The effect of conditional incentives and a girls' empowerment curriculum on adolescent marriage, childbearing and education in rural Bangladesh: a community clustered randomized controlled trial

Nina Buchmann, Erica Field, Rachel Glennerster, Shahana Nazneen, Svetlana Pimkina, Iman Sen*

December 28, 2016

Abstract

A clustered randomized trial in Bangladesh examines alternative strategies to reduce child marriage and teenage childbearing and increase girls' education. Communities were randomized into three treatment and one control group in a 2:1:1:2 ratio. From 2008, girls in treatment communities received either i) a six-month empowerment program, ii) a financial incentive to delay marriage, or iii) empowerment plus incentive. Data from 19,060 girls 4.5 years after program completion show that girls eligible for the incentive for at least two years were 22% (-9.9ppts, $p<0.01$) less likely to be married under 18, 14% (-5.2ppts, $p<0.01$) less likely to have given birth under 20, and 21% (5.6ppts, $p<0.05$) more likely to be in school at age 22. Unlike other incentive programs that are conditional on girls staying in school, an incentive conditional on marriage alone has the potential to benefit out-of-school girls. We find insignificantly different effects for girls in and out of school at baseline. The empowerment program did not decrease child marriage or teenage childbearing. However, girls eligible for the empowerment program were 12% (3.1ppts, $p<0.05$) more likely to be in-school and had completed 2.9 months (0.24 years, $p<0.10$) of additional schooling.

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*The authors are from Duke (Buchmann and Field), JPAL (Glennerster and Sen), IPA(Nazneen) and EPoD (Pimkina). Please direct correspondence to field.erica@duke.edu.

The study was funded by the International Initiative for Impact Evaluation, the US National Institutes of Health, the Nike Foundation, and the International Development Research Center. We thank colleagues at Save the Children and Bangladesh Development Society who were an integral part of designing this evaluation particularly Jahirul Alam Azad, Winnifride Mwebesa, Veronica Torres, Mary Beth Powers, Elizabeth Pearce, and Barbara Burroughs as well as Shoraez Shahjahan (IPA) and Diva Dhar (JPAL). Invaluable research assistance was provided by Libby Abbott, Michael Duthie, Rahin Khandker, Elizabeth Linos, Parendi Mehta, Rudmila Rahman, Akshay Dixit, Rizwana Shahnaz, Pauline Shoemaker, Saffana Humaira and Mihir Bhaskar. All errors are our own.

1 Introduction

While most of the world has instituted laws prohibiting marriage under 18, child marriage remains the norm in many countries, with 142 million girls projected to become child brides in developing countries between 2011-2020 (Loaiza Sr and Wong, 2012).

Girls who marry early are more likely to be socially isolated, have early and high-risk pregnancies, be at risk of sexually transmitted infections, and experience intimate partner violence (Mathur et al., 2003; Jain and Kurz, 2007; UNICEF et al., 2001). Childbearing during adolescence is associated with severe complications such as obstructed labor or obstetric fistula (EngenderHealth, 2003), and complications in pregnancy and delivery are a leading cause of death among girls aged 15-19 (Nour, 2009). Child marriage may also impact health through behavioral channels, as young mothers are often less informed and less likely to seek care (Raj, 2010). There is strong evidence that child marriage results in lower schooling attainment (Field and Ambrus, 2008), which could further impact health.

Other than legal bans, which have proven to be infeasible to enforce in developing countries, there are limited policy approaches to reducing child marriage. There is some evidence that encouraging girls to stay in-school is effective in reducing child marriage (Duflo et al., 2015; Angrist et al., 2006; Hong and Sarr, 2012; Hahn et al., 2015). However, this approach fails to reach the most vulnerable girls who leave school early due to poverty or those with insufficient access to secondary schools. One high quality study showed that an unconditional transfer could reduce child marriage and teenage childbearing in a very different context to ours (Malawi) (Baird et al., 2011).

A more inclusive approach to reducing child marriage that is growing in popularity is to strengthen girls' ability to negotiate later marriage or childbearing through empowerment or skills training. Yet there is little evidence on the impact of such programs on girls' long-run wellbeing. One experiment in Uganda found that empowerment and skills training reduces teenage pregnancy (Bandiera et al., 2014), while another empowerment program in Tanzania did not have significant effects on marriage outcomes (Buehren et al., 2015). Meanwhile, there are no impact evaluations in peer-reviewed journals of empowerment programs to reduce child marriage in South Asia where child marriage is most common and age of marriage and age of sexual onset are largely determined by parents.

An alternative approach is providing conditional incentives to parents to delay girls' marriage. Conditional incentives may be particularly important in societies like Bangladesh where the cost of marrying a daughter in the form of the dowry payment made by a bride's family is believed to increase with age (Field and Ambrus, 2008; Bruce and Sebstad, 2004). While incentives conditional on marital status have been tried on a large scale in Haryana, India, there is no rigorous evidence on their effectiveness.[1]

[1]The Apni Beti Apni Dhan program in Haryana provided bonds to mothers of newly-born girls, redeemable

This study conducts a clustered randomized trial in rural Bangladesh to evaluate the impact of two very different policy approaches to reducing child marriage and teenage childbearing – an adolescent empowerment training program and a conditional incentive program. Bangladesh has the second highest child marriage rate in the world: 74% of women aged 20-49 were married before age 18 (UNICEF et al., 2014), and in 2014, 31% of all 15-19-year-olds had begun childbearing (Mitra et al., 2016). One experimental arm tests the effectiveness of financial incentives conditional on marriage, the first randomized trial of this approach. Alongside, we also evaluate the impact of a standard empowerment program, and test whether combining the empowerment program and the conditional incentives program is more powerful than either program alone. Our findings indicate that conditional incentive programs are highly effective in increasing age at marriage and schooling attainment, while empowerment programs have no effect on marriage timing, but do encourage unmarried and older married girls to stay in school. We find no evidence of complementarities between the incentive and empowerment program on schooling or child marriage.

2 Methods

2.1 Study design and Participants

Between January 2007 and September 2015 we ran a clustered randomized trial in collaboration with Save the Children (USA) to examine alternative strategies to reduce child marriage and teenage childbearing and increase education. The study was carried out in six sub-districts (Daulatkhan, Babuganj, Muladi, Patuakhali Sadar, Bauphal and Bhola Sadar) in south central Bangladesh, where Save the Children was managing a food security program that provided transfers to pregnant and lactating mothers. The conditional incentive program that we evaluate used the distribution infrastructure of this existing program, which operated in all treatment and control communities in our study. To determine which communities were included in the study, we collected census data in all 610 communities in the six sub-districts between January and February 2007. Communities were excluded from our study if they were too remote for distribution or had less than 40 or more than 490 adolescent girls, leaving 460 eligible communities in five subdistricts that were randomized into i) a basic empowerment program, ii) a conditional incentive to delay marriage, iii) empowerment plus conditional incentive, or iv) the status quo using a stratified randomized design in the ratio 2:1:1:2.[2] The objective was to compare the effect of an empowerment program with that of a conditional incentive and

when the girl was 18 and unmarried, with additional bonuses for education. The most rigorous non-experimental evaluation of the program only examined education outcomes and found no significant gains in-schooling (Sinha and Yoong, 2009). For a full review of the literature see supplementary appendix S1.

[2]Experimental assignment was carried out by MIT staff without the involvement of Save the Children using Stata. Save the Children staff were informed of the treatment allocation of study communities.

to test whether a combined empowerment and incentive program is more powerful than either program alone. Randomization at the community level reduced the risk of inter-household spillovers. We stratified by union, an administrative grouping of roughly 10 communities, and within union by community size (supplementary appendix S5).

In communities randomized to receive the empowerment program, called Kishoree Kontha (KK), or "Adolescent Girl's Voice", all girls aged 10-19 were invited to take part in one of four six-month cycles of the program that ran between December 2007 and August 2010. In conditional incentive communities, girls whose reported age at baseline (before the program was announced) meant that they would be age 15-17 at the start of the oil distribution were eligible to receive the conditional incentive until the age of 18 if they remained unmarried. Every four months from April 2008 to August 2010 marital status was verified by interviewing family members, neighbors and community leaders and cooking oil was distributed to eligible girls. We attempted to resurvey all households with girls age 15-17 at distribution start 4.5 years after program completion (between May and September 2015). Parents of each daughter were asked about her history of marriage, childbearing and education.

The sample analyzed in this paper consists of 19,060 girls from 446 communities, which were not displaced by cyclone damage: 6,309 in the empowerment arm, 2,906 in the conditional incentive arm, 3,239 in the empowerment plus incentive arm and 6,606 in control. Participation in the empowerment and incentive programs was voluntary. Oral consent was collected from subjects for survey participation. Institutional review boards of Innovations for Poverty Action and MIT approved this project.

2.2 Procedures

The Bangladesh Development Society (BDS) implemented the empowerment program under the direction of Save the Children. Communities assigned to the empowerment program first underwent a community mobilization phase that informed parents, teachers, and community leaders about the activities and potential benefits of the program, mobilized their support and found locations for "Safe Spaces" – meeting places where girls could meet, socialize, and receive training. Safe Space committees were organized with adult members of the community to help troubleshoot any potential problems, for example if a girl's parents did not want her to attend. The empowerment curriculum included education support and social competency training. The education component aimed to enhance the basic literacy, numeracy, and oral communication of both school-attending and illiterate girls. The social competency component trained girls in life skills and nutritional and reproductive health knowledge via a curriculum designed by Save the Children USA. In randomly selected communities (50%), financial literacy and encouragement to generate own income was added to the curricula. Overall, the empowerment curriculum was similar in content to many empowerment programs being implemented worldwide, including

those designed by BRAC and Unicef.

Each Safe Space had a target of 20 girls, two to four of which were selected to be peer educators. Peer educators were given between 24 and 40 hours of training on the curriculum, which they delivered with the aid of specially designed books that included stories and examples to be read aloud, questions to be discussed, and participatory activities and games to perform. Safe Space groups were designed to meet five or six days a week for two hours each day for six months. Groups could continue to meet once the curriculum was complete but there was no support or new curricula after six months. At the end of the cycle, field staff repeated the mobilization and selection process until the entire community population had been reached. Thus, communities received up to four cycles and 24 safe spaces, depending on the number of girls living there. Monitoring data show Safe Spaces averaged six meetings, or 7.8 hours, per week, and 45,149 girls, or 84%, of girls in target communities were reached (appendix A2). This makes KK one of the largest adolescent empowerment programs implemented in the developing world.

The conditional incentive program was an in-kind transfer of cooking oil to encourage parents to postpone daughters' marriage until the legal age of consent (18). The value of the incentive was approximately $16 per year, an amount chosen to offset the estimated financial cost of higher dowry (Bruce and Sebstad, 2004). Cooking oil was chosen as an incentive because it is purchased regularly by every family in Bangladesh and thus has close to cash equivalent value, yet it is less susceptible to theft and graft than cash because of its bulk. It also has a high value to volume ratio, which minimized transport costs. Girls estimated to be age 15-17 at distribution start and confirmed to be unmarried by Community Health Volunteers (CHVs) were issued ration cards to collect the oil. Only girls (not their parents) were permitted to collect the oil by presenting their ration card, which was checked against a separate beneficiary list at distribution points. A total of 5,617 unmarried adolescent girls received the conditional incentive at least once, or 71% of the girls eligible at baseline (appendix A2). Marriage conditionality was checked before each distribution round by CHVs and independent monitors who asked beneficiaries, neighbors and community leaders about marital status. Those found to be married or who had reached 18 (according to their age at baseline) had their names removed from the eligibility list and their cards taken away.

Four and a half years after program completion, we conducted a follow-up study of all girls age 15-17 and unmarried at distribution start. Parents were asked about all daughters' current marital status.[3] Parents of married or previously married girls were also asked "How long ago did she marry?" or "How long ago did she first marry?", respectively. Parents were also asked whether the girl had ever given birth and the age of each child. In addition, parents were asked whether their daughters were still in school and which class they were currently

[3]Possible responses were "Married", "Single, never married", "Widowed", "Divorced", "Separated" or "Abandoned".

attending and/or last completed.

2.3 Outcomes

The primary outcomes of the study are child marriage (under 18), teenage childbearing (under 20) and current school enrollment. We use binary outcomes as opposed to continuous measures of marriage and birth age to avoid censored data problems that arise from excluding girls that have never been married or given birth. Secondary outcomes are marriage age, marriage rates under 16, and last class completed. Marriage age is calculated by comparing reported marriage duration with girls' age collected at baseline to avoid misreporting of underage marriages. Age at first birth is calculated using baseline age and the reported age of the girl's oldest living or deceased child. Data were collected from the household where the girl was living at the time of the baseline survey (usually the girl's parents).

2.4 Statistical Analysis

The study was powered to detect a 2.4ppts decrease in child marriage among girls receiving the empowerment program and a 2.5ppts decrease among girls receiving the incentive from a control mean of 58.7% with 80% power, 0.05 alpha, 15% attrition, and an intracluster correlation of 0.010. The study also had power to detect a 2.4ppts decrease in teenage childbearing for the empowerment program and a 2.5ppts decrease for the incentive from a control mean of 50.8%, and an intracluster correlation of 0.010. Finally, the study could detect an increase of 2.0ppts in school enrollment for the empowerment program and 2.1ppts for the incentive from a control mean of 25.3%, and an intra-cluster correlation of 0.050.[4] Means were taken from the 2004 Demographic and Health Survey data. The trial was registered at the AEA Registry prior to endline data collection, #204 (https://www.socialscienceregistry.org/trials/204).

A team of monitors, data quality control officers, and research associates monitored the data throughout data collection by conducting consistency checks across answers, analyzing variable distributions and monitoring differences between survey responses and responses of parents in a second separate backcheck survey conducted for 7% of all observations. In this sample, marriage status differed in 1.5% of the cases, birth status in 1.3% and ever-schooled in 0.8%. We recollected data through phone interviews from households with very high overall backcheck error rates across all variables. Backcheck error rates are balanced across treatment arms. We also intensively verified marriage status (including by talking to the girls themselves) for 10% of the girls in the baseline sample 1.5 years after program completion. We found no significant differences between initial and verified reports and the number of mismatches between initial and verified reports were balanced across treatment arms. In the few cases where marriage

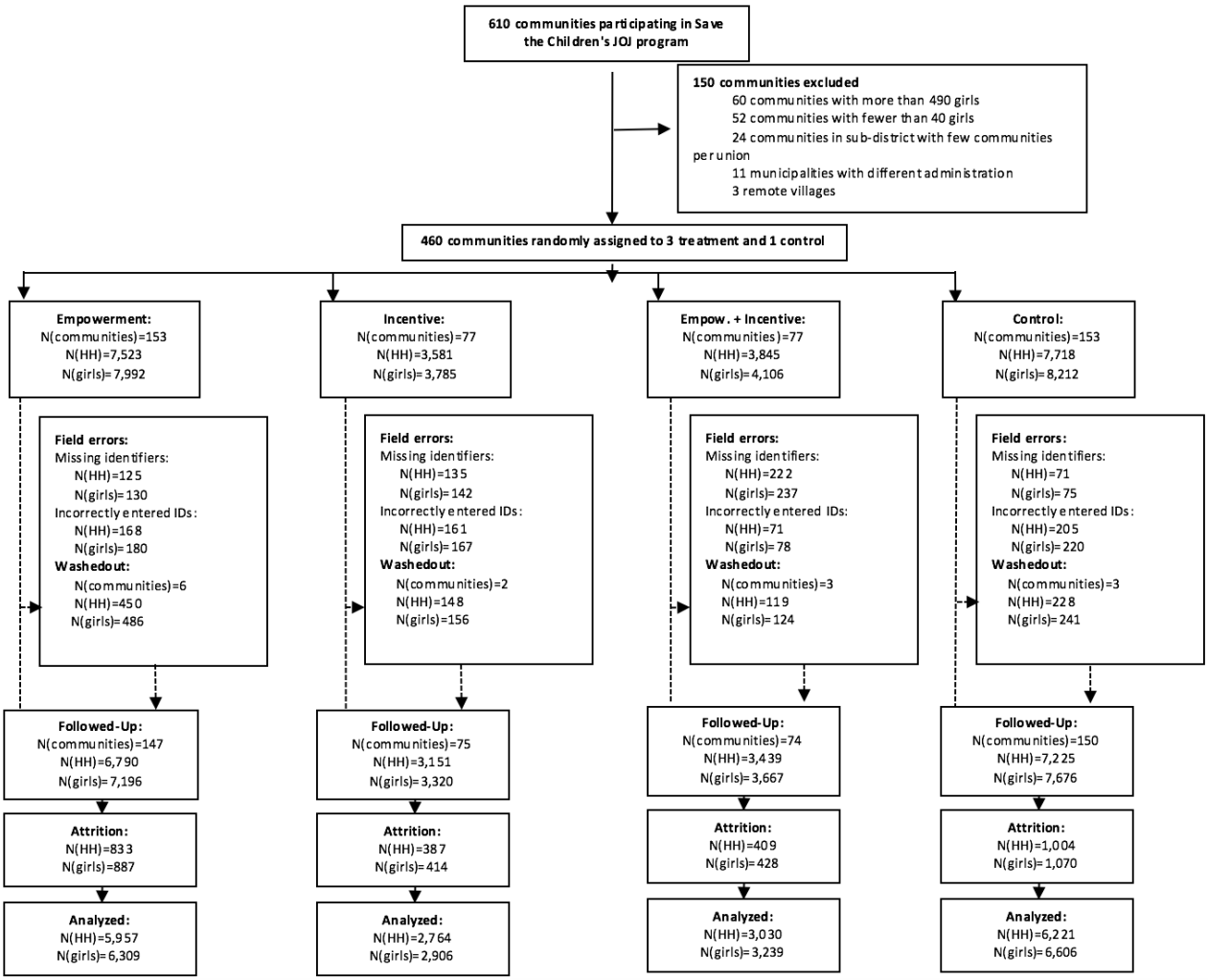
[4]Intracluster correlation in our survey data was 0.03 for child marriage, 0.03 for teenage childbearing and 0.05 for schooling status.

certificates were available at endline, marriage age differed by 2.9 months on average and the discrepancy was balanced across treatment arms (appendix A5).

Overall, 21% of eligible girls in incentive communities were excluded from the incentive program due to name match errors that prevented us from issuing eligibility cards (girls' age could not be verified at program onset if they could not be matched accurately to baseline observations). Thus, we estimate the impact of the incentive using two-stage least squares (2SLS) regressions (see appendix A6 for precise specification). In the first stage, program inclusion (card issuance) is predicted by treatment assignment in an ordinary least squares regression (OLS; linear probability). In the second stage, marriage, childbearing and education outcomes are regressed against predicted inclusion from the first stage. Under plausible assumptions, this method accounts for errors in program inclusion and produces unbiased and consistent estimates of treatment assignment under full compliance. The most important assumption is that of no cross-household spillovers onto adolescent girls in the same cohort. A comparison of girls in households who did not receive an eligibility card relative to controls suggests that this assumption is valid (see appendix A7). We regress all outcomes on dummies representing eligibility for the incentive, eligibility for the empowerment program, and an interacted dummy representing eligibility for both. Both first and second stage regressions include controls measured at baseline for strata, household size, an older unmarried sister in the household, school enrollment, mother's level of education, and the ratio of adult boys to adult girls in the community (a proxy for marriage market conditions). Errors are clustered at the unit of randomization (community). Results excluding controls, and including washed-out communities, as well as analysis using intention-to-treat specification are reported in appendix A8, and yield similar results. We also find no differences when regressing outcomes on dummies for each treatment arm (empowerment, incentive, empowerment plus incentive) as opposed to eligibility for each program.

Our analysis sample constitutes all 19,060 girls aged 15-17 and unmarried at program launch that were followed-up at endline. To assess dose response, we compare effects on the whole sample with effects on girls eligible to receive the incentive for at least two years (aged 15 at distribution start). We also check for differential effects according to whether a girl was in school at baseline to test whether the most vulnerable girls can potentially benefit from one of the policy approaches.

Figure 1: Trial profile



An endline survey, which took place between May 30 and September 8, 2015, sought follow-up data on all girls aged 15-17 at the time of program launch. There are three sources of missing data from endline. First, before endline, 1,229 observations (310 in empowerment, 309 in incentive, 315 in empowerment plus incentive, and 295 in control) were lost due to errors by the data entry firm, which lost hard copy data from 553 households before data entry occurred, and also incorrectly entered IDs such that 645 individuals could not be linked across survey waves. Second, 1,007 girls (486 in empowerment, 156 in incentive, 124 in empowerment plus incentive, and 241 in control) lived in 14 communities that were entirely displaced by cyclone damage. Finally, of the 21,859 girls we attempted to reach at endline, 2,799 could not be tracked (13% attrition, balanced across treatment arms). Our final analysis sample constitutes 19,060 girls: 6,309 girls in empowerment, 2,906 in incentive, 3,239 in empowerment plus incentive, and 6,606 in control (figure 1). Nine percent of girls were married at baseline and 60% were in school. Baseline characteristics were balanced across treatment arms (table 1).

Table 1: Baseline characteristics

	Empow.	**Incentive**	**Empow.+Incen.**	**Control**	**Total**
Married & unmarried at Baseline	**8,739**	**4,176**	**4,503**	**8,990**	**26,408**
Ever Married %	8.5	9.4	8.8	8.7	8.8
(ppts)	(28.0)	(29.1)	(28.4)	(28.1)	(28.3)
Still in-school %	60.2	59.2	60.2	61.2	60.4
(ppts)	(48.9)	(49.2)	(48.9)	(48.7)	(48.9)
Highest Class	6.2	6.1	6.3	6.2	6.2
Passed	(2.6)	(2.7)	(2.7)	(2.7)	(2.6)
Unmarried at Baseline	**7,992**	**3,785**	**4,106**	**8,212**	**24,095**
Still in-school %	64.6	64.1	65.1	65.8	65.0
(ppts)	(47.8)	(48.0)	(47.7)	(47.4)	(47.7)
Highest Class	6.4	6.3	6.4	6.4	6.4
Passed	(2.6)	(2.6)	(2.6)	(2.6)	(2.6)
Age	14.9	14.9	14.9	14.9	14.9
	(0.8)	(0.8)	(0.8)	(0.8)	(0.8)
Father Education	4.2	3.8	4.0	3.9	4.0
(0-17)	(4.4)	(4.1)	(4.2)	(4.2)	(4.2)
Mother Education	3.2	3.0	3.0	3.1	3.1
(0-17)	(3.3)	(3.3)	(3.1)	(3.3)	(3.3)
HH Size	6.1	6.1	6.1	6.0	6.1
(members)	(2.0)	(2.0)	(2.0)	(2.1)	(2.0)
Unmarried older sister in HH %	18.9	18.0	18.0	18.5	18.5
(ppts)	(39.1)	(38.5)	(38.4)	(38.9)	(38.8)
Community	1.0	1.0	1.1	1.0	1.0
Boys/Girls Ratio	(0.3)	(0.3)	(0.3)	(0.3)	(0.3)
Community size (girls	265.9	251.2	261.3	275.1	265.9
age 10 to 19)	(121.3)	(119.4)	(118.6)	(126.2)	(122.5)

3 Results

As shown in table 2, the financial incentive reduced the likelihood of child marriage by 21% overall (-8.5ppts, p<0.01) and 22% (-9.9ppts, p<0.01) for girls age 15 at distribution start. The likelihood of being married under 16 fell by 17% (-3.2ppts, p<0.05) among girls eligible for the incentive and projected to be under age 16 at distribution start,[5] and 19% among girls eligible for the incentive and age 15 at distribution start (-4.0ppts, p<0.05).

Table 2: Marriage outcomes, unmarried girls age 15-17 at program launch

	Married<18		Married<16	
	Age 15-17 (1)	Age 15 (2)	< Age 16 (3)	Age 15 (4)
Empow.	-0.007	-0.004	-0.000	0.006
	[-0.022,0.009]	[-0.030,0.023]	[-0.016,0.016]	[-0.015,0.027]
Incentive	-0.085***	-0.099***	-0.032**	-0.040**
	[-0.113,-0.056]	[-0.141,-0.057]	[-0.058,-0.005]	[-0.075,-0.005]
Incen.*Empow.	0.014	0.010	-0.018	-0.030
	[-0.026,0.054]	[-0.049,0.069]	[-0.051,0.016]	[-0.076,0.016]
Control Mean	0.40146	0.44941	0.18838	0.21332
Observations	19033	6815	13750	6815
FE	Union	Union	Union	Union

2SLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification and baseline characteristics.

As 15% of our sample is still unmarried, our marriage age data is censored. Figure 2 shows the probability density function of marriage age by treatment arm, demonstrating a shift in marriages from the two years before 18 to the years just after 18. Marriage rates had fully converged by age 22. We also report non-binary regression coefficients not adjusted for censoring in table 3. The incentive increased average age of marriage by 4.7 months (0.39 years, p<0.01) overall and 5.4 months (0.45 years, p<0.01) among girls age 15 at distribution start. If all control group girls age 15 at distribution start who married under 18 were persuaded to wait until age 18, average marriage age would have increased 5.4 months, a measure of program effect under maximum take-up. Thus, our estimated treatment effect of 5.4 months is the equivalent of every family at risk responding to the incentive for the duration of the program.

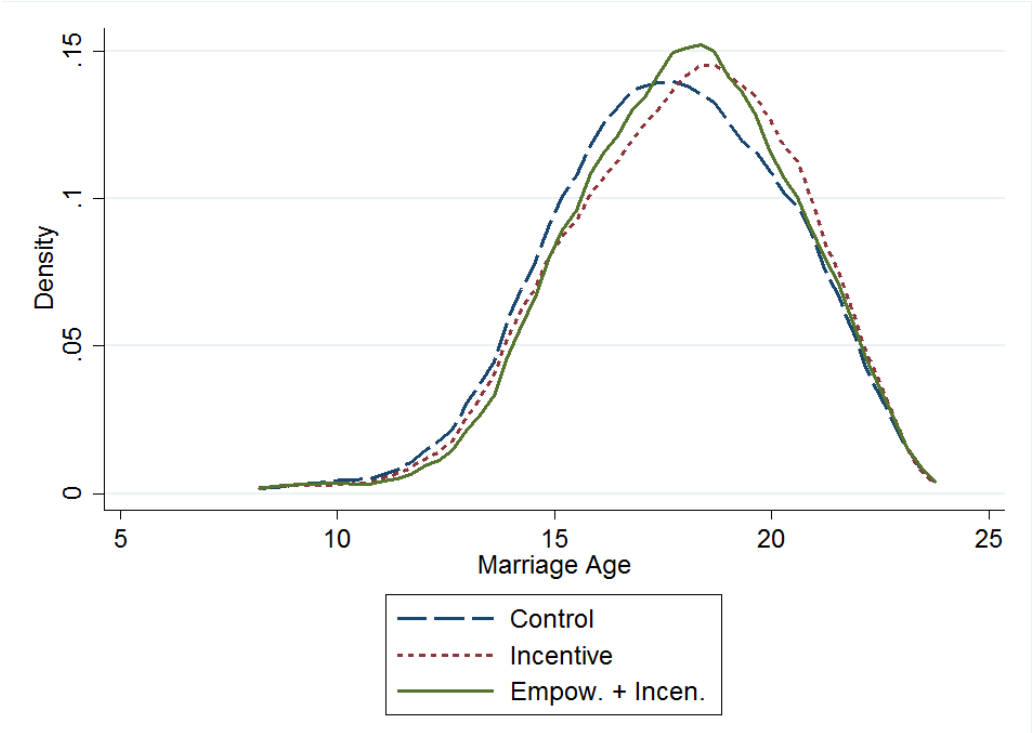
The magnitude is also consistent with less than full compliance with the program and marriage age increases among some of the responders beyond age 18, despite no incentive being offered to remain unmarried at that age. Indeed, the distribution of marriage ages (figure

[5]This includes girls reported to be age 14 and 15 at baseline.

2) suggests fewer marriages took place in the incentive arms between ages 15 and 17.5 and more took place between 18 and 22 compared to the control group. That some marriages were delayed well past 18, the cutoff for the incentive, could be explained by marriage market search frictions. Qualitative interviews support this view: marriage proposals come at infrequent intervals and parents will often wait many months for the right match for their daughter. Another possible explanation is that delaying marriage beyond a critical age may endow girls with greater bargaining power in negotiating marriage proposals, which they can then parlay into even further marriage delays once the program is over, simply on account of being older and more experienced.

We do not observe a separate or additional effect of the empowerment program on marriage outcomes.

Figure 2: Distribution of marriage age, girls age 15 and unmarried at program launch



We also find strong effects of the incentive on age at first birth (table 4). The incentive reduced the likelihood of teenage childbearing by 14% (-4.5ppts, p<0.01) overall and 14% (-5.2ppts, p<0.01) among girls age 15 at distribution start. We again do not observe a separate or additional effect of the empowerment program.

The incentive to delay marriage also has a large positive impact on school enrollment. We restrict our sample to girls in school at program launch because it is extremely rare for girls

Table 3: Marriage age, married girls, age 15-17 and unmarried at program launch

	Age 15-17 (1)	Age 15 (2)
Empow.	-0.009	-0.026
	[-0.104,0.086]	[-0.173,0.121]
Incentive	0.394***	0.452***
	[0.222,0.566]	[0.220,0.684]
Incen.*Empow.	0.056	0.114
	[-0.178,0.291]	[-0.213,0.441]
Control Mean	18.17646	17.64794
Observations	16189	5622
FE	Union	Union

2SLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification and baseline characteristics.

Table 4: Teenage childbearing, unmarried girls age 15-17 at program launch

	Age 15-17 (1)	Age 15 (2)
Empow.	0.001	0.007
	[-0.014,0.017]	[-0.016,0.030]
Incentive	-0.045***	-0.052***
	[-0.072,-0.019]	[-0.091,-0.013]
Incen.*Empow.	-0.003	-0.018
	[-0.040,0.034]	[-0.073,0.036]
Control Mean	0.32730	0.38468
Observations	18964	6794
FE	Union	Union

2SLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification and baseline characteristics.

to return to school once they have unenrolled.[6] Girls aged 15-17 at distribution start and eligible for the incentive were 14% (3.5ppts, p<0.10) more likely to be in school at age 22-25 and had completed 1.2 months (0.10 years, p>0.10) of additional schooling. Girls eligible for the empowerment program were 8% (2.0ppts, p<0.10) more likely to be in school and had completed 2.4 months (0.20 years, p<0.05) of additional schooling. We observe significant dose response both among girls eligible for the incentive and the empowerment program: Girls 15 at distribution start in the incentive group are 21% (5.6ppts, p<0.05) more likely to be in school and have completed 2.6 months (0.22 years, p>0.10) of additional schooling. Girls 15 at distribution start in the empowerment group are 12% (3.1ppts, p<0.05) more likely to be in school and have completed 2.9 months (0.24 years, p<0.10) of additional schooling.

Table 5: Education outcomes, unmarried girls age 15-17 and in school at program launch

	In school		Last class passed	
	Age 15-17 (1)	Age 15 (2)	Age 15-17 (3)	Age 15 (4)
Empow.	0.020*	0.031**	0.198**	0.243*
	[-0.000,0.041]	[0.001,0.060]	[0.006,0.389]	[-0.018,0.503]
Incentive	0.035*	0.056**	0.101	0.216
	[-0.000,0.071]	[0.010,0.103]	[-0.240,0.443]	[-0.268,0.701]
Incen.*Empow.	0.009	-0.016	0.048	0.024
	[-0.041,0.059]	[-0.081,0.049]	[-0.448,0.543]	[-0.601,0.648]
Control Mean	0.25850	0.26173	11.28643	10.78328
Observations	12626	5072	12541	5044
FE	Union	Union	Union	Union

2SLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification and baseline characteristics.

The coefficient on the interaction term between the incentive and empowerment program is insignificantly different from zero in all specifications.

Unlike other incentive programs that are conditional on girls staying in school, an incentive conditional on marriage alone has the potential to benefit out-of-school girls. On the other hand, the incentive may only be sufficient to discourage child marriage if a girl has the option of staying in school while she waits. We compare the effects of the incentive conditional on staying unmarried on child marriage and teenage childbearing outcomes for girls in school and out of school at baseline (table 6). We find insignificantly different effects for girls in and out of

[6]We test this assumption and find no evidence of impact of the incentive on schooling for those girls who were out of school at program start. However, the confidence intervals are large.

school at baseline: The conditional incentive decreased the likelihood of child marriage by 13% (-6.7ppts, p<0.05) among girls out of school at baseline and by 27% (-9.2ppts, p<0.01) among girls in school at baseline. Effects on teenage childbearing similarly do not differ significantly by baseline schooling status: The incentive decreased the likelihood of teenage childbearing by 9% (-3.9ppts, p>0.10) among girls out of school at baseline and by 18% (-4.9ppts, p<0.01) among girls in school at baseline. We again do not observe a separate or additional effect of the empowerment program on marriage and childbearing outcomes in either subsample.

Table 6: Marriage and childbearing outcomes, by baseline schooling status, unmarried girls age 15-17 at program launch

	Girls out of school at BL			Girls in school at BL		
	Married<18 (1)	Married<16 (2)	Birth<20 (3)	Married<18 (4)	Married<16 (5)	Birth<20 (6)
Empow.	0.005	-0.004	0.014	-0.012	0.001	-0.004
	[-0.024,0.034]	[-0.038,0.031]	[-0.014,0.043]	[-0.031,0.006]	[-0.016,0.019]	[-0.022,0.014]
Incentive	-0.067**	-0.056*	-0.039	-0.092***	-0.024	-0.049***
	[-0.125,-0.009]	[-0.118,0.005]	[-0.091,0.013]	[-0.124,-0.061]	[-0.053,0.005]	[-0.078,-0.019]
Incen.*Empow.	-0.015	-0.019	-0.036	0.026	-0.015	0.010
	[-0.094,0.063]	[-0.097,0.058]	[-0.108,0.037]	[-0.017,0.068]	[-0.051,0.022]	[-0.031,0.051]
Control Mean	0.51557	0.56065	0.42332	0.34497	0.35966	0.27977
Observations	6400	4205	6377	12633	9545	12587
FE	Union	Union	Union	Union	Union	Union

2SLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification and baseline characteristics.

These results imply that marriage age influences childbearing and other outcomes not only through its impact on education. Even when there is no possibility of attaining more schooling, girls are made better off by postponing marriage.

4 Discussion

These results provide novel evidence that a relatively inexpensive conditional incentive targeted to families of adolescent girls in a setting with high rates of underage marriage is effective in substantially reducing child marriage and teenage childbearing. It also increased the percentage of girls still in school at age 22 to 25 and increased years of schooling completed. A well-crafted and quite intensive adolescent girls' empowerment program did not decrease child marriage or teenage childbearing but was effective in increasing schooling.

We show that a financial incentive conditional on marriage and not education can also delay marriage and childbearing for out-of-school girls. This is important because the most popular incentive programs focus on keeping girls in school and thus are unavailable to out-of-school girls. This focus may stem from the assumption that once out of school a girl will inevitably

marry and there is little that policy can do to change this. Our results suggest this vulnerable population can still benefit from incentives.

One possible concern with the validity of our estimates is the loss of observations from data entry errors and cyclone damage. However, the problem was not driven by treatment status, minimizing risk of bias. Attrition among households that enumerators attempted to find was just 13%, which is low given the 9-year study duration (appendix A3).

Another possible concern is parents lying about marriage timing because of the incentive. We consider this unlikely as the program had finished 4.5 years before endline surveying, girls were far too old to qualify, and marriage rates are similar in a verification survey where marriage was carefully verified (appendix A5). Finally, childbearing and school enrollment results provide strong evidence that the marriage effects are real, as there was no incentive to lie about childbearing or schooling 4.5 years after the program ended.

Our results complement the growing literature suggesting that incentives can help change long-held behaviors often believed to be culturally entrenched and immutable. Incentives conditional on education have been criticized for failing to help the most marginal girls who cannot continue in school. Our results suggest a way to promote education and reach the most vulnerable.

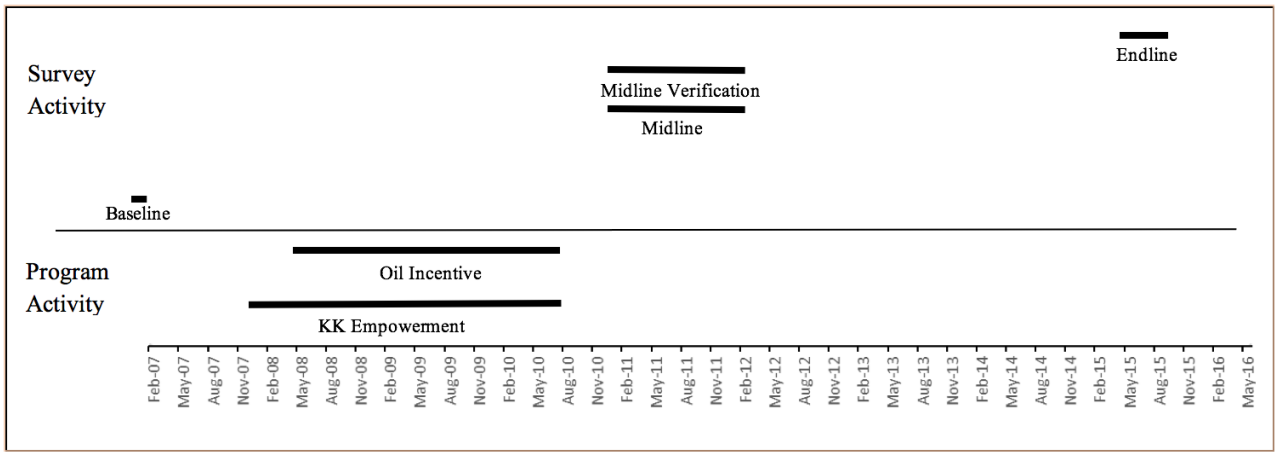
Our results also imply that the conditional incentive is highly cost-effective. The conditional incentive translates into 7.2 years of delayed marriage, 1.6 averted child marriages, and 2.9 years of schooling for every $1,000 invested by the implementer, generating $977 in Net Present Value for every $1,000 spent (costs to implementer and beneficiary) – the highest impacts among rigorously evaluated interventions in a comprehensive cost-efficacy analysis (appendix A10).

We find an impact of a well-crafted and -implemented empowerment program on education outcomes only. However, it is possible that the empowerment program will translate into gains in reproductive health outcomes or marital bargaining power later in a woman's life. Furthermore, empowerment programs may be much more effective in settings in which girls have some agency over marriage timing.

5 Appendix

A1: Program Timeline

Figure A1: Program timeline



A2: Program Outreach

Table A2: Program take-up, take-up by upazila of girls age 10-19 at baseline for the empowerment treatment arm and girls age 15-17 and unmarried at distribution start for the incentive treatment arms

Sub-district	KK Enrollment (%)	KK Attendance (%)	Oil Take-up (%)
Babuganj	79.1	77.5	69.6
	(21.1)	(4.3)	(22.7)
Bauphal	78.3	81.6	72.0
	(22.5)	(5.1)	(15.5)
Bhola Sadar	79.5	82.6	83.5
	(20.7)	(6.0)	(7.1)
Patuakhali Sadar	89.5	76.9	64.1
	(17.1)	(4.4)	(10.0)
Muladi	73.4	81.5	65.7
	(20.5)	(4.5)	(22.7)

Average of girls enrolled in/attending KK as well as oil take-up based on monitoring data. Data are % (SD).

Participation in KK

Monitoring data suggests that 32,646 adolescent girls were reached through peer education sessions in the four learning cycles, or 86% of eligible girls age 10-19 at baseline. Total enrollment rate was 84% (45,149 girls), while the average total attendance rate was 80%.

Oil Incentive

In total, 5,617 unmarried adolescent girls received the oil incentive at least once, or 71% of girls eligible at baseline.

A3: Attrition and Non-Response Analyses

Table A3a: Attrition analysis, girls age 15-17 and unmarried at distribution start

	Empow. (%)	Incentive (%)	Empow. + Incen. (%)	Control (%)	Total (%)
Households	**7,523**	**3,581**	**3,845**	**7,718**	**22,667**
Total	19.0	22.1	18.8	18.7	19.4
	(39.2)	(41.5)	(39.1)	(39.0)	(39.5)
Girls	**7,992**	**3,785**	**4,106**	**8,212**	**24,095**
Total	19.3	22.5	18.8	18.9	19.6
	(39.4)	(41.8)	(39.0)	(39.1)	(39.7)
Excluding data entry errors	16.0	15.6	12.0*	15.9	15.2
	(36.7)	(36.3)	(32.5)	(36.5)	(35.9)
–, excluding washed-out communities	13.4	12.5	11.7	13.9	13.2
	(34.1)	(33.0)	(32.1)	(34.6)	(33.8)

Balance tests are OLS results with modified Huber-White SEs clustered at the community level. *p < 0.10, **p < 0.05, ***p < 0.01.

Table A3b: Non-response analysis, percentage of missing or "don't know" responses by outcome, by treatment. Girls age 15-17 and unmarried at distribution start

	Empow. (%)	Incentive (%)	Empow. + Incen. (%)	Control (%)	Total (%)
Whether Married	0.1	0.1	<0.1	0.1	0.1
Marriage Age (married girls)	0.1	<0.1	0.1	0.1	0.1
Child Marriage	0.2	0.1	0.1	0.2	0.1
Whether Birth (married girls)	0.2	0.3	0.4	0.3	0.3
Age at First Birth (girls who gave birth)	0.2	0.1	0.9	0.1	0.3
Teenage Childbearing	0.4	0.4	1.0	0.4	0.5
Still in school	0.2	0.1	<0.1	0.1	0.1
Last class passed	0.8	0.5	0.7	0.8	0.7

Balance tests are OLS results with modified Huber-White SEs clustered at the community level. *p < 0.10, **p < 0.05, ***p < 0.01.

A4: Compliance

Table A4: Compliance, self-reported take-up in the midline verification survey. Any empowerment includes girls in empowerment and empowerment plus incentive treatment groups. Any incentive includes girls in the incentive and empowerment plus incentive treatment groups. Girls age 15-17 and unmarried at distribution start

Treatment Group	Attended at least 1 KK Session (%)	Member of KK (%)	Oil Take-up (%)
Empow.	50.8	42.4	0.2
Incentive	28.6	21.7	47.0
Empow. + Incen.	65.0	57.3	52.9
Control	10.7	7.1	0.7
Any Empow.	55.8	47.7	
Any Incentive			50.0

Table A4 reports whether a girl that was unmarried and between the age of 15-17 and thus eligible for all treatments attended at least one session of KK, was a member of KK, and/or received the incentive. The table lists rates for any empowerment communities (comprised of empowerment, and empowerment plus incentive communities), any incentive communities (comprised of incentive, and empowerment plus incentive communities) as well as the rates broken down by the different treatment types. The results highlight that KK attendance and

membership rates were higher in empowerment plus incentive treatment communities than in empowerment communities. Even the percentage of spillovers, as defined by girls who attended KK sessions or were KK members in any of the non-empowerment communities, was higher in communities that received the conditional incentive: About 21.7% of girls in incentive communities reported they were KK members, while the rate was 7.1% in control communities. This could be due to three reasons: i) girls in communities in which cooking oil was also distributed could have been much more favorable towards the project and thus also sought KK participation, ii) girls in the conditional incentive communities may have remained unmarried for a longer time and thus be allowed to participate, and iii) girls that remembered having received oil may also assume that they participated in other programs administered in their community and thus overreport KK membership. Noncompliance was very low in non-incentive communities, in which fewer than 1% of non-eligible girls report to have received oil.

A5: Verification of Marriage Status and Marriage Age

Table A5: Marriage status and age checks, comparison of marriage status and marriage age using verified reports and marriage certificates. Girls age 15-17 and unmarried at distribution start

	Empow. (%)	Incentive (%)	Empow. + Incen. (%)	Control (%)
Marriage Rate				
Married Girls in Initial Survey	54.6	49.2	52.1	55.5
	(49.8)	(50.1)	(50.0)	(49.7)
Married Girls in Verification Survey	52.4	45.2	49.2	52.2
	(50.0)	(49.8)	(50.1)	(50.0)
Difference between surveys	2.2	4.0	2.9	3.3
	(2.8)	(4.0)	(3.9)	(2.8)
Differences in Marriage Status between Initial and Verification Survey	8.0	11.0	8.5	9.1
	(27.1)	(31.3)	(28.0)	(28.8)
Marriage Age Difference (Certificate - Reported Marriage Age; months)	3.9	2.4	3.3	2.0
	(15.5)	(11.4)	(14.4)	(9.8)

Balance tests are OLS results with modified Huber-White SEs clustered at the community level. *p < 0.10, **p < 0.05, ***p < 0.01

First, to check the validity of parents' reporting of marriage, we extensively followed up a subsample 1.5 years after program completion and took several steps to verify marriage status. Among those girls for which we were able to match initial and verified reports, we found no

significant differences between initial and verified reporting, and the number of mismatches between initial and verified reporting were balanced across treatment arms. Given that this suggested that reporting was accurate, we do not think that parents were underreporting child marriage or teenage childbearing 4.5 years after program completion.

Second, for a small sample of 530 girls we have two separate estimates of marriage age: one is based on the date of marriage from marriage certificates and the other is based on parents' reports of marriage duration. On average marriage age derived from marriage certificates is 2.9 months greater than that calculated from reported marriage durations, and this difference is balanced across treatment arms (table A5). This provides some encouraging support for our measure of marriage age as it suggests parents are not systematically reducing their estimate of marriage duration to avoid accusations of child marriage (if anything they aren't underestimating marriage age). However, we should note that the 530 girls for whom we can calculate this discrepancy is not random and is based on a very small sample. The vast majority of households did not have a copy of the marriage certificate. Interviews with some of those who did not have marriage certificates suggested that certificates were often not collected from the register' office unless there was a specific need, such as divorce or separation, to reclaim denmeher, or for taking any other legal actions. In other cases, households reported they had collected certificates without this need for legal recourse but that they were not easily accessible or could not be found.

A6: Estimating Equations

Our first- and second-stage estimations are:

$$\hat{T}_i = \gamma_0 + \gamma'_{1s} Z_{is} + \gamma'_2 X_{iv} + \mu_u + \upsilon_i \quad (1)$$

$$Y_i = \alpha + \beta'_{1ij} \hat{T}_{ij} + \beta'_2 X_{iv} + \mu_u + \epsilon_i \quad (2)$$

where $\hat{T}_i$ is program inclusion for person i and Z_{is} is eligibility for each of the treatment arms. Y_i is outcome for person i and $\hat{T}_{ij}$ predicted eligibility for each of the treatment arms.

Both first and second stage regressions include a vector of individual and community controls measured at baseline for strata, household size, an older unmarried sister in the household, school enrollment, mother's level of education, and the ratio of adult boys to adult girls in the community (a proxy for marriage market conditions), as well as union fixed-effects.

A7: Inter-household spillovers

Table A7a: Married<18, by baseline age, girls in non-incentive qualifying households

	Age 6-9	Age 10-11	Age 12-13	Age 17	Whole sample
	(1)	(2)	(3)	(4)	(5)
Incentive	0.014	-0.016	0.018	0.014	0.008
	[-0.007,0.035]	[-0.042,0.011]	[-0.009,0.046]	[-0.034,0.061]	[-0.009,0.024]
Empow.	-0.004	-0.011	0.001	-0.017	-0.007
	[-0.021,0.014]	[-0.033,0.011]	[-0.022,0.024]	[-0.052,0.018]	[-0.020,0.007]
Empow.*Incen.	-0.019	0.034*	-0.024	-0.005	-0.005
	[-0.047,0.010]	[-0.006,0.074]	[-0.064,0.015]	[-0.071,0.062]	[-0.028,0.018]
Control Mean	0.30907	0.55801	0.52798	0.41866	0.42224
Observations	26666	12341	12618	3588	55213
FE	Union	Union	Union	Union	Union

2SLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification and baseline characteristics.

Table A7b: Ever married, by baseline age, girls in non-incentive qualifying households

	Age 6-9	Age 10-11	Age 12-13	Age 17	Whole sample
	(1)	(2)	(3)	(4)	(5)
Incentive	0.014	-0.012	-0.014	-0.027	-0.003
	[-0.007,0.035]	[-0.039,0.016]	[-0.038,0.010]	[-0.059,0.005]	[-0.018,0.011]
Empow.	-0.004	-0.009	-0.010	-0.004	-0.006
	[-0.021,0.013]	[-0.030,0.013]	[-0.028,0.008]	[-0.025,0.017]	[-0.019,0.006]
Empow.*Incen.	-0.019	0.023	0.004	-0.002	-0.001
	[-0.048,0.010]	[-0.017,0.063]	[-0.029,0.037]	[-0.042,0.038]	[-0.022,0.019]
Control Mean	0.30995	0.65479	0.79675	0.91598	0.53756
Observations	26673	12347	12626	3594	55240
FE	Union	Union	Union	Union	Union

2SLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification and baseline characteristics.

Table A7c: Teenage childbearing, by baseline age, girls in non-incentive qualifying households

	Age 6-9	Age 10-11	Age 12-13	Age 17	Whole sample
	(1)	(2)	(3)	(4)	(5)
Incentive	0.009	-0.004	0.013	-0.030	0.003
	[-0.005,0.023]	[-0.031,0.024]	[-0.014,0.041]	[-0.081,0.021]	[-0.011,0.017]
Empow.	0.004	-0.000	0.007	0.002	0.003
	[-0.006,0.015]	[-0.022,0.021]	[-0.015,0.029]	[-0.034,0.037]	[-0.007,0.014]
Empow.*Incen.	-0.013	0.029	-0.018	0.045	0.001
	[-0.032,0.006]	[-0.012,0.071]	[-0.055,0.020]	[-0.023,0.113]	[-0.019,0.021]
Control Mean	0.11814	0.36646	0.45563	0.33856	0.26514
Observations	26595	12286	12567	3582	55030
FE	Union	Union	Union	Union	Union

2SLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification and baseline characteristics.

Table A7d: Still in school, by baseline age, girls in non-incentive qualifying households

	Age 6-9	Age 10-11	Age 12-13	Age 17	Whole sample
	(1)	(2)	(3)	(4)	(5)
Incentive	-0.008	-0.005	0.007	0.077**	0.001
	[-0.034,0.019]	[-0.038,0.029]	[-0.022,0.037]	[0.001,0.154]	[-0.019,0.021]
Empow.	0.005	0.019	0.006	0.023	0.008
	[-0.017,0.026]	[-0.008,0.045]	[-0.018,0.031]	[-0.030,0.076]	[-0.009,0.024]
Empow.*Incen.	-0.001	0.009	0.021	-0.043	0.006
	[-0.037,0.035]	[-0.037,0.054]	[-0.024,0.067]	[-0.148,0.063]	[-0.023,0.035]
Control Mean	0.64164	0.37637	0.28146	0.25678	0.48214
Observations	22830	11347	10587	1442	46206
FE	Union	Union	Union	Union	Union

2SLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification and baseline characteristics.

Table A7e: Last class passed, by baseline age, girls in non-incentive qualifying households

	Age 6-9	Age 10-11	Age 12-13	Age 17	Whole sample
	(1)	(2)	(3)	(4)	(5)
Incentive	0.086	0.063	-0.019	-0.093	0.026
	[-0.056,0.229]	[-0.210,0.335]	[-0.291,0.253]	[-0.864,0.678]	[-0.160,0.213]
Empow.	0.097	0.066	0.067	0.373	0.102
	[-0.026,0.219]	[-0.153,0.284]	[-0.156,0.289]	[-0.094,0.839]	[-0.056,0.261]
Empow.*Incen.	-0.129	0.032	0.149	-0.075	-0.031
	[-0.339,0.082]	[-0.346,0.409]	[-0.232,0.529]	[-1.045,0.896]	[-0.299,0.236]
Control Mean	7.44533	8.89172	9.75630	13.04459	8.49720
Observations	22813	11334	10557	1428	46132
FE	Union	Union	Union	Union	Union

2SLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification and baseline characteristics.

A8: First-Stage Effects

Table A8: First stage effects, girls age 15-17 and unmarried at distribution start

	Distribution list (1)	Distribution list * Empow. (2)
Incentive assignment	0.759***	0.000
	[0.727,0.792]	[-0.008,0.008]
Incentive assignment * empowerment	0.037*	0.800***
	[-0.006,0.080]	[0.770,0.831]
Constant	0.003	-0.007
	[-0.041,0.047]	[-0.028,0.015]
F-statistic	661.22	391.52
Observations	19060	19060
FE	Union	Union

OLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification.

A9: Robustness Checks

Tables A9a: Excluding Controls

Table A9ai: Marriage outcomes, unmarried girls age 15-17 at program launch, excluding baseline covariates

	Married<18		Married<16	
	Age 15-17 (1)	Age 15 (2)	< Age 16 (3)	Age 15 (4)
Empow.	-0.006	0.000	0.001	0.010
	[-0.023,0.011]	[-0.028,0.029]	[-0.016,0.018]	[-0.012,0.032]
Incentive	-0.080***	-0.095***	-0.028**	-0.038**
	[-0.111,-0.050]	[-0.138,-0.052]	[-0.055,-0.001]	[-0.074,-0.001]
Incen.*Empow.	0.007	-0.007	-0.023	-0.043*
	[-0.036,0.050]	[-0.069,0.055]	[-0.058,0.012]	[-0.091,0.005]
Control Mean	0.40146	0.44941	0.18838	0.21332
Observations	19033	6815	13750	6815
FE	Union	Union	Union	Union

2SLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification.

Table A9aii: Teenage childbearing, unmarried girls age 15-17 at program launch, excluding baseline covariates

	Age 15-17 (1)	Age 15 (2)
Empow.	0.002	0.011
	[-0.015,0.019]	[-0.013,0.035]
Incentive	-0.041***	-0.049**
	[-0.069,-0.013]	[-0.088,-0.010]
Incen.*Empow.	-0.009	-0.033
	[-0.049,0.031]	[-0.090,0.023]
Control Mean	0.32730	0.38468
Observations	18964	6794
FE	Union	Union

2SLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification.

Table A9aiii: Education outcomes, unmarried girls age 15-17 and in school at program launch, excluding baseline covariates

	In school		Last class passed	
	Age 15-17	Age 15	Age 15-17	Age 15
	(1)	(2)	(3)	(4)
Empow.	0.023**	0.034**	0.224**	0.288**
	[0.001,0.044]	[0.003,0.065]	[0.018,0.430]	[0.011,0.564]
Incentive	0.031*	0.055**	0.058	0.207
	[-0.006,0.069]	[0.007,0.103]	[-0.301,0.418]	[-0.298,0.712]
Incen.*Empow.	0.011	-0.013	0.074	0.044
	[-0.041,0.063]	[-0.081,0.055]	[-0.446,0.594]	[-0.610,0.697]
Control Mean	0.25850	0.26173	11.28643	10.78328
Observations	12626	5072	12541	5044
FE	Union	Union	Union	Union

2SLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification.

Tables A9b: Including Washed-Out Communities

Table A9bi: Marriage outcomes, unmarried girls age 15-17 at program launch, excluding washed-out communities

	Married<18		Married<16	
	Age 15-17	Age 15	< Age 16	Age 15
	(1)	(2)	(3)	(4)
Empow.	-0.007	-0.003	-0.003	0.003
	[-0.022,0.009]	[-0.029,0.023]	[-0.019,0.013]	[-0.018,0.024]
Incentive	-0.084***	-0.099***	-0.033**	-0.040**
	[-0.112,-0.056]	[-0.140,-0.057]	[-0.059,-0.007]	[-0.075,-0.005]
Incen.*Empow.	0.013	0.010	-0.015	-0.028
	[-0.026,0.052]	[-0.048,0.067]	[-0.048,0.018]	[-0.074,0.017]
Control Mean	0.40144	0.45002	0.18965	0.21539
Observations	19354	6938	13988	6938
FE	Union	Union	Union	Union

2SLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification and baseline characteristics.

Table A9bii: Teenage childbearing, unmarried girls age 15-17 at program launch, excluding washed-out communities

	Age 15-17	Age 15
	(1)	(2)
Empow.	0.002	0.004
	[-0.014,0.017]	[-0.018,0.027]
Incentive	-0.046***	-0.056***
	[-0.072,-0.020]	[-0.095,-0.017]
Incen.*Empow.	-0.003	-0.013
	[-0.039,0.033]	[-0.066,0.040]
Control Mean	0.32776	0.38623
Observations	19282	6916
FE	Union	Union

2SLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification and baseline characteristics.

Table A9biii: Education outcomes, unmarried girls age 15-17 and in school at program launch, excluding washed-out communities

	In school		Last class passed	
	Age 15-17	Age 15	Age 15-17	Age 15
	(1)	(2)	(3)	(4)
Empow.	0.020*	0.029**	0.181*	0.221*
	[-0.001,0.040]	[0.000,0.058]	[-0.009,0.371]	[-0.037,0.479]
Incentive	0.034*	0.055**	0.068	0.169
	[-0.001,0.070]	[0.009,0.101]	[-0.273,0.409]	[-0.313,0.652]
Incen.*Empow.	0.010	-0.019	0.077	0.043
	[-0.039,0.059]	[-0.082,0.045]	[-0.410,0.563]	[-0.576,0.662]
Control Mean	0.25748	0.26150	11.28746	10.78938
Observations	12821	5156	12735	5128
FE	Union	Union	Union	Union

2SLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification and baseline characteristics.

Tables A9c: Intention-to-treat Specification

Table A9ci: Marriage outcomes, unmarried girls age 15-17 at program launch, intention-to-treat specification

	Married<18		Married<16	
	Age 15-17	Age 15	< Age 16	Age 15
	(1)	(2)	(3)	(4)
Emp.	-0.007	-0.004	-0.000	0.006
	[-0.023,0.009]	[-0.031,0.023]	[-0.017,0.016]	[-0.015,0.027]
Incentive	-0.064***	-0.079***	-0.025**	-0.032**
	[-0.086,-0.042]	[-0.113,-0.045]	[-0.046,-0.004]	[-0.060,-0.004]
Inc.*Emp.	0.008	0.005	-0.015	-0.027
	[-0.024,0.040]	[-0.044,0.054]	[-0.043,0.012]	[-0.065,0.011]
Control Mean	0.40146	0.44941	0.18838	0.21332
Observations	19033	6815	13750	6815
FE	Union	Union	Union	Union

OLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification and baseline characteristics.

Table A9cii: Teenage childbearing, unmarried girls age 15-17 at program launch, intention-to-treat specification

	Age 15-17	Age 15
	(1)	(2)
Emp.	0.001	0.007
	[-0.014,0.017]	[-0.016,0.030]
Incentive	-0.034***	-0.042***
	[-0.055,-0.014]	[-0.074,-0.010]
Inc.*Emp.	-0.004	-0.017
	[-0.033,0.025]	[-0.062,0.027]
Control Mean	0.32730	0.38468
Observations	18964	6794
FE	Union	Union

OLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification and baseline characteristics.

Table A9ciii: Education outcomes, unmarried girls age 15-17 and in school at program launch, intention-to-treat specification

	In school		Last class passed	
	Age 15-17	Age 15	Age 15-17	Age 15
	(1)	(2)	(3)	(4)
Emp.	0.020*	0.031**	0.198**	0.243*
	[-0.000,0.041]	[0.001,0.061]	[0.005,0.391]	[-0.020,0.506]
Incentive	0.028*	0.046**	0.079	0.177
	[-0.000,0.056]	[0.008,0.084]	[-0.191,0.349]	[-0.228,0.581]
Inc.*Emp.	0.009	-0.012	0.045	0.030
	[-0.031,0.049]	[-0.067,0.044]	[-0.360,0.449]	[-0.500,0.561]
Control Mean	0.25850	0.26173	11.28643	10.78328
Observations	12626	5072	12541	5044
FE	Union	Union	Union	Union

OLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification and baseline characteristics.

Tables A9d: Treatment Arm Dummies

Table A9di: Marriage outcomes, unmarried girls age 15-17 at program launch, regressing on treatment arm dummies

	Married<18		Married<16	
	Age 15-17	Age 15	< Age 16	Age 15
	(1)	(2)	(3)	(4)
Empow.	-0.007	-0.004	-0.000	0.006
	[-0.022,0.009]	[-0.030,0.023]	[-0.016,0.016]	[-0.015,0.027]
Incentive	-0.085***	-0.099***	-0.032**	-0.040**
	[-0.113,-0.056]	[-0.141,-0.057]	[-0.058,-0.005]	[-0.075,-0.005]
Incen.*Empow.	-0.079***	-0.093***	-0.050***	-0.063***
	[-0.107,-0.052]	[-0.135,-0.050]	[-0.072,-0.028]	[-0.093,-0.033]
Control Mean	0.40146	0.44941	0.18838	0.21332
Observations	19033	6815	13750	6815
FE	Union	Union	Union	Union

OLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification and baseline characteristics.

Table A9dii: Teenage childbearing, unmarried girls age 15-17 at program launch, regressing on treatment arm dummies

	Age 15-17	Age 15
	(1)	(2)
Empow.	0.001	0.007
	[-0.014,0.017]	[-0.016,0.030]
Incentive	-0.045***	-0.052***
	[-0.072,-0.019]	[-0.091,-0.013]
Incen.*Empow.	-0.046***	-0.062***
	[-0.073,-0.020]	[-0.099,-0.026]
Control Mean	0.32730	0.38468
Observations	18964	6794
FE	Union	Union

OLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification and baseline characteristics.

Table A9diii: Education outcomes, unmarried girls age 15-17 and in school at program launch, regressing on treatment arm dummies

	In school		Last class passed	
	Age 15-17	Age 15	Age 15-17	Age 15
	(1)	(2)	(3)	(4)
Empow.	0.020*	0.031**	0.198**	0.243*
	[-0.000,0.041]	[0.001,0.060]	[0.006,0.389]	[-0.018,0.503]
Incentive	0.035*	0.056**	0.101	0.216
	[-0.000,0.071]	[0.010,0.103]	[-0.240,0.443]	[-0.268,0.701]
Incen.*Empow.	0.069***	0.076***	0.386**	0.521**
	[0.031,0.106]	[0.027,0.124]	[0.015,0.757]	[0.113,0.929]
Control Mean	0.25850	0.26173	11.28643	10.78328
Observations	12626	5072	12541	5044
FE	Union	Union	Union	Union

OLS regressions with modified Huber-White SEs clustered at the community level and adjusted for stratification and baseline characteristics.

A10: Results of the Cost-Benefit and Cost-Effectiveness Analyses

Table A10a: Comparison of studies included

Intervention	Location	Outcome measure	Outcome per $1,000 spent (implementer and beneficiary)	Outcome per $1,000 invested (implementer)	Benefit-cost ratio (implementer and beneficiary)	NPV per $1,000 (implementer and beneficiary)
Conditional Incentive to Delay Marriage	Bangladesh	Additional years unmarried	2.22	7.21	1.98	$977
		Child marriages averted	0.48	1.58		
		Additional years of schooling	0.90	2.94		
FSSAP						
Hahn et al.	Bangladesh	Additional years unmarried	0.03	0.23	0.87	-$133
		Child marriages averted	0.02	0.16		
		Additional years of schooling	0.09	0.09		
Hong and Sarr		Additional years unmarried	0.65	3.61	1.74	$745
		Additional years of schooling	0.69	1.47		
Vouchers for Private Schools	Colombia	Child marriages averted	0.07	0.08	0.90	-$96
		Additional years of schooling	0.14	0.15		
Free School Uniforms	Kenya	Child marriages averted	0.16	0.98	1.76	$756
		Additional years of schooling	0.76	1.83		
UCT	Malawi	Additional years unmarried	0.98	1.41	1.33	$331
		Additional years of schooling	0.40	0.57		
BRAC	Uganda	Child marriages averted	0.28	0.46	1.04	$40
		Additional years of schooling	0.52	0.86		

Table A10b: Cost-effectiveness of the oil incentive

Outcome measure	Discount rate	Outcome per $1,000 spent (implementer and beneficiary)	Outcome per $1,000 invested (implementer)
Additional years unmarried	3%	1.92	7.08
	5%	2.22	7.21
	10%	2.87	7.53
Child marriages averted	3%	0.42	1.55
	5%	0.48	1.58
	10%	0.63	1.65
Additional years of schooling	3%	0.78	2.88
	5%	0.90	2.94
	10%	1.17	3.07

Table A10c: Cost-benefit of the oil Incentive

Discount rate	Benefit-cost ratio (implementer and beneficiary)	NPV per $1,000 (implementer and beneficiary)
3%	2.77	$1,769
5%	1.98	$977
10%	1.06	$56

Figure A10a: Comparison of years unmarried/$1,000 of interventions affecting marriage. Studies with marriage age outcome included. Costs include costs to implementer only

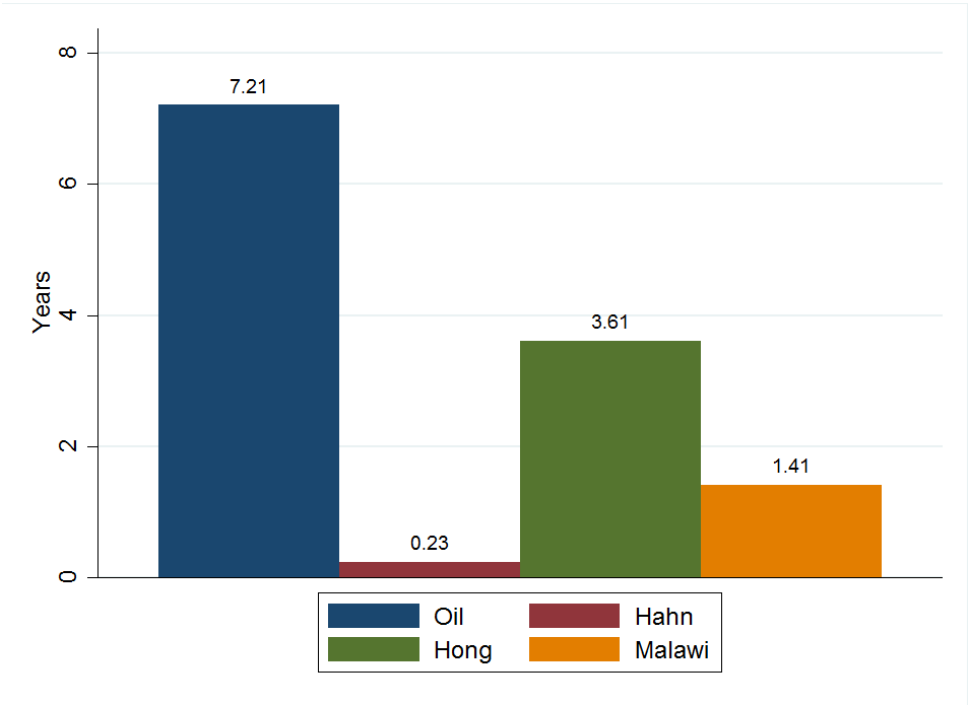


Figure A10b: Comparison of child marriages averted/$1000 of interventions affecting marriage. Studies with child marriage outcome included. Costs include costs to implementer only

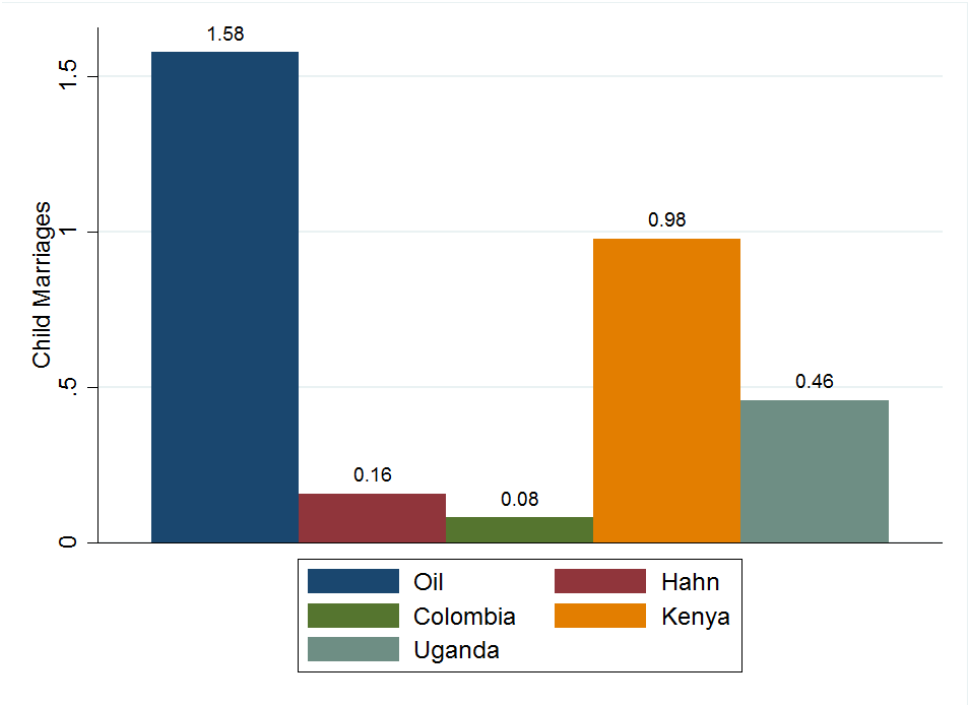


Figure A10c: Comparison of benefit-cost-ratios of interventions affecting marriage. Costs include costs to implementer and beneficiary

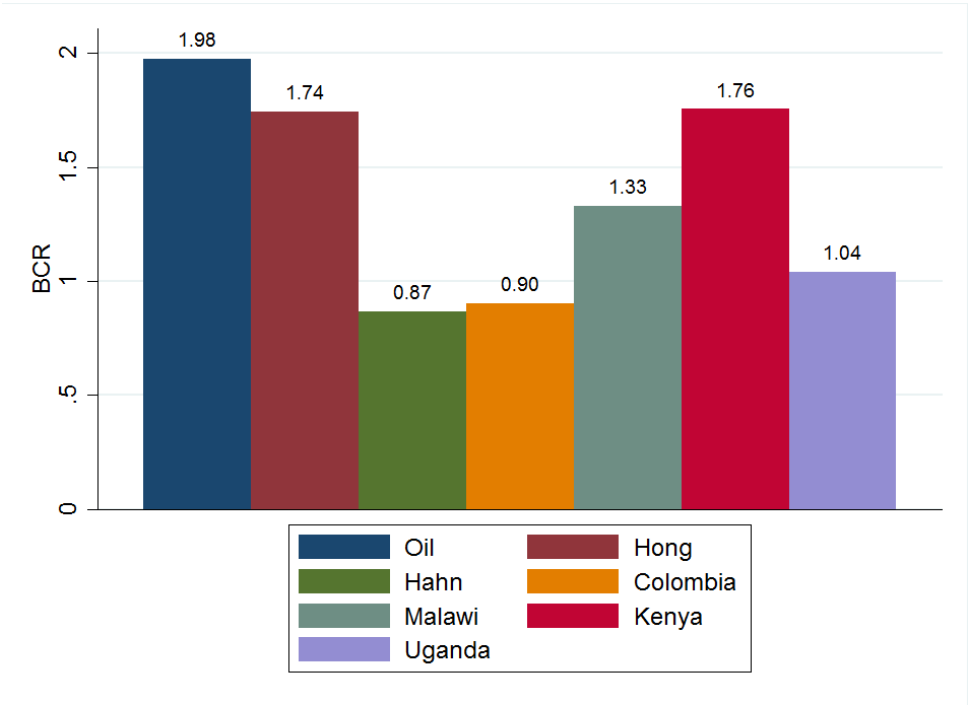
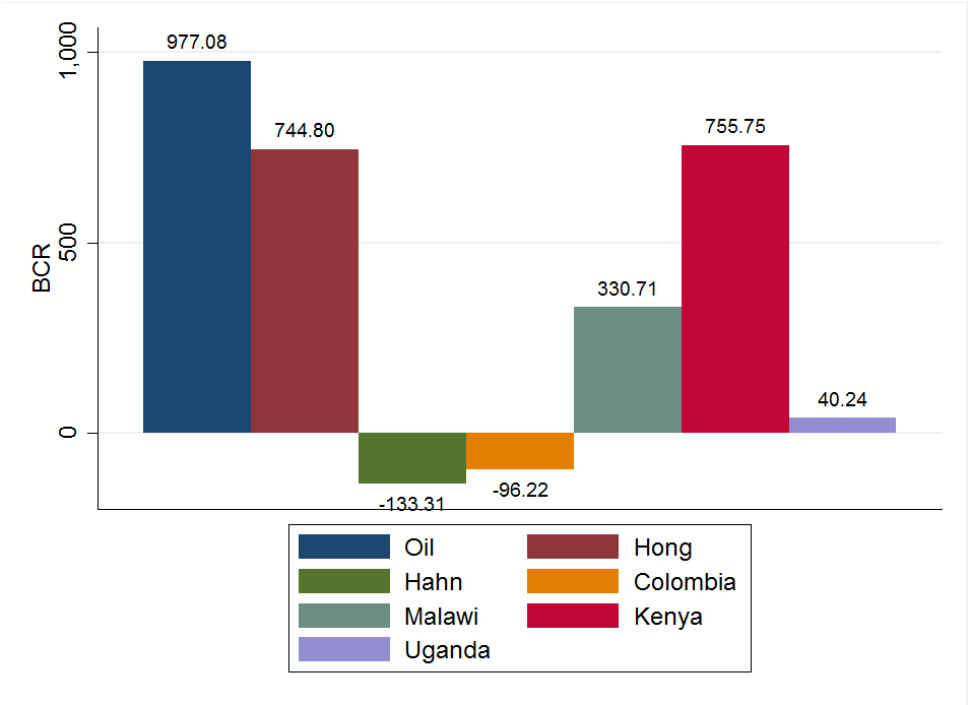


Figure A10d: Comparison of NPV/$1000 of interventions affecting marriage. Costs include costs to implementer and beneficiary



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