Experimental Evidence on Rural Childcare Provision*

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Abstract

Women are often the primary caregivers for children, which may restrict women's economic activities. Evidence on the benefits of childcare is often from more developed urban settings. We examine how the provision of community-based childcare centers for children aged 2 to 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 agriculture, plot productivity and monthly income. We find some evidence that these benefits may arise from a decrease in women's need to multi-task while farming. Additionally, women report an increase in their concentration and sense of control. We also observe changes in men's economic activities: they are more likely to be engaged in non-agricultural self-employment and experience an increase in income in this sector. 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 low-income rural settings.

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

JEL Classification: J16, J13, I38, O15

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1 Introduction

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

We examine the effects of community-based childcare centers in rural villages in the Democratic Republic of the the Congo (DRC). The DRC is an important setting to test the impacts of rural childcare provision. Like many developing countries, individuals in rural DRC are primarily reliant on subsistence agriculture. Women are almost exclusively responsible for childcare, and in the vast majority of communities, there are no private sector or public sector childcare options. Additionally, this is a setting where individuals report fairly low trust in other community members and where women report that they cannot rely on family members or friends for help with childcare demands.

In partnership with the country's Ministry of Education, we randomly select 55 out of 110 eligible villages in the province of Kongo Central to receive childcare centers. These centers provided childcare for children between ages 2 and 6 for approximately 12 months. We examine the effects of the centers 5 to 19 months later using a sample of 1,006 eligible women's households and their children. We measure impacts across several domains, including agricultural productivity, engagement in different economic sectors, income, psycho-social well-being, household dynamics, and child well-being.

We find several key results. First, despite qualitative evidence that women in rural settings would be hesitant to participate in childcare centers, we find high demand for the centers. This is a context in which households 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. The centers led to a 2.5 hour reduction in the number of daily hours spent on childcare by eligible households; this corresponds to a reduction of 3.4 hours a day

for treated households. This time savings accrues almost entirely to mothers. There is also a small and significant reduction in child care hours spent by other adult women in the household.

We examine the effects of childcare centers on types of economic activities, agricultural productivity, and income. We hypothesize that the childcare centers, by allowing women greater flexibility with their time and by allowing women to focus on their activities, will lead to increases in income and productivity. We detect substantial shifts in economic activities 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—i.e., the farming of crops for sale. Additionally, women are 8.2 percentage points more likely to work in agricultural processing—taking a raw agricultural product, such as cassava, and transforming it into a higher-value product, such as chikwangue. Finally, women are also 2.2 percentage points more likely to be employed in non-agricultural wage work, such as hairdressing. Importantly, this increase in economic engagement does not come at the expense of sleep or leisure time for these women.

We also find effects on the economic activities of husbands. Despite not seeing a significant shift in their (already minimal) time spent on childcare, husbands are 10.4 percentage points more likely to work in commercial agriculture. They are also 5.2 percentage points more likely to work in non-agricultural self-employment–e.g., running a business. When we examine results at the household level, we find evidence that childcare centers increase the likelihood of any household member being engaged in commercial agriculture, agricultural processing, and non-agricultural self-employment.

Access to childcare also leads to benefits for agricultural productivity. We collect detailed data on plots farmed, who is the main worker on each plot, who controls the income from each plot, and who manages each plot. Across all plots, we find evidence of a 44 percent increase in plot yields relative to the control group mean. We are able to look at the effects separately by who manages, controls the income for, or works on the plot. We find the largest productivity gains are for the plots for which the woman controls the income, where we find an 80 percent increase in plot yields relative to the control mean. For the husband's plots, we find large positive coefficients, but the results are statistically insignificant.

These changes in types of economic activities and productivity translate into increases in monthly income. We collect data on the woman's income, the husband's income, and total household income. We measure total income, as well as income across different forms of economic production. Consis-

tent with women becoming more likely to farm crops destined for sale, women realize an increase in income associated with commercial agriculture. Across all income categories, women's monthly revenue increases by 22.5 percent. For husbands, we find a significant increase in monthly income from non-agricultural self-employment. Overall, households experiences a significant increase in income from commercial agriculture as well as total monthly income.

Finally, we observe improvements in early childhood development outcomes, particularly for younger children. We construct a summary score of child development, which measures children's motor skills, language skills, cognition skills, socio-emotional skills and mental health. We find evidence that young children experience a 7 percent increase in the summary score of their developmental status.

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).

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 DRC is 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 those living in poverty 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.

Women farmers face greater constraints 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. Previous work has shown that on average, women in Kongo Central and Bandundu provinces 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, the capital city (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

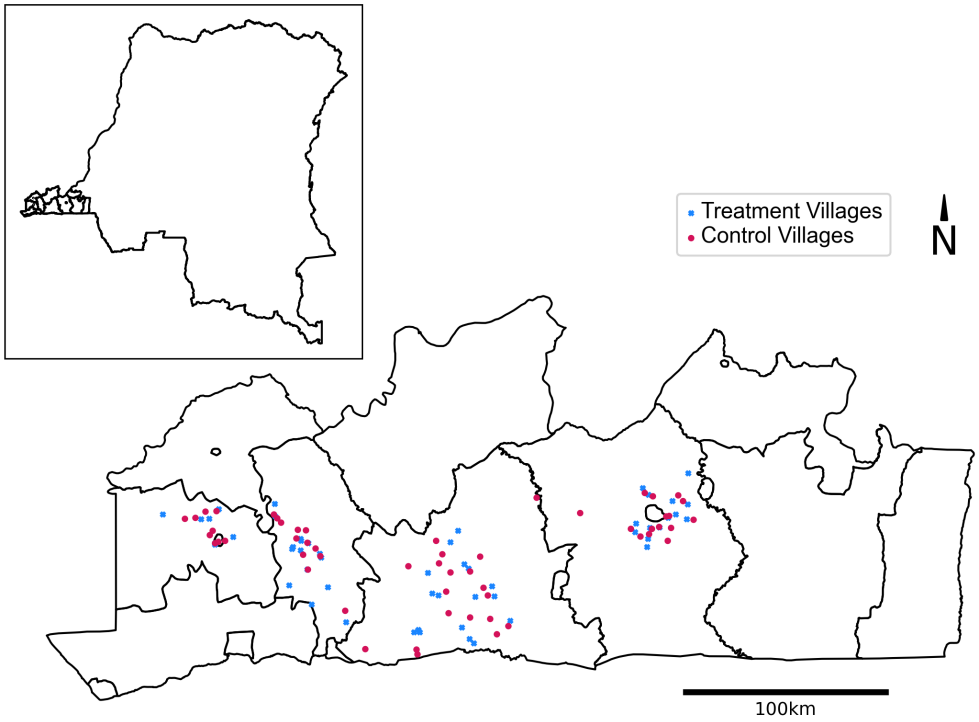
Our implementing partner, Réseau Provincial des Associations des Femmes pour la Promotion de l'Education (REPAFE), constructed the village sampling frame. Villages were eligible to participate if (i) the community agreed to participate in proposed childcare pilot, (ii) the community was willing to make a suitable building available to host the childcare center for free for the duration of the project, and (iii) the community was accessible (was reachable by motorbike for most of the year). The identification process yielded 179 eligible villages across the four study territories. These villages are located in territories of Lukula, Sekebanza, Songololo, and Mbanza Ngungu of Kongo Central province (see Figure 1).

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 referred to as 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 pairwise Mahalanobis matching with an optimal greedy algorithm (Rosenbaum 1989) to select treatment and control villages within the same territory. The matching was done using the listing data collected at baseline with the following variables: number of eligible households and children in the village, number of farmed plots in the village, average plot size, and share of plots managed by women. Villages with no pairs within their territory were matched with villages in another territory. The final sample includes 55 treatment villages and 55 control villages.

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 the childcare provider was based

Figure 1: Map of Study Sample



Notes: The figure presents the sample villages in Kongo Central province of the DRC. Treatment villages are presented in blue and control villages in red. Territory boundaries are denoted in black. The box in the upper left corner presents the DRC boundaries.

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. Their eligibility was confirmed by the implementation partner.

Following national guidelines, the maximum number of children per childcare provider was 14. The childcare provider used a structured curriculum that followed national standards and was informed by international early childhood development (ECD) best practices. Basic equipment was provided to the centers, including first aid kits, toys and mats (see Figure 2). Lunches were co-funded by the parents and the project.

The centers were opened in two rounds. The first round of 25 centers opened in 21 villages in March 2019. The centers closed and re-opened several times due to the COVID19 pandemic, and the support to the first batch of centers ended in November 2021, after 14 non-consecutive months

Figure 2: Examples of the childcare centers

Notes: These figures present examples of the childcare centers that were set up in villages.

of operation. The second round of 42 centers opened in 34 villages in May 2021 and remained open for 12 consecutive months.

2.2 Data Collection

We collected data on the index women, their households, and children through in-person interviews. A baseline survey took place between October and November 2019, with 493 index women in the treatment villages and 1,048 women in the control villages. The baseline data include information on demographic characteristics of household members, their economic activities, and plot-level data on agricultural production, as well as data on assets and food security. For the index woman, we also collected subjective well-being and agency measures and time use measures. For the children, we collect proxies for child development.

We conducted a follow-up survey with all treatment women and half of the control sample between October and November 2021 to assess the impacts of the childcare centers. As in the baseline survey, 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.

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] We reached 533 households from control villages, corresponding to an approximate attrition rate of 0.171.Though the joint F-test of attrition predictors is not significant, Table A1 shows that larger households are slightly less likely to attrit in the control group but not in the treatment group. To address concerns about differential attrition between the treatment and control groups, we estimate Lee bounds (Lee 2002) for all of the main outcomes of interest.

In addition to these in-person interviews, we also collected administrative data on (i) daily attendance, recorded by the caregiver and (ii) an enumerator assessment of center quality. For the daily attendance data, the caregiver was given the list of eligible children for enrollment. They would report the eligible students that attended the daycare center each day that the center was open. For the enumerator assessment of quality, a team member would spend two hours at the day care center. During this time, they would observe the childcare provider and their interactions with the children. The enumerator would rate the childcare provider on a variety of outcomes, including use of positive language, attentive supervision, use of open questions to stimulate cognitive development and encouragement of interaction between the children to bolster social development.

3 Empirical strategy

3.1 Estimating equation

Our baseline specification estimates Intent-to-Treat effects for households in treatment villages relative to households in control villages. Our results are estimated using ANCOVA as follows:

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

where y_{ivt} is the outcome of interest for household i from village v at midline, 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. $\gamma_{p(v)}$

[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.

denotes village-pair fixed effects, where $p(v)$ are the matched village pairs. $\mathbf{X}_i$ are additional control variables at the index woman, husband, or household level. We present results with and without these additional control variables. For the individual level analysis (i.e. index woman or husband level), individual level controls include whether the index woman is the household head, number of children 5 or younger in the household, an asset index, and the individual's age and level of education. For the household level analysis, control variables include whether the index woman is the household head, the number of children 5 or younger in the household, and an asset index. For the child level analysis, the control variables include: the index woman control variables and the child's age and gender. Standard errors are clustered at the village-pair level (de Chaisemartin and Ramirez-Cuellar 2020).

3.2 Sample Balance

Table 1 presents descriptive statistics at baseline for 55 treatment and 55 control villages and for the 493 treatment and 1,048 control households interviewed at baseline. By construction, the village level covariates are balanced across treatment and control village (see Panel A1).

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 the index women are the household head or the wife of the household head; the remainder are the daughters or 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. The most common crop grown by households at baseline is cassava, followed by peanuts, maize and then commercial crops (such as rubber, palm oil, coffee, cotton and cashew).

We find balance across treatment and control for almost all household and index-women level covariates. An exception is that 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

Table 1: Sample balance at baseline

	(1)	(2)	(1-2)
	Treatment	Control	Diff
	Mean	Mean	p-value
Panel A1. Village level			
Number of eligible HHs in the village	24.13	22.35	0.61
Number of eligible children in the village	39.75	38.93	0.84
Number of exploited plots in the village	61.85	73.35	0.39
Average plot size in the village (ha)	0.20	0.10	0.29
Share of plots managed by women in the village	26.64	25.89	0.64
Panel A2. Joint test for orthogonality			
p-value (joint F-test)			0.10
Observation	55	55	110
Panel B. 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
Household asset Index	0.34	0.33	0.36
Panel C. 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 D. Joint test for panels B-C			
p-value (joint F-test)			0.13
Observation	493	1,048	1,528

Notes: *** p<0.01, ** p<0.05, * p<0.10. In column (1), we report the means of variable in the treatment villages. In column (2), we report the means of variables in the control group. The values displayed for t-tests in column (3) are the differences in the means across the two groups. Standard errors are clustered at the village pair-level. Business incl and excl are respectively business activities including and excluding livestock and agricultural product processing. Asset index is computed using multiple correspondence analysis on different dummy variables including having a bed, a radio, a TV, a cellphone, a bicycle and a motorcycle at the household level.

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.

4 Results

4.1 Treatment adoption and compliance

All 55 villages assigned to receive a childcare center opened at least one center, with two centers opened in villages that had more than 14 eligible children. A total of 67 centers across the 55 treatment villages were opened. We find high demand for the childcare 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. During weeks of attendance, children would attend on average three days.

Table 2: 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 using midline survey data.

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 1.76 hours a day. We also note a small reduction in time spent on carework by

other adult women in the household that are not the index woman's mother, daughters or sisters.[2] While we observe a reduction in time that the index woman spent on childcare, we do not detect a change in time spent on leisure, hobbies, sleeping or other activities (see Table A2).

Table 3: Hours spent on carework by household members (last day)

	(1) Any hh member	(2) Index woman	(3) Husband	(4) Daughters	(5) Sons	(6) Adult females in hh
Baseline Specification						
Treatment	-2.488***	-1.755***	-0.112	-0.294	-0.090	-0.339**
	(0.291)	(0.355)	(0.154)	(0.230)	(0.102)	(0.145)
With Controls						
Treatment	-2.433***	-1.642***	-0.104	-0.327	-0.101	-0.347**
	(0.295)	(0.356)	(0.157)	(0.228)	(0.104)	(0.145)
Observations	947	947	947	947	947	947
Control mean	15.731	11.823	1.089	1.469	0.454	0.831

Notes: *** p<0.01, ** p<0.05, * p<0.10. Standard errors clustered at the village-pair level in parentheses. The baseline specification includes village-pair fixed effects and baseline values of outcomes. We replace missing baseline values with the median value of the variable in the control group and include a dummy for whether the variable has any missing values. With controls is equivalent to the baseline specification adding controls. Controls include an indicator for whether the mother is the household head, number of children 5 or younger in the household, and an asset index. The household member listed in each column refers to the relationship of household member to the index woman. In column (6), adult females in the household include sisters, mothers, and other adult females.

Next, we examine how access to the childcare centers affects engagement in remunerated activities for women, husbands, and the household. Panel A of Table 4 reports results for each possible category of remunerated employment for the index woman. The results indicate large shifts in the woman's economic engagement. The index woman is 11.3 percentage points more likely to farm commercial crops, 8.2 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). Column 6 presents an inverse covariance weighted (ICW) index of the remuneration activities; there is a significant increase in remunerated activities for index women.

Table A3 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 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.

[2]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 4: Engagement in remunerated activities (last 12 months)

	(1) Farming of crops destined for sale (0/1)	(2) Livestock or poultry rearing (0/1)	(3) Agricultural processing (0/1)	(4) Non-agricultural wage work (0/1)	(5) Non-agricultural self-employment (0/1)	(6) Engagement in remunerated activities (ICW index)
Panel A: Index Woman						
Baseline Specification						
Treatment	0.113***	0.008	0.082***	0.022*	0.006	0.226***
	(0.036)	(0.022)	(0.029)	(0.012)	(0.011)	(0.081)
With Controls						
Treatment	0.110***	0.011	0.083***	0.021	0.003	0.219***
	(0.037)	(0.021)	(0.029)	(0.012)	(0.011)	(0.080)
Observations	974	974	974	974	974	974
Control mean	0.390	0.128	0.285	0.016	0.031	0.000
Panel B: Husband						
Baseline Specification						
Treatment	0.104**	0.014	0.014	0.020	0.052***	0.246**
	(0.042)	(0.027)	(0.017)	(0.030)	(0.018)	(0.114)
With Controls						
Treatment	0.106**	0.009	0.015	0.024	0.049***	0.245**
	(0.044)	(0.027)	(0.018)	(0.030)	(0.018)	(0.120)
Observations	734	734	734	734	734	734
Control mean	0.415	0.091	0.038	0.109	0.038	0.000
Panel C: Household						
Baseline Specification						
Treatment	0.115***	0.022	0.097***	0.048	0.056***	0.332***
	(0.037)	(0.027)	(0.031)	(0.031)	(0.020)	(0.099)
With Controls						
Treatment	0.114***	0.021	0.096***	0.047	0.052**	0.327***
	(0.037)	(0.027)	(0.031)	(0.032)	(0.020)	(0.099)
Observations	1006	1006	1006	1006	1006	1006
Control mean	0.465	0.167	0.298	0.109	0.068	0.000

Notes: *** p<0.01, ** p<0.05, * p<0.10. Standard errors clustered at the village-pair level in parentheses. The baseline specification includes village-pair fixed effects and baseline values of outcomes. We replace missing baseline values with the median value of the variable in the control group and include a dummy for whether the variable has any missing values. With controls is equivalent to the baseline specification adding controls. For regressions in panel (A), controls include an indicator for whether the mother is the household head, the number of children 5 or younger in the household, an asset index, and index woman's age and education level. For regressions in panel (B), controls include an indicator for whether the index woman is household head, number of children 5 or younger in the household, an asset index, and husband's age and education level. In panel (C), controls include an indicator for whether the mother is the household head, the number of children 5 or younger in the household, and an asset index. In columns (1) to (5), the outcomes are whether the index woman/husband/household is engaged in farming of crops destined for sale, livestock or poultry farming, agricultural processing, non-ag wage work, and non-ag self-employment, respectively. These are all binary variables. Column (6) includes a standardized weighted index combining the outcomes in columns (1) to (5), as proposed by Anderson (2008).

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, Panel B of Table 4 shows that the husband is 10.4 percentage points more likely to participate in commercial farming, and 5.2 percentage points more likely to work in entrepreneurship (non-agricultural self-employment). Table A4 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).

Finally, Panel C of Table 4 presents the results for the household, reporting whether any household member engaged in a particular activity. Consistent with the results found for the index woman and her husband, households members are more like to be engaged in commercial agriculture, agricultural processing and non-agricultural self-employment.

4.3 Plot Yields and Income

Next, we examine the implications of access to childcare on the agricultural productivity of plots in the household, and on the income of the index woman, her husband, and the household. We categorize each plot by whether the plot is managed by the index woman or by the husband; whether income on the plot is controlled by the index woman or by the husband; and whether the plot is worked on by the index woman or by the husband. Panel A of Table 5 suggests that the increase in plot yields are concentrated in plots for which the woman controls the revenue (i.e., she is able to make decisions regarding how to use revenue deriving from these plots) (column 2). In Panel B, we observe positive coefficients for husbands for plots that they manage, control income for, and work on, but the coefficients are not statistically significant. Column 4 of Table 5 shows large gains in average plot yields of 44.4 percent at the household level.

Table 6 examines the impact of access to childcare centers on income for the index woman, the husband, and the household. We present results by income category and for total monthly income. While the individual income categories are noisy, we do detect an increase in income derived from commercial agriculture for the index woman (column 1). Moreover, we see an increase in her overall monthly income (column 7). This income gain amounts to an increase of 22.5 percent over the control mean.

In Panel B of Table 6, we examine the effects of access to childcare on income for the husband. We find significant gains in non-agricultural self-employment, and a positive, but insignificant effect, on total monthly income (column 7). In Panel C, we look at effects for all household members. Consistent with the index woman results, households experience significant increases in income from commercial agriculture and in total monthly income.

Table 5: Plot Yields ('000 FC/ha)

	(1) Yields Plots managed by (A) index woman or (B) husband	(2) Yields Plots income controlled by (A) index woman or (B) husband	(3) Yields Plots main worker (A) index woman or (B) husband	(4) Yields Household level
Panel A: Index Woman				
Baseline Specification				
Treatment	1800.944	4893.965**	1422.019	2474.245*
	(2160.864)	(2182.974)	(2024.756)	(1309.064)
With Controls				
Treatment	1713.114	5289.078**	1633.960	2292.429*
	(2219.981)	(2101.704)	(2017.572)	(1311.766)
Observations	400	853	1126	2185
Control mean	4427.458	6086.788	6800.335	5572.909
Panel B: Husband				
Baseline Specification				
Treatment	2823.203	2558.782	3304.809	
	(2682.801)	(2365.467)	(2670.520)	
With Controls				
Treatment	2540.133	2356.017	3077.335	
	(2778.459)	(2450.637)	(2796.484)	
Observations	1215	1329	1183	
Control mean	7660.560	7646.281	7791.047	

Notes: *** p<0.01, ** p<0.05, * p<0.10. Standard errors are clustered at the village-pair level. The baseline specification includes village-pair fixed effects and baseline values of outcomes. We replace missing baseline values with the median value of the variable in the control group and include a dummy for whether the variable has any missing values. With controls is equivalent to the baseline specification adding controls. Controls include an indicator for whether the mother is the household head, number of children 5 or younger in the household, and an asset index. The yield variable is equal to the total crop value winsorized at the 95^{th} percentile divided by the plot size in hectares.

4.4 Child and welfare outcomes

We examine how childcare centers affect early childhood development outcomes for the index woman's children. We measure child development using two methods, depending on the age of the child at the time of the interview. For children aged 6 months to 48, we administer the Short Form Caregiver Reported Early Development Instrument (CREDI) to parents, which generates a summary score for children's overall developmental status depending on their age. For example, questions asked regarding children aged 6-11 months include their ability to follow simple instructions or physically grasp objects, while questions asked regarding children aged 30 months or above include their ability to construct full sentences and regulate their emotions. For children aged 48 months to 92 months, we administer a short-form of the Measuring Early Learning Quality and Outcomes (MELQO), comprising questions on expressive language, oral comprehension, and empathy.

In column 1 of Table 7, we find a significant increase of 0.76 in the CREDI score, measured for

Table 6: Monthly income ('000 FC)

	(1) Farming of crops destined for sale	(2) Livestock or poultry rearing	(3) Agricultural processing	(4) Non-agricultural wage	(5) Non-agricultural self-employment	(6) Monhtly income across all 5 sectors (ICW index)	(7) Total monthly income
Panel A: Index Woman							
Baseline Specification							
Treatment	5.3384*	-0.3018	3.0759	2.0366	-0.6607	0.1124	8.6920**
	(2.9280)	(0.7477)	(2.2049)	(1.3831)	(1.6184)	(0.0770)	(4.1406)
With Controls							
Treatment	5.2045*	-0.2596	3.2347	1.8276	-1.1402	0.1030	8.4412*
	(2.9632)	(0.7645)	(2.3022)	(1.4353)	(1.5083)	(0.0785)	(4.2420)
Observations	974	974	974	974	974	974	974
Control mean	17.782	2.956	15.744	1.247	2.779	0.004	38.623
Panel B: Husband							
Baseline Specification							
Treatment	4.6613	-0.3052	2.6881	4.1275	7.3070*	0.1616	10.0537
	(6.2645)	(1.2157)	(2.6939)	(4.3650)	(4.2706)	(0.1229)	(8.8770)
With controls							
Treatment	4.2261	-0.3936	3.2341	4.7329	7.6703*	0.1745	10.4257
	(6.3505)	(1.2033)	(3.1459)	(4.3231)	(4.4078)	(0.1272)	(9.0467)
Observations	734	734	734	734	734	734	734
Control mean	33.690	3.418	3.507	10.046	4.850	0.000	53.957
Panel C: Household							
Baseline Specification							
Treatment	14.6443*	-0.0541	3.4095	5.1509	5.0677	0.1718*	27.1664**
	(7.7091)	(1.2141)	(2.3163)	(4.8995)	(3.5555)	(0.0892)	(11.9350)
With Controls							
Treatment	14.1807*	-0.1063	3.5042	4.8909	4.7351	0.1663*	26.0056**
	(7.7400)	(1.2186)	(2.4040)	(4.8609)	(3.6188)	(0.0903)	(12.0664)
Observations	1006	1006	1006	1006	1006	1006	1006
Control mean	53.230	4.986	18.555	12.831	8.118	0.000	101.657

Notes: *** p<0.01, ** p<0.05, * p<0.10. Standard errors are clustered at the village-pair level. The baseline specification includes village-pair fixed effects and baseline values of outcomes. We replace missing baseline values with the median value of the variable in the control group and include a dummy for whether the variable has any missing values. With controls is equivalent to the baseline specification adding controls. For regressions in panel (A), controls include an indicator for whether the mother is the household head, the number of children 5 or younger in the household, an asset index, and the index woman's age and education level. The asset index is computed as in Table 1. For regressions in panel (B), controls include an indicator for whether the index woman is the household head, the number of children 5 or younger in the household, an asset index, and the husband's age and education level. In panel (C), controls include an indicator for whether the mother is the household head, the number of children 5 or younger in the household, and an asset index. In columns (1) to (5), the outcomes are monthly income for woman/husband/household from farming of crops destined for sale, livestock or poultry farming, agricultural processing, non-ag wage work, and non-ag self-employment, respectively. These are all binary variables. Column (6) includes a standardized weighted index combining the outcomes in columns (1) to (5), as proposed by Anderson (2008). Column (7) is the total monthly income from activities listed in columns (1) to (5). Income variables in columns (1)-(5) and column (7) have been winsorized at the 95^{th} percentile.

children aged 6 to 48 months. This amounts to an increase of 7 percent in the index. We do not detect a significant change in our child development measure for older children (column 2).

Table 7: Child development results

	(1) CREDI score	(2) MELQO score	(3) Expressive language	(4) Oral comprehension	(5) Empathy
Baseline Specification					
Treatment	0.764**	0.318	0.060	0.151	0.108
	(0.357)	(0.246)	(0.093)	(0.114)	(0.084)
With Controls					
Treatment	0.823**	0.322	0.072	0.141	0.109
	(0.353)	(0.259)	(0.095)	(0.123)	(0.084)
Observations	627	915	915	915	915
Control mean	11.024	9.811	4.330	3.674	1.807

Notes: *** p<0.01, ** p<0.05, * p<0.10. Standard errors are clustered at the village-pair level. The baseline specification includes village-pair fixed effects and baseline values of outcomes. We replace missing baseline values with the median value of the variable in the control group and include a dummy for whether the variable has any missing values. With controls is equivalent to the baseline specification adding controls. Controls include an indicator for whether the mother is the household head, number of children 5 or younger in the household, an asset index, the index woman's age and education level, and the child's age and gender. The asset index is computed as in Table 1. (1) Caregiver-Reported Early Development Index (CREDI) has been administrated to children aged 6-48 months at the time of survey. Columns (2), (3), (4) and (5) are Measuring Early Learning Quality and Outcomes (MELQO) administrated to children aged 48-92 months.

Table 8 presents the effects of access to childcare on various welfare outcomes—whether household members have had to skip a meal in the last day, the number of meals skipped in the last day, and in the case of limited food, whether the men or the young get first access to food. We do not detect any changes in food security. Treatment households are not diferentially likely to have had to skip a meal. However, we do find that treatment households are less likely to report that in the case of limited food that male household members are preferentially given access to food.

In Table 9, we examine effects of treatment on the index woman's agency and well-being. In column 1, we construct an index of restrictions on the index woman's mobility. This is constructed based on the woman's report of whether her husband or other family member ever prevented her from visiting relatives or friends, or from working outside the home over the past 12 months. We find no significant impacts of treatment on mobility restrictions. Likewise, we construct an index on perceptions of domestic violence, based on the woman's report of whether a husband is justified in hitting his wife if she burns food or neglects the children. We find no significant reductions in the perceived acceptability of domestic violence. We also do not detect any change in the sharing of housework (column 3). Additionally, we measure if the index woman is happy with her life. We detect a significant 5.2 percentage point increase in the share of women who report being happy or

Table 8: Welfare Outcomes

	(1) Any hh member skipped a meal in last 7 days (0/1)	(2) Number of days meal was skipped in last 7 days	(3) If HH lacks food: males have food before females (0/1)	(4) If HH lacks food: young have food before adults (0/1)
Baseline Specification				
Treatment	-0.018	-0.027	-0.083**	0.025
	(0.027)	(0.059)	(0.038)	(0.036)
With Controls				
Treatment	-0.014	-0.019	-0.086**	0.024
	(0.027)	(0.057)	(0.037)	(0.035)
Observations	1005	1005	1006	1006
Control mean	0.161	0.289	0.375	0.266

Notes: *** p<0.01, ** p<0.05, * p<0.10. Standard errors are clustered at the village-pair level. The baseline specification includes village-pair fixed effects and baseline values of outcomes. We replace missing baseline values with the median value of the variable in the control group and include a dummy for whether the variable has any missing values. With controls is equivalent to the baseline specification adding controls. Controls include an indicator for whether the mother is the household head, number of children 5 or younger in the household, and an asset index. The asset index is computed as in Table 1. Column (1) is whether any household member skilled a meal in last 7 days due to lack of food. Column (2) is the number of days meal was skipped in household due to lack of food in the last 7 days. Column (3) is a binary variable capturing whether males have food before females if a household lacks food. It equals 1 if adult men feed before adult women, adult men feed before girls, boys feed before girls, and boys feed before adult women. Column (4) is whether young have food before adults. It equals 1 if girls have food before adult men or women, and boys have food before adult men or women.

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

Thus far we have documented that access to childcare has important effects on engagement in economic activities, plot yields, income, child development, and some proxies for women's well-being. We next try to understand the mechanisms that generate these improvements.

We first turn to our most detailed data source, the agricultural modules. In these modules, we ask detailed questions by plot on the number of tasks completed on the plot, which household members contributed labor to that plot, and the number of hired laborers who worked on the plot over the past 12 months. This allows us to test the hypotheses that child care allows women to complete additional discrete tasks on their plots, such as planting, weeding, harvesting or plowing and that child care affects the allocation of labor to plots.

We present these results in Table 10. In Panel A we present evidence on whether childcare allowed women to complete more tasks on their plots. We do not find a change in the number

Table 9: Index woman's gender attitudes and well-being

	(1) Mobility restrictions (ICW index)	(2) Perceptions on domestic violence (ICW index)	(3) Women solely responsible for chores (ICW index)	(4) Index woman is happy (0/1)	(5) Index woman feels lack of control (0/1)
Baseline Specification					
Treatment	0.087	-0.047	-0.014	0.053**	-0.056**
	(0.061)	(0.064)	(0.064)	(0.020)	(0.027)
With Controls					
Treatment	0.079	-0.055	-0.016	0.052**	-0.059**
	(0.059)	(0.064)	(0.063)	(0.020)	(0.026)
Observations	947	964	971	971	971
Control mean	0.000	0.000	0.000	0.894	0.200
Baseline control	Yes	Yes	Yes	Yes	No

Notes: *** p<0.01, ** p<0.05, * p<0.10. Standard errors are clustered at the village-pair level. Village-pair fixed effects and baseline values of outcomes are included in all estimation regressions. We replace missing baseline values with the median value of the variable in the control group and include a dummy for whether the variable has any missing values. Controls include an indicator for whether the mother is the household head, number of children 5 or younger in the household, an asset index, and the index woman's age and education level. In column (1), "mobility restrictions" is a standardized weighted index; the components are whether the woman was prevented from visiting family (0/1) and whether she was prevented from working outside the home (0/1). In column (2), "perceptions on domestic violence" is a standardized weighted index; the components are whether the woman believes it is normal to get beaten if she burns food (0/1) and whether it is normal to get beaten if she neglects children (0/1). In column (3), "women solely responsible for chores" is a standardized weighted index; the components are whether the woman is solely responsible for cooking (0/1), cleaning (0/1), and taking care of children (0/1). In column (4), happiness is a dummy variable = 1 if woman reported being happy or very happy in general. In column (5), the outcome is whether the index woman frequently finds it hard to control important things in her life.

of tasks done on agricultural plots that the woman works on, manages or controls the income on. Thus, this is not the channel driving increases in plot productivity.

In Panels B and C, we test the hypotheses that childcare access changes the allocation of labor. We look at labor provided by household members, excluding the index woman, in Panel B and labor provided by hired labor in Panel C. We find some evidence that access to childcare increases the number of household members who work on plots whose revenue the woman controls (column 3). We find no evidence of increases in external hired labor (Panel C).

Qualitative interviews suggest that one of the primary benefits of the childcare centers is that women now have uninterrupted work time in the field. For example, one woman offered the following anecdote to exemplify how childcare increased her yields: *'Once, I had to harvest peanuts, but I left them in the ground for a while because the child was crying a lot and I couldn't concentrate on the work. I got people from the village to help me harvest, as the peanuts were about to spoil, and I paid them in kind, part of the harvest. If the child was already in day-care, I'd go and do the work alone'*. Another woman reported: *'It was difficult because rather than concentrating, I was*

Table 10: Mechanisms

	(1) Plots index woman is main worker on	(2) Plots index woman manages	(3) Plots index woman controls the income of
Panel A: Number of Tasks			
Baseline Specification			
Treatment	-0.073	-0.469	0.104
	(0.414)	(1.011)	(0.534)
With Controls			
Treatment	-0.366	-0.563	-0.299
	(0.413)	(1.014)	(0.546)
Observations	1122	400	851
Control mean	4.093	6.800	4.742
Panel B: HH labor (exc. index woman)			
Baseline Specification			
Treatment	0.219	0.344	0.308**
	(0.134)	(0.206)	(0.142)
With Controls			
Treatment	0.249*	0.358	0.335**
	(0.136)	(0.215)	(0.148)
Observations	1122	400	851
Control mean	1.475	1.093	1.364
Panel C: Hired labor			
Baseline Specification			
Treatment	0.028	-0.782	0.151
	(0.345)	(0.772)	(0.436)
With Controls			
Treatment	-0.011	-0.762	0.190
	(0.348)	(0.817)	(0.469)
Observations	1122	400	851
Control mean	2.585	2.478	2.285

Notes: *** p<0.01, ** p<0.05, * p<0.10 Standard errors are clustered at the village-pair level. The baseline specification includes village-pair fixed effects and baseline values of outcomes. We replace missing baseline values with the median value of the variable in the control group and include a dummy for whether the variable has any missing values. With controls is equivalent to the baseline specification adding controls. Controls include an indicator for whether the mother is the household head, number of children 5 or younger in the household, and an asset index. The asset index is computed as in Table 1. In panel (A), we report the number of tasks done in the last 7 days on plots on which the index woman is the main worker (column 1), the index woman is the manager (column 2), and the index woman controls the income decisions (column 3). In panel (B), we report the HH labor (excluding the index woman) on plots on which the index woman is the main worker (column 1), the index woman is the manager (column 2), and the index woman controls the income decisions (column 3). In panel (C), we report the hired labor on plots on which the index woman is the main worker (column 1), the index woman is the manager (column 2), and the index woman controls the income decisions (column 3).

called on to watch what he was doing at home, and if it was in the field, to do the watching and working, which meant I wasn't concentrating enough. When I'd go with him to the river to prepare the chikwange, sometimes he'd throw the dust in while playing on the side, and I'd lose everything or have to start all over again. It was very difficult to concentrate. But since the start of daycare, I'm free to work.' Thus, we examine how treatment effects various measures of multi-tasking and work interruptions.

Specifically, we examine the effects of access to childcare on self-reported work interruptions over the past week, and whether the woman reports taking the child to the plot in columns 1 and 2 of Table 11. Women are 4.6 percentage points less likely to report that they have been interrupted at work. Treatment women also report taking a child to the plot fewer times during the past 7 days. Together, these results indicate 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 11: Work interruption last 7 days and Multitasking

	Work interruptions		Multitasking		
	(1) Work was interrupted (0/1)	(2) Times index woman took child to plot	(3) Never unconcentrated at home (0/1)	(4) Never unconcentrated at work (0/1)	(5) Hours multi-tasked in last 24h
Baseline Specification					
Treatment	-0.046**	-0.506***	0.027	0.048***	-0.894***
	(0.021)	(0.167)	(0.022)	(0.018)	(0.285)
With Controls					
Treatment	-0.050**	-0.471***	0.027	0.040**	-0.877***
	(0.021)	(0.174)	(0.023)	(0.018)	(0.277)
Observations	968	946	971	971	971
Control mean	0.181	2.254	0.085	0.089	2.946
Baseline control	Yes	No	No	No	Yes

Notes: *** p<0.01, ** p<0.05, * p<0.10 Standard errors are clustered at the village-pair level. The baseline specification includes village-pair fixed effects and baseline values of outcomes. We replace missing baseline values with the median value of the variable in the control group and include a dummy for whether the variable has any missing values. With controls is equivalent to the baseline specification adding controls. Controls include an indicator for whether the mother is the household head, number of children 5 or younger in the household, an asset index, and the index woman's age and education level. The asset index is computed as in Table 1. In columns (1) and (2), we report results for work interruptions. In column (1), the outcome is binary/whether the woman's work on plot was interrupted during last 7 days. In column (2), the outcome is the number of times the index woman took her child(ren) to plot during the last 7 days. Columns (3) to (5) capture multi-tasking by the index woman. In column (3), the outcome is whether the index woman is never unconcentrated at home. In column (4), the outcome is whether the index woman is never unconcentrated at work. In column (5), the outcome is the number of hours multi-tasked in last 24 hours.

We also examine effects of access to childcare on other measures of multi-tasking: including

whether the woman felt that she couldn't concentrate at home or at work. We find that the childcare centers lead to a significant increase in women reporting that they are able to concentrate at work (column 4). They also report fewer hours spent multi-tasking of the last 24 hours (column 5). Together, these results suggest that childcare allows women to concentrate more, complete work without interruption, and reduce multi-tasking.

5 Robustness

We undertake several strategies to test the robustness of our results. First, for all of our tables, we have presented our baseline specification without control variables. We find that our estimated coefficients are robust to the inclusion of control variables – such as whether the index-woman is the household head, number of children in the household, an asset index, and woman or husband age and education controls.

To address concerns about differential attrition during the follow up survey, we also consider Lee (2002) bounds for all of our outcomes of interest. Lee bounds are constructed by trimming either the top or the bottom of the distribution of each outcome variable for the treatment group by the relative difference in attrition rates between treatment and control (in our case, 7 percentage points). 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 simulate what non-differential attrition would look like by dropping 34 treatment households to equalize attrition across arms. For the lower bound of treatment impact, we trim these 34 households from the top of the distribution in the treatment group. For the upper bound, we trip 34 households from the bottom of the distribution of the treatment group.

Tables A6 and A7 present the resulting estimates of the ITT constructing the Lee bounds. 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.

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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Online Appendix for:

Experimental Evidence on Rural Childcare Provision

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Appendix A: Supplemental Tables and Figures

Figure A1: Willingness to pay for childcare services

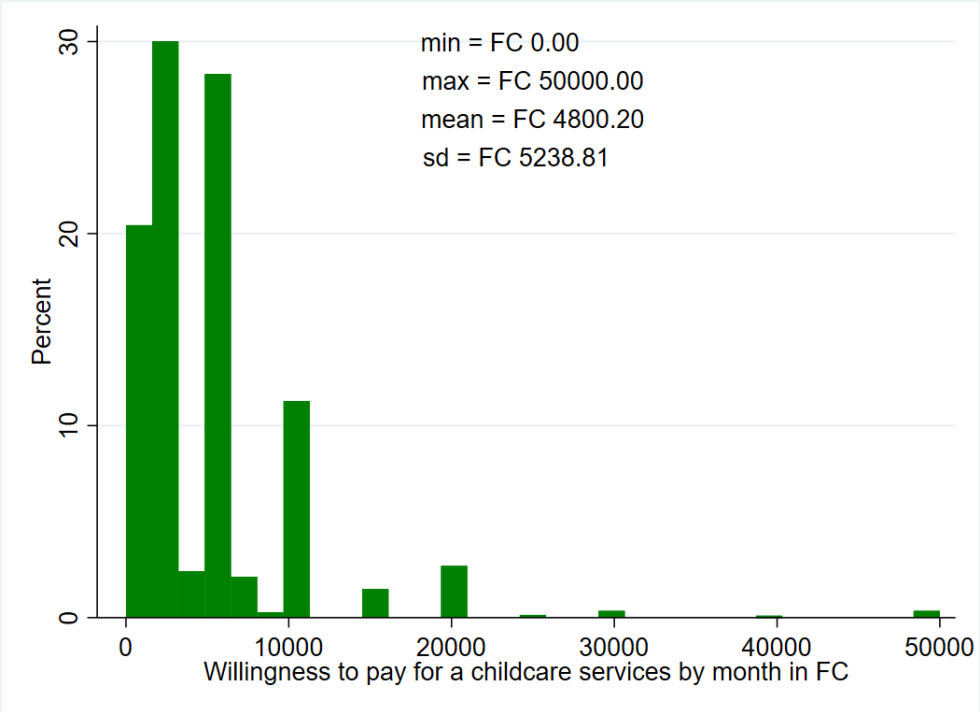

Table A1: Systematic attrition

	(1)	(2)
	Attrition at hh level	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

Table A2: 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. We replace missing baseline values with the median value of the variable in the control group and include a dummy for whether the variable has any missing values. Robust standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.10.

Table A3: Time spent on economic activities by index woman

	(1) Hours/day	(2) Days/month	(3) Months/year
Panel A : Commercial Agriculture			
Baseline Specification			
Treatment	0.479*	1.380*	0.743*
	(0.262)	(0.718)	(0.379)
With Controls			
Treatment	0.466*	1.314*	0.725*
	(0.268)	(0.735)	(0.389)
Observations	974	974	974
Control mean	2.567	6.926	3.816
Panel B: Agriculture processing			
Baseline Specification			
Treatment	0.330	0.982***	0.199
	(0.213)	(0.308)	(0.252)
With Controls			
Treatment	0.334	1.000***	0.197
	(0.212)	(0.315)	(0.254)
Observations	974	974	974
Control mean	1.689	1.765	2.124
Panel C: Self employment			
Baseline Specification			
Treatment	0.053	0.101	0.074
	(0.076)	(0.219)	(0.124)
With Controls			
Treatment	0.032	0.048	0.044
	(0.078)	(0.216)	(0.124)
Observations	974	974	974
Control mean	0.190	0.412	0.320
Panel D: Wage employment			
Baseline Specification			
Treatment	0.145	0.273	0.237*
	(0.090)	(0.248)	(0.127)
With Controls			
Treatment	0.135	0.246	0.222*
	(0.092)	(0.253)	(0.131)
Observations	974	974	974
Control mean	0.093	0.262	0.140

Notes: *** p<0.01, ** p<0.05, * p<0.10 Standard errors are clustered at the village-pair level. The baseline specification includes village-pair fixed effects and baseline values of outcomes. We replace missing baseline values with the median value of the variable in the control group and include a dummy for whether the variable has any missing values. With controls is equivalent to the baseline specification adding controls. Controls include an indicator for whether the mother is the household head, number of children 5 or younger in the household, an asset index, and the index woman's age and education level. The asset index is computed as in Table 1. In panel (A), we report results for hours/day (column 1), days/month (column 2), and months/year (column 3) spent on commercial agriculture. In panel (B), we report results for hours/day (column 1), days/month (column 2), and months/year (column 3) spent on agriculture processing. In panel (C), we report results for hours/day (column 1), days/month (column 2), and months/year (column 3) spent on self-employment. In panel (D), we report results for hours/day (column 1), days/month (column 2), and months/year (column 3) spent on wage employment.

Table A4: Time spent on economic activities by index woman's husband

	(1) Hours/day	(2) Days/month	(3) Months/year
Panel A : Commercial Agriculture			
Baseline Specification			
Treatment	0.623*	2.078**	1.001**
	(0.340)	(0.886)	(0.468)
With Controls			
Treatment	0.642*	2.095**	1.014**
	(0.345)	(0.907)	(0.480)
Observations	734	734	734
Control mean	2.866	7.496	3.944
Panel B: Agriculture processing			
Baseline Specification			
Treatment	-0.026	0.281	0.099
	(0.113)	(0.201)	(0.142)
With Controls			
Treatment	-0.012	0.273	0.110
	(0.120)	(0.199)	(0.142)
Observations	734	734	734
Control mean	0.281	0.228	0.291
Panel C: Self employment			
Baseline Specification			
Treatment	0.394***	0.488	0.262
	(0.129)	(0.305)	(0.182)
With Controls			
Treatment	0.393***	0.451	0.238
	(0.135)	(0.318)	(0.187)
Observations	734	734	734
Control mean	0.180	0.511	0.385
Panel D: Wage employment			
Baseline Specification			
Treatment	0.162	0.508	0.148
	(0.237)	(0.580)	(0.277)
With Controls			
Treatment	0.191	0.570	0.173
	(0.237)	(0.591)	(0.284)
Observations	734	734	734
Control mean	0.641	1.605	0.886

Notes: *** p<0.01, ** p<0.05, * p<0.10 Standard errors are clustered at the village-pair level. The baseline specification includes village-pair fixed effects and baseline values of outcomes. We replace missing baseline values with the median value of the variable in the control group and include a dummy for whether the variable has any missing values. With controls is equivalent to the baseline specification adding controls. Controls include an indicator for whether the index woman is the household head, number of children 5 or younger in the household, an asset index, and the index woman's husband's age and education level. The asset index is computed as in Table 1. In panel (A), we report results for hours/day (column 1), days/month (column 2), and months/year (column 3) spent on commercial agriculture. In panel (B), we report results for hours/day (column 1), days/month (column 2), and months/year (column 3) spent on agriculture processing. In panel (C), we report results for hours/day (column 1), days/month (column 2), and months/year (column 3) spent on self-employment. In panel (D), we report results for hours/day (column 1), days/month (column 2), and months/year (column 3) spent on wage employment.

Table A5: 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 A6: Lee bounds: Time on carework, index woman's and husband's engagement in economic activities, plot yields

	(1) Coefficient	(2) Lower Bound	(3) Upper Bound
Hours/day spent on carework by HH members			
By any HH member (hours)	-2.618***	-2.667***	-2.612***
	(0.197)	(0.249)	(0.203)
By index woman (hours)	-1.956***	-2.006***	-1.935***
	(0.304)	(0.352)	(0.314)
By husband (hours)	-0.102	-0.107	-0.066
	(0.133)	(0.134)	(0.181)
By daughters (hours)	-0.246	-0.252	-0.181
	(0.204)	(0.203)	(0.309)
By sons (hours)	-0.101	-0.103	-0.050
	(0.105)	(0.105)	(0.203)
By adult females in HH (hours)	-0.286**	-0.289**	-0.229
	(0.140)	(0.139)	(0.205)
Engagement in remunerated activities			
Panel (A): Index woman			
Farming of crops destined for sale (0/1)	0.109***	0.107***	0.110***
	(0.032)	(0.032)	(0.032)
Livestock or poultry rearing (0/1)	0.005	0.004	0.007
	(0.022)	(0.022)	(0.024)
Agricultural processing (0/1)	0.076**	0.075**	0.078**
	(0.030)	(0.030)	(0.031)
Non-agricultural wage work (0/1)	0.035***	0.035***	0.038**
	(0.011)	(0.012)	(0.015)
Non-agricultural self-employment (0/1)	0.013	0.012	0.015
	(0.012)	(0.012)	(0.016)
Engagement in remunerated activities (ICW index)	0.253***	0.250***	0.270***
	(0.066)	(0.066)	(0.080)
Panel (B): Husband			
Farming of crops destined for sale (0/1)	0.119***	0.112***	0.126***
	(0.037)	(0.038)	(0.039)
Livestock or poultry rearing (0/1)	0.024	0.011	0.026
	(0.022)	(0.029)	(0.023)
Agricultural processing (0/1)	0.009	-0.004	0.010
	(0.015)	(0.024)	(0.015)
Non-agricultural wage work (0/1)	0.024	0.012	0.026
	(0.024)	(0.030)	(0.025)
Non-agricultural self-employment (0/1)	0.048***	0.035	0.049***
	(0.018)	(0.026)	(0.018)
Engagement in remunerated activities (ICW index)	0.255***	0.190*	0.270***
	(0.079)	(0.113)	(0.083)

Notes: *** p<0.01, ** p<0.05, * p<0.10. Standard errors are in parentheses.

Table A7: Lee Bounds: Index woman's income, husband's income, child development outcomes, welfare outcomes, and index woman's gender attitudes and well-being

	(1) Coefficient	(2) Lower Bound	(3) Upper Bound
Monthly Income ('000 FC)			
Panel (A): Index woman			
Farming of crops destined for sale	5.312**	5.259**	5.785*
	(2.493)	(2.528)	(3.006)
Livestock or poultry rearing	-0.698	-0.706	-0.451
	(0.737)	(0.733)	(1.125)
Agricultural processing	2.516	2.468	3.009
	(2.337)	(2.350)	(2.902)
Non-agricultural wage	2.619**	2.616**	3.177
	(1.147)	(1.177)	(2.264)
Non-agricultural self-employment	0.956	0.947	1.548
	(1.676)	(1.720)	(2.679)
Monthly income (ICW index)	0.123*	0.121*	0.141
	(0.066)	(0.066)	(0.088)
Total monthly income	9.626**	9.510**	10.111**
	(3.752)	(3.791)	(4.127)
Panel (B): Husband			
Farming of crops destined for sale	6.290	2.575	6.856
	(4.728)	(7.113)	(4.862)
Livestock or poultry rearing	-0.305	-1.411	-0.263
	(1.033)	(1.679)	(1.025)
Agricultural processing	2.132	-2.232	2.207
	(2.585)	(1.986)	(2.704)
Non-agricultural wage	3.568	-0.247	3.769
	(3.366)	(5.815)	(3.443)
Non-agricultural self-employment	4.940	-0.809	5.083
	(3.437)	(7.610)	(3.565)
Monthly income (ICW index)	0.141*	0.045	0.150*
	(0.082)	(0.132)	(0.085)
Total monthly income	10.214	10.214	11.129*
	(6.540)	(8.382)	(6.744)
Welfare			
Any HH member skipped a meal in last 7 days (0/1)	-0.011	-0.011	-0.009
	(0.023)	(0.023)	(0.023)
Number of days meal was skipped in last 7 days	-0.014	-0.014	0.000
	(0.051)	(0.051)	(0.051)
Index woman's gender attitudes and well-being			
Mobility restrictions (ICW index)	0.074	0.073	0.325***
	(0.065)	(0.066)	(0.073)
Perceptions on domestic violence (ICW index)	-0.041	-0.045	-0.041
	(0.063)	(0.064)	(0.066)
Women solely responsible for chores (ICW index)	0.008	-0.589***	0.017
	(0.063)	(0.058)	(0.064)
Index woman is happy (0/1)	0.041**	0.033	0.042**
	(0.018)	(0.020)	(0.018)
Index woman feels lack of control (0/1)	-0.049**	-0.051**	-0.041
	(0.025)	(0.025)	(0.026)
Work Interruptions			
Number of times index woman took child to plot	-0.443***	-0.775***	-0.338**
	(0.130)	(0.270)	(0.168)
Work was interrupted (0/1)	-0.046*	-0.049**	-0.033
	(0.024)	(0.024)	(0.025)
Multi-tasking			
Never unconcentrated at home (0/1)	0.024	0.023	0.033
	(0.019)	(0.019)	(0.022)
Never unconcentrated at work (0/1)	0.040**	0.039*	0.049**
	(0.020)	(0.020)	(0.023)
Hours multi-tasked in last 24h (hours)	-0.998***	-1.019***	-0.942***
	(0.232)	(0.234)	(0.245)

Notes: *** p<0.01, ** p<0.05, * p<0.10. Standard errors are in parentheses.