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Schooling Impacts of an Unconditional Cash Transfer Program in Mali

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Abstract

In rural West Africa, the rate of out-of-school children is high and delayed entry to primary school is common, particularly for girls. Using the randomized roll-out of an unconditional cash transfer program (*Jigisemejiri)* in Mali, we examine its impact on child schooling by age and sex. The program leads to significant improvements in schooling outcomes for girls, but not boys. Improvements among girls are especially salient among younger (ages 6–9) and older (ages 15–18) girls. Pathway analysis reveals that the program reduces the time younger girls spend in agricultural work at home and the time older girls spend in domestic work as well as self-employment. Households in the program also spend more on education for older girls in terms of school fees, materials, and transport.

Keywords: Cash transfers, child schooling, child labor, randomized controlled trial, Mali

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1. Introduction

Sustainable Development Goal 4 (SDG 4) emphasizes the importance of education for socially disadvantaged people worldwide—recommending that all girls and boys have access to free, equitable and quality primary and secondary education. Adequate access to education, relevant knowledge, skills, and competencies contributes to acquiring decent work. Basic skills such as reading and writing can have substantial positive impacts on the population's well-being. Education promotes high private and social returns (Moretti, 2004) and is correlated with higher income levels (Gyimah-Brempong et al., 2006), while also improving health and reproductive choices amongst girls (Lloyd et al., 2000).

Over the past decades, sub-Saharan African countries have made significant investments in the education sector. In some regions, gross primary school enrolment rates[1] are now close to 80% or more. Yet many children remain excluded from school, and delayed entry into primary school is ubiquitous in some countries, particularly among girls. According to the UNESCO Institute of Statistics, of all regions, sub-Saharan Africa has the highest rates of education exclusion: 23% of girls are out of primary school compared to 19% of boys (UIS, 2019). In Mali, 44% of primary school-age girls are out of school compared to 38% of boys, and in secondary school, 67% of girls are out of school compared to 60% for boys (UIS, 2018).

Evidence suggests that children in developing countries often enter primary school at later ages, especially in rural areas, because of poverty, poor nutrition and resulting cognitive deficits, long distances to attend school, or insecurity (Bommier et al., 2000; Jukes et al., 2007). Pupils who enter school late are more likely to repeat grades, drop out, perform poorly, and are less likely to complete primary school (Nonoyama-Tarumi et al., 2010; Lewin, 2009).

[1]Number of students enrolled in a given level of education, regardless of age, expressed as a percentage of the official school-age population corresponding to the same level of education (UNESCO, 2021).

Moreover, a child entering school late reduces their working life and lifetime earnings by delaying entry into the labor market (Deming et al., 2008).

Cash transfers, food distribution, or school feeding are increasingly used in developing countries as social safety nets to improve the quality of life of the poor, with the dual goals of fighting poverty and improving human capital accumulation. Globally, cash transfer programs have reached 718 million people in over 130 countries as of 2015 (World Bank, 2018). The literature shows a range of positive benefits of cash transfer programs, including improvements in household food security, dietary diversity, and asset accumulation (Hidrobo et al., 2018; Bastagli et al., 2019).

Conditional and unconditional cash transfer programs have also been shown to improve school enrolment and attendance across 25 countries (five of which are in Africa) (Baird et al., 2013).[2] In middle-income countries where primary school enrolment rates are already high, the impacts tend to be more significant at the secondary level. However, most of the available evidence on the impact of cash transfer programs on education comes from Latin America and East Africa, where cash transfer programs are specifically targeted at women. Less is known about how unconditional cash transfer programs impact school enrolment when the transfers are targeted at household heads—primarily men—in a rural West African context where a large portion of primary and secondary school-age children are out of school.

In this paper, we investigate how the Government of Mali's unconditional cash transfer program (*Jigisemejiri*) impacts children's education. We take advantage of the randomized roll-out of the *Jigisemejiri* program to examine its impact on enrolment, highest grade completed, and grade promotion, by child sex and age. To understand the mechanisms that drive the

[2] For more updated studies see Benedetti et al. (2016); Ganimian and Murnane (2016); Kilburn et al. (2017).

program's impact on schooling outcomes, we also analyze impacts on education expenditure and child labor.

We find that while *Jigisemejiri* has no significant impacts on schooling when analyzing girls and boys together of different ages, important patterns emerge across age and sex. For girls aged 6–9 years, *Jigisemejiri* leads to positive impacts on achievement of the highest grade by 0.3 grades. For older girls (aged 15–18 years), *Jigisemejiri* leads to improvements in enrolment in the last year by 5.9 percentage points and the probability of progressing a grade by 6 percentage points. For boys, impacts are either not statistically significant or negative. Our pathway analysis reveals that the *Jigisemejiri* program led to a significant reduction in the number of hours younger girls spent in agricultural work for their own household and the number of hours older girls spent in domestic work as well as self-employment. We also observe that the program led to increased education expenditures in households with older girls, especially expenditures related to school fees, materials, and transportation.

Our study contributes to the growing literature on the impact of unconditional cash transfer programs on educational outcomes. By highlighting heterogeneity in impact by children's sex and age, it provides empirical insights into the potential of unconditional cash transfer programs to improve child education by relieving schooling barriers for both younger and older girls, who constitute the subgroup of children most likely to be excluded from the education system. Our findings are similar to those of Kilburn et al. (2017), Sabates et al. (2019), and Handa et al. (2016), who find that in the context of Malawi, Rwanda, and Zambia, unconditional cash transfers increase the demand for education by reducing financial constraints that prevent children from attending school.

The remainder of the paper is organized as follows. We begin by describing the Malian national cash transfer program and the country's educational system. We explain our evaluation design, data, and sampling method. We then present the estimation strategy, results, and

mechanisms. Finally, we discuss possible explanations for our findings and provide concluding thoughts.

2. Education sector in Mali

The Malian school system is composed of six years of elementary school (grades 1–6) and three years of junior high school (grades 7–9). At the end of junior high school, students are awarded the *Diplome d'Etude Fondmentale* (DEF). After these nine years, students can attend technical or general education. General education is a senior high school (grades 10–12) where students who complete all levels are awarded the *baccalaureat* diploma. Obtaining this diploma allows students to attend university. The technical school is vocational, and students are awarded the *Certificat d'Aptitude Professionnelle* (CAP) after two years and *Brevet de Technicien* after four years. Children are supposed to start the first year of elementary school when they are 6 years old and therefore complete primary school at 12 years old and junior high school at 15 years old.

Access to preschool education is very low in Mali (only 6.1% of children aged 3 to 5 were enrolled in 2016–2017) despite the importance of this segment for children's cognitive development. Gross primary enrolment rates were increasing in Mali from 1990 to 2011, reaching 84% in 2011 and then declining and plateauing at around 75.6% as of 2018 (71.6% for girls and 79.5% for boys).[3] Despite improvements in gross primary school rates, the out-of-school rate of children in Mali is still high. The rate of out-of-school children is the percentage of children not in school according to the UNESCO Institute for Statistics (UIS, 2019), and is derived from the net enrolment rate.[4] This estimate includes children who never start, who start late, and who drop out. Figure 1 shows that, in Mali, the out-of-school rate for girls of primary

[3] World Development Indicators accessed from the World Bank website (https://databank.worldbank.org/source/world-development-indicators#) accessed on December 6, 2021.
[4]Net enrolment rate is the ratio of children of official school age who are enrolled in school to the population of the corresponding official school age, while gross enrolment is the ratio of total enrolment, regardless of age, to the population of the age group that officially corresponds to the level of education.

school age is high (between 45–48 percent) and higher than boys across the three years (2013, 2015, 2018) although the gap has narrowed since 2013.

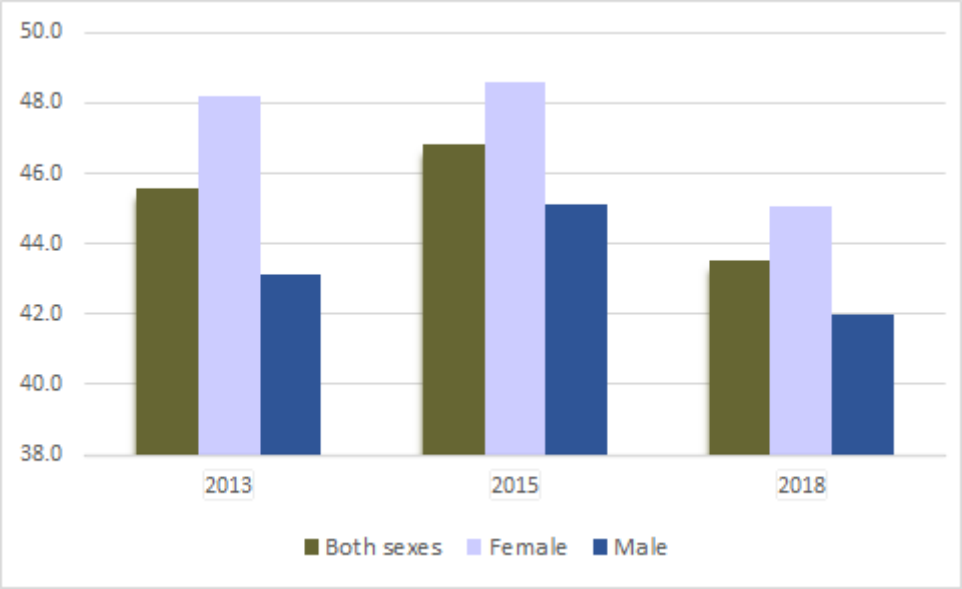

Figure 1: Annual out-of-school rate for children of primary school age (%)

Source: UNESCO Institute for Statistics, 2018.

Gross secondary school enrolment is even lower than primary school enrolment, standing at 41% in 2018, with girls less likely to be enrolled than boys (37% compared to 45%) (World Development indicators). Evidence indicates that the significant dropout of girls from the education system is partly due to child marriage, poverty, distance to school, and lack of sanitation in the school. Failing a grade at school is another factor, with girls being more likely to be taken out of school than boys if they are not performing well (Shahidul et al., 2015).

3. The Mali cash transfer program

The Malian government initiated the *Programme de Filets Sociaux* (*Jigisemejiri*) in 2014 as a national cash transfer program with poverty reduction, food security, and human capital development as its main objectives. The program targets extremely poor households and was initially implemented in six regions (Sikasso, Koulikoro, Kayes, Segou, Mopti, Gao) and the district of Bamako. During the study period for this analysis, the program had two components:

Unconditional Cash Transfers (UCT) and Accompanying Measures (AM). An additional component of Preventive Nutrition Packages (PNP) for children under 5 years and pregnant women was not implemented until after the study period.

Recipient households received 10,000 FCFA (Central African francs), equivalent to US$18, per month. Payments were made every quarter in the beneficiary villages. The cash was given to household heads, who were men in most households. The cash transfer was targeted to extremely poor households based on geographic and community-based targeting as follows: First, quotas were developed at the commune level, based on the percentage of malnourished and the percentage of extremely poor households within the commune. These quotas were then split proportionally by village (in terms of village population), to obtain village quotas. Households within villages were chosen based on four criteria related to (1) food insecurity, (2) ownership of agricultural equipment, livestock, and land, (3) "reliability" of income, and (4) household composition (3–10 household members total, with at most 1–2 working adults). These households were selected through a two-stage process: First, village committees created a list of households most vulnerable according to the criteria; second, commune committees assembled whole villages to validate the list. Preference was given to those who met more than one criterion, until the village quota was met.

The AM were group counseling sessions conducted by nongovernmental organizations in each intervention commune. These sessions were not only targeted to cash beneficiaries but also welcomed any household in the selected communes. The AM sessions were organized into groups of themes that included the use of the cash transfer, nutrition, health, pre- and post-natal care, children's rights and income-generating activities. Under children's rights, the importance of education, especially for girls, was discussed. Two training sessions were conducted per month in each intervention village. Each group of themes was covered over a 6-month period. The list of themes is presented in the Appendix (Table A1).

4. Evaluation design

The impact evaluation of *Jigisemejiri* was designed as a two-stage randomized controlled trial, using the gradual rollout of the program. The Government of Mali conducted the randomization process in collaboration with the International Food Policy Research Institute (IFPRI) and the Institute de Recherche pour le Development (IRD). Five regions were targeted for the evaluation: Sikasso, Koulikoro, Kayes, Segou, and Mopti.

In the first stage of randomization, within each region, the communes were randomly assigned to either receive the program right after a baseline survey in 2014 ("treatment") or to delay entry into the program until 2016, after a midline survey ("control"). Approximately 20% of the eligible communes in each region were randomly assigned to the control arm. Across all five regions, a total of 76 communes were randomly assigned to the treatment, and 20 communes were assigned to the control. Among the 76 treatment communes, 19 were non-randomly selected in collaboration with the national nutrition technical committee to receive the PNP. In the second stage of randomization, within these 19 communes, villages were randomly assigned to receive the PNP or not to receive the PNP. However, the PNP was not implemented during the study period for this analysis. Thus, only the first-stage randomization (treatment vs. control) is used. Figure 2 provides the flowchart of the study design.

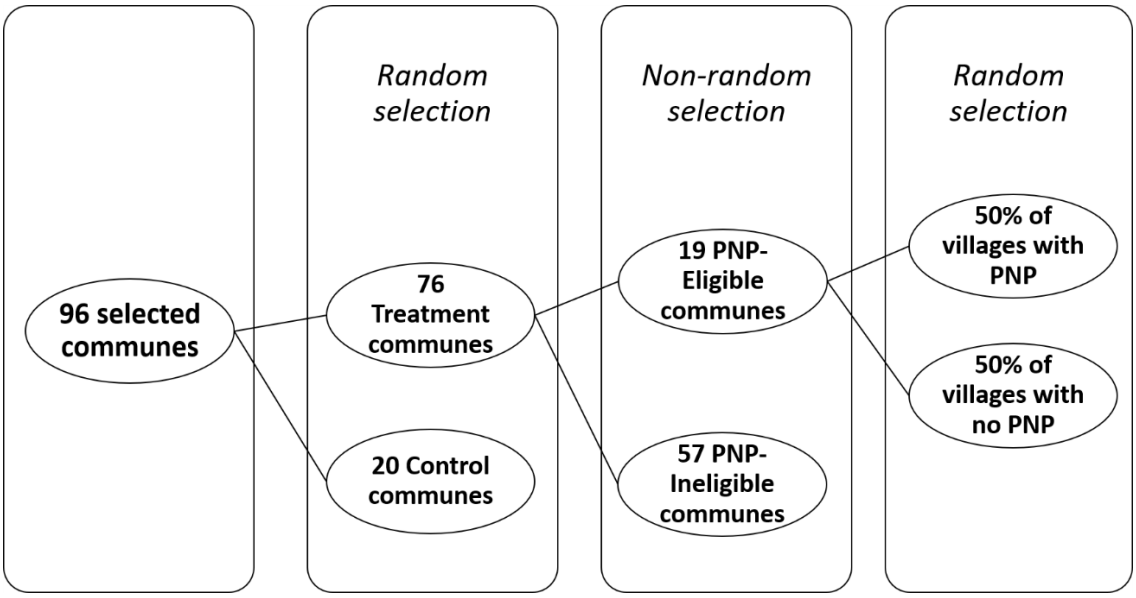

Figure 2. Flowchart of the study design

5. Data, sample, and outcomes

5.1. Data and sample

We use baseline and midline data collected by IFPRI and IRD for the impact evaluation of *Jigisemejiri*. The baseline survey was conducted from September 2014 to February 2015 and a midline survey from August to November 2016. The baseline data were collected before the beginning of the project intervention and the midline data 2 years later and before the control group started receiving the intervention. In total, 90 out of 96 communes were surveyed at baseline. Six communes were excluded prior to baseline because of instability related to the ongoing conflict between armed groups in the northern part of the country. The baseline data sampled households in treatment and control communes that were eligible for the program and had a child aged 6 to 23 months at the time of the baseline survey.[5]

Figure 3 below shows the study flowchart of the sample used to analyze schooling impacts. The main unit of analysis is the individual child aged 6–18 years old at baseline. At baseline, 3,080 households were surveyed, corresponding to 10,256 children who were 6–18 years old

[5] The selection of households with children aged 6 to 23 months was due to the evaluation also investigating nutrition impacts for children in this age range.

according to the household roster. From this population, 2,556 households were randomly selected to be interviewed at midline, corresponding to 8,444 children 6–18 years old.[6] Among these, 20 households were lost at follow-up. Within selected households that could be re-interviewed, 1,146 children in the baseline roster were no longer in the midline roster mainly due to marriage, death, leaving the household to study in the city, or household disintegration. We then excluded 86 children at midline who did not belong to the set of eligible households and were thus included by mistake in the baseline roster. To ensure that we were following the same children across rounds, we also excluded 43 children with inconsistent reports of child sex between baseline and midline. The final sample for analysis was 7,122 children across 2,536 households.

[6] For budgetary reasons, only a subset of the households sampled at baseline were randomly selected to be sampled at midline.

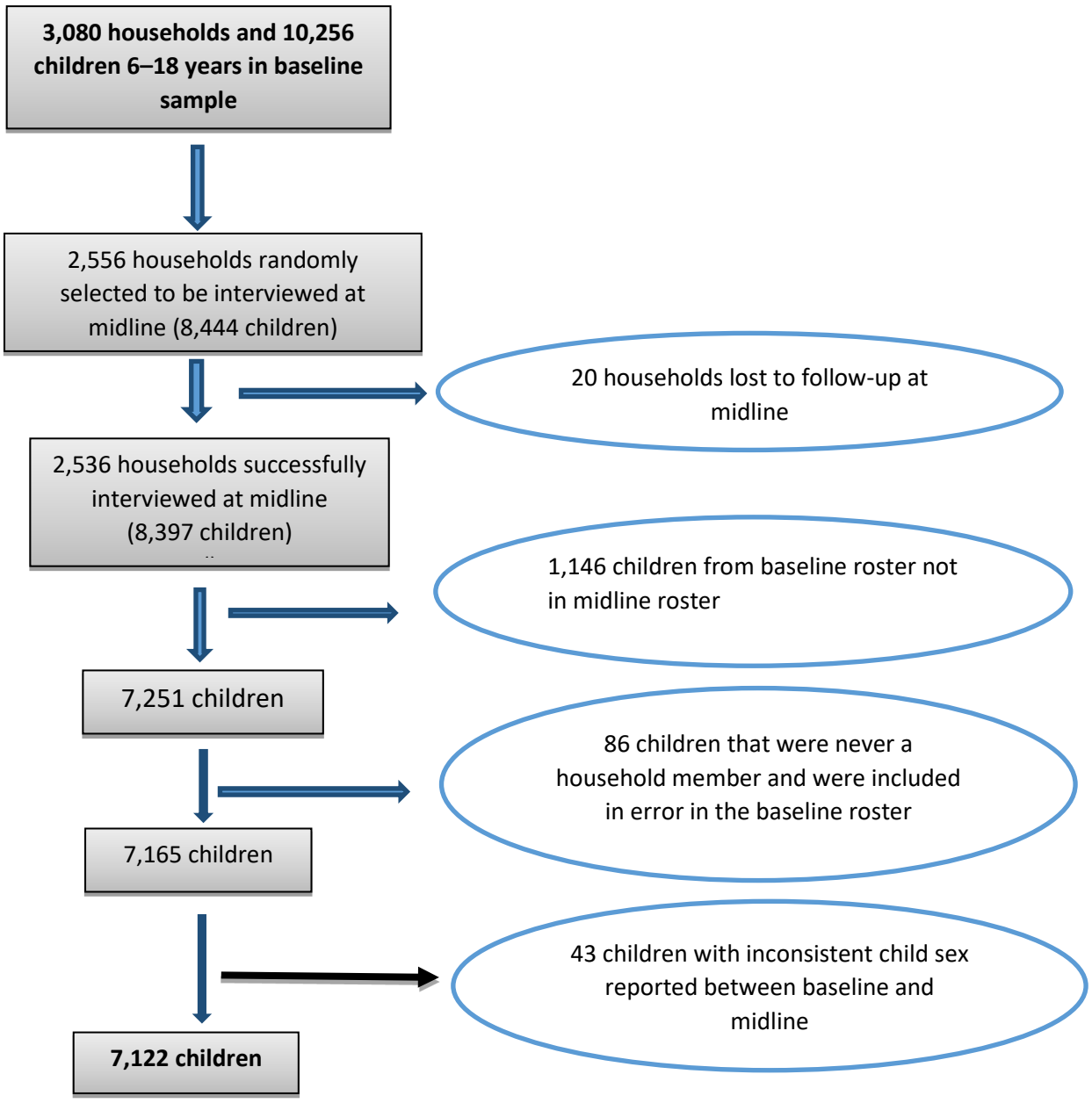

Figure 3. Sample flowchart

5.2. Outcomes

Information on schooling was collected for each individual in the household roster aged 6 to 21 years old. We limit our analysis to children 6–18 years old at baseline, with 18 being the age at which students are scheduled to graduate from senior high school if they start school at the age of 6 and progress normally. Our educational outcomes of interest are:

(1) *Highest grade completed* is the highest grade level that the child has reached at the time of the survey. It ranges from 0 for children who never reached a grade level to 14 for a child who reached university. Children who are never enrolled are recoded to 0.

(2) *Enrolled 2015/2016* indicates whether a child was enrolled during the 2015/2016 school year. This is the previous year's enrolment status at midline.

(3) *Grade promotion* measures if the child advanced in grade level. The outcome is binary and takes the value 1 if the child progressed at least one grade during the two years of the project intervention.

Outcomes (2) and (3) were only collected at midline. It is important to note that conditional on enrolment, the self-reported school attendance[7] rate was near–universal at baseline, and thus we do not analyze the impact of the program on this outcome.

Furthermore, we analyze data on school expenditures (only collected at midline) and child labor. School expenditures related to school fees, materials, and transport were estimated for each child that was reported as being enrolled in the 2015/2016 school year. Children not enrolled, were recoded to have zero school expenditures. We create three indicators on school expenditures defined as follows:

- *School fees*: child-specific expenditure in tuition fees (including registration fees) for the 2015/2016 school year.
- *Material-related expenses*: child-specific expenditure on school supplies (books, notebooks, uniforms, etc.) for the 2015/2016 school year.
- *Transportation-related expenses*: child-specific expenditure on school transport for the 2015/2016 school year.

[7] Proportion of the total school days for which enrolled students are present in the last 7 days. It is obtained by dividing in the past 7 days the number of days the child attended school by the number of days the school was open.

For labor, different questions were asked about children aged 6–14 and about individuals aged 15 years and older (defined in the questionnaire as "adults"), thus our labor outcomes are different for children 6–14 years old and adolescents 15–18 years old. For children aged 6–14 we create three binary indicators for work categories related to agriculture, domestic, and other. The child is considered to be engaged in agricultural work (taking care of household livestock or helping with other household agricultural work) on the household's land if they spent at least one hour in agricultural work for the household in the last 7 days. The child is considered to be engaged in domestic work if they spent at least 1 hour in domestic work in the last 7 days. Domestic work refers to looking after children, cooking, washing clothes, cleaning, taking care of other sick family members, collecting vegetables, collecting firewood, and carrying water. The "Other work" category combines work in small business at home (work for the family in a small trade or business) and work for another household (work for someone who is not a member of the household). We combine these two activities because most children do not engage in these activities (see Table 1). We also analyze the intensive margin by looking at work hours in these three categories.

For adolescents aged 15–18, we use seven indicators for labor. The first five indicators are binary indicators based on questions related to activities performed by the individual in the last 6 months: whether the individual (1) worked in agriculture on land cultivated by the household, (2) took care of the livestock for the household, (3) worked for pay, (4) worked in agriculture for another household, and (5) was self-employed or engaged in income-generating activities. The sixth is a binary indicator for whether the individual was involved in domestic work in the last 2 weeks, and the seventh indicator is the number of hours per day the individual usually spent in domestic work.

6. Attrition and baseline balance

Of the 8,444 children aged 6 to 18 years old at baseline, 7,122 were surveyed at midline, indicating an attrition rate of 15.6% due to not finding the same child across the survey rounds. If attrition is correlated with treatment assignment, then this could potentially bias the estimates of the impact of the cash transfer program on outcomes of interest. As Table 1 shows, there is no significant difference in attrition rates between treatment and control arms.

To assess whether the randomization led to a balance in baseline characteristics between treatment and control arms, we test for statistical differences in means between the arms using OLS regression with controls for region dummies and standard errors clustered at the commune level. We find that mean individual and household characteristics tend to be balanced between the treatment and control groups (Table 1); of the 17 variables only 2 (age and working for another household) are significant at the 10 percent level.

Children in our sample are on average 10 years old at baseline, and a little over half are boys. Households are large, with about 13 members on average. Household heads are on average 55 years old; less than 10% went to school, and only about 12% can read and write. At baseline, about 35% of children have ever enrolled in school, 32% of children aged 6–14 are engaged in agricultural work at home, and 60% in domestic work.

Table 1: Baseline characteristics of children by treatment status.

	N	All	Control	Treated	P-value
Attrition rate	8,444	0.156	0.146	0.159	0.591
Child Characteristics					
Age (in years)	7,122	10.4	10.5	10.3	0.041
Child is male	7,122	0.534	0.529	0.536	0.870
Households Characteristics					
Head age (in years)	7,122	55.0	54.4	55.2	0.586
Head went to school, %	7,122	0.084	0.094	0.081	0.420
Head can read and write, %	7,122	0.122	0.124	0.121	0.972
Head is female,%	7,122	0.108	0.103	0.110	0.870
Head is married,%	7,122	0.889	0.894	0.888	0.545
Head is monogamous,%	7,122	0.474	0.482	0.472	0.859
Head is polygamous,%	7,122	0.415	0.412	0.416	0.942
Household size	7,122	12.7	12.5	12.8	0.754
Log total per capita consumption	7,122	7.98	8.02	7.97	0.378
Outcomes					
Ever enrolled into school	7,122	0.350	0.375	0.342	0.869
Highest grade completed	7,122	1.35	1.48	1.31	0.862
Agricultural work for own household (6-14 years)	6,050	0.319	0.331	0.316	0.469
Work in small business for own household (6-14 years)	6,047	0.035	0.038	0.034	0.630
Domestic work for own household (6-14 years)	6,050	0.600	0.578	0.607	0.229
Work for another household (6-14 years)	6,050	0.036	0.021	0.040	0.022

Note: P-values are reported from t-test on the equality of means of the control and treatment group for each variable. Standard errors are clustered at the commune level. Analysis adjusted for regions.

Table 2: Baseline characteristics of children by intervention arm and by sex

	Girls					Boys				
	N	All	Control	Treated	P-value	N	All	Control	Treated	P-value
Attrition rate	4,113	0.193	0.205	0.197	0.520	4,331	0.121	0.114	0.126	0.340
Child Characteristics										
Age (in years)	3,316	10.3	10.5	10.2	0.066	3,806	10.4	10.6	10.4	0.080
Households Characteristics										
Head age (in years)	3,316	54.8	53.9	55.1	0.675	3,806	55.2	54.7	55.3	0.533
Head went to school, %	3,316	0.086	0.094	0.084	0.444	3,806	0.082	0.095	0.078	0.420
Head can read and write, %	3,316	0.125	0.119	0.127	0.636	3,806	0.119	0.127	0.116	0.704
Head is female, %	3,316	0.104	0.095	0.106	0.871	3,806	0.112	0.110	0.113	0.729
Head is married, %	3,316	0.889	0.899	0.886	0.500	3,806	0.890	0.891	0.889	0.614
Head is monogamous, %	3,316	0.471	0.501	0.462	0.510	3,806	0.477	0.466	0.480	0.805
Head is polygamous, %	3,316	0.418	0.398	0.424	0.664	3,806	0.413	0.425	0.409	0.630
Household size	3,316	12.6	12.2	12.8	0.705	3,806	12.8	12.7	12.8	0.448
Log total per capita consumption	3,316	8.02	8.01	8.02	0.192	3,806	7.95	8.03	7.93	0.694
Outcomes										
Ever enrolled into school	3,316	0.310	0.321	0.307	0.347	3,806	0.385	0.424	0.373	0.704
Highest grade completed	3,316	1.15	1.19	1.14	0.520	3,806	1.52	1.74	1.45	0.556
Agricultural work for own household (6-14 years)	2,819	0.220	0.226	0.218	0.730	3,231	0.406	0.424	0.401	0.236
Work in small business for own household (6-14 years)	2,817	0.039	0.044	0.037	0.997	3,230	0.031	0.032	0.031	0.362
Domestic work for own household (6-14 years)	2,819	0.741	0.720	0.748	0.354	3,231	0.478	0.454	0.485	0.406
Work for another household (6-14 years)	2,819	0.038	0.023	0.042	0.016	3,231	0.034	0.019	0.039	0.046

Note: P-values are reported from t-test on the equality of means of the control and treatment group for each variable. Standard errors are clustered at the commune level. Analysis adjusted for regions.

Table 2 shows baseline characteristics across the treatment and control group, stratified by child sex. For both sexes, the difference between the treatment and control group in child age and working for another household is significant at the 10 percent level. In terms of differences across sex, 31% of girls have ever been enrolled in school versus 38.5% of boys. Boys are more involved in agricultural work at home (40.6%) compared to girls (22%); the opposite holds for domestic work, where girls are more involved than boys (74.1% compared to 47.8%).

7. Estimation strategy

To estimate the impact of the *Jigisemejiri* program on the listed study outcomes, we take advantage of the randomized experimental design and conduct an intent-to-treat (ITT) analysis. This approach avoids bias that may occur due to selection into and out of the program. We estimate the treatment impact using analysis of covariance (ANCOVA) when baseline outcomes are available. For outcomes that were not collected at baseline, we conduct an ITT analysis using single-difference estimation with midline data. The randomized assignment and balance in baseline characteristics minimize concerns of bias in the single-difference treatment estimates. We estimate the following equation:

$$Y_{ict} = \beta_0 + \beta_1 \times T_c + \beta_2 \times X_{ict-1} + \beta_3 \times Y_{ict-1} + \theta + \varepsilon_{ict} \quad (1)$$

Y_{ict} represents the main outcome of interest measured for each child *i* from commune *c* at time *t*. T_c is a dummy equal to 1 if the child belongs to a commune that was allocated to receive the cash transfer program early (Treatment), and 0 to the control group. X_{ict-1} is a set of control variables measured at baseline, θ denotes region fixed effects. Y_{ict-1} represents the outcome values at baseline when available. The coefficient β_1 of the treatment (*T*) represents the impact of *Jigisemejiri* on different study outcomes.

In addition to estimating impacts on schooling for the full sample of children, we disaggregate impacts by children's sex and age group at baseline. Since enrolment rates and

constraints to enrolment vary substantially by children's sex and age, treatment impacts are also expected to vary. Schooling impacts are estimated separately for children aged 6–9 years, children aged 10–14 years, and adolescents aged 15–18 years at baseline.[8] We use these same age groupings to estimate impacts on school expenditures. For estimation of labor impacts, we use different age groupings due to differing labor modules by age. Specifically, children who were 6–13 years old at baseline were administered the child labor module at midline. Children aged 13–14 years old at baseline were administered the adult labor module at midline, given that they were 15 years or older by midline. Thus, we analyze labor impacts for age groups 6–9, 10–13, 13–14, and 15–18 years old.[9]

In all estimations, we include the following baseline covariates: child's age, household size, household head characteristics (marital status, age, sex, education), and total value per capita of household consumption. Standard errors are clustered at the commune level, which is the level at which treatment was assigned. We also use inverse probability weights to assess the robustness of our results to adjustments for attrition.

8. Results

We use equation (1) to estimate the causal impact of *Jigisemejiri* on child schooling. Impact tables report the coefficient on treatment (β_1) and the mean dependent variable for the control group at midline. We first present the impacts on the full sample of children 6–18 years old, and then disaggregate by age and sex.

Table 3 presents the impact of *Jigisemejiri* on education outcomes for the full sample of boys and girls and shows that there are no significant impacts when boys and girls ages 6–18 are analyzed together. However, important patterns emerge when we estimate impacts for boys

[8] These age groupings were chosen based on sample size in each group.
[9] Depending on the child's birthdate and date of the midline survey, some children who were 13 at baseline were administered the child labor module, while some were administered the adult labor module.

and girls separately by age categories (Table 4). The program has a positive and significant impact on highest grade completed by 0.26 grades for all girls (not disaggregated by age). Similarly, for young girls 6–9 years old (Panel A), the program has a positive and significant impact on highest grade completed by 0.30 grades. There are no impacts for boys in the same age range on any education outcome. For girls 10–14 years old, the program has a positive and marginally significant impact on highest grade completed. For boys in the same age range, however, the program has a negative and marginally significant impact for grade promotion and school enrolment (Panel B). For girls 15–18 years old, Panel C reveals a positive and significant impact on school enrolment and grade promotion by 5.9 percentage points and 6.4 percentage points respectively. We find no significant impacts on any of the educational outcomes for boys in the same age range.

Table 3: Program impacts on schooling for the full sample

	Highest grade completed (grade)	**Enrolled 2015/2016 (%)**	**Grade promotion (%)**
Full sample			
Treatment	0.078	-0.004	-0.020
	(0.190)	(0.028)	(0.031)
Mean dependent variable in control	1.84	0.300	0.360
Observation	7,122	7,122	7,122

Note: Standard errors are clustered at the commune level. Covariates include baseline value of child's age, household size, marital status, household head went to school, sex of the child, sex of the household head, age of household head, total value per capita of consumption, and region indicators. We also adjust for baseline values of outcomes for highest grade completed. Standard error reported in parenthesis; * p<0.1 ** p<0.05 ***p<0.01

Table 4: Program impacts on schooling for girls and boys

	Girls			Boys		
	Highest grade completed (grade)	**Enrolled 2015/2016 (%)**	**Grade promotion (%)**	**Highest grade completed (grade)**	**Enrolled 2015/2016 (%)**	**Grade promotion (%)**
Full sample						
Treatment	0.266**	0.030	0.001	-0.083	-0.033	-0.039
	(0.13)	(0.028)	(0.031)	(0.314)	(0.034)	0.038
Mean dependent variable in control	1.32	0.240	0.310	2.30	0.350	0.410
Observations	3,316	3,316	3,312	3,806	3,806	3,795
Panel A: 6-9 years						
Treatment	0.295***	0.057	0.025	0.147	-0.010	-0.023
	(0.109)	(0.036)	(0.041)	(0.140)	(0.042)	(0.046)
Mean dependent variable in control	0.778	0.264	0.312	1.15	0.380	0.401
Observations	1,632	1,632	1,630	1,737	1,737	1,736
Panel B: 10-14 years						
Treatment	0.255*	-0.026	-0.053	-0.260	-0.074*	-0.072*
	(0.138)	(0.041)	(0.044)	(0.692)	(0.038)	(0.042)
Mean dependent variable in control	2.06	0.310	0.390	3.34	0.390	0.460
Observations	1,189	1,189	1,187	1,498	1,498	1,489
Panel C: 15-18 years						
Treatment	0.571	0.059**	0.064**	0.252	0.013	-0.002
	(0.380)	(0.028)	(0.031)	(0.42)	(0.041)	(0.047)
Mean dependent variable in control	1.26	0.045	0.113	2.68	0.150	0.264
Observations	495	495	495	571	571	570

Note: Standard errors are clustered at the commune level. Covariates include baseline value of child's age, household size, marital status, household head went to school, sex of the household head, age of household head, total value per capita of consumption, and region indicators. We also control for baseline values of outcomes for highest grade completed. Standard error reported in parenthesis; * p<0.1 ** p<0.05 ***p<0.01

To assess the robustness of our findings to attrition, we repeat the analysis using inverse probability weights (Fitzgerald, Gottschalk, and Moffitt, 1998). We first predict the probability that a child is not in the midline sample by regressing an indicator for attrition on child's age, child's sex, household size, household head's marital status, school attendance of the household head, household head's sex, age of household head, and total value per capita of household consumption. We then use the inverse of the predicted probability as weights in equation 1. The weighted point estimates and significance levels are reported in Table 5 and remain largely unchanged compared to the original estimates shown in Table 4.

Table 5: Attrition reweighting

		Panel A: 6-9 years		Panel B: 10-14 years		Panel C: 15-18 years	
		N	Attrition reweighting	N	Attrition reweighting	N	Attrition reweighting
Highest grade completed	Girls	1,632	0.341***	1,189	0.340*	495	0.600*
			(0.004)		(0.082)		(0.08)
	Boys	1,737	0.178	1,498	-0.420	571	0.349
			(0.195)		(0.658)		(0.328)
Enrolled 2015/2016	Girls	1,632	0.061**	1,189	-0.022	495	0.050**
			(0.020)		(0.458)		(0.014)
	Boys	1,737	-0.010	1,498	-0.050*	571	0.016
			(0.707)		(0.09)		(0.407)
Grade promotion	Girls	1,630	0.023	1,187	0.004	495	0.067**
			(0.390)		(0.092)		(0.050)
	Boys	1,736	-0.030	1,489	-0.080**	570	0.013
			(0.297)		(0.04)		(0.957)

Note: Standard errors are clustered at the commune level. Covariates include baseline value of child's age, household size, marital status, household head went to school, sex of the child, sex of the household head, age of household head, total value per capita of consumption, and region indicators. P-values are reported in parenthesis. * p<0.1 ** p<0.05 ***p<0.01

9. Mechanisms

9.1 Education expenditure

In this section, we investigate the potential pathways through which the program could have impacted child education outcomes. The literature shows that cash transfer programs can increase school enrolment rates because they reduce the financial constraints to education (Baird et al., 2013; Handa et al., 2016). At midline, we collected child-specific education expenditure on school fees, school materials, and transportation. Using these data, we estimate treatment impacts on education expenditures disaggregated by sex and age, since we see large differences in impacts on education outcomes by sex and age. All expenditure data were transformed using the inverse hyperbolic sine transformation.[10]

Table 6 reveals no impact on education expenditures for the sample of younger girls and boys aged 6–9 years (except for a small, but marginally significant positive impact on transportation fees for boys) (Panel A). For children in Panel B aged 10–14 years old, the program leads to a positive impact on transport expenditure for girls and negative impacts on material and total education expenditures for boys. These negative impacts on boys' expenditures are consistent with the negative impact on their schooling outcomes. For adolescents aged 15–18 in Panel C, the program leads to an increase in expenditure for girls (but not boys) on school fees, materials, and transport, resulting in increases in total education expenditures. The observed impacts in the older group of girls are consistent with the positive impact on school enrolment in the year 2015/2016 observed in Table 4, Panel C.

[10] IHS(y) =ln (y + sqrt (1 + y^2)) is similar to the log transformation but with the advantage that it is defined at zero.

Table 6: Program impacts on school expenditure for girls and boys

	Girls				Boys			
	School fees	**Material fees**	**Transport fees**	**Total expenditure**	**School fees**	**Material fees**	**Transport fees**	**Total expenditure**
Full sample								
Treatment	-0.264	-0.131	0.111**	-0.467	-0.120	-0.081	0.047	-0.194
	(0.592)	(0.145)	(0.053)	(0.684)	(0.41)	(0.11)	(0.056)	(0.498)
Control mean value	7.39	8.36	0.001	18.7	7.39	8.39	0.080	18.7
Observations	3,316	3,316	3,316	3,316	3,806	3,806	3,806	3,806
Panel A: 6-9 years								
Treatment	-0.017	0.007	0.004	-0.005	0.001	-0.039	0.005*	-0.017
	(0.036)	(0.019)	(0.004)	(0.025)	(0.035)	(0.026)	(0.003)	(0.033)
Control mean value	1.25	1.09	1.61	2.44	1.21	1.10	1.35	2.31
Observations	1,632	1,632	1,632	1,632	1,737	1,737	1,737	1,737
Panel B: 10-14 years								
Treatment	-0.306	-0.319	0.044**	-0.299	-0.442	-0.710**	0.001	-0.782**
	(0.336)	(0.353)	(0.023)	(0.387)	(0.309)	(0.322)	(0.049)	(0.362)
Control mean value	2.37	2.65	0.010	2.78	2.85	3.35	0.073	3.53
Observations	1,189	1,189	1,189	1,189	1,498	1,498	1,498	1,498
Panel C: 15-18 years								
Treatment	0.408**	0.498**	0.137*	0.557**	0.053	0.219	0.013	0.064
	(0.184)	(0.247)	(0.079)	(0.251)	(0.315)	(0.347)	(0.09)	(0.389)
Control mean value	0.301	0.390	0.001	0.350	1.06	1.13	0.083	1.32
Observations	495	495	495	495	571	571	571	571

Note: Standard errors are clustered at the commune level. Covariates include baseline value of child's age, household size, marital status, household head went to school, sex of the household head, age of household head, total value per capita of consumption, and region indicators. Standard error reported in parenthesis; * p< 0.1; ** p< 0.05; ***p<0.01

9.2 Child labor

Table 7 presents impact estimates of *Jigisemejiri* on child engagement in the different labor categories (binary outcomes) and the number of working hours in each category. We find no statistically significant impacts on the prevalence of labor participation for the full sample of children 6–9 years old or disaggregated by sex (Panel A). However, estimates show that the program has a borderline negative impact of 0.33 hours on the time spent on agriculture work for girls aged 6–9 years. For children 10–13 years at baseline (Panel B), apart from a borderline positive impact of 6.3 percentage points on the probability of girls participating in domestic work, we find no impacts on any labor outcome.

In Table 8, we add Panel B, which represents children who were 13–14 at baseline but who responded to the adult labor module at midline. Results from Table 8 are similar to those from Table 7, Panel B. In general, we see no impacts on child labor outcomes for children aged 13–14 years at baseline. However, there is a borderline significant decrease of 4.2 percentage points in the probability that boys 13–14 years old worked for pay.

Table 9 reports the impact of *Jigisemejiri* on labor for adolescents 15–18 years old at baseline. We observe a negative program impact of 5.8 percentage points on the probability that they engage in non-farm or self-employment work for the overall sample, which is mainly driven by a reduction of 8 percentage points in adolescent girls' non-farm or self-employment work. In addition, the program leads to a reduction of 0.53 hours in the amount of time per day adolescent girls spend in domestic work. In contrast, for boys, the program leads to marginally significant increases in the probability that they take care of livestock or work in agriculture for another household.

The fewer hours spent on agricultural work for girls 6–9 years old in the treatment group, as well as the lower prevalence of engaging in self-employment or less time spent on domestic work for girls 15–18 years old support the earlier mentioned positive impacts on schooling

outcomes for younger and older girls. These results suggest that labor among girls is replaced by time spent on education.

Table 7: Program impacts on child labor for children 6–13 years of age at baseline

	Mean of control	Overall impact	N	Mean of control Girls	Impact on Girls	N	Mean of control Boys	Impact on Boys	N
Panel A: 6-9 years									
Agricultural work (binary)	0.496	-0.028	3,369	0.333	-0.044	1,632	0.656	-0.017	1,737
		(0.027)			(0.033)			(0.029)	
Domestic work (binary)	0.470	0.005	3,369	0.728	-0.008	1,632	0.215	0.022	1,737
		(0.019)			(0.026)			(0.025)	
Other work (binary)	0.017	0.003	3,369	0.010	0.007	1,632	0.023	0.001	1,737
		(0.007)			(0.006)			(0.011)	
Number of hours of agricultural work	2.59	-0.327*	3,369	1.58	-0.334*	1,632	3.58	-0.345	1,737
		(0.191)			(0.180)			(0.266)	
Number of hours of domestic work	1.26	-0.054	3,369	2.06	-0.110	1,632	0.48	0.012	1,737
		(0.075)			(0.119)			(0.068)	
Number of hours of other work	0.078	-0.010	3,369	0.024	0.034	1,632	0.132	-0.054	1,737
		(0.04)			(0.021)			(0.075)	
Panel B: 10-13 years									
Agricultural work (binary)	0.651	-0.009	1,863	0.480	0.016	861	0.790	-0.032	1,002
		(0.032)			(0.046)			(0.037)	
Domestic work (binary)	0.460	0.042	1,863	0.731	0.063*	861	0.250	0.022	1,002
		(0.024)			(0.035)			(0.033)	
Other work (binary)	0.040	-0.002	1,863	0.058	-0.015	861	0.020	0.005	1,002
		(0.014)			(0.023)			(0.012)	
Number of hours of agricultural work	3.58	-0.350	1,863	2.39	-0.200	861	4.55	-0.443	1,002
		(0.235)			(0.320)			(0.297)	
Number of hours of domestic work	1.32	0.015	1,863	2.32	-0.025	861	0.500	0.044	1,002
		(0.102)			(0.210)			(0.097)	
Number of hours of other work	0.130	0.025	1,863	0.160	-0.010	861	0.100	0.054	1,002
		(0.054)			(0.064)			(0.070)	

Note: Standard errors are clustered at the commune level. Covariates include baseline value of child's age, household size, marital status, household head went to school, sex of the child, sex of the household head, age of household head, total value per capita of consumption and region indicators. We also control for baseline values of outcomes. Standard error is reported in parenthesis; * p< 0.1; ** p< 0.05; ***p<0.01

Table 8: Program impacts on child labor for children 13–14 years of age at baseline but who responded to the adult labor module at midline

	Mean of control	Overall impact	N	Mean of control Girls	Impact on Girls	N	Mean of control Boys	Impact on Boys	N
Panel B*: 13-14 years									
Work in agriculture on land cultivated by this household	0.870	0.014	824	0.830	0.008	326	0.900	0.027	498
		(0.038)			(0.048)			(0.043)	
Take care of the livestock for this household	0.370	-0.017	824	0.260	-0.012	326	0.440	-0.023	498
		(0.037)			(0.067)			(0.047)	
Did another job for pay	0.070	-0.037	824	0.070	-0.027	326	0.080	- 0.042*	498
		(0.026)			(0.047)			(0.023)	
Work in agriculture for another household	0.080	-0.004	824	0.010	0.027	326	0.130	- 0.024	498
		(0.026)			(0.021)			(0.034)	
Worked in non-farm or self-employment such as Income Generating Activities	0.080	0.006 (0.024)	824	0.080	0.041 (0.033)	326	0.090	- 0.012 (0.031)	498
Has been involved in domestic work for the last 2 weeks	1.97	0.027	824	0.860	0.019	326	0.290	0.035	498
		(0.154)			(0.038)			(0.050)	
Number of hours per day usually spent in domestic work	3.83	-0.020	824	3.76	-0.138	326	0.780	0.156	498
		(0.207)			(0.261)			(0.164)	

Note: Standard errors are clustered at the commune level. Covariates include baseline value of child's age, household size, marital status, household head went to school, sex of the child, sex of the household head, age of household head, total value per capita of consumption and region indicators. We also control for baseline values of outcomes. Standard error is reported in parenthesis; * p< 0.1; ** p< 0.05; ***p<0.01

Table 9: Program impacts on child labor for adolescents ages 15–18 years at baseline

	Mean of control	Overall impact	N	Mean of control Girls	Impact on Girls	N	Mean of control Boys	Impact on Boys	N
Panel C: 15-18 years									
Work in agriculture on land cultivated by this household	0.823	0.032	1,066	0.810	0.026	495	0.835	0.040	571
	(0.381)	(0.036)		(0.393)	(0.043)		(0.371)	(0.041)	
Take care of the livestock for this household	0.305	0.022	1,066	0.303	-0.068	495	0.307	0.091*	571
	(0.461)	(0.047)		(0.461)	(0.067)		(0.462)	(0.047)	
Did another job for pay	0 .055	-0.004	1,066	0.030	0.019	495	0.078	-0.021	571
	(0.228)	(0.018)		(0.172)	(0.023)		(0.270)	(0.022)	
Work in agriculture for another household	0.077	0.035	1,066	0.068	0.021	495	0.085	0.056*	571
	(0.26)	(0.025)		(0.25)	(0.03)		(0.28)	(0.032)	
Worked in non-farm or self-employment such as Income Generating Activities	0.158	-0.058**	1,066	0.189	-0.080**	495	0.128	-0.030	571
	(0.365)	(0.031)		(0.393)	(0.042)		(0.335)	(0.036)	
Has been involved in domestic work for the last 2 weeks	0.584	-0.005	1,066	0.946	-0.038	495	0.242	0.035	571
	(0.493)	(0.032)		(0.224)	(0.027)		(0.430)	(0.051)	
Number of hours per day usually spent in domestic work	2.75	-0.161	1,066	4.92	-0.533**	495	0.709	0.173	571
	(3.04)	(0.153)		(2.84)	(0.258)		(1.33)	(0.15)	

Note: Standard errors are clustered at the commune level. Covariates include baseline value of child's age, household size, marital status, household head went to school, sex of the child, sex of the household head, age of household head, total value per capita of consumption, and region indicators. We also control for baseline values of outcomes. Standard error is reported in parenthesis;* p< 0.1; ** p< 0.05; ***p<0.01

10. Discussion and conclusion

This paper aims to investigate if Mali's national cash transfer program, *Jigisemejiri*, impacted the education outcomes of school-aged children. We address this question by taking advantage of the randomized controlled trial design and measuring the impact of *Jigisemejiri* on children's schooling 2 years after the program started. We analyze the program's impact by age group and by sex. We also explore program impacts on child education expenditures and child labor activities as potential mechanisms for education impacts.

We find no impacts on schooling when we analyze boys and girls 6–18 years old together, but interesting patterns emerge when analyzing impacts by age and sex. For girls 6–9 years old, we find an increase of 0.3 grades in the highest grade level completed (an improvement of 78% compared to the control mean). We find no impacts on education outcomes for boys in this age group. For girls 10–14 years old, we also find improvements of 0.25 grades in the highest grade level completed. For boys of this age group, we find marginally significant negative impacts on the probability of enrolling in the last year (2015/2016) and their grade progression. Finally, for girls 15–18 years old, we find large increases of 5.9 percentage points in the probability that they were enrolled in the last year (an improvement of over 100% compared to the control mean) and an increase of 6.4 percentage points in the probability that they advanced at least one grade between baseline and midline. We find no impact on any outcome for boys in this age range.

To explore potential mechanisms for the observed education impacts, we analyze the program's impacts on education expenditures and child labor. Consistent with the impacts on education outcomes for girls and boys, we find that the program leads to significant increases in education expenditures for girls aged 15–18 years old and decreases education expenditures for boys aged 10–14 years. In terms of labor, we find that the program reduces younger and older girls' labor participation or participation in domestic tasks, which is again consistent with the results on

schooling. For boys, we find that the program leads to marginal decreases in the probability that boys 10–14 work for pay and, thus, labor does not explain the negative impacts on boys' schooling.

Taken together, our results show that the *Jigisemejiri* program significantly impacts the schooling of younger girls' (ages 6–9 at baseline) and older girls' (ages 15–18 at baseline). Both these age groups reflect transition periods into or out of school, where girls are more likely to be at risk of either starting school late or dropping out early. At age 15–18, girls are likely to be in senior high school and face higher barriers to enrolment, such as higher fees and opportunity costs. Our pattern of results is consistent with other studies; according to Beegle et al. (2018), gains in education are especially pronounced in upper-primary and secondary school, where dropout rates rise. For example, Pellerano et al. (2014) showed that enrolment rates among children aged 13–17 were 10 percentage points higher among children in the Lesotho Child Grants Program compared to the control group. Similarly, Kenya's Cash Transfer Programme for Orphans and Vulnerable Children increased secondary school enrolment by 6 to 7 percentage points (Ward et al., 2010), and Zambia's Child Grant Program (CGP) increased school enrolment by 7–8 percentage points among children aged 11–14 (Handa et al., 2016). Thus, our impacts of about 6 percentage points for older girls are similar to the impacts from other programs.

Beegle et al. (2018) also indicate that improvements in enrolment and school attendance are consistent with other positive impacts detected on educational expenditures, such as shoes and uniforms, the lack of which represent key barriers to enrolment and attendance, especially in secondary school. Impacts observed in our study for older girls may be explained by the fact that the program alleviated income constraints of poor beneficiary households, thereby allowing them to invest more in the education of girls. Furthermore, the program decreased older girls' participation in non-farm or self-employment work as well as time spent on domestic work.

It is important to note that in our study the AM sessions, which included training sessions on how to use the money and the importance of girls' education, may also explain our findings. While *Jigisemejiri* did not impose strict conditions to obtain the cash transfer, the AM sessions may have led beneficiaries to perceive that the program required or expected them to use the cash on education. For instance, Kilburn et al. (2017) show that the perceptions households had about the rules of an unconditional cash transfer program in Malawi served as a mechanism to explain the program's impacts on school enrolment. Alternatively, the AM messaging could have increased the salience in their minds around the importance of educating their children, particularly girls. Moreover, the Malian government has policies promoting universal basic education, especially for girls. The presence of an enabling policy environment and additional behavior change communication is expected to leverage the impact of the cash transfer toward educational outcomes (Bastagli et al., 2016).

We note that there are additional mechanisms that we are unable to explore. For example, if the transfers improve household food security, they may indirectly affect children's learning capacity in school. However, our data does not include measures of children's learning capacity or academic outcomes. If transfers allow households to choose better schools for their children, then the higher quality of schools could relieve some of children's constraints on progression through secondary school (DSD, SASSA, and UNICEF, 2012). However, we lack data on the quality of education and possible migration to different schools.

Overall, our work supports findings in the literature that cash transfer programs effectively improve children's education outcomes and highlights the importance of heterogeneity by child sex and age. In the context of Mali, the *Jigisemejiri* program appears to narrow gender gaps in education, resulting in improvements, particularly for girls (both of primary and secondary age) in a setting where they tend to have lower education outcomes than boys.

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Appendices

Table A1: Accompanying measures topics

Groups of themes	Themes
1	1. Use of cash transfer for essential needs
	2. Exclusive Breastfeeding
	3. Prevention of Ebola virus disease
2	4. Complementary feeding (including PNP cooking demonstration sessions)
	5. Beneficiaries' participation in organizations of the social and solidarity economy (mutual health, associations and cooperatives)
3	6. Prenatal and postnatal consultations
	7. Nutrition practices of women, in particular pregnant women
	8. Children's rights – Feeding, sick and malnourished children.
	9. Children's rights – Vaccination calendar for children and mothers
	10. Children's rights – Birth registration
4	11. Children's rights – Importance of children and teenagers' education, in particular young girls' education.
	12. Family economy and stock management
	13. Water – Hygiene and WASH
	14. Respiratory infections of Children – IRA
	15. Promotion of the free health care services in the health insurance scheme – RAMED for CT beneficiaries.

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