GEORG-AUGUST-UNIVERSITÄT GÖTTINGEN IN PUBLICA COMMODA SEIT 1737

GRK 2654
Sustainable Food Systems

RTG 2654 Sustainable Food Systems

University of Goettingen

SustainableFood Discussion Papers

No. 22

"Behind organic cocoa, there stands a woman's time":
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March 2025

RTG 2654 Sustainable Food Systems · Heinrich Düker Weg 12 · 37073 Göttingen · Germany
www.uni-goettingen.de/sustainablefood

ISSN (2750-1671)

Suggested Citation

Santalucia, S., M. Wollni (2025). “Behind organic cocoa, there stands a woman’s time”: Organic cocoa production and women’s empowerment in Peru. SustainableFood Discussion Paper 22, University of Goettingen.

Imprint

SustainableFood Discussion Paper Series (ISSN 2750-1671)

Publisher and distributor:
RTG 2654 Sustainable Food Systems (SustainableFood) – Georg-August University of Göttingen
Heinrich Düker Weg 12, 37073 Göttingen, Germany

An electronic version of the paper may be downloaded from the RTG website:

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"Behind organic cocoa, there stands a woman's time": Organic cocoa production and women's empowerment in Peru

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Abstract

Specialization in labor-intensive export crops, such as organic cocoa, can exacerbate gender inequality if production and revenues fall under men's control and the additional labor burden falls on women. However, evidence on the implications for women's empowerment in value chains that combine certification with other supply chain initiatives remains limited, particularly outside of West Africa. Using gender-disaggregated data from cocoa farm households in Peru, we examine how participation in certified organic cocoa production is associated with the intra-household division of labor and domains of women's empowerment within the so-called sustainable segment of the value chain. We find that in certified organic cocoa farming households, women spend more time working on farm and in cocoa-related activities. However, this does not translate into an overall increase in their workload, as we find that women in certified households are less likely to have an off-farm occupation. We complement the analysis on women's time use by exploring women's time-use agency by certification status, confirming that overall workload varies by gender, yet not with certification. Furthermore, we show that women's increased participation in organic production is associated with greater decision-making power around cocoa farming. At the same time, our findings reveal that women in certified organic households are less likely to have an individual income. Hence, we recommend that initiatives for environmentally sustainable cocoa production consider the intra-household labor division and time-allocation inequities to better integrate gender equality into their strategies.

Keywords: Time allocation; Sustainability standards; Labor; Women's empowerment; Peru; Cocoa

JEL codes: J16, J22, O10, Q13

Acknowledgements: This research was financially supported by the German Research Foundation (DFG) through grant number RTG 2654 Sustainable Food Systems. We thank Abel Farfán, Teófilo Beingolea, and Rikolto for their support in the data collection. This work would not have been possible without the participation of the cocoa farming families and their cooperatives in the survey, as well as the collaboration of Anna Lena Lesch, Danitza Cenepo Tapullima, Liliana Verde Malpartida, Maria Yovancith Saurin Tuanama, Deysy Eliana Ramirez Armas, Flor Mayeva Polinar Rivera, Dina Elizabeth Contreras Prado, Franklin Morales Lama, Leopoldo Ruiz Del Aguila, Linder Santamaria Masgo, Roberto Rios Arirama, Nehemias Roque Ambicho, Beverli Bacilio Benancio, Jorge Omar Rengifo Armas, and Jose Luis Santos Sandoval. We thank Krisztina Kis-Katos, Matin Qaim, Feiruz Yimer Mohammed, Devesh Roy, Miet Maertens, and the participants of the International Conference of Agricultural Economists in New Delhi for the valuable comments on the first draft of this paper.

1. Introduction

Globally, we are off track in achieving Sustainable Development Goal 5 - reaching gender equality and women's empowerment (UN DESA 2023). Gender equality is important both as a human right and as a lever for change to achieve multiple socioeconomic outcomes (Njuki 2021). Women in agriculture, in particular, face several constraints that limit their access to productive resources, decision-making power over income and production, time allocation, participation and leadership in their communities (Quisumbing and Doss 2021). Cash crop specialization and commercialization further exacerbate inequalities, since often men take control of crop's revenues at the expense of women (Katz 1995; Njuki et al. 2011; Fischer and Qaim 2012; Chiputwa and Qaim 2016). This is the case for tropical export crops such as cocoa (Bymolt et al. 2018), also in Latin America (Barrientos 2014; Gumucio et al. 2016; Kuhn et al. 2023). The development of farmers' cooperatives with inclusive business strategies and sustainability standards creates a sustainable segment of the value chain which aims to countervail these effects (Fischer and Qaim 2012; Handschuch and Wollni 2016; Oberlack et al. 2023). However, it remains unclear whether and to what extent gender inequality persists within these global value chain segments. A better understanding of the implications of specializing in environmentally-friendly production for the intra-household division of labor and women's empowerment is crucial to address gender inequality and promote sustainable development for all. Therefore, this paper aims to analyze how organic certification is related to women's time use and empowerment in cocoa farming households in Peru.

Studies analyzing the gendered effects of tropical export crop specialization primarily focus on oil palm and coffee, often in relation to commercialization and voluntary sustainability standards (Chiputwa and Qaim 2016; Meemken and Qaim 2018a; Etuah et al. 2020; Mehraban et al. 2022; Kubitza et al. 2023). The proliferation of sustainability standards push farmers to focus on certifiable crops (Vellema et al. 2015; Meemken 2020). The effects on labor intensity and the division of labor within the household depend on the production type and prevailing social norms. Specialization in relatively less labor intensive crops can reduce women's participation and on-fam labor (Kubitza et al. 2023) leading to a decrease in women's decision-making power (Mehraban et al. 2022). Contrarily, specialization in labor intensive crops can increase women's participation and potentially their control over income and assets. The latter depends on the effectiveness of gender measures in promoting gender equality within the household (Meemken and Qaim 2018a). At the same time, additional labor requirements, e.g. under organic certification schemes, can increase on-farm labor, and worsen women's

workload and overall time poverty (Lyon et al. 2010; Bolwig 2012; Lyon et al. 2017). This suggests that it remains unclear whether women benefit in terms of economic empowerment as farm production becomes more specialized, and sustainability standards and regulations proliferate in the cocoa sector.

The evidence on the gendered effects of certified cocoa specialization is scant, especially in contexts different from Africa (Armbruster et al. 2019; Skalidou 2020; Tennhardt et al. 2022; Kuhn et al. 2023), and almost nonexistent in the case of certified organic cocoa (Traldi 2021). This is surprising given that in the case of Peru, cocoa production has quadrupled in the last 20 years and the country became the second-largest producer of organic cocoa and third-largest of organic-Fairtrade cocoa (Huetz-Adams et al. 2022). Furthermore, the participation of women in agriculture increased in the last two decades both in absolute and relative terms (Minam 2021). Yet, gender inequality in rural areas remains widespread, in terms of unequal distribution of unpaid work and time burden (OECD 2022), land ownership, and access to credit (Petrics et al. 2022). The only study shedding light on the effects of cocoa specialization on women's participation and time use finds that, while women are interested in cocoa production, their participation is constrained by their time poverty (Armbruster et al. 2019). However, the small sample size, the lack of data on men's time use, and the focus solely on time allocation as an empowerment domain limit the analysis of intra-household dynamics.

We contribute to the extant literature by exploring how certified organic cocoa production is associated with the intra-household division of cocoa labor and domains of women's economic empowerment within the sustainable segment of the cocoa supply chain in Peru. Unlike previous studies using isolated empowerment indicators (Chiputwa and Qaim 2016; Meemken and Qaim 2018a), we measure women's empowerment using the abbreviated Women's Empowerment in Agriculture Index (A-WEAI), increasing cross-country and cross-study comparability (Alkire et al. 2013; Malapit et al. 2017). In addition, we examine gender parity within the household and the differential effects on women's empowerment and labor relative to men in the same households. Differently from the study in Peru by Armbruster et al. (2019), we leverage detailed data on both women's and men's labor and time allocation. Finally, we complement quantitative measures of time use with the recently developed time-use agency module that better accounts for women's preferences and agency over their time (Sinharoy et al. 2023). Therefore, using a mixed-method approach, we integrate qualitative and quantitative evidence to examine the gendered implications of sustainability standards (Lyon et al. 2010; Lyon et al. 2017; Meemken and Qaim 2018a).

The paper is organized as follows: Section 2 presents the study context, while Section 3 outlines a conceptual framework. Section 4 describes the data, the variables used in the analysis, and the statistical methods. Both descriptive and econometric results are presented in Section 5 and discussed in Section 6. The article concludes in Section 7.

2. Study Context

Cocoa Specialization in Peru

Differently from the colonial tights of cocoa production in West African countries such as Ghana and Cote d'Ivoire, the cacao tree is native to the Amazon region of Peru, Ecuador, and Colombia. 90% of fine flavor cocoa is exported by Latin American countries (ICCO 2024), which remain the most suitable area for cocoa cultivation amidst climate change effects (FAO and IIASA 2025). Under these conditions, Peru has become one of the eight largest cocoa producers as cocoa production increased by four times from 2000 to 2020 (FAO 2021). The increase in both area and yields of cocoa production transformed non-producing cocoa regions, such as San Martin, into major cocoa producing departments (Blare et al. 2020). Cocoa expansion has been promoted as an alternative development program aiming at eradicating illicit coca cultivation, and lately also as a national climate change mitigation strategy (Nash et al. 2016). The program carried out by the Peruvian Cacao Alliance, a public-private partnership led by the Peruvian Government and the United States Agency for International Development, boosted specialization in cocoa production by organizing farmers in cooperatives, providing inputs, assistance, trainings, and export channels. This favored the proliferation of supply chain sustainability initiatives and sustainability standards, mainly Fairtrade and organic. Around half of total land under cocoa cultivation is devoted to organic cocoa or is under transition to organic cocoa, with Peru having the second-largest organic cocoa area in the world (Willer et al. 2022).

Sustainability Standards and Initiatives in Peruvian Cooperatives

Sustainability certifications and initiatives often occur at the producer organization level and almost all certified producers in Peru belong to a producer organization (Boonaert et al. 2024). Around one third of cocoa producers belong to farmer organizations that are members of the Peruvian Association of Cacao Farmers (APPCACAO) (APPCACAO 2020), which however does not include all cocoa farmer organizations in the country. While female workforce in agriculture (Minam 2021) and in the cocoa value chain (Gumucio et al. 2016), as well as the number of women cocoa producers (CAMCAFE 2025) have increased, women's formal membership in cocoa cooperatives remains low. In 2021, the Peruvian law N°. 31335

recognized the right of members' spouses, including *de facto* spouses, to become cooperative members. It also established a five-year timeframe for cooperatives to ensure that the proportion of women in their governing bodies aligns with the proportion of female members in the cooperative (El Peruano 2025). In line with the legal framework, producer organizations combine multiple certification schemes with inclusive strategies at the community level, supported by trusted buyers and NGOs (Oberlack et al. 2023).

3. Conceptual Framework

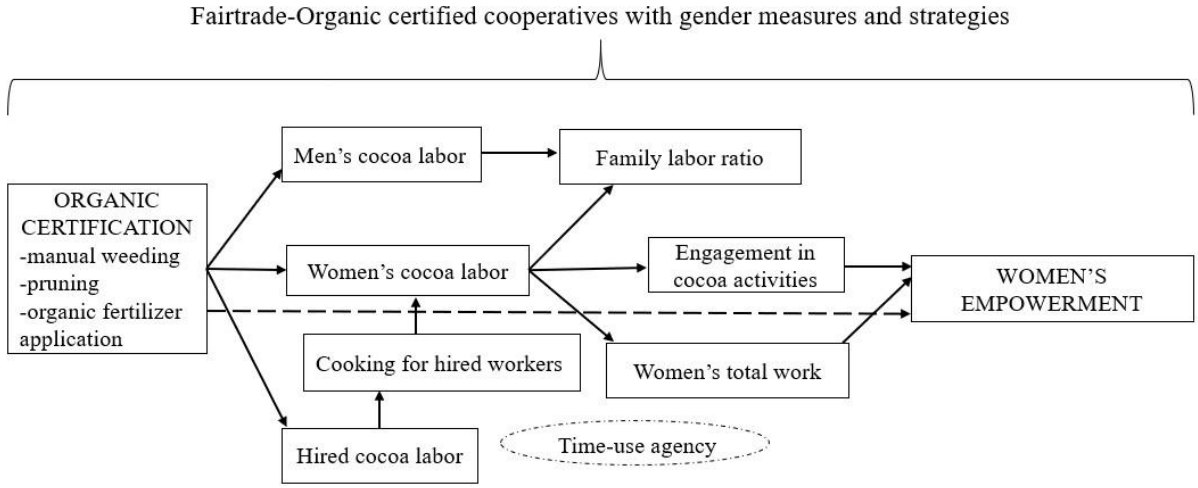
Organic Certification and Time Use

The framework in Figure 1 depicts the mechanisms through which certified organic cocoa production influences women's workload and empowerment. A male-dominated, agricultural income-generating activity can bring about an increase in women's participation and labor (Katz 1995), especially when the agricultural activity is more labor intensive and women are mainly engaged in domestic work, given the low opportunity cost of women's labor. Cocoa farming typically comprises several labor-intensive tasks, such as pod collection and pod breaking, which are often performed by women and children during the main harvest season (Nkamleu and Kielland 2006; Effendy et al. 2019). Women are also more likely to engage in activities like grafting, planting, and cooking for hired workers. As shown in Fig.1, a mechanism through which labor requirements of cocoa organic certification can affect men's and women's workload is through higher demand of manual labor for weeding, pruning, and organic fertilizer application (Bandanaa et al. 2021), due to the prohibition of synthetic fertilizers and chemical pesticides (Meemken and Qaim 2018b). The division of labor within the household depend on prevailing gender norms (Arora and Rada 2020), restricting women from performing certain "male" activities, such as land preparation, or expecting their contribution in activities like cooking for family members and hired workers (Bymolt et al. 2018).

Therefore, we expect that organic production requirements (Fig. 1) will increase labor demand for women, men, and hired workers. Specifically, we hypothesize that organic cocoa certification leads to an increase in women's labor on cocoa farms, as the opportunity cost of dedicating more time to farm work is lower for women than for men (Hypothesis 1). Consequently, women's overall workload is likely to increase, as they are also expected to carry out additional tasks, such as cooking for hired workers and household domestic work (Hypothesis 2).

Only looking at the change in women's time allocation due to an increase in women's time spent on cocoa farm activities leaves out women's time-use preferences, time-use agency, social expectations, and gender-norms-based responsibilities (Eissler et al. 2022). Similarly, being empowered or disempowered in terms of time use, does not reveal whether the individuals have "the confidence and ability to make and act upon strategic choices about how to allocate [their] time" (Eissler et al. 2022). Certified organic production influences women's time use depending on local social norms and the individual woman's agency over her time (Sinharoy et al. 2023). Therefore, we integrate the concepts of time use and time-use agency in our framework, building on the work by Pierotti et al. (2022).

Fig.1. Framework – Sustainable Segment of the Value Chain.



Given time and resource constraints, individual and household economic interests as well as social norm-based expectations determine the labor supply in agricultural households[1] (Pierotti et al. 2022). Social norms influence how women and men spend their time, and in patriarchal, rural societies women are often responsible for unpaid domestic and care work, while performing other farm and off-farm activities (Arora and Rada 2020). We refer to these gender-related norms as norms embedded in people's lives as non-written expectations for women and men (Cislaghi and Heise 2020). This could lead to women being overburdened by their workload. Following Arora and Rada (2020), we define a woman's awake time as the total time she spends on on-farm work (W_f), off-farm work (W_o), domestic work, including both household chores and care work (W_c), and leisure and other personal care activities[2] (W_l):

$$(1) \qquad \bar{W} = W_f + W_o + W_c + W_l$$

[1] While we borrow the general conceptualization of women's time use constraints, economic incentives, and social norms, we acknowledge that in Latin America there is no classification between women's plots and men's plots, differently from the sub-Saharan African context (Doss 2018).

[2] For simplicity, we group leisure, grooming, resting, and eating into a single time category in the framework.

Similarly, one can define man's awake time as:

$$(2) \qquad \bar{M} = M_f + M_o + M_c + M_l$$

Assuming the existence of social norms determining individuals' time use (Burda et al. 2007) and non-separability of production and consumption decisions in faming households, the utility function of a woman based on the above time equation can be written as a function of the utility coming from consumption and disutility of labor (Arora and Rada 2020). Following Burda et al. (2007):

$$(3) \qquad U_{Woman} = C - \frac{1}{2\nu}\left(\sum_k^n (W_k - W_{pk})\right)^2 - \frac{\mu}{2}\left(\sum_k^n (W_{pk} - \bar{W}_{ek})\right)^2$$

Where C is the woman's consumption of goods and services; ν refers to her inverse disutility of work, $\sum_k^n (W_k - W_{pk})$ is the sum of the differences between actual women's work activity *k*, where *k* is women's on-farm, off-farm, and domestic work, and *pk* combinations of her preferred time allocation for the same activities; μ is a social norm parameter representing the expectations of family and community, negatively affecting woman's utility when her preferred time allocation differs from the expected time allocation of activities *k* for women in her family and community ($\bar{W}_{ek}$) (Arora and Rada 2020). We consider women's preferences about time allocation capturing the positive utility deriving from preferred time allocation W_p. This allows us to incorporate factors such as time-use preferences, agency, and social norm-based expectations into the utility function (Sinharoy et al. 2023).

Hence, an increase in farm labor demand due to certified organic cocoa production decreases a woman's utility, when it increases the difference between her actual work and her preferred work allocation. A shift from off-farm activities and domestic activities to organic cocoa farm activities is positive in terms of utility, when this is in line with her time allocation preferences. Conversely, any change in her workload increasing this difference would negatively affect her utility. Similarly, when women are expected to contribute more on cocoa farms due to the higher labor demand, the difference between preferred time allocation W_p and expected time allocation $\bar{W}_e$ increases. This change, influenced by the social parameter μ, decreases their utility.

Organic Certification and Women's Empowerment

Following Kabeer (1999), we build on the definition of individual empowerment as "expansion in people's ability to make strategic life choices in a context where this ability was previously denied to them", and focus on the dimension of agency and gains in agency as measurements of individual empowerment (Trommlerová et al. 2015). Certified organic production, both directly and through its effects on women's participation in cocoa farming and workload, can

have heterogenous implications for women's overall empowerment and for empowerment dimensions beyond workload (Fig. 1) (Njuki et al. 2011; Johnson et al. 2018). In particular, shifts in intra-household labor division may influence their decision-making power and control over income, while also potentially redefining their roles and responsibilities (Doss and Gottlieb 2025).

As organic cocoa production increases women's engagement in farm and cocoa-related activities, we hypothesize this is associated with a higher involvement of women in production decisions regarding farming activities in general and cocoa farming in particular. This is in line with evidence from Latin America which finds a positive association between women's field work and agricultural decision-making (Twyman et al. 2015). However, the current literature remains unclear on whether higher participation in certified crop production leads to a decrease in women's participation in off-farm activities (Meemken and Qaim 2018a), resulting in a loss of decision-making power in other domains and a missed opportunity for individual income, as opposed to household farm revenues. Ruben and Fort (2012) provide evidence of a decline in off-farm employment and income from other activities as certified Fairtrade farmers specialize in organic coffee production.

Women's control over income use can also be strengthened through their involvement in farm activities, especially if they are homemakers without an existing individual income. For instance, cooperative-level strategies recommended by certification schemes, such as conditioning payments on the presence of both spouses, can enhance women's control over cocoa revenues (Chiputwa and Qaim 2016). Producers are encouraged to attend regular training sessions held at the cooperative or within their community, with the option for their spouses to participate as well (López Quirós 2020). However, this is not exclusive to members of certified organic cooperatives and is not implemented in all certified cooperatives. Attending leadership, skills, and gender awareness trainings can positively influence women's control over income use (Morgan and Zaremba 2023).

External partners and NGOs often support the creation of women's committees and other women-led business groups within the cooperatives (Morgan and Zaremba 2023). Moreover, the Fairtrade Premium that cooperatives receive can be used for these purposes (Meemken and Qaim 2018b). However, traditional gender norms and membership requirements, e.g., farm area or time commitment, can limit women's membership (Das 2014). Lyon et al. (2017) found that women's time constraints were further exacerbated by women's participation in cooperative meetings and training. The overall effect on women's group membership domain

remains unclear and depends on each cooperative's rules. In rare cases, for instance, the membership status in a producer organization is extended to the partner (Sellare et al. 2023).

Established partnerships with buyers and financial institutions as well as NGOs can help cooperatives facilitate access to credits for their members and members' spouses (Oberlack et al. 2023; Gallagher et al. 2020). To what extent the cooperative is able to supply credit depends on its financial and operational resources. Moreover, women's access to financial services hinges on meeting the eligibility criteria in terms of assets and income sources.

Therefore, we hypothesize that the relationship between organic certification and women's empowerment is unclear, potentially leading to heterogenous effects across different empowerment dimensions.

4. Materials and Methods

4.1 Sampling and Data

Between April and July 2023, we carried out a structured survey as well as semi-structured interviews, focus groups discussions, and key informant interviews in San Martín, Huánuco, and Ucayali regions (Fig. 2). The area represents around 60% of total national cocoa production (Midagri 2023) and was largely targeted by the abovementioned cocoa expansion program. We used a stratified sampling strategy. First, we compiled a list of cocoa cooperatives in the study area by using national official registries and integrated them with the list from APPCACAO. Second, we contacted managers of those cooperatives with multiple sustainability standards and diverse sustainability initiatives to ask for their interest in participating in the study. From the final 10 cooperatives which accepted to participate, we obtained the list of members and stratified the members' population by sex. We randomly selected households to sample an average of 30 women members and 30 men members from each cooperative. Our final sample consists of 566 households, of which 484 are dual-adult households and 82 are female-adult-only households, resulting in 1,050 individuals that were interviewed.

Given our focus on this segment of the cocoa value chain, we excluded cocoa farmers who are not members of a producer organization. As mentioned in the country context, finding a suitable comparison group in the case of Peru, where certification and membership in a farmer association overlap, is challenging (Boonaert et al. 2024). Furthermore, as we are interested in exploring gender dynamics and women's empowerment, we selected only dual-adult households and female-adult-only households, whereas male-adult-only households were excluded, if randomly sampled (Malapit et al. 2019).

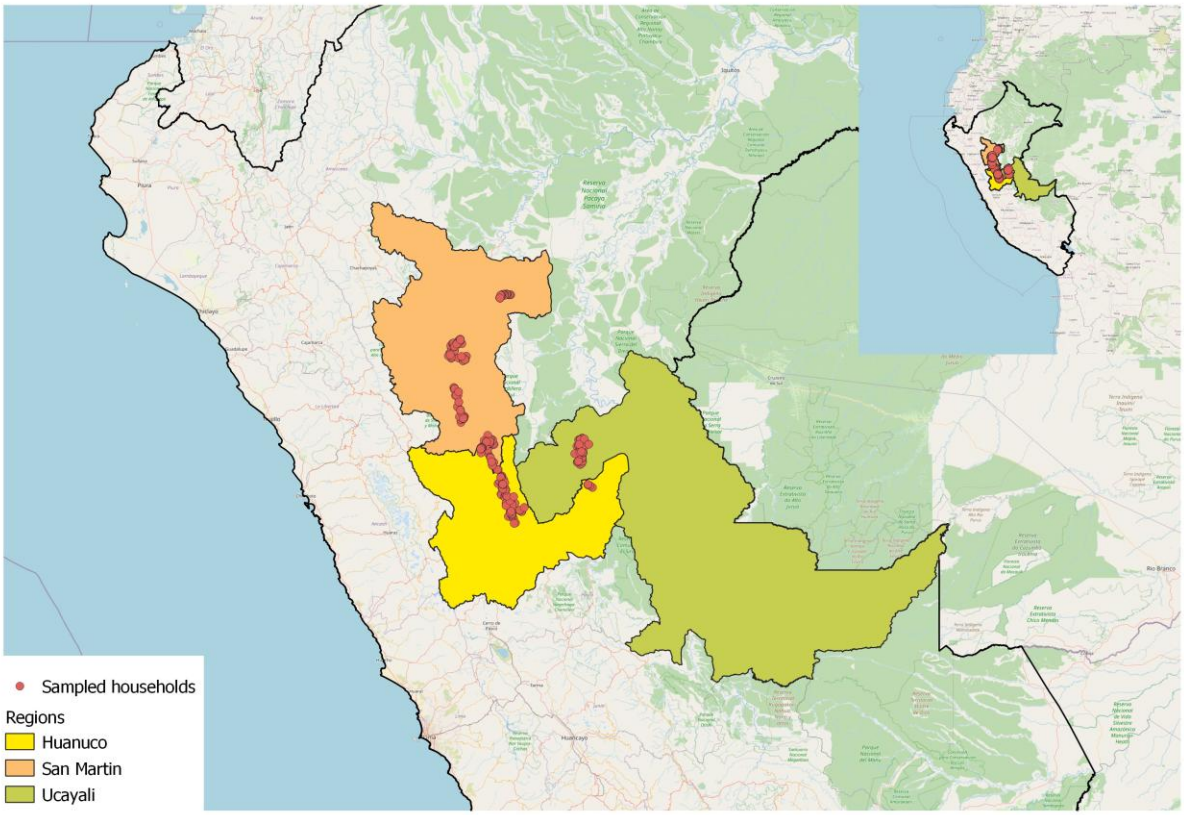
We carried out a household-level and farm-level survey with the person responsible for cocoa production in each household (who we refer to as the cocoa manager[3]), as well as separate individual-level surveys with the cocoa manager and other primary adult of a different sex in the household, most of the time the cocoa manager's spouse. The first questionnaire captures a range of demographic, socioeconomic, farm, and plot characteristics, while the individual questionnaire comprises the entire A-WEAI and time-use agency survey modules.

We collected qualitative data following the Qualitative Research Protocols developed by IFPRI Qualitative Team (2018). Particularly, we conducted semi-structured interviews and life histories with cocoa farmers, as well as key informant interviews with market traders, NGOs' staff, and community leaders in the pre-data collection visit in November 2022. Focus groups discussions with 15 participants – two groups with women only and two with both men and women – were conducted in two communities to explore local understanding and perspectives on time use, gender roles and norms, intra-household division of labor. In each cooperative, we interviewed the manager and staff to gather data on cooperative characteristics and services, as well as seasonality patterns in cocoa production.

Table A1 in the Appendix provides an overview of cooperatives' characteristics. All cooperatives in our sample are certified Fairtrade, except for one cooperative that was in the process of becoming Fairtrade certified. All the members of a Fairtrade certified cooperative are also Fairtrade certified, since the certification is at the producer organization level. When selling cocoa beans under the Fairtrade certification, the cooperatives receive both a minimum price and a price premium that allows them to finance services and projects for the cooperative members, as listed in table A1. Unlike the Fairtrade scheme, the organic certification is at the farm level, and the price difference or premium is paid to the farmer on top of the minimum or market price. At the time of our visit, the organic premium directly paid to the producers was 300USD per metric ton, and this translates into higher cocoa prices at the farm level. Given the national promotion of organic cocoa cultivation, most cooperative members are certified organic. As recommended by the certification schemes, cooperatives provide trainings and technical assistance to their members.

[3] In the paper, we use the term cocoa manager simply to identify the person responsible for cocoa production as the one who could provide the most complete information about household cocoa production during the interview.

Figure 2. Study area in the Peruvian Amazon.



4.2 Measurement of Key Variables

Time Use and Time-use Agency

Following previous studies on time use (Malapit et al. 2019; Mehraban et al. 2022), we use a 24-hour recall instrument to assess the primary activities women and men performed the day before the interview. We interviewed both primary man and primary woman respondents in each dual-adult household asking whether the day before was a holiday or festivity. In addition, we further recorded whether the respondent simultaneously performed any secondary activity and childcare-related activities, as second or third activity.

We assign primary and secondary activities to the six categories: farm work, off-farm work, sleeping and resting, personal care and eating, household chores and care work (children, elderly), and leisure (Mehraban et al. 2022). Overall workload is computed as the sum of time in minutes spent on farm work, off-farm work, household chores and care work.

This detailed disaggregation of workload allows to explore how the relationship between organic certification and workload varies by gender within the same households, and to disentangle plausible mechanisms of reallocation of time from one activity to another. The study by Armbruster et al. (2019) shows that clock time is incorporated in the culture of

Peruvian cocoa farmers, however we recognize the limitations and bias of such a construct (Sinharoy et al. 2023). Therefore, we complement quantitative evidence on time use with data on individual time-use agency, a recently developed construct to measure both intrinsic and instrumental agency of women over their time (Eissler et al. 2022). Given that the survey module is still under validation, we rely on the original questions and cautiously comment on the final responses[4] (Sinharoy et al. 2023).

Intrinsic time agency refers to 1) the awareness of inequality in women's and men's time allocation as well as in their rights, and 2) the confidence and self-efficacy to act upon their time allocation. Using a four-point Likert scale, we first asked the respondents to indicate their level of agreement with statements referring to satisfaction with how time is spent on working, leisure activities, household duties, and whether the latter hinder their participation in other preferred activities.

The same scale was used by the respondents to express 1) their perceptions of gendered differences in: power to change one's daily schedule, time for sleeping, time for leisure activities, amount of time for women's responsibilities compared to men's responsibilities. Lastly, respondents indicated 2) to what extent they agree that they feel confident in: changing their daily schedule, asking a household member to do some of their household duties, asking to help with taking care of children or other family members, and changing the amount of time they spend on paid work.

In addition, we look at instrumental time agency as the power to decide when and the amount of time one spends to perform activities in line with their preferences, goals, and aspirations (Sinharoy et al. 2023). Respondents indicated to what extent they make their own decisions regarding: daily schedule, agricultural activities, job or other paid work, household duties, care work, friend/family visits, shopping, participation in social gatherings, participation in community and cooperative meetings, leisure activities, sleeping or resting.

Division of Cocoa Labor

Measuring time allocation using a 24-hour recall interview may not capture seasonal variations in women's and men's farm labor (Sinharoy et al. 2023). Although cocoa beans are harvested all year around in the study area (Midagri 2023), we purposively selected the period of the main cocoa harvest season when most family members are involved in on-farm activities[5], and

[4] We do not report and discuss the results of the complete time agency survey module in this version of our paper. For further details on the survey module, please refer to Sinharoy et al. 2023.

[5] Data collection in the Peruvian Amazon is not recommended during the rainy season, from January to April, due to recurrent floods.

carry out pruning, harvesting, and post-harvest activities. Therefore, we asked the cocoa farm manager to recall the number of days worked on cocoa farm in the previous 12 months by the following groups: cocoa manager, male household members, female household members, female hired workers, male hired workers. We include hired workers in our analysis to better understand labor changes and the division of labor across certified organic and non-certified households. To help the respondent, the days were reported by type of activity: 1) land preparation, planting, grafting; 2) chemical fertilizer application; 3) manure or organic fertilizer application; 4) weeding and pruning; 5) shade tree maintenance 6) harvesting 7) post-harvest activities, and 8) cooking for hired workers. Including cooking for hired labor as activity allows to partly capture those tasks related to cocoa farm activities often not considered in cocoa farming and overlooked in studies looking at women's labor productivity (Doss 2018; Doss and Gottlieb 2025).

For each household, we measure changes in women's labor relative to men's labor in cocoa production by calculating two ratios: the ratio of women's cocoa labor to men's cocoa labor at the household level, and the share of women's cocoa labor in the total household cocoa labor.

Women's Empowerment Measure

To answer the question on the relationship between organic certification and women's empowerment, we carried out the individual-level survey designed to compute the A-WEAI indicators. The WEAI developed by Alkire et al. (2013) is particularly suitable to measure women's empowerment in rural areas in terms of five domains - production, resources, income, leadership, and time - and six indicators - input in production decisions, ownership of assets, access to and decisions on credit, control over use of income, group membership, workload. Similar to its predecessor (WEAI), this abbreviated version measures women's empowerment and agency in agriculture covering these five domains (Malapit et al. 2017). First, the production domain is assessed by asking the respondent how much input they had in making decisions and to what extent they feel that they can make their own personal decisions regarding the following activities: food crop farming, cash crop (in our case, mainly cocoa) farming, livestock raising and fish culture (Malapit et al. 2017). The second domain entails two indicators: ownership of productive assets, e.g. land, and access to and decisions on credit. The first indicator is measured by counting the number of household assets the respondent owns either alone or jointly, while the second indicator refers to whether the individual has access to and can make decisions around at least one source of credit, e.g., from financial institutions or cocoa cooperatives. As for the production indicators, for control over use of income, we asked

about both the actual contribution and the extent of participation in decisions around the use of income from the same activities listed above, as well as around minor - food purchase - and major -land - household expenditures. The fourth domain refers to whether the respondent is a member of a formal or informal group in the community, not only agricultural organizations. Time is the last domain that we measure through the abovementioned 24-hour time allocation recall to compute the overall workload, considering 10.5 hours of work as the threshold for time poverty.

The six indicators are weighted and aggregated in the individual disempowerment score, ranging between 0 and 1, with 1 indicating complete disempowerment[6]. As a robustness check, we use the recommended cutoff of 0.20 (20%) for the disempowerment score as maximum threshold to be considered empowered (Malapit et al. 2015). Additionally, the A-WEAI module allows to assess gender parity within households. Similar to the cocoa labor ratios, we can analyze women's empowerment relative to men in the same households by creating a gender parity indicator that shows whether the woman is equally empowered as the man in her household. This approach enables us to examine the association of organic certification with the empowerment gap between women and men in the same household.

4.3 Estimation Strategies

Inverse Probability Weighting with Regression Adjustment

To answer our research question, we first analyze the association between certified organic production and women's and men's labor on cocoa farms. Then, we descriptively compare time allocation by organic certification status and gender, complementing this with qualitative data on women's time-use agency. Finally, we examine the relationship between organic certification and women's empowerment, as well as its association with various empowerment dimensions. To do so, we use the non-certified group as a counterfactual for the certified organic group. (Manda et al. 2018). However, issues of selection bias arise when differences in certain characteristics, both observable and unobservable, between groups explain the organic certification adoption decision (Hörner and Wollni 2021). If these characteristics also correlate with the outcomes of interest, coefficient estimates for organic certification will be biased (Manda et al. 2018).

One way to overcome this problem is using the doubly-robust inverse probability weighting (IPW) with regression adjustment (RA) method, that consists in first computing weights from

[6] For a thorough overview of the A-WEAI survey and adequacy cutoffs, we suggest referring to Malapit et al. 2015.

the inverse probability of being certified organic based on observable characteristics (4), and second estimating the outcome models by certification status using these weights (5) (Ma et al. 2024):

$$\Pr(Org = 1) = g(X_h, \alpha) + \varepsilon_h \quad (4)$$

$$Y_h = f(X_h, \beta) + v_h \quad (5)$$

where Y_h is the outcome variable, namely, labor days of different groups, and empowerment outcomes, and X_h is a vector of household characteristics determining the certification status. Depending on the outcome of interest, equation (5) is estimated using a linear model for continuous variables, a fractional response probit model for bounded score variables, and a probit model for binary variables. We control for the gender of the cocoa manager, as women face various constraints decreasing their likelihood to adopt certification (Quisumbing and Doss 2021), and for cocoa manager's age and level of education, as previous studies have shown their relation to the certification decision (Meemken and Qaim 2018a; Sellare et al. 2020). We further include the number of adults to control for family labor availability since labor constraints can affect the adoption decision (Moser and Barrett 2006). In addition, we control for cocoa manager's experience with cocoa, total farm area, a household wealth index controlling for household assets and living conditions, the distance to input markets and the cooperative, and cooperative fixed effects (Meemken and Qaim 2018a).

Following previous literature on time use (Picchioni et al. 2020; Mehraban et al. 2022; Vitellozzi and Giannelli 2024), for the workload outcome variable we further control for number of children (household members below age 15), number of women and men members, the household wealth index, total farm area, whether the household has hired labor; additionally, we account for whether the day before the interview was a holiday (Seymour et al. 2020). Through an overidentification test, we check that our model is correctly specified (Table A4). We assess covariate balance using standardized weighted differences between the two groups, with no absolute difference exceeding 0.25, indicating balance (Imbens and Wooldridge 2009; Hörner and Wollni 2021), as shown in table A5 in the Appendix.

The IPWRA method reduces selection bias based on observable characteristics, yet it cannot fully capture existing unobservable heterogeneity between certified and non-certified households: for instance, if members of certified organic households have more entrepreneurship skills and an open-minded attitude compared to non-certified household members. We therefore do not claim a causal relationship between organic certification and the outcomes, and instead refer to the average difference between predicted outcomes ($ADPO^C$)

for certified organic under certification and hypothetical non-certification (Hörner and Wollni 2021).

5. Results

5.1 Sample characteristics

We first present descriptive statistics both at the household and individual levels, focusing on dual-adult households. Summary statistics of single-female-adult households are reported in the Appendix (Table A2 and Table A3). As shown in Table 1, our sample of cocoa farming households consists of smallholders with an average land area of 10 hectares, of which approximately one-third is devoted to cocoa[7]. Half of our sample cultivates only cocoa, either alone or intercropped with trees, showing high levels of specialization. Women who in the interview identified themselves as the person responsible for cocoa production make up only 5% in both household types, although the share of women formally registered as cooperative members is significantly higher. In certified-organic households the share of women cooperative members is lower compared to non-certified households. Non-certified households are slightly wealthier than certified households, yet the differences are not statistically significant.

Individual-level characteristics for women and men in dual-adult households are shown in Table 2. As mentioned, women are less likely to be identified as cocoa manager, with the majority reporting homemaking as their primary occupation. A higher proportion of women in non-certified households engage in off-farm occupations and have a bank account compared to women in certified organic households. However, women in certified households are more likely to participate in trainings provided by the cooperative. This trend is also observed among men farmers: 80% of those in certified households and 72% in non-certified households received at least one training by their cooperative in the past 12 months.

[7] Part of the land is used as fallow forests (*purma*) and cultivated with other crops and fruit trees. We follow the farm size classification used in Meemken 2021.

Table 1: Descriptive statistics of outcome and control variables for dual-adult households.

	Full Sample		Certified Households		Non-certified Households	
	mean	sd	mean	sd	mean	sd
Total cocoa area (ha)	3.56	2.34	3.53	2.37	3.68	2.24
Total land area (ha)	10.15	11.43	10.39	11.83	9.40	10.05
Female cocoa manager (0/1)	0.05	0.22	0.05	0.23	0.04	0.20
Age (years)	53.78	13.40	53.91	13.72	53.37	12.38
Years of education	7.80	3.77	7.85	3.76	7.66	3.84
Manager's experience with cocoa (years)	12.82	6.64	13.14	6.62	11.77	6.65
Female cooperative member (0/1)	0.20		0.17		0.30	
Total household income (PEN)	23581.22	21307.99	23459.01	21947.89	23973.37	19195.28
Wealth index (1-5)	3.09	1.41	2.99	1.41	3.41	1.38
Household owns small livestock (0/1)	0.12		0.12		0.13	
Household cultivates other crop(s) (0/1)	0.52		0.50		0.57	
Household size	3.68	1.47	3.64	1.47	3.80	1.45
No. of adults in HH	2.73	0.90	2.70	0.86	2.81	1.00
No. of children	0.95	1.13	0.94	1.16	1.00	1.01
Distance to input market (min)	36.46	30.09	37.22	30.00	34.04	30.42
Distance to cooperative (min)	38.23	30.73	39.83	31.59	33.08	27.31
Family woman's cocoa labor (days/ha)	17.17	18.17	18.56	19.61	12.70	11.45
Family man's cocoa labor (days/ha)	27.62	19.74	28.06	20.29	26.18	17.87
Ratio women's cocoa labor days on men's days	0.75	1.03	0.81	1.14	0.55	0.44
Share women's cocoa labor days of total family days	0.36	0.20	0.37	0.20	0.32	0.17
Hired labor on cocoa farm (0/1)	0.76		0.76		0.76	
Male hired labor (days/ha)	13.09	15.41	13.33	16.00	12.34	13.41
Female hired labor (days/ha)	2.55	5.72	2.63	5.83	2.28	5.36
Observations	484		369		115	

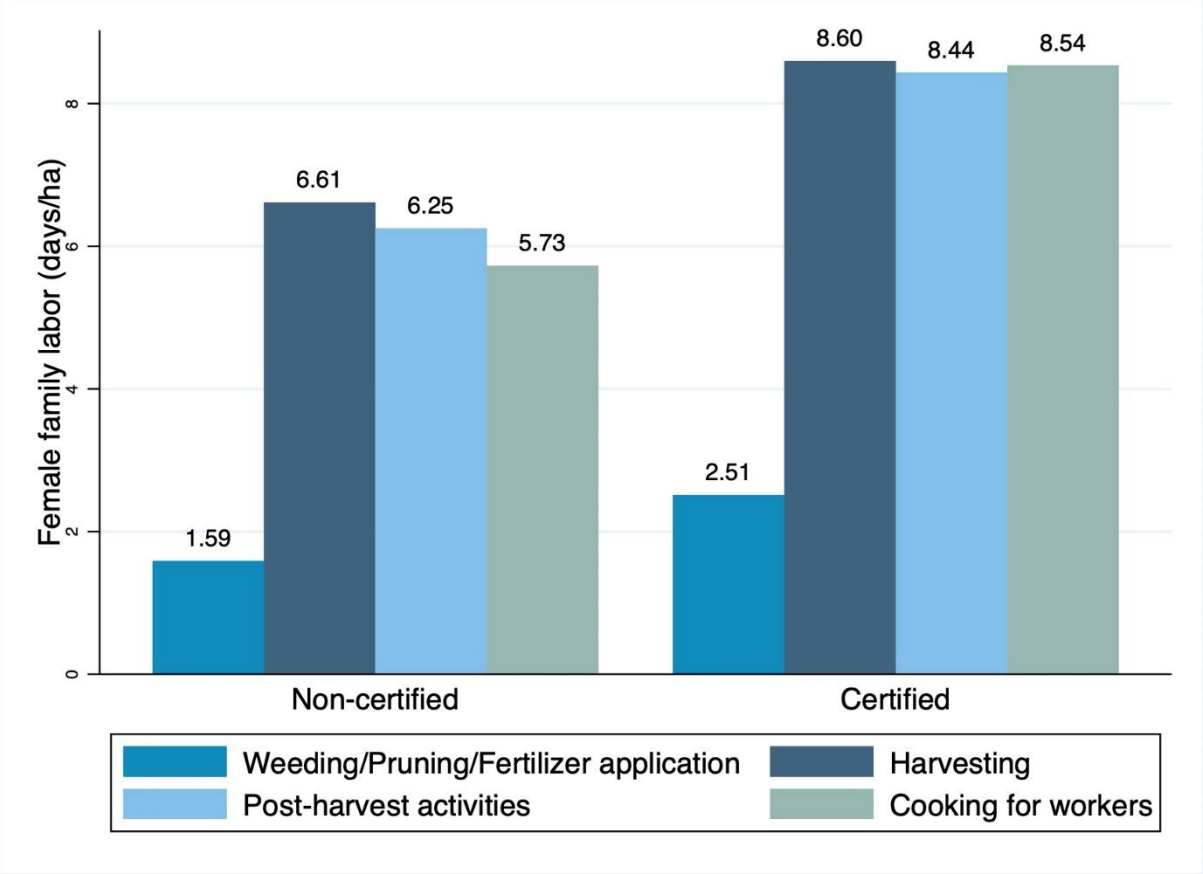
Note: sd = standard deviations. Household income in Peruvian Soles (PEN).

Table 2: Descriptive statistics of outcome and control variables at the individual level.

	Women in certified HHs		Women in non-certified HHs		Men in certified HHs		Men in non-certified HHs	
	mean	sd	mean	sd	mean	sd	mean	sd
Age (years)	49.34	13.52	48.00	11.88	53.96	14.16	53.63	12.45
Years of education	6.84	3.97	6.91	3.81	7.95	3.71	7.77	3.77
Cocoa manager (0/1)	0.05		0.04		0.95		0.96	
Main occupation is homemaker (0/1)	0.86		0.90		0.00		0.00	
Off-farm occupation (0/1)	0.17		0.24		0.33		0.34	
Has a bank account (0/1)	0.36		0.43		0.47		0.52	
Joined a cooperative training (0/1)	0.47		0.41		0.80		0.72	
Observations	369		115		369		115	

Note: sd = standard deviations.

Figure 3. Female family labor by type of cocoa activity and certification status



Note: Post-harvest activities are reported as total number of days, as their intensity depends on the quantity harvested rather than total cocoa area.

5.2 Division of Cocoa Labor

We first test the hypothesis that organic cocoa certification leads to an increase in women's labor on cocoa farms. In order to do so, we examine the relationship between organic certification and family's yearly labor division in cocoa farming activities. Descriptive statistics shows that, on average, certified organic households use six more days of female family labor per hectare compared to non-certified

households, while male family labor is only two days higher per hectare (Table 1). There are no significant differences in hired labor days between certified and non-certified households.

Considering family women's labor days by activity (Fig. 3), we find women's labor is higher in certified households compared to non-certified ones in terms of harvesting, post-harvest, and cooking activities. Additionally, women in certified households spend about one extra day per hectare on those activities recommended by the organic standard, namely weeding, pruning, and organic fertilizer application. Given an average cocoa farm size of 3.5 hectares in certified households, this leads to an average increase of roughly 3.5 days in female family labor for those activities. The greater participation of women is also confirmed by the increase in women's labor days spent on cooking for workers and bringing food to the farm[8].

Table 3 shows the results of the IPWRA for the labor outcome variables. In line with descriptive statistics, organic certification is associated with an increase by more than 5 days per hectare for a woman in a certified household. Conversely, the $ADPO^C$ for man's cocoa labor days in a certified household is not statistically significant.

We further provide evidence of changes in women's labor relative to men's labor in cocoa production by estimating the $ADPO^C$ for the household ratio of women's labor to men's labor, as well as women's labor as a percentage of total family labor. The results show that both the intra-household ratio and share of women's labor increase with organic certification, further confirming the increase in women's participation in cocoa-related activities (Table 3).

As a robustness check, we run the estimation for the full sample of women including single-female-adult households. The IPWRA result in Table A7 supports our finding that organic certification is associated with an increase in female family labor in our full sample. Furthermore, descriptive statistics on women's labor and hired labor in single-female-adult households are in line with the overall increased demand for labor in certified organic households compared to non-certified households (Figures A3 and A4 in the Appendix).

[8] In qualitative interviews during the pre-data collection visit and in focus group discussions during the data collection, women reported that Fairtrade certification requires a minimum wage and meal for hired workers. In our context, this means women have to prepare more food for laborers and often bring it to the cocoa farm (Laroche et al. 2012). Therefore, we consider it as an additional cocoa farming-related activity.

Table 3. Association between organic certification and cocoa farm labor/year/ha.

	Non-certified PO	ADPO[C]	P-value	Obs
Family labor				
Woman's cocoa labor days per ha	13.20	5.36	0.01	484
Man's cocoa labor days per ha	29.62	-1.56	0.48	484
Woman's labor to man's labor ratio	0.52	0.30	0.00	476
Woman's labor as percentage of total labor	0.30	0.07	0.01	481
Hired labor				
Female hired cocoa labor days per ha	2.01	0.63	0.23	484
Male hired cocoa labor days per ha	13.95	-0.62	0.79	484

Note: Robust standard errors clustered at the district level. Full results in the Appendix (Table A6). For the households with men's labor and both women's and men's labor equal to zero, the ratio and share cannot be computed.

Table 4: Time allocation at the individual level (only dual-adult HHs).

	Women in certified HHs		Women in non-certified HHs		Men in certified HHs		Men in non-certified HHs	
	mean	sd	mean	sd	mean	sd	mean	sd
Time farm work	208.79	189.63	180.34	193.18	261.63	252.58	311.05	232.37
Time off-farm work	83.05	171.81	106.03	194.06	235.86	243.04	198.47	249.26
Time domestic work	335.43	180.28	349.40	178.65	44.83	80.76	35.37	71.70
Time leisure activities	134.77	135.12	111.03	95.70	180.70	147.95	183.16	132.31
Time working	646.38	167.08	649.66	151.69	581.11	142.00	583.11	135.57
Time poor (0/1)	0.58		0.57		0.34		0.28	
Observations	261		87		301		95	

Note: sd = standard deviations. Time spent working (in minutes) during a regular working day, excluding holidays and festivities.

Table 5. Association between organic certification and workload by gender.

	Non-certified PO	ADPO[C]	P-value	Obs
Overall workload				
Woman's time working (in min)	584.15	15.12	0.475	484
Man's time working (in min)	570.15	-24.10	0.150	484

Note: Only dual-adult households. Robust standard errors clustered at the district level. Full results in the Appendix (Table A8).

5.3 Time Allocation and Time-use Agency

Table 4 shows descriptive statistics of women's and men's time allocation on the day before the interview. In certified households, women tend to spend slightly more time on farm work and less on off-farm work activities compared to women in non-certified households, consistent with their lower engagement in off-farm jobs. As mentioned in the conceptual framework, women are often seen as responsible for household chores and elderly/child care, measured as domestic work: significant differences between the group of women and men can be observed, independently from the certification status. Table 4 also shows the gender differences in time spent working on other activities, such as on-farm and off-farm, as well as leisure time. The time women spend on farm work relative to men is also greater in certified households than in non-certified households.

Both groups of women spend almost 11 hours per day on work activities, on average, with 60% of them being time-poor (Table 4). When asked about gender differences in workload and time allocation,

women in focus group discussions highlighted the burden of balancing both productive and domestic activities, as well as their preferences: "*A mother has no set hours, but I am a determined woman. I like fishing and working in the chakra, taking care of cocoa*" - "*I work from 5 to 5, first doing household chores and then in my small shop… my husband works on the farm. I would like to switch*". However, as shown by the IPWRA results in Table 5, women's overall workload is not significantly associated with organic certification. Therefore, while the total workload remains unchanged by certification status, the allocation of time seems to vary by certification status. Assessing whether this is positive or negative for women requires exploring women's preferences, satisfaction, and agency regarding their time allocation.

Table 6 shows the time satisfaction and time-use agency module responses for women by certification status. First, both groups of women report being overall satisfied with the time spent working, although almost all of them have to wake up earlier due to household duties. Because of these domestic responsibilities, women tend to miss other activities they would like to join.

Similarly, we find no statistically significant differences in women's responses regarding intrinsic time-use agency. Regardless of their certification status, women are aware of the unfair differences in how women and men spend their time. Around 95% of women in both groups partly or completely agree that women have less leisure time than men do, and that women's responsibilities are more time-demanding than those of men. At the same time, a large share of women in our sample partly or completely agree with the fact that they feel they can change their daily schedule and can ask other household members to help with domestic and care work.

This is in line with women's responses to decision-making power over their daily schedule and time spent on household duties. Most women can largely decide how to allocate their time across daily activities and household duties; however, they tend to have less decision-making power over other activities, such as agricultural activities. Table 6 shows that fewer than half of the women in both certified and non-certified households can decide to a significant degree how much time to spend on their agricultural activities. As a female farmer said during a semi-structured interview conducted during the pre-data collection visit: "*Behind men's crops, there stands women's time*". Participating in leisure activities, community/cooperative meetings, social gatherings, and visiting friends or family are other activities for which women have less control over their time allocation.

Table 6. Women's time-use agency responses (percentages) by organic certification status.

	Completely disagree	Partly disagree	Partly agree	Completely agree	Mann-Whitney-U test
Satisfaction with time allocation					
	You are satisfied with how much time you spend working.				
Women (non-certified)	0.88	7.89	11.40	79.82	
Women (certified)	0.82	7.07	14.67	77.45	
	You want more time for leisure activities.				
Women (non-certified)	9.65	6.14	15.79	68.42	
Women (certified)	5.72	8.72	22.89	62.67	
	You often have to wake up earlier than you want to because of your household duties.				
Women (non-certified)	3.51	0.00	14.91	81.58	
Women (certified)	2.17	4.07	12.47	81.30	
	Your household duties often make you miss out on other activities that you would like to do.				
Women (non-certified)	13.16	10.53	18.42	57.89	
Women (certified)	10.57	7.05	18.43	63.96	
Intrinsic time-use agency	Critical consciousness				
	Compared to a woman, a man can change his daily schedule more easily.				
Women (non-certified)	2.63	14.91	17.54	64.91	
Women (certified)	3.83	12.57	21.58	62.02	
	Because of their responsibilities, women generally sleep less than men do.				
Women (non-certified)	0.87	12.17	10.43	76.52	
Women (certified)	2.71	6.50	12.47	78.32	
	Because of their responsibilities, women have less leisure time than men do.				
Women (non-certified)	1.74	3.48	10.43	84.35	
Women (certified)	1.63	2.44	13.01	82.93	
	Women's responsibilities take more time than men's responsibilities do.				
Women (non-certified)	0.87	3.48	10.43	85.22	
Women (certified)	0.82	2.45	9.51	87.23	
	Self-efficacy				
	You feel that you can change your daily schedule.				
Women (non-certified)	7.89	8.77	19.30	64.04	
Women (certified)	7.61	9.24	19.57	63.59	
	You feel that you can ask a household member to do some of your household duties.				
Women (non-certified)	1.75	3.51	16.67	78.07	
Women (certified)	1.90	2.71	12.47	82.93	
	You feel that you can ask a household member to help you take care of a child or other family member.				
Women (non-certified)	12.38	8.57	15.24	63.81	
Women (certified)	7.72	8.39	15.44	68.46	

Instrumental time-use agency					
	Decision making				
	To what extent do you decide when and the amount of time you spend on the following activities:				
	Not at all	Small extent	Medium extent	High extent	Mann-Whitney-U test
	Your daily schedule				
Women (non-certified)	0.00	0.88	17.54	81.58	
Women (certified)	0.27	2.45	20.38	76.90	
	Your agricultural activities				
Women (non-certified)	1.77	17.70	33.63	46.90	
Women (certified)	1.09	15.30	38.80	44.81	
	Household duties, such as cooking, cleaning, washing clothes, or collecting water or cooking fuel				
Women (non-certified)	0.00	0.88	15.79	83.33	
Women (certified)	0.00	2.98	15.72	81.30	
	Caring for household members, such as children or elderly family members				
Women (non-certified)	14.29	11.43	31.43	42.86	**
Women (certified)	7.05	10.07	28.86	54.03	
	Visiting a friend or family member				
Women (non-certified)	3.51	27.19	35.96	33.33	
Women (certified)	3.80	21.20	37.77	37.23	
	Shopping, such as going to the community market				
Women (non-certified)	2.70	6.31	20.72	70.27	**
Women (certified)	4.37	14.48	19.40	61.75	
	Attending a social gathering within the community, such as a wedding or other celebration				
Women (non-certified)	5.31	33.63	33.63	27.43	
Women (certified)	2.99	32.88	34.78	29.35	
	Attending a community meeting/cooperative meeting				
Women (non-certified)	16.07	39.29	18.75	25.89	*
Women (certified)	8.68	36.13	26.05	29.13	
	Leisure activities other than resting, such as listening to music or chatting with friends				
Women (non-certified)	6.96	30.43	35.65	26.96	
Women (certified)	5.48	33.70	35.62	25.21	
	Sleeping or resting				
Women (non-certified)	0.00	10.43	20.00	69.57	
Women (certified)	0.00	11.96	19.02	69.02	

Note: Significance levels: *** p<0.01, ** p<0.05, * p<0.1.

Fig 4. Distribution of women's disempowerment score.

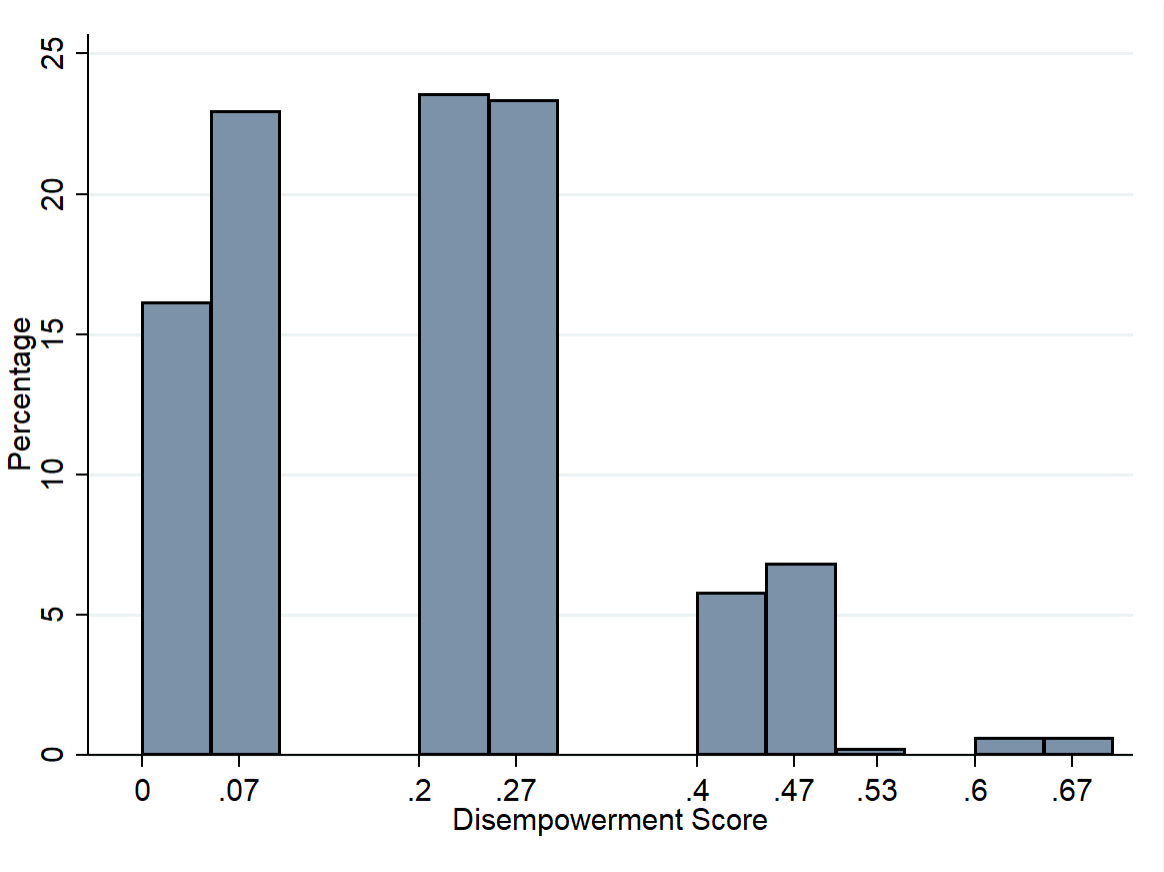


Table 7. Association between organic certification and women's economic empowerment.

	Non-certified PO	ADPO[C]	P-value	Obs
Women's empowerment [a]				
Disempowerment score (0-1)	0.17	0.02	0.37	484
Gender parity [b] (0/1)	0.65	0.05	0.58	484
Time poor (0/1)	0.43	0.05	0.41	484
Decisions on cocoa farming (0/1)	0.69	0.25	0.00	484
Decisions on cocoa income (0/1)	0.77	0.08	0.06	484
Joined a cooperative training (0/1)	0.28	0.20	0.00	484
Access to and decisions on credit (0/1)	0.41	0.02	0.89	484
Has individual income (0/1)	0.38	-0.15	0.05	484

Note: [a] For each outcome variable the model estimated with a probit estimator, except the disempowerment score for which we employ a fractional response probit model (Diiro et al. 2018). [b] Gender parity indicator at the household level. Robust standard errors clustered at the district level. Full results reported in the Appendix (Tables A9 and A10).

5.4 Women's Economic Empowerment

Table 7 shows how organic certification is related to women's empowerment and intra-household gender parity. Organic certification is not associated with a change in women's overall empowerment. As a robustness check, we estimate the model using the 20% cutoff for the disempowerment score, and we obtain a similar result indicating no significant association

in terms of magnitude and statistical significance (Table A11). Similarly, the $ADPO^C$ estimated for the gender parity outcome is not statistically significant. In addition to overall empowerment, we run separate regressions for different indicators of economic empowerment in agriculture. First, in line with the results presented in the previous sections, organic certification does not further exacerbate women's time poverty, while it is associated with higher participation of women in decisions regarding cocoa farming and income from cocoa. The same holds for participation in training provided by the cooperative: women in certified households are more likely to participate in trainings compared to women in non-certified households.

The association between organic certification and the indicator for access to and decisions on credit is insignificant both statistically and in magnitude. The last row of table 7 shows that women in certified households are less likely to have an individual income.

6. Discussion

Our study shows how organic certification is related to women's time use, cocoa labor, and empowerment in cocoa farming households in Peru. We find that organic cocoa certification is associated with an increase in labor demand as found in a previous study by Bandanaa et al. (2021) in Ghana. We provide evidence that the increased labor demand is met by women in the household, as they are primarily homemakers and have a lower opportunity cost of participating in cocoa production compared to men. Moreover, the limited availability of casual workers in the area may explain the increased labor demand on family members (Laroche et al. 2012). At the same time, our findings do not support the qualitative evidence on the overall workload implications for women under certification schemes (Lyon et al. 2010; Bolwig 2012; Lyon et al. 2017). Rather than an increase in women's overall workload, women in certified organic households are less likely to engage in off-farm activities.

Our findings align with the study by Armbruster et al. (2019), which shows that, following a program of specialty cocoa specialization in Peru, women reported spending more time on pruning, harvesting, fermenting, and weeding than three years earlier. Cooperatives in our sample often combine organic cocoa production with a demand for quality which require additional labor in pruning, harvesting, pod breaking, and post-harvesting activities.

However, the increased participation of women is not sufficient to challenge gender-based norms or change the intra-household division of tasks and time allocation. Based on our qualitative evidence on women's time-use agency, women in both certified and non-certified households have limited control over how they allocate time to agricultural activities and

activities in their community. Similarly to Armbruster et al. (2019), we find that women's engagement in cocoa activities does not reduce the time they are expected to spend on childcare and domestic duties. In this respect, we find that women are often responsible for cooking for both family members and hired workers, which is the only cocoa-related activity performed solely by women (Laroche et al. 2012). As a result, the increased demand for both hired and family labor may lead to women spending more time preparing and bringing food to the cocoa farm (Bymolt et al. 2018).

The involvement in cocoa farming activities can foster women's confidence and ability to make decisions regarding cocoa production. Our analysis shows that women in certified households are more likely to participate in cooperative trainings as well as in cocoa production and income use decisions, compared to those in non-certified households. However, consistent with the findings by Ruben and Fort (2012) in Peru, organic certification may draw women away from off-farm employment, and thus limiting their access to an individual source of income.

In line with Meemken and Qaim (2018a), we do not find any significant association between the certification scheme and access to and decisions on credit. This can be due to the poor access to credit for Peruvian women, and more in general for rural households. Although some cooperatives in our sample as well as local financial institutions facilitate women's access to credit with *ad hoc* campaigns promoted by other schemes such as Fairtrade, the uptake of these loans is very low[9].

Hence, we conclude that organic certification does not lead to a change in women's overall empowerment but rather influences their labor participation and time allocation. The welfare implications for women and their households will depend on whether the benefits of cash crop production, in terms of decision-making and control over resources, outweigh the advantages of earning an individual income through off-farm opportunities (Doss and Gottlieb 2025).

7. Conclusion

Gender equality in agriculture is far from being met, yet specialization in tropical export crops under the umbrella of global supply chain sustainability initiatives is not necessarily associated with negative effects on women. Our findings contribute to the sparse evidence on the gendered implications of certified organic cocoa production leveraging primary data from the sustainable segment of the value chain in Peru. The study confronts this gap in the literature exploring how organic certification is associated with intra-household division of cocoa labor, how workload

[9] In the survey, we purposively ask whether the household has taken any loan for which only women were eligible.

and time allocation vary by gender and by certification status, and how this influences women's economic empowerment and gender parity within the household.

We provide evidence of an increase in women's yearly cocoa labor in certified organic households, further supporting the positive association between organic certification and women's involvement in farming activities found in previous studies. However, we also find that the labor patterns still follow the traditional gendered division of labor, with men performing pruning and weeding activities, and women mainly involved in harvesting, post-harvest activities, and cooking for workers. The qualitative results on time-use agency show that the time constraint and burden for women is mainly due to the distribution of household duties based on social norms, rather than due to the certification status of the cocoa farm. In this regard, a fairer distribution of tasks can be achieved, in particular by working with men and women on intrinsic and instrumental time-use agency. This could inform additional, tailored measures cooperatives can put in place.

Our results further suggest that regardless of the certification status, women are disempowered in terms of workload compared to men. Traditional gender norms that allocate household duties to women perpetuate their time burden, yet this is not further exacerbated by the increased labor demand due to organic production. Organic certification is rather associated with different women's and men's time allocation in terms of on-farm and off-farm work. Particularly, women's higher participation in on-farm activities as the household produces organic cocoa is related to a lower engagement in off-farm activities. Furthermore, the study unveils that beyond measurements of time use, analyzing women's time-use agency as confidence and ability to decide about own time allocation provides nuanced evidence on women's time constraints that limit their participation in productive activities, whether on-farm or off-farm. This indicates that the implications of sustainability initiatives and standards on women's time use may be only one aspect of a broader issue.

Although previous studies qualitatively pointed out the possible unintended effects of crop certification on women's time and through that on empowerment (Lyon et al. 2010; Bolwig 2012), we quantitatively test the association between certified organic cocoa and women's economic empowerment. Our findings underline that in certified organic cocoa farming households, women are more likely to participate in decisions regarding cocoa production, and to some extent use of cocoa income. However, we cannot conclude that this translates into an increase in women's overall empowerment. In fact, we find that women in certified organic households are less likely to have an off-farm occupation and individual income. Therefore, we recommend actors of the cocoa value chain to cautiously measure and disentangle the

impact of their sustainability initiatives on the ground, considering potential unintended effects on women's economic empowerment and ability to benefit from economic opportunities.

To conclude, we acknowledge that by using self-reported data, we cannot fully assess the actual control of women over income. Economic experiments can complement the results from survey-based data analysis by assessing individual behavior in real-world scenarios. Moreover, even though we complement the time allocation data with detailed information on yearly cocoa labor, the time-use recall data remain subject to seasonality. Lastly, although we cautiously comment on the time-use agency responses, the module as well as its scale are still undergoing psychometric validation (Sinharoy et al. 2023). Despite these limitations, this study highlights how initiatives for a sustainable cocoa production need to look at intra-household division of labor and gender dynamics to address gender inequality. Gender disparities in the cocoa value chain can be influenced through policies and strategies at different scales, ensuring support services, e.g., childcare support, time-saving labor technologies, e.g., backpack fertilizer sprayer, education and training, e.g., workshops on time-use inequities. Future studies should identify strategies at the farmer producer organization level that promote women's economic empowerment while considering inequities in time allocation between women and men.

Appendix

Table A1: Cooperative characteristics and services.

Cooperatives	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
Region	San Martín	San Martín	San Martín	San Martín	San Martín	Huánuco	Huánuco[a]	Huánuco	Ucayali	Ucayali
N° of members	335	2000	42	110	140	64	155	408	70	453
Share of women members	12.8%	16%	24%	26%	31.5%	39%	15.5%	34%	34%	30%
N° employees (women)	18 (6)	85 (16)	5 (3)	13 (6)	5 (1)	4 (2)	6 (1)	11 (2)	8 (2)	20 (6)
N° extension agents (women)	2 (1)	40 (1)	2 (0)	4 (2)	2 (0)	1 (1)	1 (0)	0 (0)	3 (0)	8 (2)
Sex of cooperative manager	Male	Male	Female	Male	Male	Male	Male	Male	Male	Male
Area cocoa production (ha)	1,012	6,000	102	373	465	225	600	600	399	2,000
Cocoa production (metric tons)	860	3,200	70	200	380	251	250	1,000	425	1,200
Year of foundation	2009	1997	2010	2009	2013	2013	2001	2009	2021	2015
Year of first certification	2011	2000	2019	2018	2019	2013	2004	2009	2022	2015
Organic Certification	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Fairtrade Certification	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	*	Yes
UTZ/Rainforest Alliance	No	No	No	No	No	No	No	Yes[b]	No	No
Forest Stewardship Council	No	Yes	No	No	No	No	No	No	No	No
Carbon Footprint Certified	Yes	Yes	No	No	No	No	No	No	No	No
Direct relationship with buyer	Yes	Yes	No	No	No	No	No	No	No	Yes
Women's Committee	Yes	Yes	No	No	No	No	No	No	No	Yes
Women-led enterprise	Yes	No	No	No	Yes	Yes	No	No	No	Yes
Member rights to spouses	No	No	No	No	No	No	No	No	No	Yes
Training open to spouses	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Maternity allowance	No	No	No	No	No	No	No	No	No	Yes
Credit for school material	No	No	No	No	No	No	No	No	No	Yes
Credit for health emergency	No	Yes	No	No	No	No	No	No	No	Yes
Funeral expense cover	No	Yes	No	No	No	No	No	No	Yes	Yes
Agroforestry-based retirement program	No	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes
Product diversification	Derivatives of cocoa, Majambo	Derivatives of cocoa, Lemon, ginger, timber	Derivatives of cocoa	Derivatives of cocoa	Derivatives of cocoa, Apiculture	Derivatives of cocoa	Flowers, timber	Derivatives of cocoa	Derivatives of cocoa	Derivatives of cocoa and banana, small livestock

[a] The cooperative has also some members in Ucayali. [b] The only cooperative in our sample that was certified Rainforest Alliance had its certification revoked during the data collection period due to regulatory non-compliance. *At the time of the data collection, the cooperative was in the process to become certified Fairtrade.

Figure A1. Male family labor by cocoa activity and certification status.

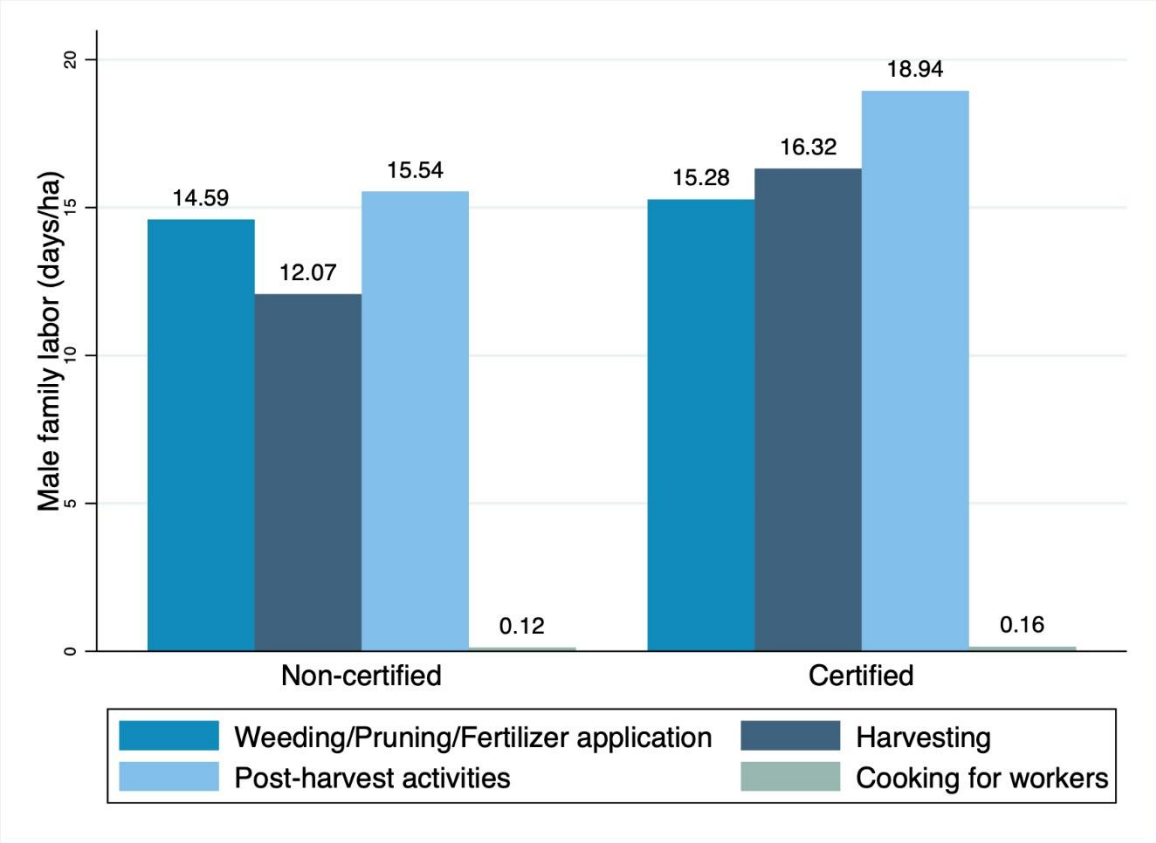


Figure A2. Hired labor by cocoa activity and certification status.

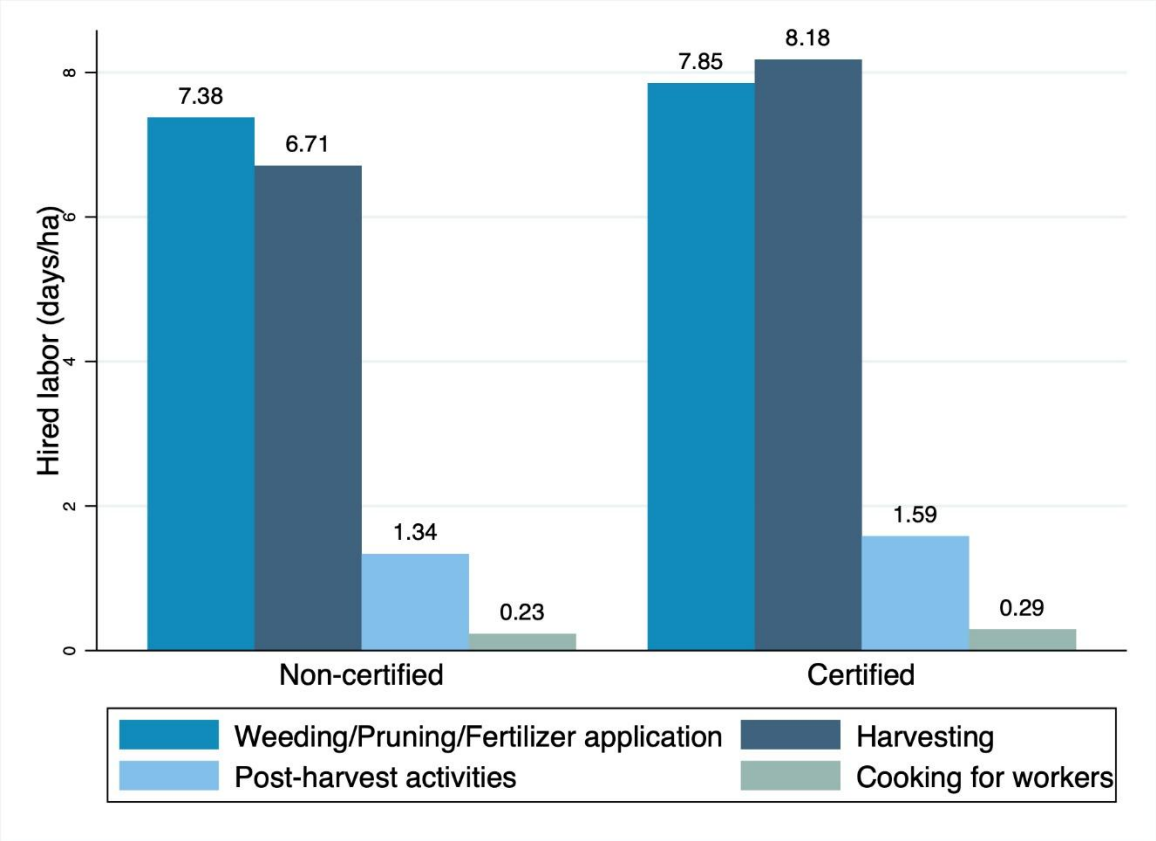


Table A2: Descriptive statistics of outcome and control variables of single-woman households.

	Full Sample		Certified Single-woman HHs		Non-certified Single-woman HHs	
	mean	sd	mean	sd	mean	sd
Total cocoa area (ha)	2.74	1.85	2.61	1.73	2.96	2.07
Total land area (ha)	5.79	6.83	4.88	4.65	7.36	9.40
Age (years)	54.09	11.98	55.23	11.98	52.10	11.91
Years of education	7.32	4.70	7.52	5.12	6.97	3.93
Manager's experience with cocoa (years)	13.68	7.19	14.08	6.77	13.00	7.94
Total household income (PEN)	14444.72	10883.48	13158.05	8027.95	16674.96	14470.31
Wealth index (1-5)	2.43	1.30	2.33	1.35	2.60	1.19
Household owns small livestock (0/1)	0.12		0.12		0.13	
Household cultivates other crop(s) (0/1)	0.27		0.31		0.20	
Household size	2.70	1.42	2.73	1.50	2.63	1.30
No. of adults in HH	1.96	0.96	1.96	0.97	1.97	0.96
No. of children	0.73	0.86	0.77	0.92	0.67	0.76
Distance to input market (min)	25.62	23.31	25.79	21.86	25.33	26.03
Distance to cooperative (min)	28.13	21.13	29.31	23.03	26.10	17.54
Family woman's cocoa labor (days/ha)	29.14	28.18	32.12	30.39	23.98	23.47
Family man's cocoa labor (days/ha)	5.29	13.27	5.52	13.89	4.88	12.33
Hired labor on cocoa farm (0/1)	0.94		0.92		0.97	
Male hired labor (days/ha)	22.85	19.84	24.93	21.22	19.25	16.92
Female hired labor (days/ha)	5.91	13.63	7.55	16.02	3.09	7.35
Observations	82		52		30	

Note: sd = standard deviations. Household income in Peruvian Soles (PEN).

Table A3: Descriptive statistics of outcome and control variables at the individual level (only single-woman HHs)

	Women in certified HHs		Women in non-certified HHs	
	mean	sd	mean	sd
Age (years)	55.23	11.98	52.10	11.91
Years of education	7.52	5.12	6.97	3.93
Homemaker as main occupation (0/1)	0.04		0.07	
Off-farm occupation (0/1)	0.19		0.30	
Has a bank account (0/1)	0.46		0.50	
Joined a cooperative training (0/1)	0.63		0.60	
Time farm work (in min)	259.58	207.84	223.64	231.68
Time off-farm work (in min)	71.67	182.70	169.09	234.00
Time domestic work (in min)	316.25	163.74	253.30	133.36
Time leisure activities (in min)	129.17	96.30	144.55	138.22
Time working (in min)	668.33	155.53	672.27	200.32
Time poor (work>10.5 hours)	0.69		0.64	
Observations	52		30	

Note: sd = standard deviations. Time spent working (in minutes) during a regular working day, excluding holidays and festivities.

Table A4. Probit regression on the certification decision to derive inverse probability weights.

Female cocoa manager (0/1)	0.18
	(0.27)
Cocoa manager's age (years)	0.01
	(0.01)
Cocoa manager's years of education	0.02
	(0.02)
HH has non-agric. Income (0/1)	0.00
	(0.15)
No. of adults in HH	-0.13*
	(0.06)
Manager's experience with cocoa (years)	0.01
	(0.01)
Total land area (ha)	-0.00
	(0.01)
Wealth index (1-5)	-0.09
	(0.08)
Distance to cooperative (min)	0.00
	(0.00)
Distance to input market (min)	-0.00
	(0.00)
Single-woman HH (0/1)	-0.46*
	(0.26)
Constant	0.25
	(0.46)
Cooperative controls	Yes
Overidentification test for model specification ($p > \chi^2$)	0.90
Observations	566

Note: Robust standard errors clustered at the district level in parentheses, * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A5. Standardized weighted differences between certified households and non-certified households after the inverse probability weighting.

	Standardized differences		Variance ratio	
	Raw	Weighted	Raw	Weighted
Cocoa manager's years of education	0.07	-0.23	1.05	1.12
Female cocoa manager	-0.17	0.03	0.77	1.05
Cocoa manager's age (years)	0.07	0.00	1.22	1.23
No. of adults in HH	-0.02	0.09	0.75	1.12
HH has non-agric. income	-0.04	-0.02	0.92	0.96
Manager's experience with cocoa (years)	0.18	-0.12	0.92	0.65
Total land area (ha)	0.07	0.09	1.31	1.06
Wealth index (1-5)	-0.24	0.13	1.06	1.10
Distance to cooperative (min)	0.24	0.00	1.44	0.98
Distance to input market (min)	0.12	-0.02	0.98	1.01
Single-woman HH (0/1)	-0.23	-0.04	0.66	0.92
Cooperative 1	0.31	0.08	2.57	1.19
Cooperative 2	0.55	-0.13	3.26	0.88
Cooperative 3	-0.51	0.03	0.33	1.10
Cooperative 4	-0.14	0.03	0.67	1.12
Cooperative 5	-0.38	-0.00	0.24	0.99
Cooperative 7	0.08	-0.03	1.58	0.88
Cooperative 8	-0.22	0.01	0.71	1.01
Cooperative 9	0.38	0.01	4.15	1.02
Cooperative 10	0.25	0.05	2.57	1.17

Table A6. Association between organic certification and cocoa farm labor/year/ha.

	(1) Family woman's cocoa labor (days/ha)	(2) Family man's cocoa labor (days/ha)	(3) Ratio women's cocoa labor days on men's days	(4) Share women's cocoa labor days of total family days	(5) Female hired labor (days/ha)	(6) Male hired labor (days/ha)
ADPO[C].	5.36**	-1.55	0.30***	0.07***	0.63	-0.62
	(2.10)	(2.22)	(0.09)	(0.03)	(0.53)	(2.34)
Non-certified PO	13.20***	29.62***	0.52***	0.30***	2.01***	13.95***
	(1.59)	(1.83)	(0.06)	(0.03)	(0.43)	(2.65)
OME0						
Cooperative member	2.28	-0.08	0.08	0.01	-0.61	-0.44
is woman (0/1)	(1.42)	(3.01)	(0.07)	(0.03)	(0.61)	(5.33)
Total cocoa area (ha)	-0.26	-3.43***	0.10***	0.02***	0.48	1.06
	(0.43)	(0.63)	(0.02)	(0.01)	(0.33)	(0.78)
Total land area (ha)	-0.41***	-0.37***	0.00	-0.00	0.11**	0.03
	(0.08)	(0.12)	(0.00)	(0.00)	(0.05)	(0.11)
Household cultivates	5.79***	-2.38	-0.03	0.05	-1.27**	3.28
other crop(s) (0/1)	(2.11)	(2.18)	(0.09)	(0.03)	(0.50)	(3.71)
Household owns	-1.00	-1.50	0.15	0.03	-1.24	-13.50***
small livestock (0/1)	(4.20)	(1.64)	(0.14)	(0.07)	(1.30)	(4.07)
Age (years)	-0.18	-0.60**	0.00	0.00	-0.02	0.19
	(0.13)	(0.30)	(0.01)	(0.00)	(0.02)	(0.23)
Years of education	-0.24	-1.18**	0.01	0.01	0.18**	2.65***
	(0.30)	(0.50)	(0.01)	(0.01)	(0.09)	(0.76)
Manager's experience	0.22	0.65***	0.00	0.00	-0.11**	-0.74**
with cocoa (years)	(0.14)	(0.24)	(0.01)	(0.00)	(0.05)	(0.33)
Household size	-2.16***	-4.02***	-0.02	-0.01	-0.02	-0.85
	(0.56)	(1.35)	(0.03)	(0.01)	(0.25)	(1.46)
HH has non-agric.	0.53	5.05	0.14	0.03	3.13	-11.07*
income	(5.35)	(6.62)	(0.23)	(0.08)	(3.09)	(6.14)
Wealth index (1-5)	0.35	-0.33	-0.02	-0.00	0.05	-2.02
	(1.04)	(0.72)	(0.02)	(0.01)	(0.29)	(2.06)
Distance to	0.02	-0.07	0.00	0.00**	0.00	-0.03
cooperative (min)	(0.05)	(0.07)	(0.00)	(0.00)	(0.01)	(0.07)

Constant	21.06***	83.20***	-0.14	0.02	4.28**	-2.38
	(7.41)	(22.03)	(0.42)	(0.14)	(1.74)	(16.36)
Cooperative controls	Yes	Yes	Yes	Yes	Yes	Yes
OME1						
Cooperative member	5.52**	-4.26**	0.71**	0.11***	1.54*	1.36
is woman (0/1)	(2.51)	(1.97)	(0.32)	(0.03)	(0.93)	(2.52)
Total cocoa area (ha)	-1.56***	-2.14***	-0.01	-0.00	0.04	-0.59**
	(0.47)	(0.50)	(0.02)	(0.01)	(0.06)	(0.23)
Total land area (ha)	-0.07	-0.19***	-0.00	-0.00	0.03	0.10
	(0.09)	(0.07)	(0.00)	(0.00)	(0.02)	(0.09)
Household cultivates	-1.52	-0.99	0.12	-0.00	-0.26	0.48
other crop(s)	(1.83)	(2.14)	(0.08)	(0.02)	(0.56)	(1.94)
Household owns	7.20	8.56**	-0.20	-0.01	1.39	-3.35
small livestock (0/1)	(7.12)	(3.79)	(0.13)	(0.03)	(1.28)	(2.15)
Age (years)	-0.21***	-0.21**	-0.00	-0.00	-0.01	-0.04
	(0.07)	(0.08)	(0.01)	(0.00)	(0.02)	(0.10)
Years of education	-0.97**	-0.65	-0.03*	-0.01***	-0.05	0.31**
	(0.42)	(0.44)	(0.02)	(0.00)	(0.09)	(0.15)
Manager's experience	0.14	0.09	0.00	0.00	0.02	-0.00
with cocoa (years)	(0.16)	(0.15)	(0.01)	(0.00)	(0.05)	(0.12)
Household size	-2.47***	-1.74***	-0.05	-0.02***	0.01	0.52
	(0.50)	(0.65)	(0.04)	(0.01)	(0.26)	(1.01)
HH has non-agric.	1.27	-3.68	0.31	0.08	0.65	-0.96
Income (0/1)	(3.92)	(2.61)	(0.31)	(0.06)	(1.10)	(2.95)
Wealth index (1-5)	0.23	-0.38	0.04	0.02***	-0.13	0.38
	(0.60)	(0.64)	(0.06)	(0.01)	(0.28)	(0.86)
Distance to	-0.00	0.02	0.00	0.00	0.02	0.00
cooperative (min)	(0.03)	(0.03)	(0.00)	(0.00)	(0.01)	(0.03)
Constant	48.00***	64.57***	1.14*	0.54***	0.34	15.18*
	(6.92)	(11.76)	(0.62)	(0.09)	(1.98)	(8.91)
Cooperative controls	Yes	Yes	Yes	Yes	Yes	Yes
Observations	484	484	476	481	484	484

Note: PO: predicted outcome, ADPOC: average difference in predicted outcome for certified farmers under certification and hypothetical non-certification, OME0: outcome model estimation for non-certified, OME1: outcome model estimation for certified, Standard errors in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A7. Robustness check: association between organic certification and cocoa farm labor/year/ha (full sample of women).

	Family woman's cocoa labor (days/ha)
ADPO[C].	4.70**
	(2.06)
Non-certified PO	15.54***
	(1.57)
OME0	
Cooperative member is woman (0/1)	2.75
	(1.92)
Total cocoa area (ha)	-0.85
	(0.55)
Total land area (ha)	-0.40***
	(0.09)
Household cultivates other crop(s) (0/1)	9.35***
	(2.13)
Household owns small livestock (0/1)	-6.83
	(6.26)
Age (years)	-0.21*
	(0.13)
Years of education	-0.31
	(0.36)
Manager's experience with cocoa (years)	0.50**
	(0.21)
Household size	-2.91***
	(0.73)
HH has non-agric. income	-5.38
	(7.72)
Wealth index (1-5)	0.27
	(0.99)
Distance to cooperative (min)	0.00
	(0.05)
Single-woman HH (0/1)	13.18***
	(3.29)
Constant	26.49***
	(9.28)

Cooperative controls	Yes
OME1	
Cooperative member is woman (0/1)	6.30**
	(2.60)
Total cocoa area (ha)	-1.88***
	(0.57)
Total land area (ha)	-0.09
	(0.09)
Household cultivates other crop(s)	-0.32
	(2.27)
Household owns small livestock (0/1)	5.32
	(6.14)
Age (years)	-0.16**
	(0.08)
Years of education	-0.83**
	(0.32)
Manager's experience with cocoa (years)	0.20
	(0.18)
Household size	-2.53***
	(0.60)
HH has non-agric. Income (0/1)	0.67
	(3.08)
Wealth index (1-5)	0.47
	(0.61)
Distance to cooperative (min)	0.00
	(0.03)
Single-woman HH (0/1)	4.88
	(4.31)
Constant	42.05***
	(6.52)
Cooperative controls	Yes
Observations	566

Note: PO: predicted outcome, ADPOC: average difference in predicted outcome for certified farmers under certification and hypothetical non-certification, OME0: outcome model estimation for non-certified, OME1: outcome model estimation for certified, Standard errors in parentheses: * p < 0.10, ** p < 0.05, *** p < 0.01.

Figure A3. Female family labor by cocoa activity and certification status (single-woman HHs).

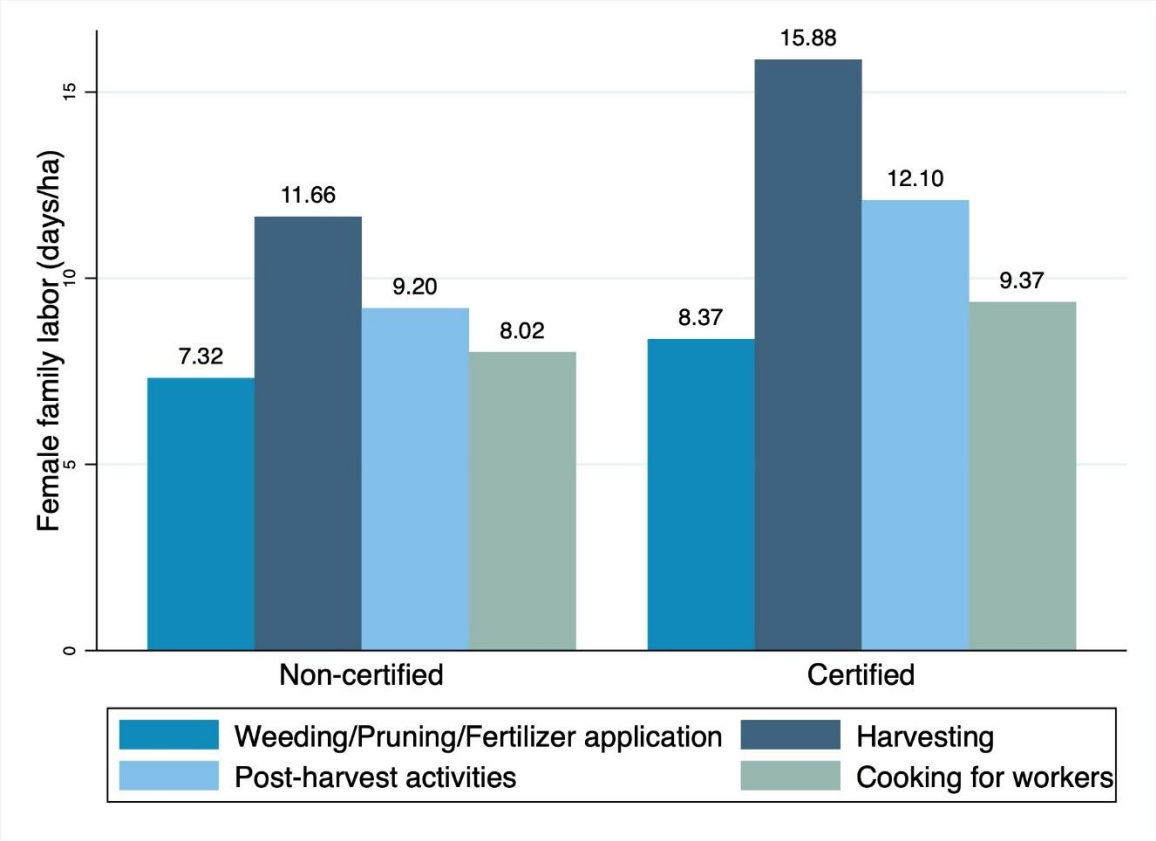


Figure A4. Hired labor by cocoa activity and certification status (single-woman HHs).

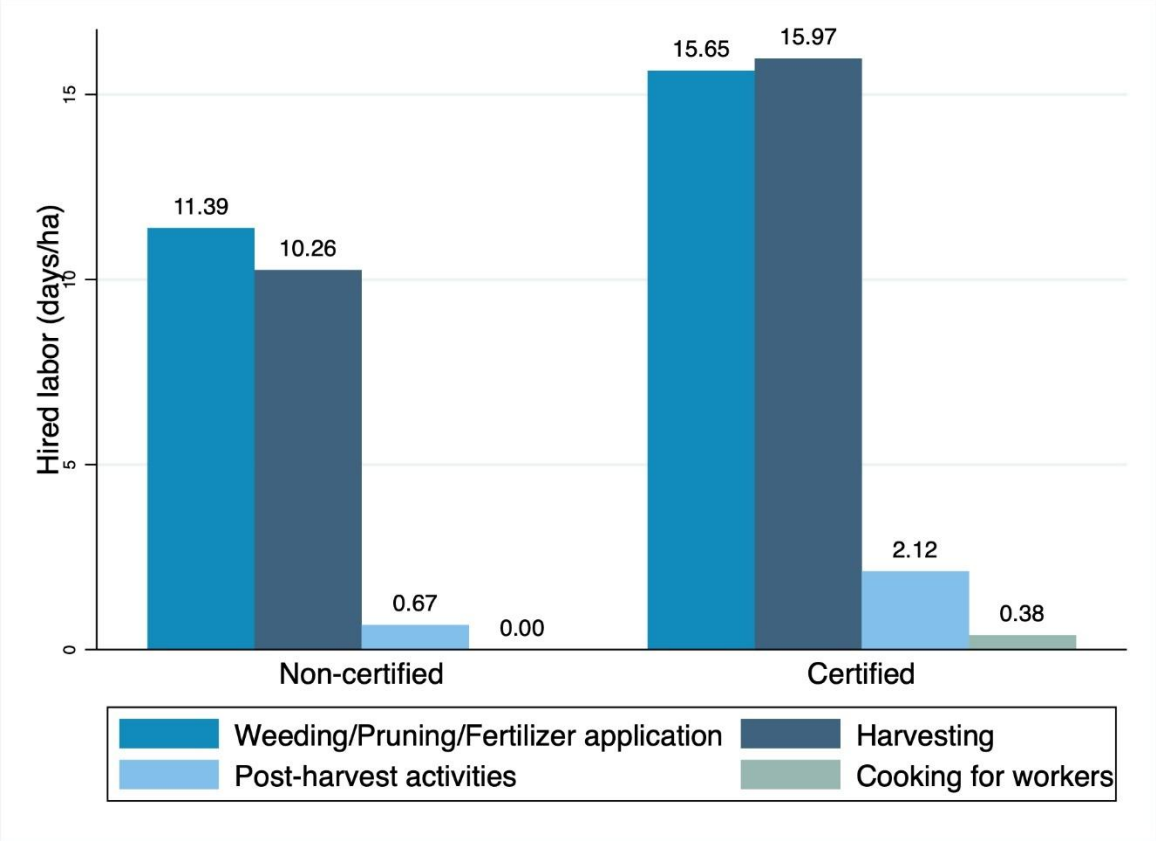


Table A8. Association between organic certification and workload by gender.

	(1) Women's time spent working (in min)	(2) Men's time spent working (in min)
ADPO[C]	15.12	-24.10
	(21.15)	(16.73)
Non-certified PO	584.15***	570.15***
	(18.47)	(18.19)
OME0		
Total land area (ha)	0.50	2.16**
	(0.96)	(0.99)
Household cultivates other crop(s) (0/1)	11.71	-70.09**
	(33.24)	(32.84)
Household owns small livestock (0/1)	25.63	11.09
	(76.74)	(29.54)
Age (years)	-1.45	-0.86
	(0.98)	(1.12)
Years of education	-12.76**	-0.19
	(5.25)	(3.05)
HH has hired labor (0/1)	-16.80	52.98
	(50.83)	(35.75)
No. of women	-18.52	22.72
	(14.28)	(17.97)
No. of men	-18.38	-49.67**
	(29.52)	(25.24)
No. of children	-11.01	47.00**
	(15.21)	(21.67)
HH has non-agric. Income (0/1)	146.17***	-16.73
	(46.84)	(73.17)
Wealth index (1-5)	-3.45	13.93
	(10.40)	(8.97)
Day before was a holiday (0/1)	-226.35***	-20.84
	(47.69)	(38.00)
Month of interview May (0/1)	98.13***	-32.47
	(22.16)	(32.02)
Month of interview June (0/1)	44.38	12.60
	(45.95)	(38.56)
Constant	807.92***	557.79***
	(105.20)	(88.33)
OME1		
Total land area (ha)	0.52	0.62
	(0.58)	(0.65)
Household cultivates other crop(s) (0/1)	-7.02	-24.65
	(13.78)	(26.89)
Household owns small livestock (0/1)	69.09***	52.49
	(18.67)	(33.13)
Age (years)	-0.41	-1.44**
	(0.72)	(0.72)
Years of education	5.16	-1.25
	(3.70)	(2.52)
HH has hired labor (0/1)	14.65	-4.01
	(22.78)	(16.57)
No. of women	4.74	27.71*
	(17.12)	(15.16)

No. of men	20.04***	-11.94
	(7.49)	(15.45)
No. of children	7.72	-4.24
	(8.55)	(6.59)
HH has non-agric. Income (0/1)	29.90	22.01
	(47.22)	(38.92)
Wealth index (1-5)	-2.66	-3.77
	(9.12)	(7.47)
Day before was a holiday (0/1)	-161.56***	-189.66***
	(23.01)	(71.71)
Month of interview May (0/1)	47.23**	2.66
	(19.08)	(25.08)
Month of interview June (0/1)	28.60	8.15
	(18.20)	(23.19)
Constant	539.56***	661.88***
	(61.23)	(53.67)
Observations	484	484

Note: PO: predicted outcome, ADPOC: average difference in predicted outcome for certified farmers under certification and hypothetical non-certification, OME0: outcome model estimation for non-certified, OME1: outcome model estimation for certified, Standard errors in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Table A9. Association between organic certification and women's empowerment indicators.

	(1) Disempowerment score (0-1)	(2) Gender parity (0/1)	(3) Time poor (0/1)
ADPO[C]	0.02	0.05	0.05
	(0.02)	(0.09)	(0.06)
Non-certified PO	0.17***	0.64***	0.43***
	(0.01)	(0.07)	(0.05)
OME0			
Years of education	0.01	-0.11*	-0.09
	(0.02)	(0.06)	(0.07)
Age (years)	0.01	-0.03	-0.03
	(0.01)	(0.03)	(0.02)
Age difference between man and woman	0.01	-0.10***	0.04**
	(0.01)	(0.03)	(0.02)
Education difference between man and woman	0.03*	-0.13**	-0.02
	(0.02)	(0.07)	(0.06)
Off-farm occupation (0/1)	0.09	0.20	-0.01
	(0.14)	(0.36)	(0.37)
Cocoa manager (0/1)	-0.56***	4.00***	-0.71*
	(0.19)	(0.35)	(0.40)
Total land area (ha)	-0.00	0.04**	-0.05***
	(0.00)	(0.02)	(0.02)
No. of children	0.05	0.01	-0.01
	(0.06)	(0.27)	(0.25)
No. of women	-0.22***	1.58***	-0.66**
	(0.08)	(0.52)	(0.28)
No. of men	-0.11	-0.06	0.02
	(0.08)	(0.23)	(0.25)
Wealth index (1-5)	-0.11***	0.31**	-0.40***
	(0.03)	(0.13)	(0.13)
Women-led chocolate enterprise (0/1)	-0.14***	0.57*	-0.15
	(0.05)	(0.34)	(0.26)
Cooperative has a women's committee (0/1)	-0.26***	-0.84***	-0.52
	(0.08)	(0.21)	(0.49)

Cooperative with member rights to spouse (0/1)	0.16	4.12***	0.53
	(0.11)	(0.42)	(0.52)
Cooperative not certified Fairtrade yet (0/1)	-0.19	3.83***	-0.50
	(0.18)	(0.60)	(0.57)
Constant	-0.50	-0.09	4.67***
	(0.43)	(1.98)	(1.78)
OME1			
Years of education	-0.01	0.03	0.00
	(0.01)	(0.03)	(0.03)
Age (years)	-0.00	0.00	-0.00
	(0.00)	(0.01)	(0.01)
Age difference between man and woman	-0.00	-0.01	-0.01*
	(0.00)	(0.01)	(0.01)
Education difference between man and woman	-0.02***	0.07***	-0.03**
	(0.01)	(0.03)	(0.02)
Off-farm occupation (0/1)	0.03	0.04	0.37*
	(0.06)	(0.16)	(0.20)
Cocoa manager (0/1)	-0.10	0.78**	0.39
	(0.10)	(0.31)	(0.31)
Total land area (ha)	0.00*	-0.01***	0.01
	(0.00)	(0.00)	(0.01)
No. of children	-0.01	0.01	0.01
	(0.02)	(0.08)	(0.06)
No. of women	-0.00	0.10	0.12
	(0.04)	(0.13)	(0.10)
No. of men	0.07**	-0.06	0.11
	(0.03)	(0.10)	(0.08)
Wealth index (1-5)	-0.01	0.00	0.08
	(0.02)	(0.06)	(0.07)
Women-led chocolate enterprise (0/1)	0.08	-0.14	0.08
	(0.07)	(0.16)	(0.10)
Cooperative has a women's committee (0/1)	-0.00	0.20	0.11
	(0.09)	(0.21)	(0.16)
Cooperative with member rights to spouse (0/1)	-0.00	-0.36	0.33
	(0.12)	(0.25)	(0.24)

Cooperative not certified Fairtrade yet (0/1)	-0.07	0.16	-0.19
	(0.10)	(0.23)	(0.19)
Constant	-0.69***	0.28	-0.63
	(0.27)	(0.60)	(0.46)
Observations	484	484	484

Note: PO: predicted outcome, ADPOC: average difference in predicted outcome for certified farmers under certification and hypothetical non-certification, OME0: outcome model estimation for non-certified, OME1: outcome model estimation for certified, Standard errors in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A10. Association between organic certification and women's empowerment indicators.

	(1) Decisions on cocoa farming (0/1)	(2) Decisions on cocoa income (0/1)	(3) Joined a cooperative training (0/1)	(4) Access to and control of credit (0/1)	(5) Has individual income (0/1)
ADPO[C]	0.25***	0.08*	0.20***	0.02	-0.15**
	(0.09)	(0.04)	(0.06)	(0.11)	(0.07)
Non-certified PO	0.69***	0.77***	0.27***	0.41***	0.38***
	(0.10)	(0.05)	(0.06)	(0.09)	(0.07)
OME0					
Age (years)	-0.04**	-0.06**	-0.01	-0.03	0.03
	(0.02)	(0.03)	(0.01)	(0.02)	(0.02)
Years of education	-0.12*	-0.12	0.08*	-0.04	0.16***
	(0.07)	(0.08)	(0.05)	(0.04)	(0.06)
Age difference between man	0.03	0.00	0.08***	-0.02	0.05***
and woman	(0.03)	(0.01)	(0.02)	(0.02)	(0.02)
Education difference between	0.00	-0.01	0.04	-0.02	-0.06
man and woman	(0.07)	(0.08)	(0.05)	(0.06)	(0.05)
Off-farm occupation (0/1)	0.54	-0.30	0.22	0.28	
	(0.49)	(0.27)	(0.43)	(0.38)	
Total land area (ha)	0.08**	0.09***	0.00	-0.02***	0.01
	(0.03)	(0.03)	(0.01)	(0.01)	(0.01)
No. of children	0.05	-0.09	0.13	-0.34	-0.19
	(0.22)	(0.24)	(0.27)	(0.31)	(0.20)
No. of adults	0.06	-0.16	0.32*	0.60***	0.07
	(0.12)	(0.15)	(0.17)	(0.12)	(0.19)
Wealth index (1-5)	-0.03	0.12	-0.06	-0.20	-0.20
	(0.16)	(0.12)	(0.14)	(0.14)	(0.13)
Women-led chocolate	-0.54*	-0.75**	-0.62	1.81***	-0.11
enterprise (0/1)	(0.31)	(0.36)	(0.64)	(0.58)	(0.24)
Cooperative has a women's	-1.11**	0.03	-0.56	-1.60***	0.57
committee (0/1)	(0.48)	(0.45)	(0.47)	(0.47)	(0.36)
Cooperative with member	4.55***	3.15***	1.65**	-0.51	
rights to spouse (0/1)	(0.41)	(0.39)	(0.83)	(0.95)	
Cooperative not certified	3.01***	-1.10	-0.81*	1.08**	0.09
Fairtrade yet (0/1)	(0.69)	(0.72)	(0.43)	(0.47)	(0.44)

Constant	2.99*	4.51**	-1.66	1.05	-3.16*
	(1.64)	(2.19)	(1.34)	(1.31)	(1.65)
OME1					
Age (years)	0.01	0.00	-0.02**	-0.01***	0.01**
	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Years of education	0.05	-0.01	0.04	0.06***	0.11***
	(0.05)	(0.03)	(0.03)	(0.02)	(0.04)
Age difference between man	0.00	0.01	-0.01	0.00	-0.01
and woman	(0.02)	(0.01)	(0.01)	(0.01)	(0.01)
Education difference between	0.01	-0.01	0.01	0.07***	0.05***
man and woman	(0.03)	(0.02)	(0.02)	(0.02)	(0.02)
Off-farm occupation (0/1)	3.29***	-0.07	0.09	0.12	
	(0.18)	(0.21)	(0.20)	(0.22)	
Total land area (ha)	0.02	-0.01	-0.00	-0.00	-0.00
	(0.02)	(0.01)	(0.00)	(0.01)	(0.01)
No. of children	-0.13	-0.02	-0.06	0.03	0.07
	(0.11)	(0.10)	(0.07)	(0.08)	(0.07)
No. of adults	0.14	0.19*	-0.14	-0.01	-0.18**
	(0.10)	(0.11)	(0.10)	(0.07)	(0.08)
Wealth index (1-5)	0.07	0.15***	0.00	0.06	-0.03
	(0.05)	(0.06)	(0.05)	(0.04)	(0.05)
Women-led chocolate	-0.26	-0.56***	0.16	0.04	0.10
enterprise (0/1)	(0.26)	(0.17)	(0.13)	(0.21)	(0.20)
Cooperative has a women's	-0.11	-0.29*	0.14	0.32*	0.00
committee (0/1)	(0.29)	(0.17)	(0.16)	(0.19)	(0.20)
Cooperative with member	0.92***	1.42***	-0.15	-0.40*	
rights to spouse (0/1)	(0.30)	(0.28)	(0.11)	(0.22)	
Cooperative not certified	0.34	0.02	-0.14	-0.06	-0.09
Fairtrade yet (0/1)	(0.27)	(0.19)	(0.17)	(0.16)	(0.25)
Constant	0.19	0.46	0.78	-0.31	-1.73**
	(0.82)	(0.85)	(0.58)	(0.46)	(0.76)
Observations	484	484	484	484	484

Note: PO: predicted outcome, ADPOC: average difference in predicted outcome for certified farmers under certification and hypothetical non-certification, OME0: outcome model estimation for non-certified, OME1: outcome model estimation for certified, Standard errors in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A11. Robustness check: women's overall empowerment (disempowerment score with 20% cutoff).

	Disempowerment Score (cutoff=20%)
ADPO[c]	0.00
	(0.02)
Non-certified PO	0.13***
	(0.01)
OME0	
Years of education	0.01
	(0.03)
Age (years)	0.02
	(0.01)
Age difference between man and woman	0.02
	(0.01)
Education difference between man and woman	0.04
	(0.04)
Off-farm occupation (0/1)	-0.15
	(0.22)
Cocoa manager (0/1)	-0.97***
	(0.30)
Total land area (ha)	0.01
	(0.01)
No. of children	0.05
	(0.18)
No. of women	-0.64***
	(0.22)
No. of men	-0.31*
	(0.18)
Wealth index (1-5)	-0.12*
	(0.07)
Women-led chocolate enterprise (0/1)	0.02
	(0.13)
Cooperative has a women's committee (0/1)	0.03
	(0.14)
Cooperative with member rights to spouse (0/1)	-0.37*
	(0.22)
Cooperative not certified Fairtrade yet (0/1)	-0.74*
	(0.43)
Constant	-0.63
	(1.29)
OME1	
Years of education	-0.02
	(0.02)
Age (years)	-0.00
	(0.00)
Age difference between man and woman	0.00
	(0.00)
Education difference between man and woman	-0.04**
	(0.01)
Off-farm occupation (0/1)	-0.04
	(0.10)
Cocoa manager (0/1)	-0.26
	(0.17)

Total land area (ha)	0.01**
	(0.00)
No. of children	-0.01
	(0.05)
No. of women	-0.01
	(0.07)
No. of men	0.10**
	(0.05)
Wealth index (1-5)	-0.01
	(0.04)
Women-led chocolate enterprise (0/1)	0.16
	(0.13)
Cooperative has a women's committee (0/1)	-0.03
	(0.16)
Cooperative with member rights to spouse (0/1)	0.07
	(0.17)
Cooperative not certified Fairtrade yet (0/1)	-0.05
	(0.15)
Constant	-1.10***
	(0.39)
Observations	484

Note: PO: predicted outcome, ADPOC: average difference in predicted outcome for certified farmers under certification and hypothetical non-certification, OME0: outcome model estimation for non-certified, OME1: outcome model estimation for certified, Standard errors in parentheses: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Publication bibliography

Alkire, Sabina; Meinzen-Dick, Ruth; Peterman, Amber; Quisumbing, Agnes; Seymour, Greg; Vaz, Ana (2013): The Women's Empowerment in Agriculture Index. In *World Development* 52, pp. 71–91. DOI: 10.1016/j.worlddev.2013.06.007.

APPCACAO (2020): Plan Estrategico 2020-2030. Asociación Peruana de Productores de Cacao. Lima.

Armbruster, Stacy; Solomon, Jennifer; Blare, Trent; Donovan, Jason (2019): Women's time use and implications for participation in cacao value chains: evidence from VRAEM, Peru. In *Development in Practice* 29 (7), pp. 827–843. DOI: 10.1080/09614524.2019.1604630.

Arora, Diksha; Rada, Codrina (2020): Gender norms and intrahousehold allocation of labor in Mozambique: A CGE application to household and agricultural economics. In *Agricultural Economics* 51 (2), pp. 259–272. DOI: 10.1111/agec.12553.

Bandanaa, Joseph; Asante, Isaac K.; Egyir, Irene S.; Schader, Christian; Annang, Ted Y.; Blockeel, Johan et al. (2021): Sustainability performance of organic and conventional cocoa farming systems in Atwima Mponua District of Ghana. In *Environmental and Sustainability Indicators* 11, p. 100121. DOI: 10.1016/j.indic.2021.100121.

Barrientos, Stephanie (2014): Gendered Global Production Networks: Analysis of Cocoa–Chocolate Sourcing. In *Regional Studies* 48 (5), pp. 791–803. DOI: 10.1080/00343404.2013.878799.

Blare, Trent; Corrales, Isabel; Zambrino, Luca (2020): Can Niche Markets for Local Cacao Varieties Benefit Smallholders in Peru and Mexico? In *Choices* Quarter 4. Available online at https://www.choicesmagazine.org/choices-magazine/theme-articles/functional-foods-fad-or-path-to-prosperity/can-niche-markets-for-local-cacao-varieties-benefit-smallholders-in-peru-and-mexico.

Bolwig, Simon (2012): Poverty and Gender Effects of Smallholder Organic Contract Farming in Uganda. International Food Policy Research Institute (IFPRI). Washington, DC (USSP Working Paper 8). Available online at https://forskning.ruc.dk/en/publications/poverty-and-gender-effects-of-smallholder-organic-contract-farmin.

Boonaert, Eva; Depoorter, Charline; Marx, Axel; Maertens, Miet (2024): Carrots rather than sticks: Governance of voluntary sustainability standards and farmer welfare in Peru. In *Sustainable Development*, Article sd.3035. DOI: 10.1002/sd.3035.

Burda, Michael; Hamermesh, Daniel; Weil, Philippe (2007): Total Work, Gender and Social Norms. In *National Bureau of Economic Research*. DOI: 10.3386/w13000.

Bymolt, R.; Laven, A.; Tyszler, M. (2018): Demystifying the cocoa sector in Ghana and Côte d'Ivoire.

CAMCAFE (2025): Cacao peruano - Estadísticas. Cámara Peruana del Café y el Cacao. Available online at https://camcafeperu.com.pe/ES/cacao-peruano-estadisticas.php, updated on 3/5/2025, checked on 3/5/2025.

Chiputwa, Brian; Qaim, Matin (2016): Sustainability Standards, Gender, and Nutrition among Smallholder Farmers in Uganda. In *The Journal of Development Studies* 52 (9), pp. 1241–1257. DOI: 10.1080/00220388.2016.1156090.

Cislaghi, Beniamino; Heise, Lori (2020): Gender norms and social norms: differences, similarities and why they matter in prevention science. In *Sociology of health & illness* 42 (2), pp. 407–422. DOI: 10.1111/1467-9566.13008.

Das, Priyam (2014): Women's Participation in Community-Level Water Governance in Urban India: The Gap Between Motivation and Ability. In *World Development* 64, pp. 206–218. DOI: 10.1016/j.worlddev.2014.05.025.

Diiro, Gracious M.; Seymour, Greg; Kassie, Menale; Muricho, Geoffrey; Muriithi, Beatrice Wambui (2018): Women's empowerment in agriculture and agricultural productivity: Evidence from rural maize farmer households in western Kenya. In *PloS one* 13 (5), e0197995. DOI: 10.1371/journal.pone.0197995.

Doss, Cheryl; Gottlieb, Charles (2025): Gendered Patterns of Labor in Agriculture. In *Agricultural Economics*, Article agec.70012. DOI: 10.1111/agec.70012.

Doss, Cheryl R. (2018): Women and agricultural productivity: Reframing the Issues. In *Development policy review : the journal of the Overseas Development Institute* 36 (1), pp. 35–50. DOI: 10.1111/dpr.12243.

Effendy; Pratama, M. Fardhal; Rauf, Rustam Abdul; Antara, Made; Basir-Cyio, Muhammad; Mahfudz; Muhardi (2019): Factors influencing the efficiency of cocoa farms: A study to increase income in rural Indonesia. In *PloS one* 14 (4), e0214569. DOI: 10.1371/journal.pone.0214569.

Eissler, Sarah; Heckert, Jessica; Myers, Emily; Seymour, Greg; Sinharoy, Sheela; Yount, Kathryn (2022): Measuring Women's Empowerment: Gender and Time-use Agency in Benin, Malawi and Nigeria. In *Development & Change* 53 (5), pp. 1010–1034. DOI: 10.1111/dech.12725.

El Peruano (2025): Ley de perfeccionamiento de la asociatividad de los productores agrarios en cooperativas agrarias - LEY - N° 31335 - CONGRESO DE LA REPUBLICA. Diario oficial de la República del Perú. Available online at https://busquedas.elperuano.pe/dispositivo/NL/1980284-1, updated on 3/5/2025, checked on 3/5/2025.

Etuah, S.; Ohene-Yankyera, K.; Aidoo, R.; Haleegoah, J.; Wiggins, S.; Henley, G. (2020): Impact of oil palm-related activities on women's empowerment in Ghana. In *World Development Perspectives* 19, p. 100225. DOI: 10.1016/j.wdp.2020.100225.

FAO (2021): FAOSTAT. Statistical Database. Food and Agriculture Organization of the United Nations (FAO). Rome, Italy. Available online at https://www.fao.org/faostat/en/#data/QCL, updated on 7/26/2022, checked on 8/23/2022.

FAO; IIASA (2025): Global Agro Ecological Zones version 4 (GAEZ v4). Available online at http://www.fao.org/gaez/, checked on 9/21/2023.

Fischer, Elisabeth; Qaim, Matin (2012): Gender, agricultural commercialization, and collective action in Kenya. In *Food Sec.* 4 (3), pp. 441–453. DOI: 10.1007/s12571-012-0199-7.

Gallagher, Emily J.; Monterroso, Iliana.; Sanjaya, Made (2020): Women's access, equity and empowerment: Progress and uptake of the Fairtrade Gender Strategy 2016-2020. Fairtrade International. Available online at https://www.fairtrade.net/library/womens-access-equity-and-empowerment-study.

Gumucio, Tatiana; Yore, Hannah; Mello, Denyse; Loucel, Claudia (2016): Coffee and cocoa value chains: Gender dynamics in Peru and Nicaragua: International Center for Tropical Agriculture. Available online at https://cgspace.cgiar.org/handle/10568/78760.

Handschuch, Christina; Wollni, Meike (2016): Traditional Food Crop Marketing in Sub-Saharan Africa: Does Gender Matter? In *The Journal of Development Studies* 52 (3), pp. 343–359. DOI: 10.1080/00220388.2015.1068289.

Hörner, Denise; Wollni, Meike (2021): Integrated soil fertility management and household welfare in Ethiopia. In *Food Policy* 100, p. 102022. DOI: 10.1016/j.foodpol.2020.102022.

Huetz-Adams, Friedel; Campos, Pablo; Fountain, Antonie (2022): Latin America Baseline Cocoa Barometer 2022.

ICCO (2024): Fine Flavor Cocoa - International Cocoa Organization. International Cocoa Organization. Available online at https://www.icco.org/fine-or-flavor-cocoa/, updated on 5/15/2024, checked on 3/5/2025.

IFPRI Qualitative Team (2018): GAAP 2 Qualitative Research Protocols. IFPRI. Washington, DC. Available online at https://gender.cgiar.org/publications/gaap-2-qualitative-research-protocols.

Imbens, Guido W.; Wooldridge, Jeffrey M. (2009): Recent Developments in the Econometrics of Program Evaluation. In *Journal of Economic Literature* 47 (1), pp. 5–86. DOI: 10.1257/jel.47.1.5.

Johnson, Nancy; Balagamwala, Mysbah; Pinkstaff, Crossley; Theis, Sophie; Meinsen-Dick, Ruth; Agnes, Quisumbing (2018): How do agricultural development projects empower women? Linking strategies with expected outcomes. In *Journal of Gender, Agriculture and Food Security (Agri-Gender)* 3 (302-2019-3652). DOI: 10.22004/ag.econ.293596.

Kabeer, Naila (1999): Resources, Agency, Achievements: Reflections on the Measurement of Women's Empowerment. In *Development & Change* 30 (3), pp. 435–464. DOI: 10.1111/1467-7660.00125.

Katz, Elizabeth G. (1995): Gender and trade within the household: Observations from rural guatemala. In *World Development* 23 (2), pp. 327–342. DOI: 10.1016/0305-750X(94)00118-I.

Kubitza, Christoph; Krishna, Vijesh V.; Klasen, Stephan; Kopp, Thomas; Nuryartono, Nunung; Qaim, Matin (2023): Labor Displacement in Agriculture. In *Land Economics*, 122122-0109R1. DOI: 10.3368/le.100.3.122122-0109R1.

Kuhn, Michaela; Tennhardt, Lina; Lazzarini, Gianna A. (2023): Gender Inequality in the Cocoa Supply Chain: Evidence from Smallholder Production in Ecuador and Uganda. In *World Development Sustainability* 2, p. 100034. DOI: 10.1016/j.wds.2022.100034.

Laroche, Karine; Jiménez, Roberto; Nelson, Valerie (2012): Assessing the Impact of Fairtrade for Peruvian Cocoa Farmers. Natural Resources institute, University of Greenwich. Available online at https://tinyurl. com/qssew77.

López Quirós, Carlos Eduardo (2020): Manual de Producción y Certificación de Cacao Orgánico.

Lyon, Sarah; Bezaury, Josefina Aranda; Mutersbaugh, Tad (2010): Gender equity in fairtrade–organic coffee producer organizations: Cases from Mesoamerica. In *Geoforum* 41 (1), pp. 93–103. DOI: 10.1016/j.geoforum.2009.04.006.

Lyon, Sarah; Mutersbaugh, Tad; Worthen, Holly (2017): The triple burden: the impact of time poverty on women's participation in coffee producer organizational governance in Mexico. In *Agric Hum Values* 34 (2), pp. 317–331. DOI: 10.1007/s10460-016-9716-1.

Ma, Wanglin; Zhou, Xiaoshi; Boansi, David; Horlu, Godwin Seyram Agbemavor; Owusu, Victor (2024): Adoption and intensity of agricultural mechanization and their impact on non-farm employment of rural women. In *World Development* 173, p. 106434. DOI: 10.1016/j.worlddev.2023.106434.

Malapit, Hazel; Kovarik, Chiara; Sproule, Kathryn; Meinzen-Dick, Ruth; Quisumbing, Agnes (2015): Instructional guide on the abbreviated women's empowerment in agriculture index (A-WEAI). 2020 Updated. International Food Policy Research Institute (IFPRI). Available online at https://weai.ifpri.info/files/2021/01/a-weai-instructional-guide_updated-june-19-2020.pdf.

Malapit, Hazel; Pinkstaff, Crossley; Sproule, Kathryn; Kovarik, Chiara; Quisumbing, Agnes; Meinzen-Dick, Ruth (2017): The Abbreviated Women's Empowerment in Agriculture Index (A-WEAI). International Food Policy Research Institute (IFPRI) (IFPRI Discussion Paper 01647). Available online at https://www.ifpri.org/publication/abbreviated-womens-empowerment-inagriculture-index-weai.

Malapit, Hazel; Quisumbing, Agnes; Meinzen-Dick, Ruth; Seymour, Greg; Martinez, Elena M.; Heckert, Jessica et al. (2019): Development of the project-level Women's Empowerment in Agriculture Index (pro-WEAI). In *World Development* 122, pp. 675–692. DOI: 10.1016/j.worlddev.2019.06.018.

Manda, Julius; Gardebroek, Cornelis; Kuntashula, Elias; Alene, Arega D. (2018): Impact of improved maize varieties on food security in Eastern Zambia: A doubly robust analysis. In *Review of Development Economics* 22 (4), pp. 1709–1728. DOI: 10.1111/rode.12516.

Meemken, Eva-Marie (2020): Do smallholder farmers benefit from sustainability standards? A systematic review and meta-analysis. In *Global Food Security* 26, p. 100373. DOI: 10.1016/j.gfs.2020.100373.

Meemken, Eva-Marie (2021): Large farms, large benefits? Sustainability certification among family farms and agro-industrial producers in Peru. In *World Development* 145, p. 105520. DOI: 10.1016/j.worlddev.2021.105520.

Meemken, Eva-Marie; Qaim, Matin (2018a): Can private food standards promote gender equality in the small farm sector? In *Journal of Rural Studies* 58, pp. 39–51. DOI: 10.1016/j.jrurstud.2017.12.030.

Meemken, Eva-Marie; Qaim, Matin (2018b): Organic Agriculture, Food Security, and the Environment. In *Annu. Rev. Resour. Econ.* 10 (1), pp. 39–63. DOI: 10.1146/annurev-resource-100517-023252.

Mehraban, Nadjia; Debela, Bethelhem Legesse; Kalsum, Ummi; Qaim, Matin (2022): What about her? Oil palm cultivation and intra-household gender roles. In *Food Policy* 110, p. 102276. DOI: 10.1016/j.foodpol.2022.102276.

Midagri (2023): Perfil Productivo y Competitivo de los Principales Cultivos del Sector - Cacao - Year 2022. Available online at https://app.powerbi.com/view?r=eyJrIjoiNzEzNTU2MmUtY2EzZC00YjQ2LTg5YzUtYzJjODRhZjg5NGY5IiwidCI6IjdmMDg0NjI3LTdmNDAtNDg3OS04OTE3LTk0Yjg2ZmQzNWYzZiJ9, updated on 10/16/2023, checked on 10/16/2023.

Minam (2021): Plan Nacional de Adaptación al Cambio Climático del Perú: un insumo para la actualización de la Estrategia Nacional ante el Cambio Climático. Ministerio del Ambiente, Gobierno del Perú.

Morgan, Miranda; Zaremba, Haley (2023): The contribution of voluntary sustainability systems to women's participation and leadership in decision-making: A strategic evidence review. Available online at https://cgspace.cgiar.org/handle/10568/132142.

Moser, Christine M.; Barrett, Christopher B. (2006): The complex dynamics of smallholder technology adoption: the case of SRI in Madagascar. In *Agricultural Economics* 35 (3), pp. 373–388. DOI: 10.1111/j.1574-0862.2006.00169.x.

Nash, Julie; Grewer, Uwe; Bockel, Louis; Galford, Gillian; Pirolli, Gillian; White, Julianna (2016): Peru Cacao Alliance: Carbon sequestration as a co-benefit of cacao expansion. CCAFS Info Note. CIAT; FAO. Available online at https://www.fao.org/3/i6502e/i6502e.pdf, checked on 8/24/2022.

Njuki, Jemimah (2021): Gender Equality and Women's Empowerment in Rapidly Transforming Food Systems. Discussion Starter prepared for the United Nations Food Systems Summit 2021. Available online at https://sc-fss2021.org/wp-content/uploads/2021/06/fss_brief_gender_equality.pdf.

Njuki, Jemimah; Kaaria, Susan; Chamunorwa, Angeline; Chiuri, Wanjiku (2011): Linking Smallholder Farmers to Markets, Gender and Intra-Household Dynamics: Does the Choice of Commodity Matter? In *Eur J Dev Res* 23 (3), pp. 426–443. DOI: 10.1057/ejdr.2011.8.

Nkamleu, Guy B.; Kielland, Anne (2006): Modeling farmers' decisions on child labor and schooling in the cocoa sector: a multinomial logit analysis in Côte d'Ivoire. In *Agricultural economics (Amsterdam, Netherlands)* 35 (3), pp. 319–333. DOI: 10.1111/j.1574-0862.2006.00165.x.

Oberlack, Christoph; Blare, Trent; Zambrino, Luca; Bruelisauer, Samuel; Solar, Jimena; Villar, Gesabel et al. (2023): With and beyond sustainability certification: Exploring inclusive business and solidarity economy strategies in Peru and Switzerland. In *World Development* 165, p. 106187. DOI: 10.1016/j.worlddev.2023.106187.

OECD (2022): Gender Equality in Peru: Towards a Better Sharing of Paid and Unpaid Work // Gender Equality in Peru. Edited by OECD Publishing. Paris.

Petrics, H.; Barale, K.; Kaaria, S. K.; David, S. (2022): Good practices for promoting gender equality through rural advisory services - Case studies from Ethiopia, India and Peru. Rome: FAO.

Picchioni, Fiorella; Zanello, Giacomo; Srinivasan, C. S.; Wyatt, Amanda J.; Webb, Patrick (2020): Gender, time-use, and energy expenditures in rural communities in India and Nepal. In *World Development* 136, p. 105137. DOI: 10.1016/j.worlddev.2020.105137.

Pierotti, Rachael S.; Friedson-Ridenour, Sophia; Olayiwola, Olubukola (2022): Women farm what they can manage: How time constraints affect the quantity and quality of labor for married women's agricultural production in southwestern Nigeria. In *World Development* 152, p. 105800. DOI: 10.1016/j.worlddev.2021.105800.

Quisumbing, Agnes R.; Doss, Cheryl R. (2021): Gender in agriculture and food systems. In Christopher B. Barrett, David Just (Eds.): Handbook of agricultural economics, vol. 5. Amsterdam, Oxford, Amsterdam: Elsevier; North Holland (Handbooks in economics), pp. 4481–4549.

Ruben, Ruerd; Fort, Ricardo (2012): The Impact of Fair Trade Certification for Coffee Farmers in Peru. In *World Development* 40 (3), pp. 570–582. DOI: 10.1016/j.worlddev.2011.07.030.

Sellare, Jorge; Jäckering, Lisa; Kahsay, Goytom; Meemken, Eva-Marie (2023): Five stylized facts about producer organizations and rural development. In *J of Agr & App Econ Assoc* 2 (3), pp. 428–445. DOI: 10.1002/jaa2.70.

Sellare, Jorge; Meemken, Eva-Marie; Kouamé, Christophe; Qaim, Matin (2020): Do Sustainability Standards Benefit Smallholder Farmers Also When Accounting For Cooperative Effects? Evidence from Côte d'Ivoire. In *American Journal of Agricultural Economics* 102 (2), pp. 681–695. DOI: 10.1002/ajae.12015.

Seymour, Greg; Malapit, Hazel; Quisumbing, Agnes (2020): Measuring Time Use in Developing Country Agriculture: Evidence from Bangladesh and Uganda. In *Feminist Economics* 26 (3), pp. 169–199. DOI: 10.1080/13545701.2020.1749867.

Sinharoy, Sheela; Cheong, Yuk Fai; Seymour, Greg; Heckert, Jessica; Johnson, Erin R.; Yount, Kathryn M. (2023): The Time-Use Agency Scale: Development and Validation of a Measure for Ghana and Beyond. In *Feminist Economics* 29 (4), pp. 103–132. DOI: 10.1080/13545701.2023.2262476.

Skalidou, Dafni (2020): Women and Cocoa: Fairtrade Foundation research paper into the links between female participation in cocoa production and women's economic empowerment.

Tennhardt, Lina; Lazzarini, Gianna; Weisshaidinger, Rainer; Schader, Christian (2022): Do environmentally-friendly cocoa farms yield social and economic co-benefits? In *Ecological Economics* 197, p. 107428. DOI: 10.1016/j.ecolecon.2022.107428.

Traldi, Rebecca (2021): Progress and pitfalls: A systematic review of the evidence for agricultural sustainability standards. In *Ecological Indicators* 125, p. 107490. DOI: 10.1016/j.ecolind.2021.107490.

Trommlerová, Sofia Karina; Klasen, Stephan; Leßmann, Ortrud (2015): Determinants of Empowerment in a Capability-Based Poverty Approach: Evidence from The Gambia. In *World Development* 66, pp. 1–15. DOI: 10.1016/j.worlddev.2014.07.008.

Twyman, J.; Useche, P.; Deere, C. D. (2015): Gendered Perceptions of Land Ownership and Agricultural Decision-making in Ecuador: Who Are the Farm Managers? In *Land Economics* 91 (3), pp. 479–500. DOI: 10.3368/le.91.3.479.

UN DESA (2023): The Sustainable Development Goals Report 2023: Special Edition. New York, USA. Available online at https://unstats.un.org/sdgs/report/2023/, updated on 9/22/2023, checked on 9/22/2023.

Vellema, W.; Buritica Casanova, A.; Gonzalez, C.; D'Haese, M. (2015): The effect of specialty coffee certification on household livelihood strategies and specialisation. In *Food Policy* 57, pp. 13–25. DOI: 10.1016/j.foodpol.2015.07.003.

Vitellozzi, Sveva; Giannelli, Gianna Claudia (2024): Thriving in the rain: natural shocks, time allocation, and women's empowerment in Bangladesh. In *World Development* 181, p. 106684. DOI: 10.1016/j.worlddev.2024.106684.

Willer, Helga; Trávníček, Jan; Meier, Claudia; Schlatter, Bernhard (2022): The World of Organic Agriculture. Statistics and Emerging Trends 2022. Research Institute of Organic Agriculture FiBL, Frick, and IFOAM – Organics. Bonn.