Heterogeneous Impacts of Interventions Aiming to Delay Girls’ Marriage and Pregnancy Across Girls’ Backgrounds and Social Contexts

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ABSTRACT

Purpose: Despite many programs aiming to delay girls’ marriage and pregnancy over the last 2 decades, there is no consensus yet concerning the effectiveness of different approaches and the contexts in which they are implemented. We focus on different social contexts within Bangladesh and Zambia and investigate how literacy, poverty, and community characteristics impact the effectiveness of interventions.

Methods: We utilize data sets from two randomized controlled trials conducted by the Population Council in Bangladesh and Zambia. Within each respective country, we estimate the impacts of the interventions on marriage and pregnancy among adolescent girls using the analysis of covariance estimator by different social contexts based on community-level variables.

Results: In Bangladesh, providing academic skill training had a significant impact on discouraging child marriage in the villages where girls’ paid-work participation rate was relatively high, whereas in low paid-work participation villages, providing gender-awareness skill training had an impact. In Zambia, providing empowerment intervention and safe spaces had a significant impact on delaying pregnancy especially for illiterate girls in the communities where premarital sex was relatively common.

Conclusions: In Bangladesh, where girls’ paid-work participation is limited, premarital sex is uncommon, and marriage is subject to collective decision-making; the effectiveness of a program may depend on girls’ agency and the availability of acceptable working opportunities. In Zambia where premarital sex is common, pregnancy may precede marriage, and marriage entails the nature of individual decision-making; empowering the most vulnerable girls seems to be more effective in delaying marriage/pregnancy.

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IMPLICATIONS AND CONTRIBUTION

Social contexts and girls’ backgrounds affect the effectiveness of interventions. Our study supports the view that interventions are more effective for the most vulnerable girls, i.e., illiterate girls in social contexts where acceptable jobs for girls are unavailable or where premarital sex and sexual violence are more prevalent.

Child marriage is correlated with multiple negative consequences such as depriving girls of educational opportunities, adversely affecting maternal and child health, contributing to higher fertility, less bargaining power, and greater susceptibility to domestic violence within the marital household [1–5]. Given
these detrimental consequences, many interventions have been implemented to delay the age at marriage. Many of them are similar in design, consisting of multiple components such as girls’ empowerment, life-skill training, and community sensitization, in addition to financial incentives, typically cash transfers conditional on school attendance [6–16]. There is not yet a consensus on which of these components are most effective in delaying girls’ age at marriage and pregnancy: although a certain component was shown to be effective in some studies, it was ineffective in others based on recent attempts to review the effectiveness of child-marriage interventions [17–20]. Mixed results from similar interventions may be partly due to differences in social contexts. For example, an empowerment component, such as educating girls about reproductive health and rights, may not be effective in a context where girls have little choice about their own marriage because parents decide who they will marry. Moreover in many cases, even parents’ decisions are not entirely independent and are made under community pressure [21,22]. With this mixed evidence, it is difficult to decide how to allocate limited resources to delaying marriage and pregnancy.

Differential impacts of similar interventions or natural experiments themselves are not surprising. Some studies have revealed differential impacts of interventions depending on girls’ age and school enrollment status [6,12,15,16,23]. Among natural experiments, similar economic shocks can have differential impacts on the timing of marriage across different social contexts [24]. Differential impacts are also in line with the recently developed sociocological framework which considers a wide range of factors that shapes a girl’s experience of child marriage, including household, schools, community, policy, poverty, culture, and religion [25,26]. The path to child marriage is different across societies [27], and the importance of tailoring interventions to the social context of the target population is underscored by some reviews [19]. However, little is known about the social contexts behind the differential impacts of interventions that aim to delay girls’ age at marriage and pregnancy. It is also uncertain whether the same intervention works differently for subgroups within the same context. This study tries to fill this knowledge gap by investigating the combination of girl-, household-, and community-level characteristics to assess interventions that are most likely to be effective at delaying marriage and pregnancy.

This study presents two case studies utilizing data collected by Bangladeshi Association for Life Skills, Income, and Knowledge for Adolescents (BALIKA) in Bangladesh and the Adolescent Girls Empowerment Program (AGEP) in Zambia. Each program was designed as a randomized controlled trial (RCT), and the data set has at least two rounds of household surveys. The data sets offer two contrasted settings as follows. Bangladesh is characterized by a low rate of female labor-force participation (36.4% [28]), arranged marriage, and social taboo against premarietal sex [21,29]. Zambia’s female labor-force participation rate is twice as high at 70.3% [28] and is characterized by a high prevalence of premarietal sex and pregnancies [30]. Among the community-level characteristics, we focus on girls’ paid work participation in Bangladesh and prevalence of premarietal sex in Zambia because variation in each characteristic is technically required in the following estimations.

Case study 1 investigates the differential impacts of interventions on delaying girls’ marriage by village-level paid-work participation in Bangladesh. Increased workforce participation is often considered important for delaying marriage [31,32]. We utilize data from BALIKA in southwestern Bangladesh, where women working outside the home are rare, and there exists a stigma associated with women engaging in paid menial work outside the home [21,33]. In such a context, village-level rates of girls’ participation in paid work may reflect social norms concerning girls’ participation in paid work, poverty, their opportunities, and the level of girls’ agency.

Case study 2 investigates the differential impacts of interventions on delaying girls’ pregnancies by the community-level prevalence of girls’ premarietal sex and sexual violence. We utilize data from the AGEP in Zambia where premarietal sex and pregnancies are common. Note that even where premarietal sex is accepted at some level, there is still stigma. If early pregnancy does not necessarily lead to child marriage, preventing early pregnancy may be equally important for girls’ welfare as preventing child marriage. It may be more important in terms of girls’ welfare, given that pregnancy is associated with huge opportunity costs, not only in terms of foregone present income but also expected income due to lost educational opportunity. Keeping girls in school usually delays marriage and pregnancies. However, in contexts where premarietal sex is more common and acceptable, school may not necessarily decrease exposure to the risk of pregnancy [34]. Besides, pregnancy is not necessarily consensual and can be perpetrated by teachers and non-partners [34,35]. We also explore the differential impacts by the community-level prevalence of sexual violence. We consider that the prevalence of nonconsensual sex is related to social norms because tolerance of sexual abuse in the community affects the prevalence of sexual violence [36].

Girls’ literacy and household poverty may further impact the effectiveness of the interventions in different social contexts. Baird et al. [12,15] show that financial incentives are effective in delaying marriage and pregnancy only for girls who had dropped out of school, but did not benefit girls who were enrolled in school in Malawi. It is not clear, however, whether the differential impacts come from the lack of girls’ human capital, household poverty, or both. To explore the pathways generating differential impacts, both case studies further explore the differential impacts by girls’ literacy, and case study 1 does also by household wealth.

**Method**

The following estimations investigate the differential impacts of interventions across girls’ backgrounds and social contexts.

Case study 1 utilizes the intervention conducted by BALIKA, which was designed as a four-arm cluster RCT, targeting adolescent girls aged 12–19 years with the aim of delaying marriage. BALIKA offered three different types of skill-building opportunities with varying emphasis on tutoring support on mathematics and English (arm 1: education), gender-awareness life skills (arm 2: gender awareness), and livelihood skills (arm 3: livelihood). The baseline and endline survey interviews were conducted from March 2013 to August 2013 and from July 2015 to February 2016, respectively. The skill training was provided between the baseline and endline surveys. The survey, the content of the skill-training program, and its evaluation are detailed in the study by Amin et al. [6] and in Appendix A1.

Case study 2 utilizes the intervention conducted by the AGEP, which was designed as a cluster RCT, targeting adolescent girls aged 10–19 years with an aim to delay marriage and pregnancy...
in Zambia. The AGEP is a multifaceted empowerment program that trains adolescent girls in an experimental setting. A key component of the AGEP training was the formation of mentor-led girls’ clubs that consisted of 20–30 adolescent girls and held weekly meetings over 2 years [37]. The AGEP had two incremental add-on components, namely, health vouchers and savings accounts. The 2-year intervention was implemented from late 2013 to early 2016, and the baseline and endline surveys were conducted in 2013 and 2017, respectively. The survey and the content of the training are detailed in Appendix A2.

In both case studies, we use the analysis of covariance (ANCOVA) estimator, which controls for the baseline outcome measure as well as socioeconomic characteristics, to estimate the program’s impact on adolescent girls’ likelihood of child marriage in case study 1 and their likelihood of early pregnancy in case study 2. ANCOVA is considered a preferred estimator in evaluating program impact with respect to increasing statistical power, especially when autocorrelation of the outcome variables is low, i.e., .2–.3 as a benchmark. [38] The autocorrelation of child marriage in BALIKA (case study 1) is .59 and that of early pregnancy in the AGEP (case study 2) is .33, which may not be low. However, we consider it important to control for the baseline outcome variable to address the time-invariant unobserved characteristics leading to child marriage/pregnancy.

The ANCOVA estimates the impact of interventions on the outcome variables, i.e., likelihood of child marriage or early pregnancy. Specifically, the estimation equation is given by,

\[ Y_{ij1} = \beta_1 \text{Treat}_{ij} + \theta Y_{ij0} + x_{ij0} \beta_2 + \epsilon_{ij} \] (1)

where \( Y_{ij1} \) and \( Y_{ij0} \) are outcome variables at endline and baseline, respectively. The outcome variables take the value of 1 if the girl \( i \) married in case study 1 (was pregnant in case study 2) before age 18. The outcome variable is early pregnancy in case study 2 because there is no variation in marital status at baseline in the AGEP, i.e., all girls were unmarried. \( \text{Treat}_{ij} \) takes the value of 1 if the girl \( i \) is in the treatment group \( j \) (=1 if education, =2 if gender, or =3 if livelihood in case study 1 and =1 if safe space, =2 if safe space + health voucher, or =3 if safe space + health voucher + savings account in case study 2). \( x_{ij0} \) is a vector of girl and household \( i \)’s characteristics at baseline, namely, girl’s age, number of siblings, functional illiteracy, parental education, religion, and the household wealth index at baseline in case study 1. Because of the data availability, the control variables are different in case study 2, namely, girl’s age and illiteracy, parental education, place of residence (i.e., urban or rural), religion, and ethnicity (measured by the language spoken at home). Appendix Tables 1 and 2 present the summary statistics of outcome variables at baseline and endline and baseline socioeconomic characteristics of girls and their households in case study 1 and case study 2, respectively. Explanations of the variables are provided in the notes of the respective Appendix Tables.

The standard errors were adjusted for clustering at the village level in case study 1 and at the census supervisory areas, which are referred to as the community in case study 2. Because participation in either program was voluntary, we estimated the impact by intention-to-treat analysis to avoid a selection bias.

The impacts of interventions were estimated separately by social contexts. Specifically, Equation 1 was estimated separately by the village-level rate of girls’ participation in paid work at baseline in case study 1 and by the community-level prevalence of premarital sex and sexual violence in case study 2. The village- and community-level variables are constructed as,

\[ w_{ij0} = \frac{1}{n-1} \sum_{k=1}^{k} w_{ij0} \] (2)

where \( w_{ij0} \) takes the value of 1 if a girl \( i \) ever participated in paid work in case study 1 (experienced sexual intercourse before marriage in case study 2) at baseline \((t = 0)\), and \( n \) is the number of girls in the village or the community. Thus, each \( w_{ij0} \) is constructed as the village- or community-level average excluding the individual girl \( i \) herself. In case study 1, the villages above and below the median rate \((w_{ij0} = .09)\) are considered relatively “high” and “low” participation villages, respectively. Note that the participation is low, but given its variation (the standard deviation is .3), the villages are heterogenous enough in girls’ labor-force participation. In case study 2, the communities above and below the median \((w_{ij0} = .22)\) are considered to have relatively “high” and “low” premarital sex prevalence, respectively.

In case study 1, we supplementarily construct the village-level ratio of girls participating in white-collar to blue-collar jobs. White-collar occupations consist of teaching/tutoring, business, and services, and the majority (81%) are teachers/tutors. Blue-collar occupations vary and include tailors, factory workers, housekeepers, and agricultural laborers. The ratio of girls participating in white-collar to those in blue-collar jobs at the village-level baseline is calculated, and the villages above and below the median \((=.25)\) are considered as relatively “high” and “low” white-collar job villages, respectively.

This work was approved as exempt by the Population Council Institutional Review Board as it includes secondary data analysis of de-identified data. The original data collection was conducted by the Population Council and all approved by the Council’s Institutional Review Board. Informed consent procedures included parental permission and adolescent assent (for minors) and informed consent (for adults 18+ and emancipated minors).

**Results**

**Case study 1: differential impacts of interventions depending on girls’ participation rate in paid work at the village level**

Table 1 presents the estimation results by the village-level rate of girls’ participation in paid work at baseline. Columns 1 and 2 present the estimation results for girls in villages where girls’ participation rate in paid work was relatively high and low, respectively. In high-participation villages, the education arm had a significant and the largest impact on discouraging child marriage by 5 percentage points, which is substantial given that 40% of girls were subject to child marriage by endline (Appendix Table 1). By contrast, in low-participation villages, the education arm had an insignificant and the smallest impact. Interestingly, in low-participation villages, the gender-awareness arm alone had a significant impact on discouraging child marriage.

Table 2 presents the estimation results by interacting each arm with an indicator variable measuring functional illiteracy at baseline. In high-participation villages, the impacts did not significantly differ by girls’ literacy (column 1). In low-participation villages (column 2), the education arm had a...
significant impact of discouraging child marriage by 7 percentage points for illiterate girls only. These associations between literacy and differential impacts are not derived from girls’ age as there is no correlation between girls’ ages and literacy (−.008) and no differential impact across girls’ ages (Appendix Table 3). Nor are these associations derived from girls’ school enrollment status as

there is no differential impact by girls’ enrollment status at baseline (Appendix Table 4).

Table 3 presents the estimation results concerning the differential impacts by interacting each arm with household wealth tertiles at baseline. In high-participation villages, no differential impact was observed across household wealth tertiles (column 1). Interestingly, in low-participation villages, incidence of child marriage was higher among girls in middle-class households than that in poor households by 6 percentage points (column 2). In middle-class households, all treatment arms were significantly effective in discouraging child marriage among which the livelihood arm had the strongest impact.

In the context of rural Bangladesh where there is usually a stigma against girls engaging in paid menial work outside the home especially among educated girls, girls may work only when acceptable jobs such as teaching and tutoring are available. Estimating the differential impacts by the ratio of girls participating in white-collar to blue-collar jobs at the village level reveals that the results shown in high white-collar villages (Appendix Table 5) are, in fact, similar to those shown in high-participation villages (column 1 of Table 1). Note that ways of constructing these two village-level variables are different, as explained in the method section, and they measure different aspects of the village labor market (the correlation coefficient is .37, and the villages are half overlapped in these two measures).
Cluster (community)-robust standard errors are in parentheses. The other variables controlled in the estimation include early pregnancy at baseline, girl's age, parental years of schooling, place of residence (rural), religion (protestant), and ethnics measured by language spoken at home (Nyanja, Bemba, Kaonde, and Tonga). Sex is equivalent to that measuring ever having sex at baseline.

Case study 2: differential impacts of the interventions depending on prevalence of premarital sex and sexual violence among girls at the community level

Table 4 presents the estimated differential impacts of interventions on adolescent girls' pregnancy by community-level prevalence of premarital sex. Columns 1–2 and columns 3–4 present the estimation results for girls in communities where prevalence of premarital sex was high and low, respectively. Columns 2 and 4 present the results differentiated by girls' illiteracy at baseline. Note that differentiation by household wealth as in case study 1 was not feasible because of data unavailability. In communities with high premarital-sex prevalence, there was a significant impact for the health voucher arm of the intervention in delaying pregnancies by 4 percentage points (column 1), which is large given that 11% of girls experienced early pregnancy by endline (Appendix Table 2). By contrast, in low prevalence communities, there is no significant impact of interventions (column 3). Note, the savings account arm provided an incremental component to the health voucher arm, and explaining why the savings account arm did not have any impact is beyond the realm of this study. One possible explanation may be the unobserved effectiveness of program-implementing staff and logistics. Because of this uncertainty, we focus on the effectiveness of providing the common component, i.e., safe spaces, and not on the incremental components. The results are similar when the estimations were by communities below and above the median girls' age at first sexual intercourse at the community level and available on request. The health voucher arm intervention significantly prevented early pregnancy by 10 percentage points more for illiterate girls than literate girls in high premarital-sex prevalent communities, and the preventive impact was not observed among literate girls (column 2).

Table 5 presents the differential impact of interventions by community-level sexual violence at baseline. They show that providing safe spaces effectively prevented early pregnancy by 4–6 percentage points irrespective of girls' literacy in communities with high sexual-violence prevalence (columns 1 and 2). Combining the results shown in Table 4, there is an overlap between the communities where girls' premarital sex is more prevalent and those with higher sexual violence rates by about two thirds. The link between premarital sex and sexual violence is supported by the history of girls' sexual intercourse (Appendix Figure 1). For example, only one fourth of girls responded that they wanted to have sex when they had their first sexual intercourse (panel E of Appendix Figure 1), which suggests that many girls had sex against their will.

Discussion

Results from these case studies suggest that the effectiveness of interventions varies depending on the social contexts, such as norms and the types of opportunities, and girls' background, such as their literacy, level of agency, and their households' wealth. In Bangladesh, girls' participation rate in paid work is low, premarital sex is uncommon, and marriages are collectively arranged. In this context, the effectiveness of a program that aims to delay girls' marriage may depend on girls' agency and the availability of acceptable working opportunities. In Zambia, where premarital sex is common, girls who consented to having sex (i.e., one fourth of girls shown in Appendix Figure 1) had at least some decision-making power over their own sexual behavior, although we cannot ignore the existence of sexual intercourse that occurred due to power and violence. In such communities, pregnancy may precede marriage, and marriage has the nature of individual decision-making/behavior, in contrast to marriage that is decided collectively as in Bangladesh. In this context, empowering or educating individual girls may be more effective in delaying marriage/pregnancy than addressing this with their parents.

Estimation results show that, in Bangladesh, assuring both education and paid working opportunities for adolescent girls may be an effective way to discourage child marriage; however, the relative focus may vary depending on the contexts. The similarity of results in high white-collar job and high-participation villages implies that the differential impacts by girls' participation in paid work are derived from the availability of acceptable working opportunities, such as teaching and tutoring. In relatively high-participation or high white-collar job villages, where girls may already be relatively empowered via the availability of acceptable jobs or...
differential negotiation skills to let them work outside the home, continuous education rather than improvement in negotiation skills seems more effective. By contrast, in areas where girls' participation rate in paid work was relatively low, fostering negotiation skills within the household (focus in the gender-awareness arm), especially for illiterate girls, may be effective in delaying marriage. In such a society, girls' participation in the program itself may be a bottleneck. Girls' low participation in paid work may also reflect the lack of girls' human capital rather than the lack of acceptable job opportunities, as the results suggest that encouraging girls to stay in school or focus on academic education (focus in the education arm) is effective for girls who were illiterate and in low white-collar job villages. Interestingly, child marriage was observed more among girls in middle-class households than in poor households. This may reflect the U-shaped curve observed in female financial contribution to their households. This may reflect the U-shaped curve observed in female labor-force participation in Bangladesh, where girls in middle-class households participate least in the labor force [39], and may suggest that poverty is not necessarily a main determinant of child marriage. The strongest impact shown by the livelihood arm among middle-class households is also consistent with the view that girls' financial contribution to their households is a way to delay marriage.

In Zambia, where premarital sex is prevalent, providing adolescent girls, particularly the most vulnerable girls who are illiterate and live in communities where premarital sex is prevalent, with safe spaces seems effective in delaying pregnancy. Such girls are at greater risk of early pregnancies and thus in more need of such interventions. Although differential impact by girls' literacy was not significant across communities based on prevalence of sexual violence, it should be noted that communities with high premarital sex prevalence and those with high rates of sexual violence overlapped by about two thirds.

There are some limitations in this study, which are mainly related to lack of data availability. In case study 2, the outcome variable is early pregnancy instead of child marriage because there was no variation in marital status at baseline in the AGEP. In this data set, the correlation coefficient between early pregnancy and child marriage is low at .15. Early pregnancy does not necessarily lead to child marriage in Zambia, and the relationships between early pregnancy and child marriage are not yet clear.

Our findings support the view that the lack of girls' human capital and social contexts should be considered in implementing a program that aims to discourage child marriage and early pregnancy. In line with the socioecological framework to understand child marriage, previous reviews have underscored the necessity of tailoring interventions to the cultural context of the target population [19,25,26]. Our contribution is, in response to this necessity, to reveal the specific social contexts and girls' background that affect the effectiveness of the interventions aiming at delaying marriage and pregnancy. Results from the case studies suggest the effective combination of specific components of interventions, social contexts, and girls' background. In the societies where marriage is subject to collective decision-making, enhancing girls' negotiation skills seems effective in delaying marriage. In the societies where marriage involves relatively individual decision-making, empowering and educating girls seem more effective for the most vulnerable girls who are illiterate and in communities with high frequencies of sexual violence. Because this study is limited to two case studies and social contexts, more evidence needs to be accumulated to tailor interventions to the cultural context of the target population. Nonetheless, our findings contribute to filling the knowledge gap and understanding the types of social contexts that generate the differential impacts of the interventions. Our findings bring forward global efforts and add to the evidence base concerning what works to prevent child marriage among girls.

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Table 5
Differential impacts of interventions on early pregnancy by community-level sexual violence (case study 2)

|                | (1)                      | (2)                      | (3)                      | (4)                      |
|----------------|--------------------------|--------------------------|--------------------------|--------------------------|
| Dependent variable: early pregnancya | High prevalence of sexual violence* | Low prevalence of sexual violence* | High prevalence of sexual violence* | Low prevalence of sexual violence* |
| Arm 1: safe space | -.0263 (.0198)            | -.0575*** (.0236)        | -.0038 (.0182)            | -.0153 (.0291)            |
| Arm 2: plus health voucher | -.0394** (.0194)         | -.0144 (.0294)           | .0234 (.0220)             | .0100 (.0342)             |
| Arm 3: plus microsavings | -.0069 (.0207)           | .0039 (.0229)            | .0096 (.0229)             | .0071 (.0323)             |
| Illiterate     | .0488*** (.0153)         | .0253 (.0165)            | .0250 (.0396)             | .0200 (.0396)             |
| Arm 1 × illiterate | .0513 (.0374)            | .0429 (.0414)            | .0232 (.0412)             | .0298 (.0363)             |
| Arm 2 × illiterate | -.0092 (.0353)           | -.0071 (.0182)           | .0038 (.0182)             | .0153 (.0291)             |
| Arm 3 × illiterate | -.0429 (.0414)           | .0253 (.0165)            | .0250 (.0396)             | .0200 (.0396)             |
| Observations   | 1,928                    | 1,928                    | 1,844                    | 1,844                    |
| R-squared      | .124                     | .126                     | .112                     | .112                     |

Cluster (community)-robust standard errors are in parentheses. Other variables controlled in the estimation are the same as in the estimation reported in Table 4.

* The communities above and below the median (>.096) are considered to have relatively “high” and “low” sexual violence, respectively. Sexual violence takes the value 1 if the girl answered yes to the question of whether anyone ever forced her in any way to have sexual intercourse or perform any other sexual acts, at any time in her life.
