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Can Community Information Campaigns Improve Girls' Education?

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Can Community Information Campaigns Improve Girls' Education? Evidence from a GEC project in Zimbabwe

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ABSTRACT. We examine the impact of a large, randomized Girls' Education Challenge (GEC) project in rural Zimbabwe. The multifaceted project initially provided information about girls' rights and education barriers to girls, parents, teachers, and others. Later, the project introduced a learn-to-read program and provided resources such as bicycles and books. The information campaign significantly improved mathematics performance and school enrolment in a short time frame. The subsequent provision of resources and curriculum changes corresponded to improvements in literacy but did not correspond to any additional improvements in mathematics and enrolment beyond what was observed following the information provision alone.

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Key words and phrases. Girls' Education Challenge, education, empowerment, information provision, impact evaluation, economic development, field experiment, multifaceted intervention

JEL: C93, I25, O15.

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1. INTRODUCTION

Despite the general recognition that improving education offers substantial social and economic benefits, youth around the world continue to face significant barriers in their pursuit of education. Many of these barriers disproportionately affect the poorest children and girls (Tuwor & Sossou, 2008; Sabates et al., 2013). Families may not be able to afford tuition and school fees. In rural areas, youth may have to walk long distances to get to school, and the commute can be dangerous, especially for young women. In some places, family members and local leaders may not prioritize education for girls, and some may outright oppose it. Girls, more so than boys, are often responsible for many hours of daily chores both at home and at school. The poverty in which they live means that hunger and basic sanitary conditions may be challenges to attending school and learning. Even in the absence of these concerns, parents, community leaders, and girls themselves may not fully recognize the potential for education to substantially improve life outcomes (Jensen, 2010; Attanasio & Kaufmann, 2014).¹

The “Improving Girls’ Access through Transformative Education” (IGATE) project worked to reduce such barriers and improve education outcomes for tens-of-thousands of primary school girls in rural Zimbabwe. The project was part of the UK Department for International Development (UKAID/DFID)’s multi-country Girls’ Education Challenge (GEC). Implemented between 2014 and 2016, IGATE initially focused on a community information campaign in randomly selected locations, conveying information about the rights of adolescent girls, the barriers they face in their pursuit of education, and strategies for helping address some of the most-substantial barriers. Later, the program was expanded to introduce curriculum changes in schools, and to provide books to classrooms and bicycles to girls living far from school. Rigorous data collection occurred in both treatment communities, and comparable control communities in which the program was not implemented. The treatment status of these communities was randomly assigned.

The staggered implementation of the project allows us to identify the impact of the information campaign on the academic performance of girls, before other program components providing resources and curriculum changes were implemented. The broad information campaign implemented during the initial phase of the IGATE project intended to disseminate information across villages, reaching girls, parents, teachers, and other community members. The project facilitated the organization of community- and

¹Qualitative data from the our project in Zimbabwe shows that girls are required to do significantly more chores, requiring them to wake up earlier, spend less time on their homework and sleep later than boys, often resulting in girls sleeping through lessons and being too tired to learn productively. They also face religious and traditional pressures, which encourage young marriages. Girls disproportionately leave school early, and teen pregnancies are common. See also Mawere (2012).

school-based groups through which it provided information about the importance of supporting girls' education in their households, at school, or more broadly within their communities. By altering attitudes, the project hoped to improve support of girls' education among parents and teachers and the agency of girls themselves, leading to increased enrolment and school performance.² The analysis shows that the information campaign resulted in a significant improvement in mathematics performance and school enrolment within a relatively short time frame, and that improvements in mathematics persisted through the life of the project. The improvement in mathematics occurred even though the information campaign did not specifically encourage math or STEM participation or performance.³ We see no similar improvement in literacy that can be attributed to the information campaign.

We then compare the impact attributable to the information campaigns alone with the ultimate impact of the project after all intervention components were implemented. Overall, the entire IGATE project led to significant improvements in mathematics, literacy, and enrolment among the girls in the treatment communities. The total impact on mathematics and enrolment appears to be caused by the information campaign alone, as no additional improvements on these dimensions were observed after the introduction of the later non-information project interventions. The later non-information based components, however, likely contributed to the observed improvements in literacy. This suggests that information provision alone may have had similar impact to the broader IGATE project on many, but not all, dimensions.

Our evaluation contributes to a growing literature working to identify the channels through which programs and policies may improve education outcomes in developing countries.⁴ Most-directly, our paper is related to a small set of papers considering how providing information to students or parents about the benefits to schooling may affect education outcomes. Jensen (2010), the one published paper in this area, shows that youth in the Dominican Republic typically underestimated the returns to completing

²Quantitative data involving attitudes was not collected by the project. Rather, in its midline and endline evaluations, IGATE relied on qualitative assessments based on interviews with community members to argue that the program succeeded at improving attitudes and "girls empowerment." The qualitative data and methodology has not been shared with the research team; we therefore focus our analysis on the education outcomes for which we have reliable quantitative data.

³There are several reasons that a general campaign to encourage girls' education may have such impact on math performance. The campaign may have encouraged greater effort or focus by girls on tasks that others have shown are traditionally viewed as difficult, masculine, and largely irrelevant (Gudyanga, 2016). It may also have led to increased teacher attention for girls after teachers were informed about gender gaps in student engagement in the classroom.

⁴Several research articles provide surveys and meta-analyses of this work in development, including Kremer & Holla (2009); Duflo (2012); Conn (2017); Banerjee et al. (2013); Glewwe et al. (2014). For examples of interventions focused on girls education specifically, see Burde & Linden (2013); Kazianga et al. (2013) and Muralidharan & Prakash (2017).

secondary school and that providing information regarding the returns to completing school led students to complete between 0.2 and 0.35 additional years of schooling, on average.⁵ Furthermore, a working paper by Nguyen (2008) explores the impact of providing information about the returns to education in Madagascar, showing that such information can increase student performance on tests.

Compared to this past work, our study is novel on several dimensions. It is the first study to isolate the impact of an information campaign from a major education-focused development aid project, allowing us to compare the contribution of information provision to the overall impact of the broader project. Moreover, where previous papers focus on providing information about the correlation between secondary school completion and earnings, our analysis focuses on a different type of information provision. The type of information considered here emphasizes the rights of marginalized girls to pursue education, highlights the general importance of additional schooling at the primary level, and increases awareness among girls, parents, teachers and other community members about the types of barriers girls face in pursuit of education. Ours is also the first to study information provision tailored to girls' education, the first study of information provision regarding education on continental Africa, the first to consider separately the impact on mathematics and literacy performance (as well as on academic progression), and the first to primarily focus on rural populations and primary school education. Our findings are consistent with the insights from Jensen (2010) and Nguyen (2008). At the same time, our analysis is able to consider several issues that were not present in the earlier work.⁶

More broadly, our work is related to the evaluation of other information campaigns aiming to improve outcomes of marginalized populations in international development. Information-based interventions have been particularly successful in improving health outcomes. In Kenya, providing information to teenagers about the relative risk of contracting HIV infections from partners of different ages has been shown to increase their likelihood of choosing less risky partners and adopting safe-sex practices (Dupas, 2011). In Malawi, interventions designed to inform new mothers on the importance of breastfeeding newborn infants and on the importance of adopting a nutritious diet (along

⁵The author attributes the increased educational attainment to an updated set of expectations, as students were significantly more accurate in their perceptions about the returns to completing secondary school after the intervention took place. This is consistent with the insights in Attanasio & Kaufmann (2014), which finds that parents' and students' expectations about the returns to schooling influence decisions about attendance. See also Attanasio (2009).

⁶The information provision to the youth in our setting shares some similarities to programs that provide mentorship to youth in the North American context including those in (Oreopoulos et al., 2017; Lavecchia et al., in press) and (Walsh et al., 2014).

with information on how to prepare such a diet) was shown to improve food consumption and nutrition outcomes for both the newborn and the household (Fitzsimons et al., 2016).⁷ Beyond health, information interventions have been shown to increase the number of small business that receive a loan (De Mel et al., 2011), to increase labor mobility for workers in poor work environments (Shrestha & Yang, 2019), and to increase the use of chlorine to improve water quality for households with a lower socioeconomic status (Brown et al., 2017).

Section 2 describes the IGATE project. Section 3 describes the randomization of treatment, the process through which data was collected and literacy and numeracy performance measured, and the estimation strategy. Section 4 presents the results. Section 5 concludes.

2. CONTEXT AND PROGRAM DESCRIPTION

In 2012, UKAID/DFID launched its GEC initiative, a 12 year commitment to improving access to education and learning for marginalized and at-risk youth, especially girls, in the developing world. The GEC is the largest-ever donor funded program focused on girls in developing countries through the implementation of 37 major education-focused projects across 18 countries. Projects were proposed and implemented by a diverse set of international organizations. As of April 2017, with the conclusion of its first wave of projects, the GEC had spent roughly £300 million and claims to have directly benefited more than a million girls through the training of almost 90 thousand teachers, the construction or renovation of nearly 6 thousand classrooms, the distribution of more than 12 million textbooks and student kits, the provision of nearly £25 million in bursaries, stipends and cash transfers, and the provision of many other services and resources.⁸ The program has since been extended through 2022 with an additional budget of approximately £200 million to support the implementation or extension of 47 projects.

The GEC's IGATE project focused on improving attitudes and knowledge around girls education in rural Zimbabwe, in an effort to increase access to and quality of education for at-risk girls. It was implemented by a coalition of nongovernmental organizations (NGOs) led by World Vision. IGATE involved a series of interventions intended to empower girls, increase community and household support for girls education, and provide resources to improve the academic and non-academic outcomes of adolescent girls. The

⁷However, a working paper by Krämer et al. (2019) suggests that in other contexts, improved information about nutrition may not be sufficient to improve nutrition outcomes if the household faces other constraints.

⁸<https://girlseducationchallenge.org/>

program was implemented in randomly-selected schools across 10 primarily-rural districts in Zimbabwe. The project is estimated to have directly or indirectly reached a total of 48,773 girls.

IGATE worked to deliver a variety of different interventions across the treatment locations from 2014 through 2016. The initial wave of the project comprised of interventions providing information to girls, parents, teachers and the community more broadly on girls' rights, the importance of girls attending school, and the barriers they face in doing so. Later, the program expanded to introduce updated early reading curriculum and provide books in the local primary schools, and to provide bicycles to girls who lived far from school.

The IGATE information campaign included the following components in treatment communities:

- **Mothers Groups (MGs)**—The project recruited local female caregivers to participate in MGs, and provided the groups with information on the importance of girls' education and school attendance. These groups also highlighted the challenges girls face due to gender based violence, inequitable treatment, and hygiene and menstruation. The mothers were then provided information on how to mentor girls on these topics. In some places, fathers groups (FGs) were also implemented.
- **Power Within Clubs (PWCs)**—The project recruited teachers to set up and run PWCs within schools, often with support from the local MG. They were designed to encourage girls' agency through the development of knowledge and understanding of girls' rights and how to navigate barriers to education. They encouraged girls to take an active role in decision making about their own lives. They also provided participants with information on the importance of education, attending school and doing school work. Participation in the groups was voluntary, and participants were encouraged to actively share their knowledge with others in the school who did not directly participate in the groups.
- **Village Savings and Loan (VSL)**—The project recruited adults from the community to join local savings groups, providing participants guidance on how to set up a group in accordance with World Vision's VSL model. The project *did not* provide any financial assistance or other resources, only information. Participants in such groups were expected to meet regularly and contribute to a collective account from which participants could borrow when needed. Through these groups, IGATE also provided information on the importance of encouraging girls' education and tips for saving for future education needs.

- **Community in Support of Girls' Education (CSGE)**—Implemented by Government of Zimbabwe employees trained by IGATE staff, CSGE focused on providing information within communities about what was expected from local primary and secondary schools, and how communities could hold them accountable. This program did not involve any policy changes; it only involved communicating existing policies to local communities.
- **School Development Committees (SDCs)**—These school-based committees provided teachers and school officials information about how to create learning environments that were gender sensitive. This included information on how schools and teachers could support MG efforts relating to hygiene and menstruation.

Following the community-wide information provision, the IGATE project expanded to include other interventions that were not focused on information provision. This second stage of the project also involved the provision of resources through a Bicycle Education Empowerment Program (BEEP) in partnership with the World Bicycle Relief NGO that provided bicycles to girls with long commutes to school, and a Happy Readers program that provided books to school that helped students learn to read.⁹

The 37 treatment schools in our sample communities had a total enrolment of 9,589 girls and 10,000 boys at baseline. The IGATE program directly engaged only a subset of girls and their families. On average, 41 girls per school participated in the PWCs, representing 16% percent of all enrolled girls within the schools. The direct engagement of others was also limited, with an average of 15 mothers and 5 fathers participating in parent groups, 49 people engaged in VSL, 8 people engaged with SDCs, and 201 people participating in community meetings with CSGE information provision per location. When the program expanded after midline to provide books and bikes, an average of 96 bikes and 1,478 books were delivered at each treatment school. Because direct exposure to the various interventions within communities was not random, we define treatment as being in a community that received treatment and not based on one's own direct exposure to the interventions.

2.1. Dates. The relationship between the data collection and program timing is summarized in Figure 1. Baseline data collection occurred before implementation began in February 2014. At the time of baseline data collection, none of the IGATE interventions were implemented within the treatment or control locations. Midline data collection occurred in June-August 2015, following the wide implementation of the community information campaigns, but before the non-information interventions were implemented.

⁹There were a small number of locations where girls received bicycles before midline data was collected. These locations have been dropped from this analysis to isolate the impact of the information-based interventions.

Before midline data was collected, each of the treatment locations in the sample had received all five of the community information interventions. Between midline and endline data collection, the project continued the information campaign and introduced of non-information interventions. Endline data collection occurred in November-December 2016 at the end of the project.

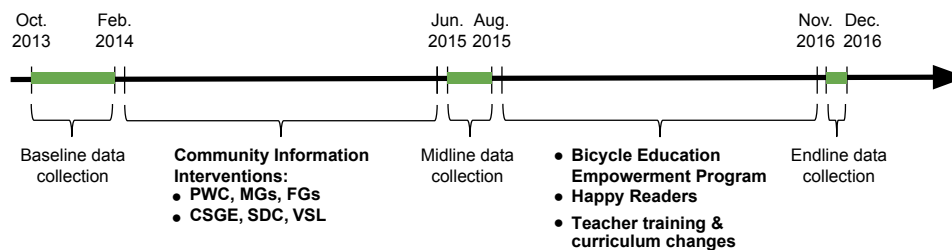


FIGURE 1. IGATE Data Collection and Program Implementation Timeline

3. DATA AND METHODOLOGY

3.1. Sampling Framework. The program was targeted to 467 schools in rural districts in Zimbabwe. From the 467 schools that were identified as eligible for the program, schools were randomly assigned to treatment and control groups. Of these, a total of 85 schools were selected for extensive data collection and evaluation, including 52 treatment schools and 33 control schools.¹⁰ As we discuss later, additional observations have been dropped to remove girls who received bicycles from the BEEP intervention before midline. After these restrictions, there are 37 treatment locations and 28 control locations remaining in our sample. Baseline data collection took place between October 2013 and February 2014.¹¹ The map in Figure 2 in the online appendix shows the location of treatment and control schools across Zimbabwe.

The procedure used to select girls (and their caregivers) within these communities involved a sampling procedure in which teams of professional enumerators from a Zimbabwe-based firm started at a recognizable local landmark (e.g., community center) and then enumerators walked in different directions using a routine where they would pass three households and knock every fourth door. At the household they then would

¹⁰Data was originally collected on an addition 16 schools, but these schools were dropped from the analysis because an additional GEC program, Campaign for Female Education (“CAMFED”), was also operating in those locations.

¹¹Data from 62 of the schools were collected during an initial wave of data collection in October 2013, with data from the remaining 23 schools being collected in January and February 2014 after the program decided to expand its original sample size. The estimated effects are similar if the second set of schools is not included in the sample.

ask if any girls of the appropriate age lived there and if so proceed the questionnaires, returning later if a girl lived there but was not home.

For clarity of interpretation, we limit our data to girls who were in grade seven or below at baseline (i.e. in primary school at baseline). We do this for several reasons: IGATE was a primary-school focused program so we wouldn't expect the same impact on secondary aged students as on primary aged students; it was difficult to accurately determine the extent that secondary school students received access to program components; and a limited sample secondary school students prevented subgroup analyses, meaning that their inclusion would likely bias the estimates in unknown ways.¹²

After restricting the sample to only include students with completed numeracy tests, we observe 812 girls at baseline in total, with 453 in treatment locations and 359 in control locations. By midline, we were able to successfully reconnect with 710 girls in total. At endline we observe 615 girls in total. For each school in the panel data set, there are between three and twenty girls, with an average of 11 girls from each location. For each girl in the data set, we have information provided by their caregivers and teachers, as well as data from reading and mathematics tests.

3.2. Tests. The main data collected at baseline, midline, and endline included a girl's survey, a caregiver survey, and the Early Grade Reading Assessment (EGRA) and Early Grade Mathematics Assessment (EGMA). Originally designed for the United States Agency for International Development (USAID), EGRA has been used to assess reading skills in primary school-aged students in over 70 countries and by hundreds of projects worldwide. EGMA, which was developed after EGRA, has been used to assess mathematics skills in primary school-aged students in over 20 countries around the world. In one study by Friedman et al. (2016), EGRA and EGMA were found to be the most commonly used assessment systems in education evaluations in Eastern and Southern Africa.

The version of EGMA implemented here included the common subtasks of number identification, quantity discrimination, missing number, addition-level 1, and subtraction-level 1, along with additional subtasks for addition, subtraction, multiplication, and division subtask for grade six and above. In EGMA, the number identification, addition, and subtraction are timed, while the other subtasks are not.

The version of EGRA implemented as part of the IGATE project involved five subtasks: letter sound identification, invented word reading, reading fluency and reading comprehension. The standard EGRA tool was adapted for students in grades six and

¹²We also limit attention to locations where only primary schools were treated, dropping the few locations where both local primary and secondary schools were treated. The main results can be estimated with and without this restriction and the results are similar.

above (at baseline) to include a more difficult passage to assess reading fluency. We provide a detailed description and examples of EGMA and EGRA subtasks in the online appendix.

At midline, similar tests were administered with slight variations from the baseline versions. It is necessary to change the versions of the tests to separate learning from recall in the analysis. The EGRA and EGMA subtasks all follow very strict standard guidelines that ensure the difficulty level is standardized across versions.

3.3. Sample Attrition. The sample suffered from high rates of attrition. However, the attrition was similar across treatment and control locations with rates of 25% and 24% in the control and treatment regions, respectively, over the three years between baseline and endline data collection.¹³

Given the *ex ante* similarity of the girls who dropped out of the sample as demonstrated in table 6, we are not particularly concerned that girls that attrited from the sample are systematically different from girls who remain at midline or endline in any way that will clearly bias the analysis. Across the main household controls and test scores, the mean scores and standard deviations in the two groups are similar and well within a standard deviation of each other, as we see in Tables 5 and 6, which provide some summary statistics of baseline test scores. After restricting the sample to only include girls with completed learning assessments in grade seven or below at baseline, who could successfully be recontacted at midline, we are left with 305 and 405 girls in the control and treatment samples, respectively, at midline. The treatment and control groups exhibit similar observable characteristics at baseline, as shown in Table 1. The groups also have similar baseline test scores and grade distributions, as shown in Tables 7 and 8 in the Appendix.

3.4. Econometric Strategy. The randomization of treatment locations allows for an experimental approach to the evaluation. We use difference-in-differences (DiD) analysis to compare changes in outcomes within the treatment group with changes in outcomes within the comparison group, while verifying that the required common trends assumption between the groups is likely to hold. External factors such as the presence of droughts or other policy changes that occurred are likely to affect both the treatment and control groups similarly. In this way, the evaluation can be considered a causal analysis, identifying the changes in outcomes attributable to the IGATE project.

¹³Although we cannot distinguish between a girl who drops out of school and one who cannot be recontacted for some other reason, we should note that girls who have dropped out of the sample should not be assumed to be out of school since they may have moved to a new school in a different region.

TABLE 1. Baseline Summary Statistics

	Control	Treatment	Difference
Age	9.334 (2.003)	9.412 (2.001)	0.078
Grade	3.643 (1.715)	3.649 (1.804)	0.006
Illness	0.105 (0.307)	0.111 (0.315)	0.006
Disability	0.170 (0.377)	0.195 (0.397)	0.025
Orphan	0.0623 (0.242)	0.0568 (0.232)	-0.006
Travel time to school	33.06 (23.75)	35.17 (27.15)	2.110
Household often goes hungry	0.230 (0.421)	0.225 (0.418)	-0.005
Household often goes thirsty	0.128 (0.334)	0.121 (0.327)	-0.007
Caregiver has no education	0.0885 (0.285)	0.114 (0.318)	0.026
Caregiver has primary education	0.544 (0.499)	0.519 (0.500)	-0.025
Caregiver has secondary education	0.367 (0.483)	0.368 (0.483)	0.001
Caregiver works outside of household	0.770 (0.421)	0.827 (0.379)	0.057
N	305	405	

Note these numbers measure baseline levels for girls who could be recontacted at midline.

The impact of IGATE measured at midline can be attributed to the information interventions alone, as the non-information project interventions had not yet been implemented. On the other hand, the impact of IGATE measured at endline cannot be attributed to any subset of the program interventions as all components were implemented before that time.

The analysis focuses on the impact of the IGATE program on numeracy and literacy (as measured by EGMA and EGRA), and academic progression measured as advancing to the next grade as expected and enrolment. To provide additional insights, we also consider the impact of the project on specific subtasks of the learning assessments, and the number of questions attempted. We report results from an intent-to-treat analysis, classifying all girls in treatment locations as treated, regardless of whether they or their families report being directly exposed to the information campaign at midline or any program by endline.

4. RESULTS

Our evaluation assesses the impact of the IGATE program on both academic progression, including enrolment, and mathematics performance and literacy.¹⁴

4.1. Progression. The IGATE program's primary aim is to improve access to education for marginalized girls. To assess its effectiveness at doing so, we consider the impact of the program on the enrolment status of girls in the treatment communities. Additionally, we consider whether the program reduced grade repetition of those who remained enrolled in school throughout the program.

Table 2 shows that girls in treatment areas are 2.2 percentage points more likely to be enrolled in school than girls who did not receive treatment by midline. This difference between baseline and midline is statistically significant and also intrinsically meaningful as well. Specifically, at baseline over 99.0% of girls in the sample across treatment and control areas were enrolled in school. At midline, this fell to 96.1% in the control group, but only fell to 98.5% in the treatment group. This represents a substantial decrease in the drop out rate, with the drop out rate in the treatment group being less than 20% of what we observe in the control group between baseline and midline.

Because IGATE only provided information to the sample communities ahead of midline, the entirety of the program's impact on enrolment can be attributed to the information campaign and not to the other program components that were introduced later. Furthermore, no similar impact on enrolment is observed between midline and endline, suggesting that the subsequent interventions resulted in no additional improvement to enrolment beyond what was caused by the information provision alone.

Between baseline and midline, girls in the treatment schools were 3.6 percentage points less likely to repeat a grade between baseline and midline than those in the control group, while controlling for observable characteristics.¹⁵ However, the difference is not significant. As was also the case with enrolment figures, the IGATE program was associated with no additional improvements in grade advancement between midline and endline.

4.2. Mathematics. The results in Table 3 show that the treatment group performance on EGMA improved by 3.15 percentage points (0.09 SD) compared to the control group.

¹⁴As shown in Nordstrom & Cotton (2020), the impact on enrolment and learning can move in opposite directions, potentially leading to misleading conclusions about the benefits of a program to education outcomes. This motivates the evaluation of both progression and learning outcomes to confirm no adverse consequences to education overall.

¹⁵In Zimbabwe, schools follow a policy of automatic progression, meaning that advancing to the next grade is less indicative of girls learning at an appropriate level, and more indicative that the girls were enrolled for the entire year and attended school regularly enough to advance in grade.

TABLE 2. Probability of Successful Transition

	Repetition	Enrolment
BL to ML Progression		
Treatment	-0.0355 (0.0269)	0.0218 (0.0125)
Observations	710	591
Pseudo R-squared	0.0353	0.2645
ML to EL Progression		
Treatment	0.00339 (0.0217)	0.00064 (0.0141)
Observations	615	568
Pseudo R-squared	0.1060	0.2122

Note: The table reports the marginal effect on progression outcomes. Controls include girl characteristics (Age, grade, illness, disability, orphan, travel time to school), household characteristics (indicators for whether a family member within the household often goes hungry or thirsty), and caregiver characteristics (Caregiver's education level). Cluster-robust standard errors are in parentheses. Standard errors are clustered at the school level.

This statistically significant increase in mathematics performance occurred entirely between baseline and midline, and persisted until endline despite the fact that no further gains occurred between midline and endline. This suggests that the information campaign had a significant, positive impact on math performance of the girls while the later intervention components did not lead to significant increases in scores on numeracy tests.

To explore the gains in math performance in more detail, we consider impact on the performance of girls on the EGMA subsections. Girls' scores on the Addition subtask experienced the biggest increase, followed by Number Identification, Subtraction, and Missing Numbers with 4.9, 3.8, 3.6, and 2.9 percentage point gains, respectively. It is worth noting that the subsections showing the greatest improvement in EGMA scores are those with time constraints, and participants had to complete as many questions as they could within a limited amount of time (60 seconds).¹⁶ This suggests that the improvements in mathematics performance caused by the information campaign may not necessarily come from improvements in the understanding of mathematical concepts,

¹⁶In addition to achieving higher scores, girls in treatment locations increased the number of questions they answered on some of mathematics subtests. This is discussed in more detail in the Online Appendix.

TABLE 3. DiD Results: Mathematics

	Number Identification EGMA 1	Number Quantities EGMA 2	Missing Numbers EGMA 3	Addition EGMA 4	Subtraction EGMA 5	Average Total
ML-BL DiD						
Treatment	0.0378 (0.0200)	0.0368 (0.0221)	0.0286 (0.0152)	0.0485 (0.0203)	0.0358 (0.0127)	0.0375 (0.0141)
Observations	710	710	710	710	710	710
R-Squared	0.256	0.253	0.203	0.098	0.086	0.245
EL-ML DiD						
Treatment	0.00654 (0.0150)	0.00171 (0.0172)	0.00893 (0.0148)	-0.0145 (0.0150)	-0.0111 (0.0131)	-0.00169 (0.00958)
Observations	615	615	615	615	615	615
R-Squared	0.150	0.084	0.056	0.104	0.068	0.159
EL-BL DiD						
Treatment	0.0442 (0.0223)	0.0361 (0.0254)	0.0288 (0.0189)	0.0326 (0.0210)	0.0154 (0.0172)	0.0315 (0.0161)
Observations	610	610	610	610	610	610
R-Squared	0.357	0.286	0.191	0.132	0.058	0.303
Timed	Yes	No	No	Yes	Yes	
Early Stop Rule	No	Yes	Yes	Yes	Yes	

Note: The table reports the coefficient on an indicator for belonging to an IGATE treatment school. Controls include girl characteristics (Age, grade, illness, disability, orphan, travel time to school), household characteristics (indicators for whether a family member within the household often goes hungry or thirsty), and caregiver characteristics (Caregiver's education level). Cluster-robust standard errors are in parentheses. Standard errors are clustered at the school level.

but may alternatively come from a change in attitudes or increase in confidence leading to an improved ability to apply their understanding under time pressure.¹⁷ The possibility that an information campaign changes performance by changing attitudes is particularly relevant in the Zimbabwe context, where rural female students tend to perceive math as difficult, masculine, and largely irrelevant (Gudyanga, 2016).

To further explore the mechanism through which girls improve their mathematics performance following the information campaign, the Appendix considers the impact of the IGATE program on the number of questions attempted on each subtask in the mathematics assessment.

4.3. Literacy. When we explore the impact of IGATE on literacy performance, we see no improvements between baseline and midline (see Table 4). This means that the information campaign promoting girls education did not have similar short-run impacts on literacy as they did on numeracy performance. However, gains do occur across all subtasks between the midline and endline analysis with the largest improvement observed in comprehension and letter and number sound identification, with gains of 4.2 and 3.7

¹⁷Similarly, Cotton et al. (2013) finds that gender gaps in mathematics performance depend at least partially on the time constraints and competitive pressure.

percentage points, respectively, and an overall improvement of 2.8 percentage points between midline and endline. This contributed to an overall gain in 2.5 percentage point gain between baseline and endline. At that stage the other treatment programs such as Happy Readers, which provided books and reading materials to schools, were in place. It is possible that the eventual gains in literacy occurred because of the information-based interventions offered before the midline but took more time to be realized. However, it is also likely that they were at least in part driven by the other intervention components introduced after the midline data collection.

TABLE 4. DiD Results: English Reading

	Letter Sound Identification EGRA 1	Invented Words EGRA 2	Oral Fluency EGRA 3/4	Reading Comprehension EGRA 5	Average Total
ML-BL DiD					
Treatment	-0.00192 (0.0145)	-0.00770 (0.00556)	0.00145 (0.0126)	0.0122 (0.0212)	0.00101 (0.0102)
Observations	594	594	594	594	594
R-Squared	0.073	0.067	0.035	0.058	0.060
EL-ML DiD					
Treatment	0.0369 (0.0179)	0.0141 (0.00599)	0.0180 (0.00909)	0.0424 (0.0233)	0.0279 (0.00970)
Observations	521	521	521	521	521
R-Squared	0.065	0.074	0.146	0.121	0.146
EL-BL DiD					
Treatment	0.0210 (0.0200)	0.00435 (0.00787)	0.0236 (0.0140)	0.0522 (0.0283)	0.0253 (0.0124)
Observations	525	525	525	525	525
R-Squared	0.079	0.064	0.063	0.093	0.078
Timed	Yes	Yes	Yes	No	
Early Stop Rule	Yes	Yes	Yes	No	

Note: The table reports the coefficient on an indicator for belonging to an IGATE treatment school. Note that EGRA 3 and 4 both assess oral fluency, but EGRA 3 was only given to girls who were in grades 1-5 at baseline while EGRA 4 was given to girls in who were in grades 6 and above at baseline. Controls include girl characteristics (Age, grade, illness, disability, orphan, travel time to school), household characteristics (indicators for whether a family member within the household often goes hungry or thirsty), and caregiver characteristics (Caregiver's education level). Cluster-robust standard errors are in parentheses. Standard errors are clustered at the school level.

5. CONCLUSION

Using data from the randomized implementation of a major development aid project in Zimbabwe, this paper represents the first study of the impact of a multifaceted community-wide information campaign on the education of at-risk girls. This is a broader type of information provision than has previously been considered in the literature, focusing on providing information on the rights of adolescent girls and the barriers they face in the pursuit of education. We show that such information campaigns can result in relatively quick and persistent improvements in girls' mathematics performance on standardized assessments. They also improve enrolment rates, leading

girls who would have otherwise left school to remain in school for one additional year, on average.

Also, we show that the project's non-information interventions had no additional impact on mathematics performance and progression above what was achieved by the information provision alone. However, these other interventions, which included updating the reading curriculum and providing books, likely contributed to improvements in literacy attributable to the project.

These results highlight the effectiveness of a campaign aiming to change knowledge and attitudes around girls education at improving outcomes of girls. We show this in the case of rural Zimbabwe, a context where households tend to be poor and girls potentially marginalized in their pursuit of education.

Because of the way the project was implemented and the timing of data collection, we are able to isolate the impact attributable to the community-wide information campaign, but we are unable to confidently assess the relative impact of the individual information interventions. We cannot, for example, determine the impact of the power within clubs targeting girls within schools, or the mothers groups providing caregivers with strategies for reducing the barriers their daughters face in their pursuit of education. Understanding their relative importance would be of great interest for future research, and we encourage implementers to consider future randomization in the roll-out of specific program components to allow for such an analysis. Understanding the relative effectiveness of the different interventions would allow projects to focus their limited resources on the components that provide the greatest cost effectiveness. Our analysis is a first step in this direction, showing that many, but not all, of a major GEC project's impact came through information campaigns, and not the provision of direct resources and curriculum changes. But, it also suggests that improvements in early-grade literacy, perhaps the most-important measure of primary education effectiveness, were not responsive to information provision alone.

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APPENDIX A. APPENDIX

A.1. **School Locations.** Figure 2 shows a map of the IGATE school locations across rural districts in Zimbabwe.

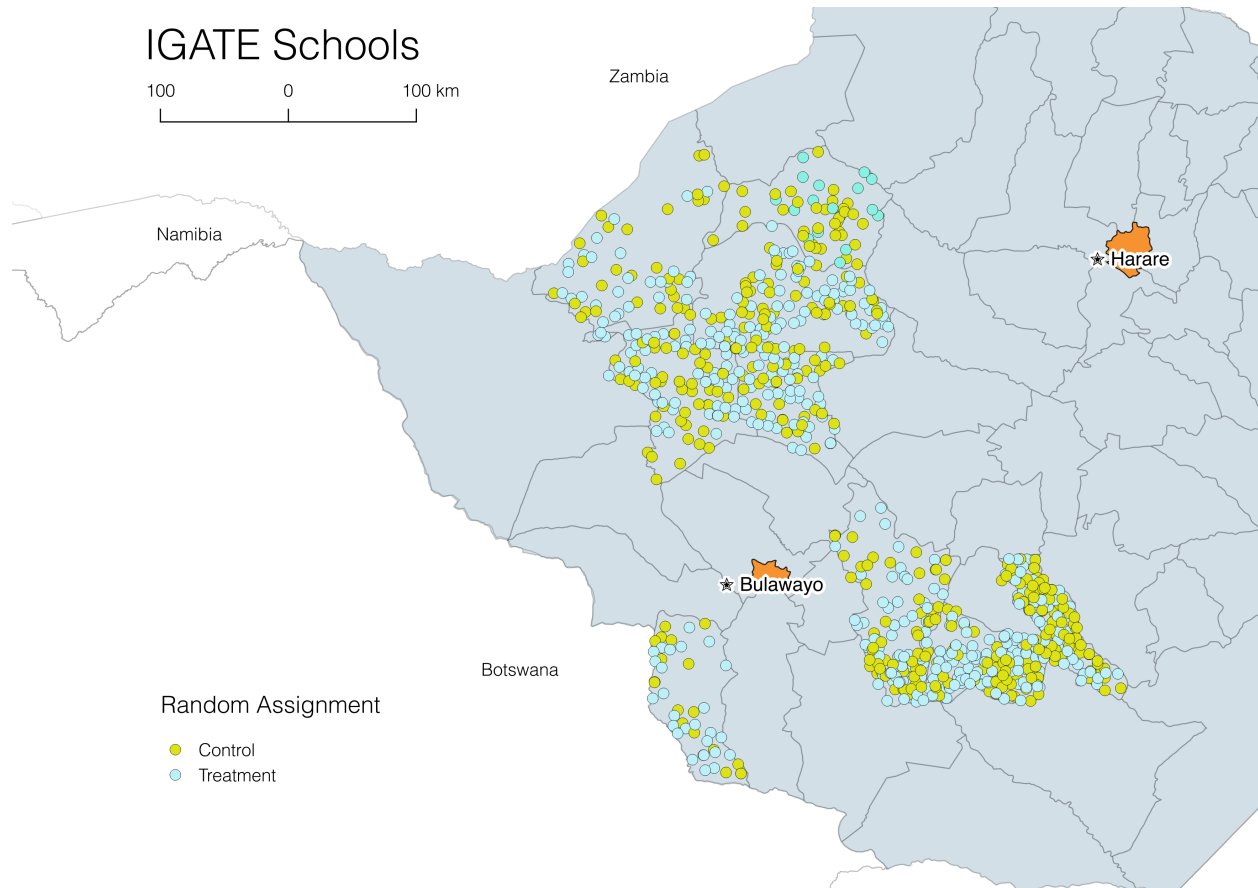


FIGURE 2. IGATE School Locations

APPENDIX B. EGRA/EGMA TEST DETAILS

As is standard with the EGRA and EGMA assessments, the questions in each test were described verbally, one by one, by a professional enumerator to individual students. Students then provided their answers verbally and enumerators record whether the student's answer was correct. During the test, students are given a visual stimuli to follow along and to see the specific numbers, letters, and words they are asked to say or analyse. There are five subtasks that make up the numeracy assessment: number identification, number quantities, missing numbers, addition, and subtraction. The number identification subtask consists of 20 numbers which students are asked to identify in one minute. An example of a typical EGMA number identification subtask as viewed by the enumerator is shown in figure 3.

Start					54
9	5	0	26	52	
69	92	61	53	86	*
57	44	32	28	17	*
686	753	914	829	234	*
Stop					

FIGURE 3. EGMA 1 (Number Identification) Example

In the quantity discrimination subtask, a student is presented with a list of 10 pairs of numbers and is asked to identify the larger number. This exercise is not timed but ends after 4 incorrect answers in a row or hesitation of 5 seconds by the student. This stop rule trigger is shown in figure 4.

Correct Incorrect No response

3) What number goes here?
 __, 20, 30, 40
 [10]
 Correct Incorrect No response

4) What number goes here?
 200, 300, 400, __
 [500]
 Correct Incorrect No response

5) What number goes here?
 8, 10, __, 14
 [12]
 Correct Incorrect No response

6) What number goes here? Auto skipped

FIGURE 4. EGMA 3 (Missing Numbers) Example: Early Stop Rule Trigger

The addition and subtraction level 1 components include 20 problems each. According to the EGMA guidelines, subtraction questions must be the inverse of the addition questions. A stop rule after 5 incorrect answers applies to these tasks as well.

There are five literacy subtasks: letter and sound identification, invented words, oral fluency (grade 1-5, and grade 6-7), and reading comprehension. The letter and sound identification task involves students phonetically reading individual letters in the alphabet, much like the number identification task. The enumerator records each correct pronunciation. Invented word tasks involve 50 words that do not have a meaning in English or in the local languages. The student is asked to read each made up word aloud and the enumerator records each correct pronunciation. An example of an invented words subtask as viewed by the enumerator is shown in figure 5.

Start		
dur	zid	Hib
boq	kaz	Cog
rit	nak	jol
jev	Yot	muk

FIGURE 5. EGRA 2 (Invented Words) Example

The remaining subtasks, oral fluency and reading comprehension, ask students to read a short story aloud. Enumerators are instructed to record the words the students misidentified or mispronounced and to identify the last word the student correctly said aloud within the time limit. The reading comprehension task then asks the students questions about the passage to assess their understanding of the story they just read.

The test design guidelines specify all details about each question's difficulty level. This includes details about the number each sequence increases by in numeracy subtasks and the number of single, double, and triple-digit numbers to be used in the Missing Numbers and Number Identification subtasks; and subtraction problems are required to be the inverse of the addition problems. In the first two EGRA components the versions are made different by reordering of letters or words within the rows to retain the same level of difficulty. The EGRA story subtasks are written with the intention of remaining the same difficulty using the same number of words per sentence and per passage and using a similar vocabulary. Given this strict structure, different versions of the tests are not likely to be different difficulties.

B.1. Additional Treatment and Control Comparison Tables. Here, we provide additional tables comparing the treatment and control group baseline characteristics, illustrating that there are no substantial differences between the groups ahead of the IGATE implementation.

TABLE 5. Numeracy Test Subtasks - Attrited versus Remaining Samples

	Attrited		Remaining	
	Control	Treatment	Control	Treatment
EGMA 1: Number Identification	0.753 (0.309)	0.684 (0.336)	0.715 (0.319)	0.673 (0.339)
% of questions attempted	0.959 (0.0922)	0.947 (0.142)	0.957 (0.111)	0.951 (0.128)
% of time spent	0.684 (0.246)	0.758 (0.234)	0.719 (0.236)	0.741 (0.239)
EGMA 2: Number Quantities	0.648 (0.350)	0.581 (0.342)	0.591 (0.336)	0.558 (0.355)
% of questions attempted	0.939 (0.160)	0.905 (0.204)	0.908 (0.193)	0.880 (0.222)
EGMA 3: Missing Numbers	0.424 (0.312)	0.372 (0.234)	0.394 (0.267)	0.376 (0.263)
% of questions attempted	0.864 (0.222)	0.860 (0.199)	0.843 (0.219)	0.830 (0.230)
EGMA 4: Addition	0.482 (0.279)	0.384 (0.239)	0.450 (0.295)	0.409 (0.283)
% of questions attempted	0.698 (0.140)	0.643 (0.146)	0.721 (0.146)	0.682 (0.169)
m,nb % of time spent	0.986 (0.0618)	0.995 (0.0372)	0.986 (0.059)	0.981 (0.085)
EGMA 5: Subtraction	0.395 (0.277)	0.261 (0.228)	0.335 (0.269)	0.295 (0.254)
% of questions attempted	0.686 (0.146)	0.634 (0.180)	0.673 (0.140)	0.645 (0.173)
% of time spent	0.980 (0.0863)	0.994 (0.0398)	0.987 (0.065)	0.988 (0.068)
Average Numeracy Score	0.541 (0.280)	0.457 (0.236)	0.497 (0.265)	0.462 (0.265)
% of questions attempted	0.829 (0.0981)	0.798 (0.103)	0.820 (0.109)	0.798 (0.115)

TABLE 6. Baseline Summary Statistics - Attrited and Remaining Samples

	Attrited		Remaining	
	Control	Treatment	Control	Treatment
Age	9.324 (2.212)	9.610 (1.894)	9.334 (2.003)	9.412 (2.001)
Grade	3.706 (1.801)	3.644 (1.595)	3.643 (1.715)	3.649 (1.804)
Illness	0.0882 (0.288)	0.119 (0.326)	0.105 (0.307)	0.111 (0.315)
Disability	0.206 (0.410)	0.237 (0.429)	0.170 (0.377)	0.195 (0.397)
Orphan	0.0882 (0.288)	0.0169 (0.130)	0.062 (0.242)	0.057 (0.232)
Travel time to school	27.56 (16.10)	33.39 (27.14)	33.060 (23.750)	35.170 (27.150)
Household often goes hungry	0.441 (0.504)	0.407 (0.495)	0.230 (0.421)	0.225 (0.418)
Household often goes thirsty	0.176 (0.387)	0.153 (0.363)	0.128 (0.334)	0.121 (0.327)
Caregiver has no education	0.0882 (0.288)	0.203 (0.406)	0.089 (0.285)	0.114 (0.318)
Caregiver has primary education	0.441 (0.504)	0.475 (0.504)	0.544 (0.499)	0.519 (0.500)
Caregiver has secondary education	0.471 (0.507)	0.322 (0.471)	0.367 (0.483)	0.368 (0.483)
Caregiver works outside of household	0.824 (0.387)	0.814 (0.393)	0.770 (0.421)	0.827 (0.379)

TABLE 7. Numeracy Test Subtasks - Summary Statistics

	Control	Treatment	Difference
EGMA 1: Number Identification	0.715 (0.319)	0.673 (0.339)	-0.04
% of questions attempted	0.957 (0.111)	0.951 (0.128)	-0.01
% of time spent	0.719 (0.236)	0.741 (0.239)	0.02
EGMA 2: Number Quantities	0.591 (0.336)	0.558 (0.355)	-0.03
% of questions attempted	0.908 (0.193)	0.880 (0.222)	-0.03
EGMA 3: Missing Numbers	0.394 (0.267)	0.376 (0.263)	-0.02
% of questions attempted	0.843 (0.219)	0.830 (0.230)	-0.01
EGMA 4: Addition	0.450 (0.295)	0.409 (0.283)	-0.04
% of questions attempted	0.721 (0.146)	0.682 (0.169)	-0.04
% of time spent	0.986 (0.0586)	0.981 (0.0849)	-0.01
EGMA 5: Subtraction	0.335 (0.269)	0.295 (0.254)	-0.04
% of questions attempted	0.673 (0.140)	0.645 (0.173)	-0.03
% of time spent	0.987 (0.0645)	0.988 (0.0679)	0.00
Average Numeracy Score	0.497 (0.265)	0.462 (0.265)	-0.04
% of questions attempted	0.820 (0.109)	0.798 (0.115)	-0.02
N	305	405	

Note these numbers measure baseline levels for girls who could be recontacted at midline.

TABLE 8. Sample Grade Distribution

Baseline Grade	Control	Treatment	Difference
1	13%	15%	2%
2	17%	16%	-1%
3	15%	17%	2%
4	20%	16%	-5%
5	20%	20%	-1%
6	8%	10%	2%
7	6%	7%	1%
N	305	405	

B.2. Questions Attempted on EGMA. Table 9 reports results from an analysis considering the impact of IGATE on the number of questions attempted on the EGMA exam. The first panel shows that the relevant coefficients from the DiD analysis of question attempts are positive and significant. This suggests that the community information interventions led girls to answer more questions between baseline and midline. Note that in the case of the number quantities subtask, this should be interpreted as an indication of improved ability rather than increased effort since this subtask was stopped after participants incorrectly answered four questions in a row.

TABLE 9. DiD % of Questions Attempted

	EGMA 1	EGMA 2	EGMA 3	EGMA 4	EGMA 5	Total
ML-BL DiD						
Treatment	0.0015 (0.011)	0.036 (0.018)	0.011 (0.016)	0.035 (0.021)	0.013 (0.025)	0.019 (0.0093)
Observations	710	710	710	710	710	710
R-Squared	0.256	0.253	0.203	0.098	0.086	0.245
EL-ML DiD						
Treatment	0.0077 (0.0051)	0.000 (0.0099)	0.022 (0.011)	0.011 (0.016)	0.011 (0.017)	0.011 (0.0073)
Observations	615	615	615	615	615	615
R-Squared	0.150	0.084	0.056	0.104	0.068	0.159
EL-BL DiD						
Treatment	0.044 (0.022)	0.036 (0.025)	0.029 (0.019)	0.033 (0.021)	0.015 (0.017)	0.032 (0.016)
Observations	610	610	610	610	610	610
R-Squared	0.357	0.286	0.191	0.132	0.058	0.303
Timed	Yes	No	No	Yes	Yes	
Early Stop Rule	No	Yes	Yes	No	No	

Note: The table reports the coefficient on an indicator for belonging to an IGATE treatment school. Controls include girl characteristics (Age, grade, illness, disability, orphan, travel time to school), household characteristics (indicators for whether a family member within the household often goes hungry or thirsty), and caregiver characteristics (Caregiver's education level). Cluster-robust standard errors are in parentheses. Standard errors are clustered at the school level.