The Effects of Expanding Female Economic Opportunities on Fertility: Causal Evidence from a Randomized Control Trial in Bangladesh*

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Abstract

There has lately been a push to expand economic opportunities for women in low- and middle-income countries, but we know little about the effects on fertility. Prior studies suffer from the standard endogeneity problem that women more interested in making use of economic opportunities might also have different fertility preferences. To overcome this problem, we examine how the "Targeting the Ultra Poor" program of BRAC in Bangladesh, which specifically targets women in ultra-poor households, affects fertility. The program provides both income-generating assets and livelihood training to women in ultra-poor households. Our preliminary findings suggest an increase in fertility from the transfer. The largest increase in fertility occurs for women who are late twenties to early thirties, while younger women show less of an increase. We cannot directly establish whether the increase reflects shorter spacing or higher desired fertility, although there is also evidence that children work more as a result of the program. These results are consistent with women extending childbearing while not significantly changing the start of childbearing or the spacing between births.

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1 Introduction

There has lately been a push to expand economic opportunities for women in low- and middle-income countries, but we know little about the effects on fertility. Prior studies suffer from the standard endogeneity problem that women more interested in making use of economic opportunities might also have different fertility preferences.

There is a growing literature that examines the effects of asset transfer programs on labor market outcomes and individual well-being. These studies find evidence that asset transfer programs lead to women moving permanently to higher-income occupations, which consequently leads to higher long-term income, assets, expenditure, and food security (Bandiera et al., 2017; Banerjee et al., 2015). Studies have also found evidence of improvements in child and adult health (Bandiera et al., 2017; Banerjee et al., 2015; Raza et al., 2018).

It is not clear how fertility decisions may be affected by such programs. On one hand, with the move to higher income occupations, women's opportunity cost of time will increase, which should, everything else equal, reduce fertility. Similarly, the increased health of children should reduce the precautionary need for higher fertility. On the other hand, the higher income might increase the demand for children and better female health could lead more pregnancies to be carried to term. Furthermore, the changes in occupations might also increased the demand for children as labor, either directly in the woman's new occupation or as replacement for household chores.

We examine the effect on childbearing of Targeting the Ultra Poor (TUP) program of BRAC in Bangladesh, which specifically targets women in ultra-poor households. The program provides both income-generating assets and livelihood training to women in ultra-poor households. As part of the livelihood training program, women are provided information on the benefits of having a small family and encouraged to have a small family. Therefore, the asset transfer program can have two types of effects. First, if the income-generating assets lead to higher income, we should expect higher fertility. Furthermore, if children's labor becomes more valuable as the result of the asset transfer, women will have an increased incentive for having more children. Second, both the higher opportunity cost of women's time and the information on the benefits of having fewer children may lead to a decrease in fertility for women.

We use a randomized control trial in Bangladesh, conducted from 2007 to 2014 in Bangladesh. We find that the TUP program increases overall fertility of women. The largest increase in number of children born occur for women who are late twenties to early thirties at the beginning of the program, while the effects are smaller for younger women. We cannot directly establish whether the increase reflects shorter spacing or higher desired fertility, but the results are consistent with women continuing childbearing later with little change in the starting age of childbearing and the spacing between births. Furthermore, there is also evidence that children work more as a result of the program.

2 Description of the TUP Program

The goal of the TUP program of BRAC is to reach women in ultra-poor households. This is because prior evidence shows that (i) ultra-poor households lack the physical capital and skills necessary to move out of poverty and (ii) while there are different development programs that target women in rural areas, women in ultra-poor households are marginalized (Hashemi and Rosenberg, 2006; Roy et al., 2015). Therefore, BRAC used a three-step targeting procedure and a cluster randomized control design to identify the TUP beneficiaries [Roy@2015;Raza et al. (2018)]. First, they identified the poorest 13 districts in Bangladesh using the World Food Program's poverty map. One or two sub-districts within each district were then randomly selected. Only sub-districts with at least two BRAC branches, which typically encompasses a few villages, were included.

Next, BRAC officials in the sub-districts identified vulnerable branches, which typically encompasses few villages, that had a significant number of ultra-poor households. Randomization was conducted a pair-wise manner within each sub-district, where two branches within each sub-district were randomly selected, one branch randomly assigned as treated, and the other branch assigned as control. A total of 40 branches were selected where 20 are treatment, and 20 are controls. The randomization was done at the branch level, instead of village level, to limit spillover in effects from treatment group to control group. As each branch operate in a 3-mile radius and are on average 8 miles apart from another branch, the chances of spillover from treatment to control groups are low.

Lastly, all households in treatment and control villages were divided by relative wealth ranks. If a household is at the bottom rank, that household is considered the poorest. Then BRAC conducts verification survey to ensure that the poorest households are eligible for the TUP program. To be eligible for the TUP program, a household must satisfy at least three of the following five inclusion criteria: total land owned, including homestead, is less than 10 decimals; household has no productive or income-generating assets; no adult male income earner in the household; women in the household worked outside the homestead; school-aged children work for pay. Additionally, households were excluded if they met all the three following criteria: if a household member is a microfinance participant; if a household member is a recipient of government anti-poverty program; and no adult women present in the household. All households that met the eligibility criteria were included in the sample.

The TUP program provides women in ultra-poor households with income-generating assets valued at approximately USD 560 (2007 PPP terms) and a comprehensive livelihood development training program. The goal of the livelihood program is to provide the training on the use of productive assets, encourage entrepreneurship, and improve their health, nutrition, social, legal, and political awareness.

The TUP program provided a combination of income-generating assets such as cows, goats, poultry, or vegetation nurseries.[1] The type of asset transferred depended on the capability of

[1] About 90% of households received at least one cow.

the participants and local conditions such as access to grazing grounds and suitability of the geographical locations. The program considered the preferences of women, but the BRAC officials decided the final selection of assets.

The overall hands-on training sessions were typically done on a weekly or bi-weekly basis. The sessions took place either in a home or in a classroom setting. The TUP program specifically provided health training where a BRAC staff with specialized health training would visit the household once a month for two years to provide health information to the women. The staff provided information on health topics such as importance of child immunization, exclusive breastfeeding of infants, antenatal care, postnatal care, use of safe latrines, consumption of iron tablets and vitamin A.[2] Particularly relevant to this project, women were also informed of the benefits of having a small family. The program also provides curative care for common illnesses at cost, and if the household is unable to pay, it is provided for free. Community health promoters also visited the treatment households, and they would provide doctor referrals if needed. The program also provides access to sanitary latrines, by either creating new latrines near the home of the beneficiary or negotiating access to a nearby privately-owned latrine.

3 Data

We use the panel data collected by the Research and Evaluation Division of BRAC, previously used by Bandiera et al. (2017), Raza et al. (2018), and Roy et al. (2015). The baseline survey was conducted in 2007 before the start of the intervention. This was followed by three surveys, one in 2009 at the end of the intervention, one in 2011, and the endline survey in 2014. The survey collected household level information, including information on income, labor, and assets owned. This includes the number of hours worked by each household members in different income generating activity. The survey also has a health component,

[2]BRAC staff also encourage TUP beneficiaries to participate in free promotional drives of Vitamin A supplementation and child immunization that are implemented by the government.

where the female recipient of the program was asked the total number of live births she had in her lifetime. We use this variable as our main outcome variable for our fertility estimations. The household level attrition rate for the survey was TK.

Our sample consists of the main respondent women, who were aged 14 to 40 at the baseline and have consistent information on the number of births and age. For the number of children born, we drop any woman who report a declining number of total births between any two rounds.

For age, we use baseline as the starting point and keep survey rounds where the respondent report an increasing age relatively to the baseline. Hence, if, for example, a woman report being of age 20 in the baseline, and then report 19, 24, and 27 in the subsequent rounds, we drop the second round but keep the others. There is substantial bunching on certain ages, so we create an age group variable with four age ranges based on age at baseline: 14–22, 23–27, 28–32, and 33–40.

Table 1 shows the average number of children ever born together with the standard deviation and the number of observations by survey wave for treated and control for the four age group and overall. Consistent the low total fertility rate in Bangladesh, fertility is low even among this group of ultra-poor women; for the oldest age group, the average number of births by the 2014 survey is around 3.6. Not surprisingly, the number of children born between baseline and the final survey is highest for the youngest age group at about 1 child, and declines with older age groups.

Figure 1 shows the distribution of children ever born at the baseline across treatment and control. The distribution for the treated group is slightly flatter than the control group with the treated group more likely to have no or one child and six and seven children than the control. However, these differences are small and there is no statistically significant difference in means.

Table 1: Births by Treatment Status, Survey Wave, and Age Group

		Baseline			2009			2011			2014		
Age	Group	Mean	SD	N	Mean	SD	N	Mean	SD	N	Mean	SD	N
14-22	Control	1.51	1.08	174	1.85	0.91	155	2.07	0.98	147	2.48	1.18	122
14-22	Treated	1.29	0.95	402	1.64	0.87	368	1.97	0.95	329	2.37	0.91	289
23-27	Control	2.20	1.06	269	2.43	1.10	237	2.62	1.15	209	2.77	1.09	200
23-27	Treated	2.35	1.26	530	2.56	1.25	491	2.76	1.25	430	2.94	1.25	406
28-32	Control	2.86	1.44	311	2.88	1.28	257	3.00	1.35	232	3.10	1.36	215
28-32	Treated	3.03	1.51	589	3.15	1.50	515	3.17	1.53	451	3.43	1.63	420
33-40	Control	3.38	1.95	499	3.44	1.94	388	3.51	2.01	385	3.56	2.05	340
33-40	Treated	3.51	1.97	758	3.47	1.90	614	3.50	1.87	550	3.62	1.94	495
All	Control	2.74	1.69	1253	2.83	1.59	1037	2.98	1.65	973	3.12	1.64	877
All	Treated	2.72	1.74	2279	2.82	1.63	1988	2.95	1.59	1760	3.17	1.61	1610

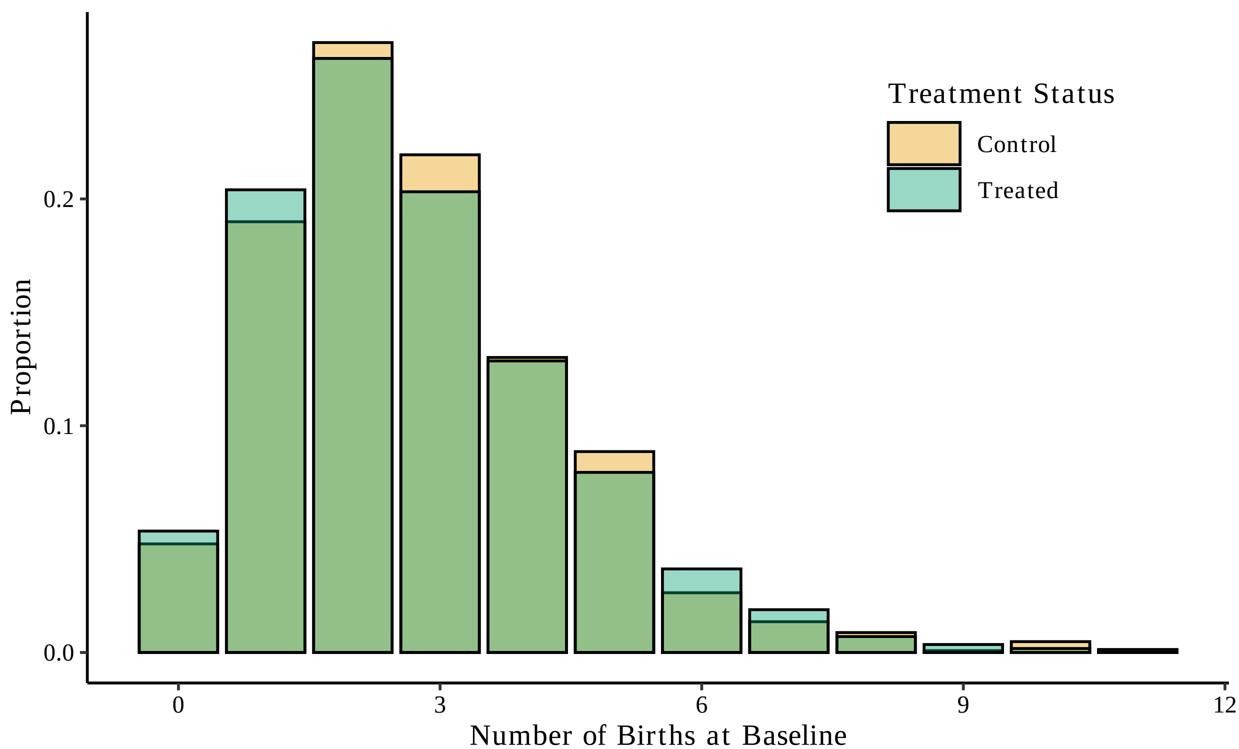

Figure 1: Baseline distribution of births across treatment/control

4 Empirical Methodology

We examine the impact of the TUP program on total births using the experimental variation in this RCT. One of the problems with estimating the effect of the program on fertility decisions is that it is akin to estimating differences in slopes as fertility is never-decreasing with age, and there is a natural underlying increase, which is larger the younger the age group.

We use two different approaches for our estimations. First, to estimate the effect of the program on fertility in the 2014 survey round, we estimate an ANCOVA model:

$$Y_{i,j} = \beta_0 + \beta_1 T_i + \beta_2 Y_i^{\text{baseline}} + \gamma_j + \epsilon_{i,j},$$

where Y represents the outcome of interest for individual i in subdistrict j and T_i is an indicator variable where 1 represents an individual i is part of the treatment group, and 0 represents the individual is part of the control group. γ_j represents subdistrict fixed effects to improve the efficiency of the estimation as the randomization is stratified by subdistricts. The error term ϵ is clustered at the branch level, the unit of randomization. The coefficient of the interaction term β_1 represents the intent-to-treat effect of the TUP program on individual i in ultra-poor households.

Second, to examine the changes in fertility across rounds, we also estimate an individual-level fixed effects model:

$$Y_{i,t} = \beta_1 T_i \times D_t + \gamma_i + \epsilon_{i,t},$$

where D_t is a set of indicators for the survey waves, 2009, 2011, and 2014.

To understand whether there are differences in effects by the age of women, we estimate these models both for the entire sample and separately by age group as defined above.

Table 2: ANCOVA Estimation of Treatment Effect on Total Births in 2014 Wave

		Age Group			
	Full sample	14-22	23-27	28-32	33-40
Treated	0.063	-0.045	0.032	0.057	0.021
	(0.017)	(0.081)	(0.062)	(0.041)	(0.040)
Children ever born at baseline	0.899	0.714	0.883	0.968	1.014
	(0.013)	(0.061)	(0.031)	(0.021)	(0.014)
Number of observations	2,487	411	606	635	835
Number of subdistricts	20	20	20	20	20

Note: Standard errors clustered at branch level and shown in parentheses. Subdistrict fixed effects included in all estimations

5 Results

Table 2 shows the ANCOVA results both for the combined sample and by age group. For the full sample, the effect of living in a treated branch on the total number of births is positive and statistically significant, although the absolute number is relatively small at 0.06 children. Splitting by age group, none of the treatment effects are statistically significant, although only the one for the youngest age group, those 14 to 22 at the baseline, is negative.

The downside of our ANCOVA approach is that we are restricted to women observed in the 2014 round and does not tell us anything about the changes over time. Table 3, therefore, shows woman-level fixed effects estimations for the full sample and by age groups.

As for the ANCOVA results, there is no evidence that fertility is decreasing with access to the program. For the full sample, the differences in fertility between the treatment and control groups fertility are 0.006, 0.043, and 0.086 across the 2009, 2011, and 2014 rounds. The effect on 2014 number of births is statistically significant and equivalent to an approximately 17% increase over the control group.

By age group, the control group results show that, as expected, the increase in number of births by wave is smaller the older the woman. Women 14 to 22 at the baseline have, on average, just over one child between baseline and the 2014 survey, while those 33 to 40 at

Table 3: Treatment Effect on Total Births by Wave Using Female Level Fixed Effects

		Age Group			
	Full sample	14-22	23-27	28-32	33-40
Wave 2009	0.231	0.410	0.267	0.200	0.168
	(0.017)	(0.048)	(0.035)	(0.037)	(0.018)
Wave 2011	0.357	0.637	0.499	0.290	0.219
	(0.020)	(0.069)	(0.046)	(0.045)	(0.027)
Wave 2014	0.513	1.053	0.638	0.409	0.311
	(0.029)	(0.080)	(0.060)	(0.053)	(0.033)
Wave 2009 × Treated	0.006	0.000	-0.014	-0.001	-0.007
	(0.023)	(0.053)	(0.039)	(0.040)	(0.034)
Wave 2011 × Treated	0.043	0.085	-0.032	0.021	0.016
	(0.025)	(0.076)	(0.051)	(0.050)	(0.038)
Wave 2014 × Treated	0.086	0.077	0.020	0.069	0.035
	(0.035)	(0.094)	(0.067)	(0.064)	(0.046)
Number of observations	11,777	1,986	2,772	2,990	4,029
Number of women	3,532	576	799	900	1,257

Note: Standard errors clustered at branch level and shown in parentheses baseline, only have 0.3. The initial effect at the end of the 2 years of the program, fertility is very slightly lower for the treatment groups, except for very youngest group. However, although the treatment estimates are not statistically significant, they are all positive for the 2014 wave and for the 2011 wave only the 23 to 27 age group show a negative effect.

5.1 Health and Abortions

If women become healthier with program participation, that may explain the absence of a decline in fertility. We, therefore, examine the effect of the TUP program on BMI and stillbirths. Furthermore, although abortions are relatively rare in the area, we also include that because it may be related to health status of the women. Table 4 shows the results of the ANCOVA model for the BMI in the top panel, total number of stillbirths in the middle panel, and total number of abortions in the bottom panel.

A higher BMI is an imperfect health proxy, but we would expect women with a higher BMI to have a higher likelihood of being able to conceive and carry a pregnancy to term. However, although the coefficients are positive, except for the 23–27 age group, they are all small and far from statistically significant.

For stillbirths, all but the 33–40 age group show very small changes around zero. The oldest age group does appear to have a significantly higher number of stillbirths with program participation. Combined with the main results above, this suggests that even the oldest age group saw an increase in attempted fertility, which for the oldest group resulted in significantly more stillbirths and not significantly more live births.

The overall effect on abortions is minimal, but the 14–22 do have 0.05 more abortions if they participated in the program. This number is close to the decline in fertility for this group with program participation, suggesting that the lower number of live births is achieved through abortions rather than fewer pregnancies.

Table 4: ANCOVA Estimation of Treatment Effect on BMI, Stillbirths, and Abortions in 2014 Wave

		Age Group			
	Full sample	14-22	23-27	28-32	33-40
Outcome: BMI					
Treated	0.106	0.128	-0.105	0.141	0.118
	(0.091)	(0.184)	(0.207)	(0.173)	(0.128)
BMI at baseline	0.830	0.762	0.718	0.926	0.857
	(0.045)	(0.061)	(0.095)	(0.049)	(0.079)
Number of observations	2,417	399	590	619	809
Number of subdistricts	20	20	20	20	20
Outcome: stillbirths					
Treated	0.025	-0.012	0.009	-0.013	0.066
	(0.016)	(0.030)	(0.016)	(0.021)	(0.023)
Stillbirths at baseline	0.379	0.520	0.597	0.254	0.353
	(0.072)	(0.186)	(0.138)	(0.116)	(0.112)
Number of observations	2,417	399	590	619	809
Number of subdistricts	20	20	20	20	20
Outcome: abortions					
Treated	0.011	0.050	-0.010	-0.013	0.015
	(0.010)	(0.031)	(0.018)	(0.022)	(0.018)
Abortions at baseline	0.221	0.285	0.304	0.178	0.214
	(0.046)	(0.134)	(0.108)	(0.081)	(0.063)
Number of observations	2,417	399	590	619	809
Number of subdistricts	20	20	20	20	20

Note: Standard errors clustered at branch level and shown in parentheses. Subdistrict fixed effects included in all estimations

6 Conclusion

To come.

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