Experimental Evidence on Rural Childcare Provision*

Aletheia Donald† Sara Lowes‡ Julia Vaillant§

World Bank *UC San Diego* *World Bank*

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Abstract

Women are often the primary caregivers for children, which may restrict women's economic activities. We examine how the provision of community-based childcare centers for children aged 2-6 in rural areas of the Democratic Republic of the Congo affects outcomes for women, their husbands, and children. Using a randomized controlled trial, we find that 73% of households provided with access to the centers use them. This translates into a reduction in the amount of time women spend on childcare. The centers lead to significant increases in women's engagement in commercial agricultural, plot productivity, and monthly income. Women decrease their need to multi-task while farming, reporting increases in their concentration and sense of control. Men are more likely to be engaged in non-agricultural self-employment, and overall household income increases. Finally, children benefit from attending childcare centers; we find evidence of improvements in early childcare development indicators. Our results underscore the broad welfare benefits of increasing childcare access in rural low-income settings.

Keywords: childcare, gender, labor force participation, child development

JEL Classification: J16, J13, I38, O15

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†World Bank, Africa Gender Innovation Lab. Email: adonald@worldbank.org.

‡UC San Diego. Email: slowes@ucsd.edu. Website: www.saralowes.com.

§World Bank, Africa Gender Innovation Lab. Email: jvaillant@worldbank.org.

1 Introduction

Women are more likely than men to be the primary caregivers for children around the world. There is growing recognition that these childcare responsibilities restrict women's economic potential and limit their earnings (Delecourt and Fitzpatrick, 2021; Kleven et al., 2019). The resulting economic losses are particularly consequential for lower-income countries, who could witness large gains in output from leveling the playing field for women in the labor market (Ostry et al., 2018; Hsieh et al., 2019). Yet, evidence on income gains for women and their families from increased availability of childcare in low-income settings is scarce, particularly in rural contexts.

This paper presents findings on the effects of opening community-based childcare centers in rural villages within the Democratic Republic of the Congo (DRC), in partnership with the country's Ministry of Education. We randomly select 55 out of 110 eligible paired villages to receive childcare centers, open to children aged between 2 and 6. We examine effects 5-19 months later, using a sample of 1,006 eligible women's households and their children.

We find high demand for the centers, even though the centers were implemented in rural villages and had no previous experience with institutional childcare arrangements. 73% of eligible households sent their children to the center in their village at least once, and 65% sent their child at least once a week. This results in a reduction in the number of daily hours spent on childcare by eligible households of 2.5 hours, corresponding to a reduction of 3.4 hours a day among treated households. This time savings accrues almost entirely to mothers.

We detect substantial shifts in economic participation as a result of opening a childcare center in a village. Women are 11.3 percentage points more likely to be engaged in commercial agriculture, 8.7 percentage points more likely to work in agricultural processing, and 2.2 percentage points more likely to be employed in non-agricultural wage work. This increase in economic engagement does not come at the expense of sleep or leisure time for these women. Their husbands, despite not seeing a significant shift in their (already minimal) time spent on childcare, are 9.8 percentage points more likely to work in commercial agriculture, and 5.3 percentage points more likely to work as entrepreneurs.

Women report taking their child to work less often, and consequently being interrupted less, multi-tasking less and feeling unconcentrated less often. We detect significant gains in agricultural yields on household plots, particularly on plots for which the woman has decision-making power over crop revenue. Women's monthly revenue increases by 28.7%. Husbands also benefit, and total household monthly revenue increases 34.2%.

We observe improvements in early childhood development outcomes, particularly for younger children—who witness an 7% increase in a summary score of their developmental status (which measures their motor, language, cognition, socio-emotional skills and mental health). These results are not significantly higher in centers assessed as higher-quality by independent raters, suggesting that they partially arise from an income effect at the household level. However, we do observe a higher prevalence of altruistic behavior among children in higher-quality centers.

Although the positive effects of women's access to childcare on their labor force participation are well-documented in developed countries (Bick, 2016; Givord and Marbot, 2015), this is not the case in low-income settings. Our study advances this limited experimental literature, which is largely concentrated in urban areas and examines increasing access for *existing* centers. De Barros et al. (2011) show that the odds of a mother having a job improve from 36 to 46 percent when she wins a spot in a lottery for free child care for low-income families in Rio de Janeiro, Brazil. Household incomes increase by 16 percent. Clark et al. (2019) examine the effects of childcare in an informal settlement in Nairobi, Kenya. They find that women who were offered vouchers for subsidized early childcare were 8.5 percentage points more likely to be employed than those who were not given

vouchers, and have 24 percent higher monthly earnings. Martínez and Perticará (2017) randomize applicants to an afterschool program for children aged between 6 and 13 in Chile, and find that program participation increases employment by 5% and labor force participation by 7%. In urban Burkina Faso, Ajayi et al. (2022) find that mobile crèches increased women's hours worked and monthly income. Lastly, Bjorvatn et al. (2022) offer childcare subsidies to households in urban and peri-urban Uganda, and find a 44% increase in household income. In contrast, our study examines the opening of new childcare centers in remote rural villages, among a population with no prior exposure to institutional childcare.

Our paper is also related to the broader literature on the consequences of strengthening women's economic participation. We find that decreasing women's childcare hours not only benefits them, but allows their husbands to diversify their economic activities due to labor complementarities. This advances work on the ramifications and spillover effects of increasing women's labor force participation and productivity at work (Ostry et al., 2018; Weinstein, 2017).

Lastly, our paper contributes to the literature on how to improve early childhood development in low-resource settings, and on the consequences of childcare provision on inequality. Li et al. (2016) examine the early development of fairness preference in sixty 2-and 3-year-old children, and find that inequity aversion develops in young children and increases with age over the course of early childhood. In our paper, we show causal evidence that access to childcare centers increases altruism and gender egalitarian preferences in young children, but only in higher-quality centers.

The remainder of the paper proceeds as follows. Section 2 introduces the experimental design, data and presents summary statistics. Section 3 covers our estimation strategy and describes balance. Our results on outcomes and mechanisms are covered in Section 4, while Section 5 presents robustness checks. Section 6 concludes.

2 Setting and experimental design

The Democratic Republic of Congo (DRC) is the largest country in Sub-Saharan Africa, with a vast endowment of natural resources. However, it is also one of the poorest countries in the world. While the proportion of people living below the poverty line declined from 69% to 64% between 2005 and 2012, the absolute number of poor increased by 7 million during the same period. Agriculture is the cornerstone of the Congolese economy, though productivity has been declining over the last fifty years (Akitoby and Cinyabuguma, 2004), and yields of the principal food crops (such as cassava and rice) remain very low.

Within the DRC, women face significant barriers to economic opportunities and empowerment. The DRC ranked 150th out of 162 countries in the 2019 Gender Inequality Index. Women's labor force participation rate in the DRC is 62%, and nationally, women are 6.2% to 8.2% less likely to work than their male counterparts. Within agriculture, which employs over two-thirds of women in the DRC, the production of women farmers is 18% lower than that of men and their productivity is 11% lower (World Bank, 2021). Gender gaps are even larger when comparing men and women in the same households.

Female farmers face greater constrains than men in terms of access to agricultural inputs such as land, fertilizer and improved seeds (O'Sullivan et al., 2014). Women farmers also face severe time constraints due to their larger role in domestic work and childcare responsibilities. Our data show that on average, women in Kongo Central and Bandundu spend 20 hours a week on domestic work and care activities compared to men's 7 hours, which is associated with women's lower labor productivity (Donald et al., 2018).

Despite this, the supply of daycare services in the DRC is severely limited. Only 4% of children

nationally are enrolled in childcare. The vast majority of centers are private and located in urban areas, with up to 12.6% of children between the ages of 3 and 5 attending pre-school in Kinshasa (MEPS-INC and MESU, 2015). Pre-school provision is evenly divided between the public and private sector with 50.8% in the public sector and 49.2% in the private sector. For children younger than 3, almost all nurseries or childcare are organized by private partners (Cellule Technique pour les Statistiques de l'Education, 2021).

2.1 Experimental design

Our sampling frame is a group of rural villages compiled by our implementation partner Réseau Provincial des Associations des Femmes pour la Promotion de l'Education (REPAFE). These villages are spread across the four *territoires* of Lukula, Sekebanza, Songololo, and Mbanza Ngungu (Figure A1). The eligibility of villages was determined as a result of (i) community agreement with the proposed childcare pilot, (ii) community willingness to make a suitable building available to host the center for free for the duration of the project, and (iii) accessibility. The identification process yielded 179 eligible villages.

A listing exercise was conducted in all 179 villages by a survey firm to identify eligible households. A household was determined to be eligible if it included a woman with at least one child aged 1 to 5 at the time of listing, who was engaged in agriculture and was interested in using the childcare centers (hereafter called the 'index woman'). Villages with fewer than 10 eligible households were dropped from the sampling frame.

Villages were then randomized into treatment and control. We used a pairwise Mahalanobis matching using an optimal greedy algorithm (Rosenbaum, 1989) to select treatment and control villages within the same territoire, using the listing data collected at baseline and the following matching variables: number of eligible households and children in the village, number of farmed plots per household, average plot size, and share of plots managed by women. Villages with no pairs within their territoire were matched with villages in another territoire.

Treatment villages were supported in opening a daycare center, in which children ages 2 to 6 could come for six hours a day, five days a week, for a duration of 12 months. The childcare provider, called *encadreuse*, lived in the village. The selection of encadreuses was based on their good character, their availability for the duration of the program and their writing and reading skills. They were selected by the community including the women in the program and the head of the village and their eligibility was confirmed by the implementation partner.

Following national guidelines, the maximum number of children per encadreuse was 14. The encadreuse used a structured curriculum that followed national standards and was informed by international ECD best practices. Basic equipment was provided to the centers, including first aid kits, toys, mats. Lunches were co-funded by the parents and the project.

Table 1: Parent Satisfaction with Centers

	Very satisfied (%)	Satisfied (%)	Not very/not at all satisfied (%)
Location	35.97	52.26	11.76
Learning activities	44.98	50.23	4.72
Opening hours	38.91	53.17	7.92
Hygiene and security	39.91	53.74	6.35
Children's knowledge	48.30	48.98	2.72
Overall functioning	36.59	58.86	4.55

Notes: 454 eligible women in treatment villages, interviewed during follow-up.

The centers were opened in two batches. The first batch of 25 centers opened in 21 villages in March 2019. The centers closed and re-opened several times due to the COVID19 pandemic, and support to the first batch of centers finally ended at the end of November 2021, after 14 non-consecutive months of operation. The second batch of 42 centers opened in 34 villages in May 2021 and remained open for 12 consecutive months.

2.2 Data

We collected data on index women, their households and children through in-person interviews. A baseline survey took place in October-November 2019, with 493 index women in the treatment villages and 1,048 women in the control villages. We conducted a follow-up survey with all treatment women and half of the control sample in October-November 2021 to assess impacts. This survey included modules on household members' economic activities and time use, mothers' well-being and early childhood development. We also collected plot-level data, with detailed information on crop production, revenue and labor inputs. For child outcomes, we administered the Caregiver Reported Early Development Instruments (CREDI) to parents for children between 6 and 48 months, and the Measuring Early Learning Quality and Outcomes (MELQO) module to children between 49 and 92 months.

In addition to these in-person interviews, we also collected (i) daily attendance data, recorded by the encadreuse and (ii) an enumerator assessment of center quality.

3 Empirical strategy and sample

3.1 Empirical strategy

Our primary results specification estimates Intent-to-Treat effects for households in treatment villages vs. households in control villages. Our results using survey data are estimated using ANCOVA as follows:

$$y_{ivt} = \beta_1 Childcare_{iv} + y_{iv0} + \gamma_{p(v)} + \epsilon_{ivt} \tag{1}$$

where y_{ivt} is the outcome of interest for household i from village v at midline or endline, and y_{iv0} is the outcome of interest for household i at baseline ($t = 0$). $Childcare_{iv}$ is an indicator variable that equals one if the household i is located in a village assigned to receive a childcare center. $\gamma_{p(v)}$ denotes village-pair fixed effects, where $p(v)$ are the matched village pairs. Standard errors are clustered at the village-pair level (de Chaisemartin and Ramirez-Cuellar, 2020).

3.2 Balance and final sample

All 55 villages assigned to receive a childcare center opened at least one center, with two centers in villages that had more than 14 eligible children. A total of 67 centers across the 55 treatment villages were opened. Table 2 shows descriptive statistics at baseline for the 493 treatment and 1,048 control households interviewed at baseline.

The sample is balanced. The average number of children per household is slightly higher in treatment households (significant at the 10 percent level). Control households have an additional 0.22 plots compared to treatment households, and they are 5 percentage point less likely to be headed by a woman. There is no significant difference between treatment and control households at baseline for a range of other socio-economic characteristics and the joint significance test rejects systematic differences between the two groups.

Table 2: Sample balance at baseline

	(1)	(2)	(1-2)
	Treatment	Control	Diff
	Mean	Mean	p-value
Panel A. HH level			
Household size	5.75	5.85	0.40
Number of adults (> or = to 15 years)	2.64	2.75	0.11
Number of children (< or = to 5 years)	1.46	1.39	0.07
Dependency ratio	133.97	132.47	0.75
Number of plots in the hh	1.60	1.82	0.05
Asset Index	0.34	0.33	0.36
Panel B. Selected woman level			
Index woman age	31.94	31.51	0.33
Index woman years of education	6.76	6.70	0.89
Index woman is wife of hh head	0.89	0.84	0.06
Index woman is a plot manager	0.22	0.22	0.95
Index woman has farmed crops for sale	0.72	0.72	0.79
Index woman has off-farm business (incl)	0.12	0.10	0.70
Index woman has off-farm business (excl)	0.02	0.02	0.46
Panel C. Joint test for panels A-B			
p-value (joint F-test)			0.13
Observation	493	1,048	1,528

Notes: The value displayed for t-tests are the differences in the means across the groups. Standard errors are clustered at variable village. ***, **, and * indicate significance at the 1, 5, and 10 percent critical level. Business incl and excl are respectively business including and excluding livestock and agricultural product processing. Asset index is computed using the multi correspondence analysis of different dummy variables including having a bed,a radio, a TV, a cellphone, a bicycle and a motorcycle at hh level.

Households in our sample have an average of 5.8 members, 2.7 of them adults (aged 15+) and with 1.4 children aged 5 or less. The dependency ratio (the number of dependents aged zero to 14 and over the age of 65, compared with household members aged 15 to 64) is 134.6, indicating high care burdens. Index women are on average 32 years old with less than seven years of education. 88% of them are the household head or his wife, with the remainder being the daughters/daughters-in-law of the household head (or in a few instances, the household head's granddaughter). Households on average own 1.7 plots, and 21% of index women manage a plot in the household. 73% of index women work in agriculture, while 11% work in an off-farm business (mostly in agricultural processing, followed by livestock rearing) at baseline. As shown in Table B1, the most common crop grown by households at baseline is cassava, followed by variety of crops, peanuts, then commercial crops (such as rubber, palm oil, coffee, cotton and cashew) and maize.

At follow-up, we attempted to reach all treatment households and half of the control group. We were able to reach 473 of the 529 households randomized into treatment, which translates into an attrition rate of 0.106 for the treatment group.[1] For the ANCOVA analysis, we further drop 27 households who had been assigned to treatment but had not been interviewed at baseline, yielding 446 treatment households who had been interviewed both at baseline and midline.We reached 533 households from control villages, corresponding to an approximate attrition rate of 0.171.[2] Though the joint F-test of attrition predictors is not significant overall, Table B2 shows that larger households are slightly less likely to attrit in the control group but not in the treatment group. To address differential attrition between the treatment and control groups, we estimate Lee bounds (Lee, 2002).

4 Results

4.1 Treatment adoption and compliance

We find high demand for the centers, even though we are considering rural villages without previous experience with institutional childcare arrangements. 73% of eligible households sent their children to the center in their village at least once, and 65% sent their child at least once a week (Table 3).

4.2 Time use and labor force participation

We find that the presence of the centers significantly reduces the time that household members spend on childcare. Our intent-to-treat effects show an average reduction of 2.5 hours among treatment households, a 16% reduction over the control mean. Nearly all of this treatment effect derives from a reduction in carework hours by the index woman, who decreases her daily time spent on carework by 1.8 hours a day. We also note a small reduction in time spent on carework by other

[1] 36 households were randomized into treatment at a later stage, post-baseline, in order to fill up vacancies in some centers. This means that at midline we attempted to interview 493+36=529 treatment households.

[2] Due to a lack of documentation of tracking attempts in the control villages by the survey firm, calculating the real attrition rate in the control group is not straightforward. The survey firm was handed a primary list of 535 control households to track, and 513 replacement households (all of which had been interviewed at baseline). When the firm was not able to reach 179 households from the primary list, it went through the replacement list until it reach the desired total number of interviewed households of 533. However, although the number of recontact attempts were not documented, we know that tracking was less intensive in the control group then in the treatment group, due to the availability of the replacement list. Multiple attrition rates can thus be calculated, depending on the denominator chosen, and they most likely overestimate the extent to which attrition was higher in the control group. Considering the number of households that were replaced over the full list of potential control households yields an attrition rate of 0.171 (179/1048).

Table 3: Compliance Statistics in treatment villages

	N/[Clusters]	Mean/SE
Child ever used childcare center	504	0.732
	[55]	(0.027)
Child uses childcare center at least once a week	504	0.653
	[55]	(0.032)
Child uses childcare center at least once a week (conditional on ever used)	369	0.892
	[53]	(0.023)
Number of days/week of center attendance	504	3.107
	[55]	(0.163)

Notes: Compliance analysis for children aged 24-72 months. Midline survey data.

adult women in the household that are not the index woman's mother, daughters or sisters.[3]

Table 4: Hours spent on carework by household members (last day)

	(1) Any hh member	(2) Index woman	(3) Husband	(4) Daughters	(5) Sons	(6) Sisters	(7) Mother	(8) Other adult female
Treatment	-2.483***	-1.748***	-0.112	-0.306	-0.079	-0.059	-0.158	-0.122*
	(0.292)	(0.355)	(0.155)	(0.231)	(0.102)	(0.046)	(0.105)	(0.062)
Constant	13.153***	9.323***	0.569***	0.854***	0.043	0.133***	1.534***	0.838***
	(1.173)	(0.556)	(0.066)	(0.099)	(0.044)	(0.020)	(0.056)	(0.027)
Observations	920	920	920	920	920	920	920	920
Control mean	15.744	11.851	1.082	1.455	0.465	0.181	0.502	0.143

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects and baseline values of outcomes are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10. The member category refers to the relationship of household members to the index woman.

In Table B4, we present conditional regressions. Instead of replacing time spent on carework as zero if a specific household member category does not exist, here we run the regression only among households in which a member type exists, for each member type. The results remain unchanged, except that the 'other adult female' category becomes insignificant.

Moreover, we do not detect a change in time spent on leisure, hobbies, sleeping or other activities (Table B5).

What effect does this time saved by the index woman have on her economic participation? Table 5 reports results for each possible category of remunerated employment, and shows large shifts in the woman's economic engagement. She is 11.3 percentage points more likely to farm commercial crops, 8.7 percentage points more likely to work in agricultural processing and 2.2 percentage points more likely to be engaged in non-agricultural wage work (such as working as a hairdresser or teacher).

Table B6 shows that increased engagement in commercial agriculture is coming from an increase of 0.48 hours per day and 1.4 days per month that the woman spends farming crops destined for

[3]Polygamy rates are higher in households that report carework in this category, so this other adult female is likely the husband's second wife.

Table 5: Index woman's engagement in remunerated activities (last 12 months)

	(1) Farming of crops destined for sale	(2) Livestock or poultry rearing	(3) Agricultural processing	(4) Non-agricultural wage work	(5) Non-agricultural self-employment
Treatment	0.111***	0.008	0.081***	0.024*	0.008
	(0.037)	(0.022)	(0.029)	(0.012)	(0.011)
Constant	0.332***	0.068***	0.037***	0.133***	-0.003
	(0.026)	(0.009)	(0.012)	(0.005)	(0.005)
Observations	944	944	944	944	944
Control mean	0.388	0.127	0.283	0.015	0.031

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects and baseline values of outcomes are are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10.

sale, along with an increase of 0.75 months per year. For agricultural processing, we detect a 1 day increase in the number of days per month that the woman works in agricultural processing. For wage employment, the increase derives from 0.24 additional months per year spent on wage work.

Such large changes in the woman's economic engagement may have implications for her husband. For example, if she now has the time to take over an economic activity in the household, the husband may shift to a new economic activity. Or, now that the woman has more time, the household may decide that it's worthwhile to engage in a new economic activity. Both of these channels can have effects on the husband's labor supply.

Indeed, Table 6 shows that the husband is 9.8 percentage points more likely to participate in commercial farming, and 5.3 percentage points more likely to work in entrepreneurship. Table B7 shows large changes in time use for the husband, who increases his involvement in commercial agriculture by 2 days per month, and 0.86 months per year. The increase in engagement in entrepreneurship is due to both an increase in the number of hours per day (0.38) and an increase in the number of days per month (0.49).

Table 6: Husband's engagement in remunerated activities (last 12 months)

	(1) Farming of crops destined for sale	(2) Livestock or poultry rearing	(3) Agricultural processing	(4) Non-agricultural wage work	(5) Non-agricultural self-employment
Treatment	0.106**	0.010	0.014	0.021	0.053***
	(0.043)	(0.026)	(0.017)	(0.030)	(0.018)
Constant	0.402***	-0.005	-0.007	0.365***	-0.026***
	(0.036)	(0.013)	(0.009)	(0.015)	(0.009)
Observations	733	733	733	733	733
Control mean	0.420	0.092	0.039	0.106	0.036

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects and baseline values of outcomes are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10.

4.3 Income and productivity outcomes

Next, we look at the implications of this increase in the woman's (and her husband's) labor supply on the agricultural productivity of plots in the household, and on their their income. Column (1)

of Table 7 shows large gains in average plot yields of 33.7 percent.

In order to investigate mechanisms, we categorize each plot by whether a) the plot is managed by the index woman or by the husband b) whether income on the plot is controlled by the index woman or by the husband and c) whether the plot is worked on by the index woman or by the husband.[4] The results show that the increases in plot yields are concentrated in plots that the woman manages, and especially those for which the woman controls the revenue (i.e., she is able to make decisions regarding how to use revenue deriving from these plots).

Table 7: Plot Yields ('000 FC/ha)

	(1) Yields Household level	(2) Yields Plots index woman manages	(3) Yields Plots index woman controls the income of	(4) Yields Plots index woman is main worker on	(5) Yields Plots husband manages	(6) Yields Plots husband controls the income of	(7) Yields Plots husband is main worker on
Treatment	1782.517**	1530.893*	2592.162**	1326.625	1494.952	1520.331	1992.264
	(799.101)	(911.580)	(1257.423)	(1067.345)	(1323.042)	(1221.541)	(1306.222)
Constant	6234.146***	2153.321*	489.429	9057.305***	11566.384***	10899.798***	11998.418***
	(884.903)	(1217.376)	(1265.767)	(1675.438)	(1295.250)	(1240.603)	(1289.686)
Observations	2185	715	1168	1441	1530	1644	1498
Control mean	5286.363	2076.222	4391.070	4810.601	5820.398	5932.235	5825.698

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects and baseline values of outcomes are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10. Income control plots include also plots which revenue are jointly controlled by the index woman and another household member. The yields variables have been winsorized at 1% and 99% respectively.

Table 8 examines the impact of access to childcare centers on the index woman's income. The individual income categories are noisy, though we do detect an increase in income derived from commercial agriculture. Moreover, when we pool all categories together, we see an increase in overall income (significant at the 10 percent level). This income gain amounts to an increase of 28.7 percent over the control mean.

Table 8: Index woman's monthly income ('000 FC)

	(1) Total	(2) Farming of crops destined for sale	(3) Livestock or poultry rearing	(4) Agricultural processing	(5) Non-agricultural wage	(6) Non-agricultural self-employment
Treatment	12.674*	6.131	0.863	3.331	2.248	0.352
	(7.108)	(3.689)	(1.818)	(2.800)	(1.435)	(1.987)
Constant	28.605***	7.355***	-0.155	0.358	21.894***	-0.151
	(3.078)	(1.567)	(0.779)	(1.200)	(0.615)	(0.852)
Observations	944	944	944	944	944	944
Control mean	42.871	19.148	3.129	16.583	1.260	2.752

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects and baseline values of outcomes are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10.

The equivalent gains for the husband are proportionately similar, but not statistically significant (Table 9).

[4]These variables were collected at follow-up, but Table B8 shows that none of these binary classifications changed as a result of treatment.

Table 9: Husband's monthly income ('000 FC)

	(1) Total	(2) Farming of crops destined for sale	(3) Livestock or poultry rearing	(4) Agricultural processing	(5) Non-agricultural wage	(6) Non-agricultural self-employment
Treatment	19.888	7.489	-1.522	2.577	5.099	6.342
	(14.373)	(9.350)	(1.532)	(2.755)	(4.805)	(4.734)
Constant	129.094***	73.889***	0.761	-1.289	60.575***	-3.171
	(6.831)	(4.244)	(0.766)	(1.377)	(2.402)	(2.367)
Observations	733	733	733	733	733	733
Control mean	62.298	37.736	4.348	3.628	10.287	6.300

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10.

4.4 Child and welfare outcomes

We examine welfare outcomes for households. First, we focus on human development outcomes by examining treatment effects on early childhood development outcomes for the index woman's children. We find a significant increase of 0.76 in the parent-reported CREDI score, measured for children aged 6 to 48 months. This amounts to an increase of 7 percent in the index. We do not detect a significant change for older children.

We build a measure of center quality using surprise assessments by our follow-up survey enumerators, who rated each center and encadreuse on the basis of nine characteristics (Table B9). We do not observe significantly higher child development outcomes in above-average quality centers (Table B10). However, in a simple experiment we conducted during the follow-up survey, in which children were given sweets and asked whether they wanted to share their sweets with a puppet (and the gender of the puppet was randomized) we observe that children shared a higher number of sweets in higher-quality centers, particularly with female puppets (Table B11).

Table 10: Child development results

	(1) CREDI score	(2) MELQO score	(3) Expressive language	(4) Oral comprehension	(5) Empathy
Treatment	0.764**	0.318	0.060	0.151	0.108
	(0.357)	(0.246)	(0.093)	(0.114)	(0.084)
Constant	15.907***	10.455***	4.582***	3.856***	1.948***
	(0.540)	(0.414)	(0.236)	(0.123)	(0.125)
Observations	627	915	915	915	915
Control mean	11.024	9.811	4.330	3.674	1.807

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects and baseline values of outcomes are included in all regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10. (1) Caregiver-Reported Early Development Index (CREDI) has been administrated to children aged 6-48 months at the time of survey. (2), (3), (4) and (5) are Measuring Early Learning Quality and Outcomes (MELQO) administrated to children aged 48-92 months.

Looking at Table 11, we see a 34.2 percent increase in total household income as a result of the childcare centers. We do not detect any changes in food security (measured by whether any household member skipped a meal in the last month, and the number of days on which a meal was skipped by a household member). We also do not detect any change in the sharing of housework or

Table 11: Welfare Outcomes

	(1) Total hh monthly income	(2) Any hh member skipped a meal	(3) Number of days meal was skipped	(4) Index woman is happy	(5) Index woman's lack of control
Treatment	38.976**	-0.016	-0.026	0.052**	-0.060**
	(16.860)	(0.027)	(0.059)	(0.020)	(0.027)
Constant	231.910***	0.074***	0.079***	0.873***	0.097***
	(8.178)	(0.013)	(0.027)	(0.036)	(0.012)
Observations	978	977	977	944	944
Control mean	111.379	0.161	0.289	0.894	0.200
Baseline Control	Yes	Yes	Yes	Yes	No

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects and baseline values of outcomes are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10.(1) Total hh monthly income in thousands of FC (4) Happiness is a dummy variable = 1 if woman reported being happy or very happy in general. (5) Index woman frequently finds it hard to control important things in her life.

gender attitudes (Table B12). Last but not least, we measure how happy the index woman is with her life. We detect a significant 5.2 percentage point increase in the share of women who report being happy or very happy. We also see a 5.6 percentage point decrease in the share of women who feel they often do not have control over the important things in their lives.

4.5 Mechanisms

How do these changes come about? We first turn to our most detailed data source, the agricultural modules.

Table 12: Number of tasks done on plots worked on by index woman (last week)

	(1) All plots	(2) Plots women worked more on	(3) Plots women managed	(4) Plots women income control
Treatment	0.004	-0.004	-0.255	-0.058
	(0.067)	(0.093)	(0.428)	(0.470)
Constant	1.635***	1.779***	3.504***	6.890***
	(0.024)	(0.041)	(0.285)	(0.268)
Observations	926	598	221	434
Control mean	1.577	1.598	3.154	4.502
Baseline Control	No	No	No	No

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects and baseline values of outcomes are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10.

We do not see a change in the number of tasks done on agricultural plots that the woman works on, manages or controls the income on–so the channel is not that having more time allows the woman to complete additional discrete tasks, such as planting, weeding, harvesting or plowing (Table 12).

Table 13: Number of laborers working on plots for index women (excluding herself)

	(1) Household labor Plots index woman is main worker on	(2) Hired labor Plots index woman is main worker on	(3) Household labor Plots index woman manages	(4) Hired labor Plots index woman manages	(5) Household labor Plots index woman controls the income of	(6) Hired labor Plots index woman controls the income of
Treatment	0.213	0.017	0.345	-0.773	0.299**	0.149
	(0.137)	(0.359)	(0.206)	(0.775)	(0.143)	(0.461)
Constant	0.653**	2.462***	0.461	2.016***	0.264	1.202*
	(0.280)	(0.418)	(0.296)	(0.656)	(0.303)	(0.653)
Observations	1091	1091	388	388	827	827
Control mean	1.475	2.571	1.093	2.478	1.363	2.275

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects and baseline values of outcomes are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10.

We do, however, see increases in the number of household members working on plots whose revenue the woman controls (Table 13). We also detect decreases in whether the woman reports being interrupted in her farm work over the past week: a 4.5 percentage point reduction, coming from a reduction in being interrupted by a child (Table 14). In parallel, we see a significant reduction in the number of times in the past week that the index woman took one of her children to the plot while she was working. This indicates that being able to work with fewer interruptions might be driving some of the productivity and income gains we saw in the previous section.

Table 14: Work interruption last 7 days

	(1) Worked on plot	(2) Work was interrupted	(3) Work was interrupted by child	(4) Number of times the index woman has taken a child to plot	(5) Minutes of walk to get to the plot worked by index woman
Treatment	-0.027	-0.047**	-0.045**	-0.498***	5.118
	(0.036)	(0.021)	(0.018)	(0.173)	(3.538)
Constant	0.750***	0.240***	0.232***	2.272***	34.518***
	(0.045)	(0.018)	(0.016)	(0.063)	(1.287)
Observations	941	941	941	919	919
Control mean	0.756	0.181	0.100	2.235	42.727
Baseline Control	Yes	Yes	Yes	No	No

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects and baseline values of outcomes are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10.

This benefit in lack of interruption and concentration holds when we zoom out and ask the woman about all her activities. Table 15 looks at whether the woman reports multi-tasking during any of her activities during the past day. We find a 0.87 hour reduction in time spent multitasking (corresponding to a 30 percent decrease). When we ask the woman about her levels of concentration, we do not see changes in reported concentration at home, but we do see a significant increase in the proportion of women who report full concentration at work: a 0.46 percentage point (51 percent) increase.

Table 15: Multi-tasking and concentration

	(1) Hours multi-tasked	(2) Never unconcentrated at home	(3) Never unconcentrated at work
Treatment	-0.906***	0.027	0.040**
	(0.287)	(0.023)	(0.017)
Constant	3.559***	-0.012	-0.017**
	(0.354)	(0.010)	(0.007)
Observations	945	944	944
Control mean	2.931	0.087	0.090
Baseline Control	Yes	No	No

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects and baseline values of outcomes are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10. (1) Hours spent on household plots and looking afer kids

5 Robustness

We have shown in Section 3.2 that treatment and control households are balanced in terms of observable baseline characteristics, despite having some differential attrition. For completeness we also consider (Lee, 2002) bounds for all outcomes of interest. If treatment households had had the same attrition rate as control households, we would have had 34 fewer treatment households at follow-up. To construct the Lee lower bounds, we assume that all of these observations were successes, that is, all of the treated households that could not be tracked at follow-up had experienced an increase in income due to the treatment. Setting 34 observations in the treatment to missing will therefore provide a lower bound for the estimation of the impact of the treatment. Conversely upper bounds provide an estimate of the extreme case in which all of the additional households who could not be tracked in the treatment group had had the lowest impact on their outcomes.

Tables B13 and B14 show the resulting estimates of the ITT. As we would expect, these lower bounds reduce the estimated impacts. Nevertheless, all of the lower bounds for economic outcomes are still positive, and most are still statistically significant. Therefore, even in the unlikely case that all the additional control group households who were not interviewed were increasing their labor supply and income, the childcare program is still found to have additional benefits.

6 Conclusion

We presented findings from a randomized control trial in which the effects of offering daily childcare services to rural women in the Democratic Republic of the Congo were assessed. We find that access to childcare—even community-based low-cost models such as the one piloted for this study—causes significant gains for both children and their households. Women and their husbands diversify their economic activities, work more, and see an increase in their productivity, leading to higher income. Women also report feeling happier and having a higher sense of control over important things in their lives. However, their gender attitudes and how housework is shared in the household do not change.

Cost-effectiveness estimates show a high return on investment. The cost for each center (including encadreuse salary and basic equipment and lunches) was approximately $144 a month. Using our average number of nine children per center, the cost would be $16 per child per month, compared

to a $38 gain per month in household income. This figure would likely be even higher for centers at full capacity.

Our results show that demand for childcare is high and has large impacts even in rural settings with strong kinship networks. Such settings are commonly not perceived as good targets for promoting childcare access, since it is assumed that women bear minimal costs from carrying children with them to the field and that it is easy for women to find childcare arrangements when they are embedded in family networks. Our results show that this received wisdom needs correcting, and that poor women in rural Africa both desire and draw large benefits from institutional childcare provision. Results from this study provide a strong case for making childcare services and preschools available to rural households, since not only will it improve children's development, but it would also lead to significant gains in income.

Providing childcare services does not imply making any changes to the distribution of chores within the household, it merely alleviates the burden for women. A potential future avenue for research would be to examine how social norms change interventions around childcare and housework responsibilities could complement or substitute childcare services. Such interventions could also help achieve gains in women's decision-making power which was not affected by this pilot. The question around increasing men's participation in housework is particularly interesting in light of the positive effects of the daycare intervention on men. More work is needed to understand why men are also making significant gains from the availability of childcare services, through their increase engagement in various types of economic activities.

Measuring the longer term impacts of access to childcare is another path for future research. The childcare centers in this experiment were no longer supported by the project after 12 months of operation. Even though communities were encouraged by the implementing partner to maintain the service through community participation, our administrative data shows substantial variation in whether and how the childcare centers continue to operate. Yet our results suggest that cumulative gains stemming from access to continuous daycare in rural areas may be very large. The policy case for childcare services being offered to rural women in Sub-Saharan Africa would hugely benefit from an additional rigorous evaluation of the service over multiple years.

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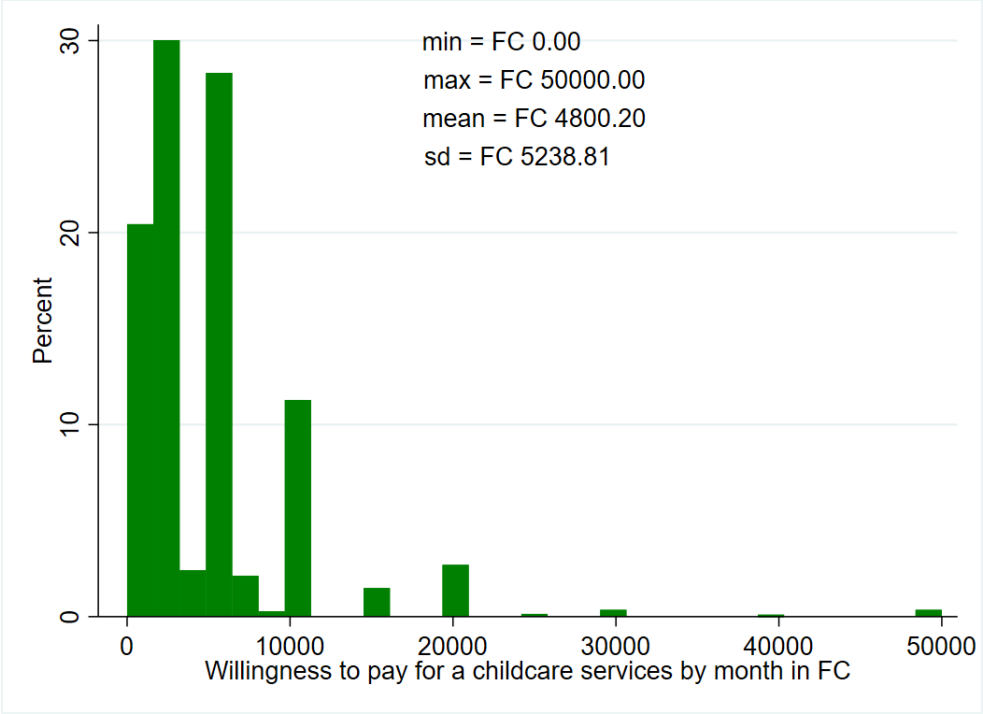
Appendix Tables and Figures

Appendix A: Supplemental Figures

Figure A1: Project Location

Figure A2: Willingness to pay for childcare services



Appendix B: Supplemental Tables

Table B1: Cultivated crops

Crops cultivated	No.	%
Cassava	1566	66.8%
Variety of crops	324	13.8%
Peanut	141	6.0%
Horticulture	87	3.7%
Crops for sale	77	3.3%
Maize	52	2.2%
Other tubers	30	1.3%
Bananas and other	27	1.2%
Ginger	21	0.9%
Legume	12	0.5%
Rice	6	0.3%
Total	2343	100.0%

Notes: Crops cultivated across sample household plots over the last last 12 months.

Table B2: Systematic attrition

	(1) Attrition at hh level	(2) Attrition at hh level
Treatment	-0.069***	-0.166
	(0.015)	(0.107)
Household size		-0.011*
		(0.006)
Index woman age		-0.002
		(0.002)
Index woman years of education		0.000
		(0.003)
Number of plots in the hh		0.023
		(0.015)
Index woman is a plot manager		0.005
		(0.030)
Index woman has off-farm business (incl)		-0.033
		(0.038)
Total household monthly revenue (0000 FC)		-0.001
		(0.001)
Treatment*Household size		0.017
		(0.011)
Treatment*Index woman age		-0.000
		(0.002)
Treatment*Index woman years of education		0.007
		(0.005)
Treatment*Number of plots in the hh		-0.023
		(0.018)
Treatment*Index woman is a plot manager		0.056
		(0.049)
Treatment*Index woman has off-farm business (incl)		-0.015
		(0.052)
Treatment*Total household monthly revenue (0000 FC)		-0.001
		(0.001)
Observations	1541	1541
Joint F-test p-value controls vars		0.447
Joint F-test p-value interraction vars		0.242

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10. We replaced the missing values of control variables with their averages at baseline for the overall sample. A labor member is a household member that was engaged at least in one of the following activities during last 12 months : farming of crops destined for sale, agricultural processing, livestock, non agricultural wage employment and non agricultural self-employment. Asset index is computed using the multi correspondence analysis of different dummy variables including having a bed,a radio, a TV, a cellphone, a bicycle and a motorcycle at hh level.

Table B4: Hours spent on carework by household members (last day) for existing members

	(1) Index woman	(2) Husband	(3) Daughters	(4) Sons	(5) Sisters	(6) Mother	(7) Another adult female
Treatment	-1.748***	-0.122	-0.167	-0.233	1.000***	-1.800	-0.063
	(0.355)	(0.182)	(0.423)	(0.241)	(0.000)	(3.464)	(0.360)
Constant	9.323***	0.452***	1.667***	0.233	-1.000***	-0.000	0.021
	(0.556)	(0.091)	(0.423)	(0.241)	(0.000)	(0.000)	(0.120)
Observations	920	747	392	426	21	32	123
Control mean	11.851	1.082	1.455	0.465	0.181	0.502	0.143

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects and baseline values of outcomes are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10.

Table B5: Hours spent on other activities by the index woman (last day)

	(1) Sleep	(2) Housework	(3) Leisure and socializing	(4) Studying	(5) Breasfeeding
Treatment	0.123	-0.120	-0.228	0.000	0.018
	(0.080)	(0.175)	(0.190)	(0.032)	(0.045)
Constant	8.348***	4.171***	0.302***	0.625***	0.475***
	(0.334)	(0.218)	(0.082)	(0.014)	(0.019)
Observations	945	945	945	945	945
Control mean	8.968	4.547	0.789	0.042	0.176

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects and baseline values of outcomes are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10.

Table B6: Time spent on economic activities by index woman

	(1) Hours/day	(2) Days/month	(3) Months/year
Panel A : Commercial Agriculture			
Treatment	0.434	1.190	0.684*
	(0.266)	(0.723)	(0.386)
Constant	2.246***	6.297***	3.859***
	(0.200)	(0.595)	(0.315)
Obs.	944.000	944.000	944.000
Control mean	2.558	6.879	3.792
Panel B : Agriculture processing			
Treatment	0.324	0.989***	0.194
	(0.214)	(0.309)	(0.252)
Constant	0.075	0.148	0.346***
	(0.092)	(0.132)	(0.108)
Obs.	944.000	944.000	944.000
Control mean	1.673	1.748	2.104
Panel C : Self employment			
Treatment	0.059	0.141	0.097
	(0.078)	(0.220)	(0.125)
Constant	-0.025	-0.061	-0.042
	(0.033)	(0.094)	(0.054)
Obs.	944.000	944.000	944.000
Control mean	0.188	0.408	0.317
Panel D : Wage employment			
Treatment	0.153*	0.292	0.259**
	(0.091)	(0.249)	(0.128)
Constant	0.863***	3.018***	1.246***
	(0.039)	(0.107)	(0.055)
Observations	944	944	944
Control mean	0.092	0.260	0.138

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects and baseline values of outcomes are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10.

Table B7: Time spent on economic activities by index woman's husband

	(1) Hours/day	(2) Days/month	(3) Months/year
Panel A : Commercial Agriculture			
Treatment	0.633*	2.099**	1.017**
	(0.342)	(0.888)	(0.471)
Constant	2.992***	8.164***	3.366***
	(0.250)	(0.703)	(0.353)
Obs.	733.000	733.000	733.000
Control mean	2.915	7.626	4.024
Panel B : Agriculture processing			
Treatment	-0.026	0.282	0.099
	(0.114)	(0.201)	(0.142)
Constant	0.013	-0.141	-0.049
	(0.057)	(0.101)	(0.071)
Obs.	733.000	733.000	733.000
Control mean	0.280	0.234	0.307
Panel C : Self employment			
Treatment	0.396***	0.497	0.268
	(0.129)	(0.303)	(0.180)
Constant	-0.198***	-0.248	-0.134
	(0.065)	(0.152)	(0.090)
Obs.	733.000	733.000	733.000
Control mean	0.171	0.488	0.367
Panel D : Wage employment			
Treatment	0.167	0.525	0.156
	(0.237)	(0.583)	(0.276)
Constant	2.667***	6.988***	3.922***
	(0.119)	(0.292)	(0.138)
Observations	733	733	733
Control mean	0.611	1.531	0.845

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects and baseline values of outcomes are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10.

Table B8: Proportion of plots by manager and worker

	(1) Managed by woman	(2) Income controlled by woman	(3) Worked on by woman	(4) Managed by husband	(5) Income controlled by husband	(6) Worked on by husband
Treatment	0.008	-0.005	0.042	0.005	0.035	0.012
	(0.022)	(0.039)	(0.032)	(0.029)	(0.023)	(0.031)
Constant	0.364***	0.442***	0.613***	0.512***	0.560***	0.500***
	(0.012)	(0.018)	(0.018)	(0.040)	(0.050)	(0.038)
Observations	2064	1766	1766	1619	1392	1392
Control mean	0.171	0.445	0.574	0.559	0.704	0.630

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects and baseline values of outcomes are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10. Income control plots include also plots which revenue are jointly controlled by the index woman and another household member.

Table B9: Center quality in treatment villages (enumerator assessment)

	mean	sd	min	max	p50	count
Treats all the children with respect	3.63	0.87	2	5	4	51
Uses positive language with children	3.51	0.78	2	5	3	51
Responds to the need of children	3.49	0.90	2	5	3	51
Redirects misbehavior and focuses on expected behavior rather than unwanted beha	3.39	0.80	2	5	3	51
Uses questions, prompts or other strategies	3.35	0.89	2	5	3	51
Supervises most children during activities	3.71	0.78	2	5	4	51
Asks open-ended questions	3.18	0.77	2	5	3	50
Offers choices for children	3.28	0.88	2	5	3	50
Encourages children's collaboration through interaction	3.44	0.86	2	5	3	50

Notes: During the data collection, the supervisors spent 30 min to 1 hour in each center to observe the providers operating in each center and rated their performance according to some guidance. For each item cited in the table, the provider is rated 1-5, where 1 is a very low score meaning that the provider does not comply with the standard and 5 is high level of compliance with the procedures. The rate is missing if a particular item is not observed during the time spent on the center.

Table B10: Child development results for high quality centers

	(1) CREDI score	(2) MELQO score	(3) Expressive	(4) Oral comprehension	(5) Empathy
Treatment	0.380	0.246	-0.015	0.116	0.135
	(0.631)	(0.375)	(0.138)	(0.167)	(0.145)
Constant	13.303***	10.053***	4.555***	3.745***	1.759***
	(0.490)	(0.397)	(0.228)	(0.100)	(0.111)
Observations	615	904	904	904	904
Control mean	11.024	9.811	4.330	3.674	1.807

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects and baseline values of outcomes are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10. (1) CREDI has been administrated to children aged 6-48 months at the time of survey. (2) MELQO has been administrated to children aged 48-92 months. We compute the center quality index using the standardized weighted index of the of the center quality variables measured by the enumerators during the data collection. They have attended to a class during 1h to 1h30 min and have evaluated different aspects from 1 to 5 (with 1 corresponding to a bad attitude and 5 a good attitude) of the childcare providers about : if 1) they treated every kid with respect, 2) used positive language, 3) responded to the needs of the children, 4) redirected misbehavior and focused on expected behavior rather than unwanted behavior, 5) supervised most children during independent/small group educational activities, including free play 6) used questions, prompts or other strategies to assess children's level of understanding, 7) asked opened questions, 8) offered choice to children, 9) encouraged child collaboration through peer-to-peer interaction

Table B11: Altruism outcomes for high-quality centers

	(1) Sweets shared	(2) Shared with a male puppet	(3) Shared with a female puppet	(4) Number of sweets shared with a puppet	(5) Number of sweets share with male puppet	(6) Number of sweets shared with female puppet
Treatment	-0.014	-0.001	-0.016	-0.044	-0.024	-0.017
	(0.020)	(0.039)	(0.028)	(0.042)	(0.060)	(0.060)
Treatment * High quality center	-0.018	-0.061	0.019	0.128**	0.106	0.141*
	(0.037)	(0.055)	(0.070)	(0.060)	(0.087)	(0.076)
Constant	1.006***	1.001***	1.005***	1.171***	1.012***	1.228***
	(0.008)	(0.020)	(0.009)	(0.016)	(0.030)	(0.020)
Observations	900	480	420	850	450	400
Control mean	0.957	0.954	0.960	1.163	1.169	1.156

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10. This is an OLS regression because the altruism outcomes have not been collected at the baseline.

Table B12: Index woman's gender attitudes and sharing of housework

	(1) Woman was prevented from visiting family	(2) Woman was prevented from working outside home	(3) Woman think it is normal to be beaten if she burned food	(4) Woman think it is normal to be beaten if she neglects children	(5) Woman is the only responsible for cooking	(6) Woman is the only responsible for cleaning the house	(7) Woman is the only responsible of taking care of children
Treatment	0.018	0.031	-0.024	-0.020	-0.017	0.025	-0.026
	(0.018)	(0.023)	(0.032)	(0.028)	(0.033)	(0.030)	(0.036)
Constant	0.069***	0.056***	0.225***	0.511***	0.725***	0.725***	0.705***
	(0.008)	(0.013)	(0.014)	(0.016)	(0.037)	(0.031)	(0.030)
Observations	913	908	933	933	944	944	944
Control mean	0.109	0.120	0.277	0.484	0.604	0.648	0.531

Notes: Standard errors are clustered at the village-pair level. Village-pair fixed effects and baseline values of outcomes are included in all estimation regressions. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10.

Table B13: Lee bounds: Time on carework, index woman's and husband's engagement in economic activities

Outcome	coefficient	lower bound	upper bound
Care by any hh member	–2.599***	–2.609***	–2.578***
	(0.201)	(0.213)	(0.252)
Care by index woman	–1.884***	–1.896***	–1.868***
	(0.310)	(0.318)	(0.327)
Care by husband	–0.109	–0.135	–0.107
	(0.135)	(0.219)	(0.135)
Index woman engagement in			
Farming of crops destined for sale	0.109***	0.108***	0.110***
	(0.032)	(0.032)	(0.032)
Livestock or poultry rearing	0.011	0.009	0.011
	(0.022)	(0.022)	(0.022)
Agricultural processing	0.081***	0.080***	0.082***
	(0.030)	(0.031)	(0.031)
Non-agricultural wage	0.026**	0.024**	0.026**
	(0.011)	(0.011)	(0.011)
Non-agricultural self-employment	0.004	0.002	0.004
	(0.012)	(0.012)	(0.012)
Husband engagement in			
Farming of crops destined for sale	0.117***	0.110***	0.124***
	(0.036)	(0.039)	(0.041)
Livestock or poultry rearing	0.022	0.010	0.024
	(0.022)	(0.037)	(0.023)
Agricultural processing	0.007	–0.006	0.008
	(0.015)	(0.035)	(0.015)
Non-agricultural wage	0.022	0.010	0.024
	(0.023)	(0.037)	(0.024)
Non-agricultural self-employment	0.050***	0.037	0.051***
	(0.017)	(0.035)	(0.018)

Table B14: Lee bounds: index woman's income, husband's income, welfare outcomes

Outcome	coefficient	lower bound	upper bound
Woman total income (000FC)	12.926**	11.411**	13.036**
	(5.447)	(5.768)	(5.566)
Woman income from			
Farming of crops destined for sale (000FC)	7.094**	6.173*	7.145**
	(3.330)	(3.541)	(3.420)
Livestock or poultry rearing (000FC)	0.233	–0.733	0.240
	(1.335)	(1.705)	(1.405)
Agricultural processing (000FC)	2.987	2.363	3.025
	(2.761)	(2.841)	(2.772)
Non-agricultural wage (000FC)	2.364**	1.937	2.371*
	(1.181)	(1.299)	(1.227)
Non-agricultural self-employment (000FC)	0.249	–1.010	0.254
	(1.740)	(2.208)	(1.814)
Husband total income (000FC)	17.780*	5.293	18.915*
	(10.197)	(21.779)	(10.821)
Husband income from			
Farming of crops destined for sale (000FC)	10.073	–0.957	10.751
	(7.365)	(20.908)	(7.760)
Livestock or poultry rearing (000FC)	–1.627	–2.720	–1.588
	(1.389)	(2.560)	(1.331)
Agricultural processing (000FC)	1.510	–2.755	1.583
	(2.619)	(2.717)	(2.725)
Non-agricultural wage (000FC)	4.089	–0.396	4.292
	(3.522)	(8.408)	(3.645)
Non-agricultural self-employment (000FC)	3.735	–2.074	3.877
	(4.090)	(11.779)	(4.118)
Household member missed food	–0.010	–0.010	–0.008
	(0.024)	(0.024)	(0.024)
Number of days food was missed	–0.012	–0.013	0.003
	(0.052)	(0.052)	(0.053)
Index woman is happy	0.044**	0.042**	0.044**
	(0.018)	(0.018)	(0.018)