In addition, focus group data suggests that there is greater availability of most food groups in Ghana compared with Côte d'Ivoire. In Ghanaian cocoa households, 62% of women of reproductive age achieved minimum dietary diversity. In Ivorian cocoa households, only 41% achieved the same. It should be noted that, in Ghana, the data was collected during the main cocoa season when households had more disposable income available, whereas data was collected a month or two later in Côte d'Ivoire, which means the two countries are not directly comparable.

Food insecurity is greatest just before the cocoa main season. This is the period when there is little money left in the household, farmers run out of stocks, and it is still too early to harvest food crops. In this period, food prices are relatively high. Food affordability of certain food groups is more of a challenge than availability. There are other periods of the year when food crops are produced in abundance, with low local prices as a result.

7 The choice to grow cocoa contributes to pressure on land availability, soil erosion and deforestation

In Ghana, around half of the households reported clearing land and planting cocoa in the last year; in Côte d'Ivoire, around a quarter did land clearing and a third planted cocoa. This appears to confirm that land under cocoa is increasing and that planting or (re)planting is a fairly common practice. Once planted, cocoa typically remains on the land for 30 years or more, as it offers long-term land tenure security and income. Participants explained that land owners are rarely interested in selling land if there is cocoa planted on it because income from cocoa is believed to be more profitable than selling the land. Participants also explained that a lack of land has inevitably led to some households intensifying production on the same piece of land. Previously, they would rotate (non-cocoa) crops and leave land fallow at times so as not to exhaust the soil of nutrients, however, now land is frequently under continuous cultivation. Farmers expect yields to decline in the future unless fertiliser use is increased, which emphasizes to us the importance of programmes that educate on erosion control and soil fertility management.

A fairly high proportion of respondents in Ghana (46%) and in Côte d'Ivoire (35%) reported that their household had increased the amount of land under cocoa in the past five years. Most respondents in Ghana (84%) and Côte d'Ivoire (66%) did so by clearing bush or a natural area, which could be considered rational economic behaviour. Forestland typically has good soil fertility, and the household does not lose income (or the value of food crops) from conversion. Planting cocoa may also allow the household to strengthen their tenure claims over the land in a context

of increasing land scarcity. Earlier studies also point out other reasons for clearing natural area for cocoa, such weak laws and enforcement, weak legal systems, and government policies promoting cocoa production.

8 Land-size positively correlates with income, but negatively with yield

In Ghana (US\$2,873) and Côte d'Ivoire (US\$3,796), male-headed, large households have much higher net cocoa income than other groups. In Côte d'Ivoire, male-headed, typical households earn US\$2,215 per year, while male-headed, large households earn US\$5,687 per year from all income sources.

In Ghana, this difference is primarily driven by their larger productive land size, resulting in higher total production. Their higher net income is not typically due to higher cocoa yields. In Ghana, a significant negative correlation was found between the amount of productive land under cocoa and yield. The model shows that, for every additional hectare under cocoa, yields fall by approximately 71 kg.

In Ghana and Côte d'Ivoire, we found the majority of the households produce between 100 and 500 kg/ha, which is well below potential yields commonly cited between 1,000 and 1,900 kg/ha. In Ghana, a regression analysis shows that several other variables are significantly correlated with yield. We found that farmer group members produce 85 kg/ha more than non-members, and Central and Western regions yield more than other regions. Input use was also significantly correlated, with fertiliser use increasing yields by 95 kg/ha, and pesticide use boosting yields by 65 kg/ha. In Ghana, we found that male-headed households produce, on average, approximately 63 kg/ha more cocoa than female-headed households.

In Côte d'Ivoire, a regression analysis shows fewer variables significantly correlate with yield compared with Ghana. The strongest predictor of higher productivity was the use of pesticides, which increases yields by around 105 kg/ha. In Côte d'Ivoire, we find no statistically significant differences in yield between male-headed and female-headed households, possibly due to the very low number of observations.

9 Female-headed households have access to land, but their average land size is smaller than male-headed households

Female-headed households do typically own land, contrary to some narratives. In Ghana, an even higher proportion of female-headed households (91%) reported owning land than male-headed households (85%). In Côte d'Ivoire, virtually all male- and female-headed households said they own some land. These findings may suggest

that female-headed households' access to land is changing, possibly due to legislative changes (e.g. regarding inheritance) and enforcement of women's rights. These findings should not be interpreted more broadly in terms of 'female land ownership'. We are unsure about the extent to which any changes also apply to married women in male-headed households.

However, female-headed households still own less land than male-headed households, on average. In Ghana, female-headed households own a little less land, on average (3.49 ha), compared with male-headed households (4.19 ha). The disparity in Côte d'Ivoire is greater, with 4.54 ha for female-headed households compared with male-headed households owning 8.16 ha.

10 Despite the high importance given to cocoa, there are no optimal-functioning institutions in place

The governments of both Ghana and Côte d'Ivoire closely regulate their country's cocoa sector. While both have enacted certain reforms in recent decades, the state-owned marketing board COCOBOD in Ghana and Conseil du Café-Cacao (CCC) in Côte d'Ivoire regulate the prices and coordinate the marketing. Through their monopoly positions on external marketing, COCOBOD and CCC are able to effectively tax producers at rates that contribute to farmers receiving consistently lower prices than those in liberalised markets. For the period 2000/2001 to 2014/2015, Ghanaian producers received an average of 57% of the ICCO daily price, while Ivorian farmers received an average of 51% of the ICCO daily price. Therefore, regulated price mechanisms do not lead automatically to higher incomes for cocoa farmers than liberalised price mechanisms in other countries.

Part of the cocoa revenues received by the marketing boards in Ghana and Côte d'Ivoire are reinvested in the sector and in general public goods. However, there is a perceived lack of transparency in decision-making, and the efficiency of the allocated public reinvestments (e.g. input distribution) has been questioned. There is a lack of evidence that the effective tax on producers applied by the marketing boards of Ghana and Côte d'Ivoire has led to significantly higher productivity as a result of government programmes. Any productivity improvements are not sufficient to offset the lower prices farmers receive, even with companies providing further support to some farmers.

Farmers in Ghana receive considerably more institutional support than farmers in Côte d'Ivoire. CODAPEC, a subsidiary of Ghana COCOBOD distributes free or subsidised hybrid cocoa seedlings and pods and provides 'free' mass spraying. This explains why 'hybrid' cocoa varieties are much more frequently planted in Ghana than in Côte d'Ivoire. In Ghana, a much higher proportion of cocoa households use fertiliser and fungicide than in Côte d'Ivoire. Both countries have relatively high rates

of pesticide use. Ghanaian households also apply pesticides and fungicides a greater number of times per year than Ivorian households, though still below recommended frequencies. The difference in input use with Ghana can largely be attributed to the fact that most Ivorian households do not receive inputs for free through government programmes or other sources.

11 Despite the potential benefits of being organized in a cocoa producer group, most farmers are not organized

In Ghana, only 11% said that someone in their household was a producer group member compared with 21% in Côte d'Ivoire. In Ghana, participants typically confirmed that cocoa producer group members get access to training about farming techniques, such as spraying and pruning, and access to seedlings. In Ghana, we found that farmer group members produce 85 kg/ha more than non-members. This being the case, we do not know for sure why there are relatively few formal farmer organisations or why farmers have not self-organised. Other studies have suggested that the benefits of collective action may be mitigated in a regulated cocoa sector, where being organised does not provide any tangible benefits in terms of price negotiation or economies of scale. Moreover, without being formally organized, farmers can access training and certification.

In Côte d'Ivoire, when discussing formal cooperatives, participants often expressed negative sentiments. The main reasons were financial mismanagement or embezzlement of funds by cooperative leaders, which, understandably, causes mistrust among community members and hampers the establishment of new cooperatives. Participants also said that it was not particularly easy to set up a cooperative without support from local actors (i.e. governments and NGOs). Despite the higher degree of organization in Côte d'Ivoire, only 17% received training on cocoa farming in the past five years, compared with 49% in Ghana. However, training density (number of training sessions) was significantly higher in Côte d'Ivoire.

12 Most cocoa households do not keep a record of the inputs and labour they invested in cocoa production, and this is a barrier to professionalization

In Ghana and Côte d'Ivoire, records are only kept by one third of cocoa households. Of those keeping records, most only keep records on volume produced and sold, the price, and amount of money received. A smaller proportion of respondents in Ghana kept records on money spent on inputs and hired labour whereas, in Côte d'Ivoire, records were not kept on these items.

In Ghana, household labour is the predominant source of labour for most cocoa activities, as there is no perceived cost (although there is an opportunity cost). Ghanaian households more frequently use hired labour for heavy and laborious tasks (land clearing and weeding), and for the spray application of fertiliser, pesticides and fungicides. Most often, households use either household labour or hired labour, rather than a combination of both. In Côte d'Ivoire, households rarely reported hiring labour for cocoa production. When they do, it is usually for the spray application of fertiliser, pesticides and fungicides; less frequently, labourers may be hired for weeding and transport.

The availability and affordability of labour is perceived to be getting worse. In Ghana, this was most frequently attributed to farm labourers moving to other sectors (gold mining, work in the towns). In both countries, participants said that young people are staying in school longer instead of working as labourers, and that more people are working to establish their own cocoa farms instead of selling their labour. However, focus group participants often noted that increases in hired labour costs were broadly in line with increases in other costs and in the price of cocoa, which suggests that inflation is also playing a role.

13 Good intentions to increase prices to farmers can potentially do harm if a supply/demand imbalance results

Since 2000, average global prices have trended upwards (in both nominal and real terms). On several occasions, average annual prices have pushed above US\$3,000/tonne in real terms, reflecting price levels not seen for two decades. It is in this context that we must consider the narrative that 2016/2017 prices are 'too low'. The 2016/17 season was remarkable as it saw the largest ever annual increase in production by tonne, and the fourth largest change as a percent of total production; oversupply led to a single year fall in prices, and much uncertainty in the market. However, there is no evidence that this signifies a new trend. Most of the production increase can only be attributed to particularly favourable weather conditions, as most other factors influencing production levels (e.g. production improvements, tree planting etc.) take place over several years and we would be able to observe trends, if this was the case.

From a policy perspective, it is important that arguments for and against market interventions (particularly price interventions) are based on a good analysis of market dynamics. Our analysis illustrates that the market is a system that generally follows economic principles of supply and demand, if imperfectly. It is not possible to intervene in one aspect without triggering effects in other aspects. For those entertaining the idea of a cocoa cartel, supply management (buffer stocks), or guaranteed (minimum) prices, there should be good evidence that the intervention will, as a minimum, do no harm to farmers over time.

14 Although more often seen as a ‘man’s job’, cocoa farming should be considered as a family business

In Ghana, men participate in all cocoa production activities at very high rates and ‘take the lead’, while women typically do so at lower rates alongside men. Women rarely participate in heavy, labour intensive activities, such as land clearing and weeding, and have much lower participation in the application of inputs. Women participate most frequently in ‘lighter’ work, such as planting, pod breaking, fermenting and drying.

In Côte d’Ivoire, women participate at much lower rates. The main cocoa activity where women contribute alongside men is ‘pod breaking’. But women also participate in complementary activities, such as food preparation for the labourers, fetching water for spraying, and managing the young cocoa farms and taking care of the intercropping of plantain and cassava. Male and female respondents agreed that in male-headed households, women generally engage in cocoa production activities at lower rates than men, and were often described as ‘supporters’. Women in female-headed households are more actively engaged in cocoa production activities; for heavy labour and spraying, these women would still hire male labourers.

The tendency to look at women mainly as ‘supporters’ is also reflected in the lower proportion of women than men reported receiving training in the past five years. In Ghana, male respondents reported higher rates of training (56%) compared with female respondents (34%). Likewise, in Côte d’Ivoire, 20% of male respondents reported having received training in the past 5 years, compared with only 5% of female respondents.

Our findings suggest that, particularly for Ghana, male-headed households apply good agricultural practices at a somewhat higher rate than female-headed households, which explains why male-headed households produce, on average, higher yields. In Ghana, we find female heads, on average, produce approximately 63 kg/ha less cocoa than male heads after controlling for all other variables (highly significant). In Côte d’Ivoire, we find no statistically significant differences in yield between male-headed and female-headed households, possibly due to the very low number of observations.

15 Men are typically the ones that sell the cocoa, which gives them more decision-making power over the largest share of the household income

In marriage, men and women usually recognise the man as the household head. Being the head of the household typically implies an important role in decision-making and is often related to ownership over assets such as land, and taking up a

management role on the farm. The head of the household (either man or women) is typically the one who sells the cocoa.

In male-headed households, men take the most decisions about cocoa and do the marketing, while women tend to have more control over the income they earn from selling food crops and other small businesses. This income tends to be far less than the income that is earned with selling cocoa. We observe some differences between Ghana and Côte d'Ivoire. In Ghana, men and women report a reasonably high degree of shared decision-making on cocoa-related issues. In Côte d'Ivoire, men in male-headed households virtually always make decisions related to cocoa, while only a small proportion of women in the household contribute to such decisions. Women in male-headed households are almost never involved in selling cocoa.

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