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Under her control: Evidence on intra-household decision-making from married adolescents*

Isabelle Cohen, Aisha Bello, Bilkisu Abba, Aminu Bello Gurin and Daniel Perlman

Abstract

Intra-household decision-making dynamics under unequal bargaining power are commonly understood to contribute to both under-utilization of contraception and under-investment in women and children’s human capital. We focus on married adolescents in northern Nigeria, a group particularly vulnerable to such dynamics. We evaluate a life skills intervention, which also focuses on health services and reproductive health, via a cluster-randomized control trial among 1,200 married girls aged 14 to 19. We find that the intervention significantly increases contraceptive use, decreases pregnancy rates, and, according to surveys of girls and health workers, increases access to health services for women and their children. We also find large increases in involvement in household decision-making and decreases in intimate partner violence. The results suggest that life skills and negotiation capacity can alter intra-household decision-making, even in the absence of material changes in circumstances.

JEL Codes: J12, J13, J16, I12, O15

1 Introduction

A women’s power in the household can be defined as her degree of control over household choices (Jayachandran and Voena, 2026). In low and middle income countries, external factors like limited employment options for women, gendered laws and restrictive norms combine to limit women’s power by limiting the outside options she can leverage (Jayachandran, 2015; Hyland et al., 2020; Shah and Barski, 2026). Existing evidence shows that changes to external circumstances – women-controlled cash transfers (Attanasio and Lechene, 2002), increase in women’s earning potential (Qian, 2008), access to a bank account (Field et al., 2021), the ability to divorce (Bargain et al., 2024) – can meaningfully change intra-household decisions. At the same time, evidence suggests that improved communication skills can affect household decisions and women’s outcomes (Ashraf et al., 2020; Kala and McKelway, 2025), even in the absence of changes to

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broader determinants. We provide novel evidence of these dynamics from an intervention targeting married adolescents in northern Nigeria.

Contraception and use to health services, for both women and children, are spheres where these dynamics unfold. Though the number and timing of children is affected by many factors, there is good reason to think intra-household bargaining plays a key role, particularly under differing preferences or misinformation (Westoff, 2010; Ashraf et al., 2026). Evidence also suggests that power dynamics affect many other decisions that households make. When control over household resources change, for example, so do investments in children’s human capital (Thomas, 1990; Duflo, 2003, 2012).

We focus on these dynamics within a specific population: married adolescent girls. Causal and correlational evidence shows that girls who marry as children face worse educational, economic and household outcomes Parsons et al. (2015) and that the children born from these unions have worse health (Chari et al., 2017; Raj, 2010). Such girls also have increased fertility; cross-sectional evidence suggests that eliminating child marriage would reduce total fertility on average by 0.59 children per woman, equivalent to an 11% reduction (Wodon et al., 2017). Earlier marriage is causally linked to lower utilization of antenatal care (Field and Ambrus, 2008) and correlated with lower use of contraceptives (Raj, 2010) and increased rates of intimate partner violence (Parsons et al., 2015). These data are consistent with married adolescents wielding less intra-household power relative to other married women.

In this paper, we look at an intervention targeted specifically to married adolescents in northern Nigeria. Safe Spaces for Married Adolescents (MAS) provides safe space-based life skills training to married adolescent girls aged 14 to 19, and connects girls to communities, clinics, and contraception. We evaluate this program using a cluster-randomized control trial of 1,200 girls in 40 communities, and leverage surveys of girls, surveys of health workers and digitized health facility records to identify the impact of the intervention.

We find that MAS leads to a 10x increase in the self-reported use of contraception and a 40% decreases in pregnancy rates (14.5 percentage points) in a one-year follow-up survey. We find large and significant increases in health services visits for the participants and their children in both self-reported data and health worker surveys, and increases in family planning visits for injectable contraceptives (as well as condoms and implants) from digitized clinic records. Our survey of participants also finds a 1.3 standard deviation increase in an index measuring respondents’ participation in household decision-making, and a .6 standard deviation decrease in an index measuring intimate partner violence.

We add to the literature on the types of interventions that have proven successful in increasing women’s power. Many papers have focused on economic changes and interventions, either those that directly affect the balance of resources (e.g., Attanasio and Lechene, 2002; Duflo, 2003; Qian, 2008) or those that directly alter control over those resources ((e.g., Field et al., 2021; Riley, 2024). Others have studied legal changes, including to inheritance (Health and Tan, 2020), property distribution (Vardani, 2025; Ambler et al., 2026) and divorce (Bargain et al., 2024).

The intervention we study is essentially a life skills training, with a particular focus on negotiation and communication alongside health services and contraception. Evidence from in-school adolescents shows that even without changes in resources, improvements in negotiation skills can fundamentally alter intra-household dynamics (Ashraf et al., 2020).¹ In India, training on effective communication increased labor supply and earnings for (relatively) older married women whose preferences differed from their husbands (Kala and McKelway, 2025).

Our results suggest that life skills interventions can materially affect outcomes where household decision-

¹More broadly, life skills trainings for adolescents have been shown to improve mental health, increase school attendance, and improve socio-emotional measures (Shah et al., 2023; Tagat et al., 2025).

making matters, even in the absence of significant changes to outside options. We show evidence of effects not only on women’s choices for themselves - such as increased uptake of contraceptive technology - but also on the resources they can access for their children, particularly around health services.

Our results also speak to the importance of non-financial barriers to uptake of contraceptive technologies, particularly around birth spacing. Despite survey evidence that suggests persistent unmet contraceptive need in sub-Saharan Africa (Westoff, 2006), supply-side interventions have proven inconsistent or ineffective (Bellows et al., 2016; Korachais et al., 2016; Dupas et al., 2025). However, there is significant evidence of the importance of non-financial barriers, including misinformation (Bau et al., 2025; Ashraf et al., 2026), and intra-household disagreement (Ashraf et al., 2014). More intensive community-based interventions, particularly those which also involve husbands, have also been shown effective (Karra et al., 2022; Silverman et al., 2023; Alemayehu et al., 2021). Our results demonstrate that an intervention that improves women’s life skills, specifically their ability to negotiate with their husbands, can improve contraceptive uptake and lead to birth spacing.

Our work also contributes to a broader literature on the effects of contraceptive provision and empowerment initiatives more broadly, particularly around intimate partner violence (IPV). Broader changes to what can be termed women’s economic empowerment have had mixed results, with some interventions and external changes decreasing IPV (Eggers del Campo and Steinert, 2022; Sanin, 2025 and others increasing IPV (Green et al., 2015; Hidrobo et al., 2016; Halim et al., 2019; Bulte and Lensink, 2019). The evidence we have suggests that increased access to contraception can enable women to leave abusive partners (Deschamps, 2026) and that decreased access to abortions increases IPV (Dave et al., 2025). We find that our life skills intervention leads to significant reductions in IPV, suggesting that improvements in intra-household communication can lessen IPV, whether directly or through changes in contraceptive use.

This paper additionally makes a contribution through its explicit focus on married adolescents. This is not a small population; roughly 12 million girls under the age of 18 marry every year (UNICEF, 2022). Many interventions are focused on delaying child marriage (e.g., Bandiera et al., 2020; Buchmann et al., 2023; Cohen et al., 2026) yet far less research has examined post-marital dynamics or how policies and programs affect this population. We show that MAS may actually ameliorate some of the worst effects of early marriage, suggesting potentially high returns to policies and programs that target this vulnerable population.

2 Safe spaces for married adolescents

Adolescent marriage in northern Nigeria is fairly widespread. Estimates from the time of this evaluation are that 78% of girls were married before the age of 18 and 48% before the age of 15 (Save the Children, 2021).

MAS is a program of the Centre for Girls’ Education (CGE), a women-led non-governmental organization based in northern Nigeria, and was designed intentionally for married adolescents. Under MAS, CGE initially approaches traditional and religious leaders and other community stakeholders to explain the program and elicit feedback. Enrollment targets all married adolescents (ages roughly 14 to 19) in a given community. During the course of the program, girls meet twice per week with a mentor - typically a graduate of a CGE program herself - for a combination of life skills training, social support, remedial education, vocational-focused training, reproductive health-centered discussions, and more. Childcare is explicitly provided for during the meetings, as the majority of participants have young children.

Meeting topics include life skills, but also basic literacy and numeracy, financial literacy, reproductive

health, agricultural training and climate education. Under life skills, the program focuses on topics such as decision-making (e.g., critical thinking and problem solving), community living (e.g., communication and negotiation), and personal awareness and management (e.g., self-awareness and self-esteem). Reproductive health topics covered include puberty, menstruation, and birth spacing, the locally preferred term for matters relating to decision-making around the use of contraception.

As part of MAS, participants visit health facilities to learn how to access care. The program also includes dialogues with husbands of adolescent girls, as well as religious leaders, on topics such as Islamic teachings on gender and girls’ education and rights and birth spacing.

Feedback from participants suggest that they perceive the life skills modules as a crucial part of the meetings. During these sessions, girls have the opportunity to discuss intra-household negotiation, particularly as it pertains to their husbands. The examples below were drawn from pilot communities, where more extensive qualitative work was conducted; these communities were very similar to the locations in the randomized control trial and the implementation of the program was nearly identical.

The quotes below demonstrate some of the ways girls, in reflecting, felt that MAS had improved their ability to communicate with their husbands:

“I used to think that talking to my husband carelessly made me brave and that arguing with him to prove a point gave me power. Now I know a better way. A woman is more likely to have her husband under her control when she is calm and respectful.” - Quote from MAS participant in a 2020 pilot community

“I kept telling my husband about what I was learning in my safe space and explained the benefits of birth spacing in a very diplomatic way. I then asked him if he always wanted to come into a smelly room with children’s urine everywhere and if he wanted me always breastfeeding without giving him the time and care he deserved. The next day we went to the hospital together and chose a method.” - Quote from MAS participant in a 2020 pilot community

3 Experimental design and data collection

The randomized evaluation of MAS began with a baseline in June and July 2022 of approximately 1,200 girls across 40 communities. Post-baseline, the communities were allocated into twenty pairs using an optimally greedy algorithm (King et al., 2007) and randomized between treatment and control within pairs. This analysis focuses on data from a one-year follow-up survey in September 2023, as well as data from surveys of health workers and digitization of health facility records collected (retrospectively for specific periods) in October and November 2025. A timeline of the evaluation is available in Appendix Figure A1.

The baseline and endline surveys were conducted by teams of female surveyors employed by the Centre for Girls Education and were tablet-based. The baseline surveys took place prior to program implementation. Community leaders identified eligible girls, though girls and their families were also asked to propose additional candidates for inclusion. Surveyors verified eligibility when girls arrived for the survey. For all girls, permission was sought from their husbands prior to surveys being conducted. All girls identified for inclusion at baseline were surveyed.

After the baseline, we implemented an optimally greedy algorithm to pair communities (King et al., 2007). We begin with the overall set of forty communities and a large set of covariates drawn from the

baseline survey. We first computed the Mahalanobis distance for every possible pair of clusters available to be matched at any one time. We then chose the pair with the smallest distance and removed it from the sample. The procedure was then repeated until all communities in the study were matched. Within each pair, one community was randomized to treatment and the other to control.

Endline surveys took place just over one year after the baseline; roughly 94% of respondents were re-surveyed. However, attrition is differential; control respondents were 4.6 percentage points more likely than treatment respondents to be surveyed at endline and the difference is statistically significant at the 10% level under randomization inference.² Analysis of the baseline data suggests that the attriting respondents are positively selected; they are slightly more likely to work than non-attriting respondents and have lower rates of intimate partner violence and husband financial control. Though the extent of attrition remains qualitatively small, there remains the possibility that attrition could bias our estimates upwards or downwards. To address this, though not pre-specified, we implement Lee bounds estimates of all endline impacts, where the bounds assume the tracked sample is either entirely negatively or entirely positive selected (Lee, 2009).

We focus here on preliminary results from a subset of outcomes including take-up, attitudes and knowledge of reproductive health, reproductive health behavior, and economic outcomes. Results are estimated using the following pre-specified estimating equation:

$$Y_{ij}^1 = \beta_1 + \beta_1 T_j + Y_{ij}^0 + X_{ij}^0 + \gamma_j + \varepsilon_{ij} \quad (1)$$

where Y_{ij1} is an outcome of interest for individual i in community j , measured at follow-up ($t = 1$). T_j is a treatment dummy that indicates being in a community assigned to the safe spaces for married adolescents intervention, γ_j pair-fixed effects (Bruhn and McKenzie, 2009) and Y_{ij}^0 is the outcome as measured at the baseline (McKenzie, 2012). X_{ij}^0 is a set of individual covariates, chosen by the PDS Lasso method per outcome (Belloni et al., 2013).

Although we report cluster-robust standard errors at the community level, our primary method of inference is to use randomization inference (Athey and Imbens, 2017) which addresses both concerns about multiple inference and the issue that cluster-robust standard errors can be too small if the number of clusters is low (Cameron et al., 2008). To implement this approach, we randomly reassign communities within each stratification cell (i.e., each pair) and then re-estimate treatment effects for simulated assignments using equation (1) to construct a distribution over a thousand draws. We also account for multiple hypothesis testing by reporting sharpened q -values in all tables (Anderson, 2008, Benjamini et al., 2006).³

Two years post-endline, we visited health facilities in the vicinity of treatment and control communities to gather further data.⁴ In total, we conducted visits to 22 different health facilities, each of served between 1 and 5 of the communities that participated in the study; the exercise resulted in data for 38 of the 40 communities in the study.⁵ As we were not able to access individual level records, we leveraged community-level randomization to ask for (and record) aggregate data. 63% of communities were served by one facility, and 37% by more than one; in cases where communities were served by multiple facilities, we asked about the community at each relevant facility.⁶

At each health facility, we conducted two different activities. First, we conducted surveys of 4 health

²Results available upon request.

³This and the use of randomization inference were pre-specified in our PAP.

⁴This data collection exercise was not anticipated at the time of our endline, and as such is not included in our PAP. We follow pre-specified estimating approaches as closely as possible in our analysis of health facility data.

⁵Facility closures meant that there were two communities for which there was no government health facility where we could conduct survey activities.

⁶29% of communities (11 communities) were served by two facilities, and 8% (3 communities) by three facilities.

workers, for a total of 90 different surveys.⁷ For each health worker, we asked them questions about their background and qualifications as well as the facility overall. For the bulk of the survey, we asked them separately about each study community served by the facility. The main questions focused on the typical number of visits per month for different types of services by young married women from each study community served by the health facility. We also asked health workers about the perceived comfort level of young married women from each study community served by the health facility. We then estimate equation 2, which resembles equation 1 but is estimated on community-level averages of health worker responses:⁸

$$Y_j = \beta_1 + \beta_1 T_j + \gamma_j + \varepsilon_j \quad (2)$$

where Y_j is an outcome of interest for community j . Other variables are defined as in 1.

Our second activity was to digitize monthly visit counts from health facility family planning records based on linking addresses to specific communities (where available). In some health facilities, community names were not recorded with sufficient specificity for us to link them to study communities, but we accessed at least one month of data from 18 different health facilities, covering 29 communities. We sought records for July 2025, January 2025, July 2024, January 2024, and July 2023.⁹ The resulting data contains, for these months, the number of visits from girls from a given community for any family planning services, as well as whether oral pills, injectable contraceptives, IUDs, condoms, or implants were prescribed. Where the same community is covered by multiple facilities, we aggregate by averaging across health facilities.¹⁰ We then estimate equation 3, which is a version of equation 1 on community-month level data:

$$Y_{jt} = \beta_1 + \beta_1 T_j + \gamma_j + \varepsilon_{jt} \quad (3)$$

where Y_{jt} is an outcome of interest for community j in month t . Other variables are defined as in 1.

4 Balance, uptake and spillovers

At baseline, treatment and control communities were relatively balanced. In Table 1, we report baseline means by treatment group for selected covariates and all outcomes in the tables that follow.

Respondents averaged just under 17.5 years of age at baseline; the median respondent was 17, the 10th percentile respondent 15, and the 90th percentile respondent 19. Almost the entire sample was currently married, by design. Just under 40% of respondents had no more than a primary school education, and roughly half of respondents answered yes to at least one question on disabilities.¹¹ More than 80% of respondents have husbands older than 25 years at baseline, and a quarter of respondents indicated that their husband had at least one other wife. More than a quarter of respondents have given birth at least once, and the average respondent has one child.

Less than a third of respondents reported ever having heard of birth spacing, and under ten percent of respondents used birth spacing. A little less than a quarter of respondents were pregnant at baseline.

⁷At two health facilities, we surveyed 5 health workers.

⁸Our results are robust to estimation on health worker-community level data; this estimation approach is available on request.

⁹We also sought records for May 2022; however, as these records were more than three years old at the time of the data collection, we were able to get complete records from only 5 health facilities; as such, we exclude these records from the analysis.

¹⁰In the July 2025 data, 93% of communities (27 communities) had records available at only one facility; only 7% of communities (2 communities) had records available at two facilities.

¹¹We asked respondents if they had difficulty with any of the following: seeing, hearing, walking or climbing steps, remembering or concentrating, performing self-care activities including washing and dressing, and communicating in their usual language.

Table 1: Balance Table

Variable	Control	Treatment	ri p-value	Obs
Age (years)	17.4	17.3	0.631	1217
Currently married (d)	.984	.986	0.975	1217
No schooling beyond primary (d)	.366	.412	0.569	1217
Reported any disability (d)	.478	.452	0.511	1213
Husband over 25 (d)	.806	.8	0.983	1047
Husband is literate in English (d)	.632	.577	0.313	1159
In polygamous household (d)	.264	.251	0.922	1198
Has ever given birth (d)	.76	.746	0.642	1217
Number of children	1.05	1.01	0.517	1167
Asset index (sd)	0	.086	0.657	1217
Has heard of CGE (d)	.392	.457	0.220	1216
Ever participated in CGE program (d)	.097	.134	0.384	1216
Heard of birth spacing (d)	.324	.303	0.668	1034
Discuss birth spacing with husband (d)	.041	.048	0.666	994
Uses birth spacing (d)	.096	.079	0.667	963
Is pregnant (d)	.219	.25	0.137	1193
Health services visits for self	2.5	2.45	0.922	1186
Health services visits for children	3.11	3.16	0.571	845
Last birth at health facility (d)	.386	.326	0.713	905
Husband control index (sd)	0	-.292	0.008***	1199
Intimate partner violence index (sd)	0	-.028	0.425	1215
Index of partic in HH decision-making (sd)	0	.121	0.045**	1199
Saving money (d)	.571	.574	0.906	1214
Worked in last year (d)	.48	.508	0.731	1216
Community help access care (d)	.075	.054	0.224	1217
Husband help access care (d)	.645	.637	0.866	1217
Respondent funded care (d)	.047	.049	0.968	1217
Relationship quality index (sd)	0	.213	0.024**	1217
Reproductive autonomy index (sd)	0	.152	0.181	1217
Social capital index (sd)	0	.056	0.466	1217
Gender equitable attitudes index index (sd)	0	.019	0.856	1217
Health services index (sd)	0	-.058	0.718	1217
Birth spacing index (sd)	0	-.053	0.869	1034
Pregnancy and childbearing index (sd)	0	.034	0.401	1217
Education index (sd)	0	0	0.754	1178
Economic resources index (sd)	0	0	0.734	1216
Household decision-making index (sd)	0	.067	0.218	1199
Climate change index (sd)	0	-.181	0.151	1217

The first and second columns show the control and treatment means for the relevant variables. The third column contains the p-value from a test of the significance of the treatment dummy in a regression of the variable on treatment status controlling for pair IDs and using randomization inference. The fourth column is the number of observations in the full sample for that variable at baseline.

Over the last six month, the average respondent had accessed health services about 2.5 times for themselves, and, among those with children, about 3 times for their children. Just under 40% of respondents had their last birth at a health facility. Roughly half of respondents worked in the last year, and closer to 57% were currently saving money. Despite that, most respondents need financial or transportation-related help to access health care: 68% of respondents received some help from another person to access health services, including over 60% who received assistance from their husband. Only 5% of respondents reported contributing any funding to their own care.

At baseline, we also find that no more than a third of women even participate in household-decision making around any major areas, including what food to cook for the family, and less than fifteen percent report being sole decision-makers in any sphere (Appendix Figure A2). Only 12% of respondents report any participation in decisions about health care for members of the household, and less than 1% report making sole decisions about healthcare.

In Table 1, we test thirty eight variables for imbalance; the last eleven listed are pre-specified composite indices, defined in Appendix D, some of which contain variables also tested in the table. Of these variables, three are slightly imbalanced at baseline: an index of husband’s control over behavior, a relationship quality index (which contains the index of husband’s control over behavior), and an index of respondents’ participation in household decision-making. Reassuringly, there are no significant differences in contraceptive behavior or in frequency of access to health services, suggesting that any differences in these variables at baseline have not led to differences in key outcome variables. As well, while not significant under randomization inference, girls in treatment communities are roughly three percentage points more likely to be currently pregnant at baseline relative to girls in the control group.

At baseline, non-response was generally low, with the exception of questions on contraceptive use. For example, 15% of girls were unwilling to answer a question asking if they had heard of birth spacing; this led to correspondingly lower sample sizes on subsequent birth spacing related questions. As well, pregnant respondents were not asked about contemporary birth spacing use, further (intentionally) lowering response rates. At endline (not reported), we see missingness over 15% (our pre-determined threshold to test for differential missingness) for only one variable: roughly 83% of the sample answered the question on contemporary birth spacing use.¹²

We also plot the distribution of marriage age across treatment and control in Figure 1. Although there are a few outliers who report being married at very young ages, the typical girl was married between the age of 14 and 18; less than 15% of girls were older than 18 at the time of their marriage. There are a few small differences between the distributions of age of marriage by treatment and control, though a Kolmogorov-Smirnov test fails to reject the null hypothesis of the equality of the distributions. As of the baseline, the mean girl had been married for 1.5 years, and the median girl for a year.

Appendix Table A1 shows that take-up of MAS was high and there is an extremely strong first stage of the experiment; roughly 98.5% of women in treatment communities participated in MAS, relative to 1.5% in control communities.¹³ 79% of treatment respondents reported that their husband had attended CGE programming, relative to only half a percent of respondents in control communities. Roughly 63% of treatment respondents reported that a friend had attended a CGE program in the last year, compared to 8% of respondents in control communities. These results suggest not only that individuals in the control group were not directly treated, but also that informational or attitudinal spillovers are likely minimal.

¹²Following our pre-specified approach to test for differential missingness, we find no statistically significant difference in response rates by treatment. Results are available on request.

¹³These variables are not pre-specified as outcomes; we present them in order to give a sense of the take-up of the intervention, as well as the magnitude of potential spillovers.

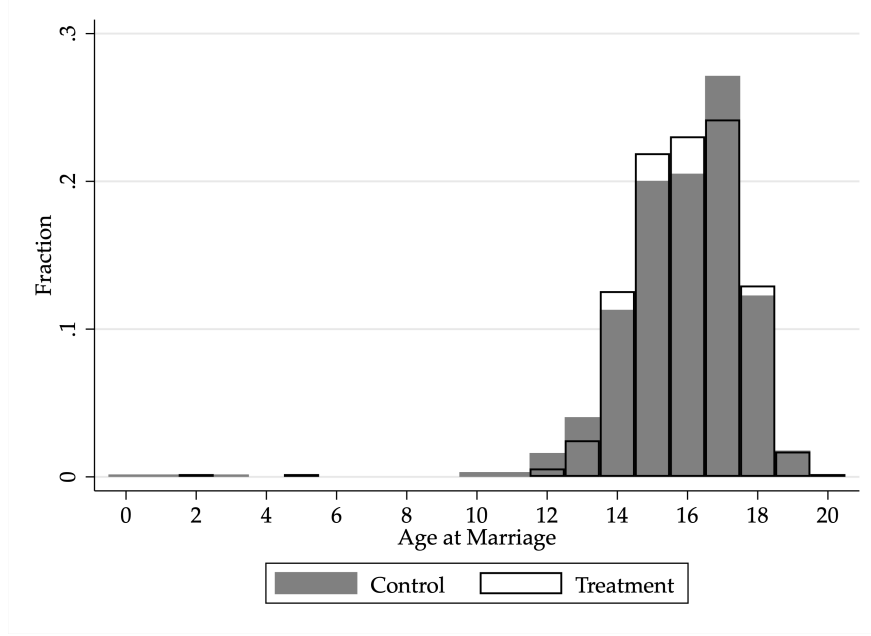


Figure 1: Distribution of Age at Marriage

5 Effects of MAS

We start by examining the effects of MAS on ten pre-specified indices constructed from survey data, including relationship quality (Appendix Table B1), reproductive autonomy (Appendix Table B2), social capital (Appendix Table B3), gender equitable attitudes (Appendix Table B4), health services (Appendix Table B5), birth spacing (Appendix Table B6), pregnancy and childbearing (Appendix Table B7), education (Appendix Table B8), economic resources (Appendix Table B9), and household decision-making (Appendix Table B10).¹⁴ We find fairly large effects across all indices, ranging from .4 standard deviations to roughly 1.3 standard deviations, all statistically significant under both conventional clustered standard errors and randomization inference. As pre-specified, we also re-estimate all equations controlling for imbalanced baseline covariates rather than LASSO-selected covariates; the results, in Appendix Figure A3, are highly robust to this alternate specification.

We also present results along various pre-specified dimensions of heterogeneity, in Appendix Table A2. We find the majority of baseline factors are not meaningfully correlated with treatment effects on any of our ten outcome indices, with the exception of whether a respondent had had a child at baseline; we find larger treatment effects for several outcomes for respondents without children at baseline.

In order to better understand these results, we focus on select outcomes from these different indices. We first look at the effects of MAS on outcomes typically subject to intra-household bargaining – contraceptive use and care-seeking – to see whether the intervention affects them. We then look directly at the effects of MAS on intra-household dynamics and economic outcomes to better understand how MAS is likely to work.

¹⁴Our original pre-analysis plan also includes an eleventh index, measuring awareness of and actions taken with regard to climate change. Results for this outcome are presented in Appendix Table B11.

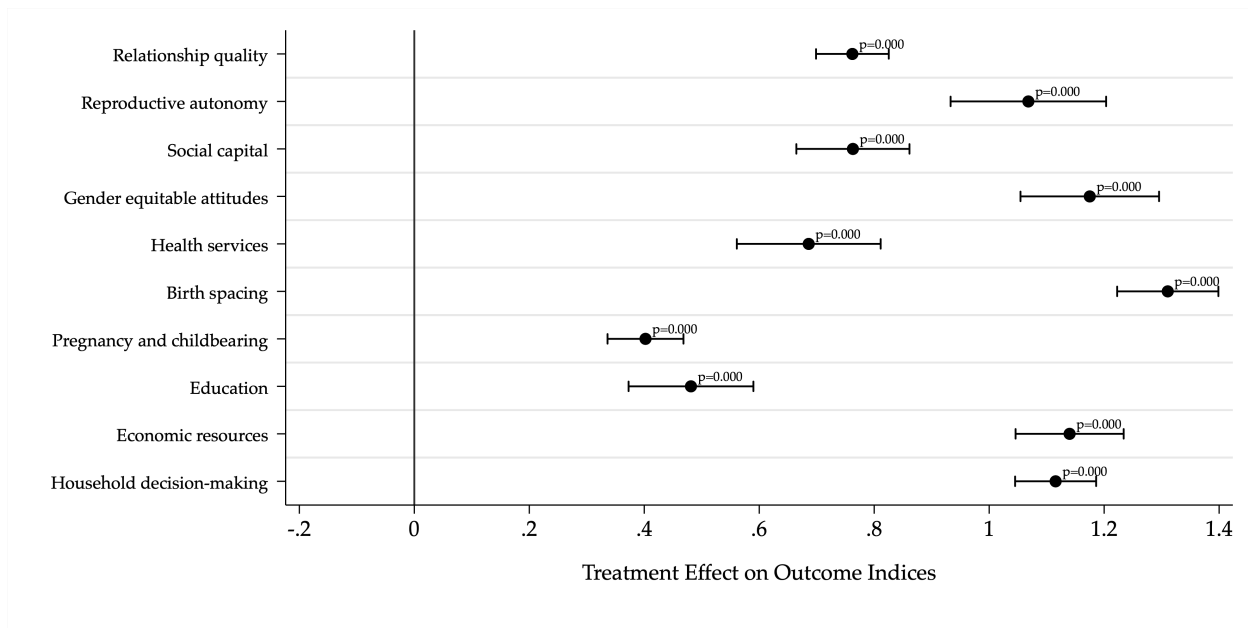


Figure 2: Effects of MAS

Notes: The estimated effect is the coefficient on an indicator for assignment to treatment. 95% confidence intervals are constructed based on robust standard errors clustered at the community levels, and reported p-values are randomization inference p-values with 1,000 repetitions. The regressions include the baseline value of the outcome, pair fixed effects, and other baseline covariates as selected by LASSO.

6 Contraception and health services

Table 2 focuses on contraception and fertility outcomes. Girls in the treatment group are more than 200% more likely to report having heard of at least one birth spacing method. Unlike in the control group, where the share of respondents who self-report having heard of birth spacing changes not at all between baseline and endline, the share of MAS participants who self-report having heard of birth spacing increases to nearly 100%. Girls are also significantly more likely to have discussed birth spacing with their husband; rates increase from 5% in control communities to 42% in treatment communities, an 8x increase in the likelihood of engaging in these discussions.

We also observe dramatic increases in contraceptive use of roughly 68 percentage points. Given the topic's sensitivity, we ask a fairly general question about use and do not ask about regularity; we should think of these results as indicating that the respondent has tried a birth control method relatively recently, rather than that she necessarily uses it correctly or regularly.¹⁵ Consistent with these self-reports, rates of current pregnancy significantly decrease; respondents in treatment communities are 14 percentage points less likely to be pregnant, a decrease of 38% relative to respondents in control communities.

We also find evidence from the girls survey of increased uptake of health services in Table 3. Girls from treatment communities report 2.3 additional visits for health services for themselves over the last six months and 1.7 additional visits for children over the last six months, both statistically significant. Women were also roughly 10 percentage points more likely to have had their last birth at a health facility, a 32% increase

¹⁵ Respondents were able to report multiple types of contraception, though the majority - 88% - used only one method. Among the 320 respondents who self-report using contraception, 90% of whom are in the treatment group, the most prevalent method is an implant; roughly 40% of contraceptive users self-report an implant. Roughly 20% report using injectables or pills, and another 14% report using condoms. Many respondents using condoms also reported using other methods. More conventional methods are also reported; roughly 10% of respondents report using withdrawal, and 5% the rhythm method.

Table 2: Contraception and Fertility

	(1) Heard of Birth Spacing (d)	(2) Discuss Birth Spacing with Husband (d)	(3) Uses Birth Spacing (d)	(4) Is Pregnant (d)
Treat	0.683 (0.016)*** {0.000}*** <0.001>***	0.371 (0.021)*** {0.000}*** <0.001>***	0.679 (0.026)*** {0.000}*** <0.001>***	-0.140 (0.016)*** {0.002}*** <0.001>***
Lee Bounds	[.685 .703]	[.339 .392]	[.674 .729]	[-.14 -.12]
Pair FE	Yes	Yes	Yes	Yes
Control Mean	0.320	0.047	0.060	0.367
Observations	1090	1079	904	1127

Note: Robust standard errors clustered at the community level in parenthesis, randomization inference p-values within pairs with 1,000 repetitions in braces, and sharpened q-values in angled brackets. Lower and upper Lee Bounds are reported in square brackets. The regressions include the baseline value of the outcome, pair fixed effects, and other baseline covariates as selected by LASSO. Significance is indicated at * p<.1, ** p<.05, *** p<.01.

over the control group.¹⁶

Table 3: Health Services Outcomes

	(1) Health Services Visits for Self	(2) Health Services Visits for Children	(3) Last Birth at Health Facility (d)
Treat	2.267 (0.237)*** {0.000}*** <0.001>***	1.672 (0.215)*** {0.001}*** <0.001>***	0.107 (0.022)*** {0.014}** <0.001>***
Lee Bounds	[2.16 2.60]	[1.29 2.34]	[.102 .118]
Pair FE	Yes	Yes	Yes
Control Mean	1.860	2.567	0.337
Observations	1145	880	929

Note: Robust standard errors clustered at the community level in parenthesis, randomization inference p-values within pairs with 1,000 repetitions in braces, and sharpened q-values in angled brackets. Lower and upper Lee Bounds are reported in square brackets. The regressions include the baseline value of the outcome, pair fixed effects, and other baseline covariates as selected by LASSO. Significance is indicated at * p<.1, ** p<.05, *** p<.01.

Results directly from participants, however, include responses from girls who have spent the last year in the MAS program. Our surveys were also conducted by CGE-employed enumerators. Although we do not believe surveyors intentionally tried to influence respondents, enumerator demand effects and other sources of bias may have affected their responses. As such, we supplement surveys of respondents with data from health worker surveys and the digitization of health records. Reassuringly, the results are consistent; both sets of data agree, both in overall direction and in various particulars, with our self-reported survey data.

First, in Table 4 we find that health workers report significantly more visits from girls in MAS communities.¹⁷ We see statistically significant increases in antenatal care, childbirth, family planning and visits

¹⁶This outcome was not pre-specified.

¹⁷In our survey of health workers, we asked about visits from 'young married women' from a specific community. While

to tend to sick children, all large relative to control group means.¹⁸ The largest proportional increase is in family planning services, with roughly a 400% increase in the number of family planning visits monthly from girls in MAS communities. We also find that health workers report young women from MAS communities are significantly more comfortable at health facilities, both objectively and relative to women from other communities (Appendix Table A3).

Table 4: Health center visits

	(1) All visits	(2) Antenatal	(3) Childbirth	(4) Family planning	(5) Sick child
Treat	78.399 (8.306) ^{***} {0.000} ^{***} <0.001 ^{***}	30.090 (3.554) ^{***} {0.000} ^{***} <0.001 ^{***}	13.349 (2.330) ^{***} {0.000} ^{***} <0.001 ^{***}	23.918 (3.546) ^{***} {0.000} ^{***} <0.001 ^{***}	30.112 (6.158) ^{***} {0.000} ^{***} <0.001 ^{***}
Control Mean (e)	27.511	10.431	6.196	6.200	10.358
Observations	38	38	35	38	38
Pair FE	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors clustered at the community level in parenthesis, randomization inference p-values with 1,000 repetitions in braces, and sharpened q-values in angled brackets. Data comes from health worker surveys; we specifically use community-level aggregates weighting all responses equally. Significance is indicated at * p<.1, ** p<.05, *** p<.01.

Second, we find statistically significant increases in the number of recorded family planning visits from MAS communities (roughly a 70% increase), concentrated in prescriptions for injectables, condoms and implants under conventional standard errors, as presented in Table 5. Reassuringly, the types of contraceptives in which we see increases are consistent with self-reports from the MAS data.¹⁹ However, the results are not robust to randomization inference p-values.

Overall, responses from health workers and health facility visit data are consistent with the results of the surveys, and suggest that MAS led to large (and persistent) increases in the utilization of health services, particularly for family planning and contraceptive services.

7 Intra-household dynamics

Table 6 looks at respondents' experiences at home, focusing on several measures of potential intra-household difficulties.

Among treated respondents, a higher share report using contraception than report having discussed it with their husbands; while reporting bias may lead to inaccurate results here, such dynamics could result in strife at home. However, we instead see a .5 standard deviation decrease in controlling behavior by a girls' husband and a .6 standard deviation decrease in an index measuring experience of intimate partner violence.

We also find a 1.3 standard deviation increase in self-reported participation in household decision-making.

MAS endeavored to enroll the majority of married adolescents, the program only targeted married adolescents aged 14 to 19 at baseline; there are likely many other women in each community who health workers may classify as young married women. It is likely that these results come disproportionately from MAS participants, but also possible that spillovers to non-participants in treated communities may contribute.

¹⁸In theory, the same visit could be for both a sick child and another purpose; as such, we did not constrain the number of each type of visit to add up to the number of all visits.

¹⁹The fact that there is a greater proportional increase in injectables than implants is likely due to the fact that injectables required a visit once every three months, whereas implants last up to five years.

Table 5: Recorded visits to health center

	(1) All FP	(2) Oral Pills	(3) Injectables	(4) IUDs	(5) Condoms	(6) Implants
Treat	7.524 (3.415)** {0.143} <0.147>	0.180 (0.396) {0.624} <0.354>	5.309 (2.700)* {0.183} <0.147>	-0.030 (0.380) {0.929} <0.454>	0.554 (0.287)* {0.132} <0.147>	0.913 (0.530)* {0.233} <0.147>
Control Mean (e)	10.857	1.551	6.388	0.347	0.061	2.816
Observations	117	117	117	117	117	117
Pair FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: Robust standard errors clustered at the community level in parenthesis, randomization inference p-values with 1,000 repetitions in braces, and sharpened q-values in angled brackets. Data comes from records at health worker clinics, and pools all periods after the start of the intervention; we specifically use community-level aggregates weighting all responses equally. Significance is indicated at * p<.1, ** p<.05, *** p<.01.

These results are consistent with the primary pathway through which we think MAS is likely to work: girls learn skills that enable them to better communicate with their husband. This creates opportunities for them to participate in household decision-making, eases tensions around where girls go, and may even reduce intimate partner violence.²⁰

Table 6: Intra-household Outcomes

	(1) Husband Control Index	(2) Intimate Partner Violence Index	(3) Index of Partic in HH Decison-Making
Treat	-0.507 (0.045)*** {0.000}*** <0.001>***	-0.590 (0.045)*** {0.000}*** <0.001>***	1.280 (0.063)*** {0.000}*** <0.001>***
Lee Bounds	[-.55 -.40]	[-.62 -.42]	[1.22 1.42]
Pair FE	Yes	Yes	Yes
Control Mean	0.000	-0.000	-0.000
Observations	1145	1136	1142

Note: Robust standard errors clustered at the community level in parenthesis, randomization inference p-values within pairs with 1,000 repetitions in braces, and sharpened q-values in angled brackets. Lower and upper Lee Bounds are reported in square brackets. The regressions include the baseline value of the outcome, pair fixed effects, and other baseline covariates as selected by LASSO. Indices are defined in Appendix D. Significance is indicated at * p<.1, ** p<.05, *** p<.01.

8 Economic and social explanations

The life skills and other training provided by MAS, in addition to affecting how women engage with their husbands in their households, are also likely to affect other economic and social outcomes. In theory, changes in economic outcomes could drive our results; if the intervention leads women to earn significantly more money, they might be able to self-fund contraception and health services access, explaining our results.

²⁰Improved communication skills could either reduce the need for extractive violence or enable women to avoid expressive violence.

Table 7 focuses on economic outcomes. Women in treated communities are significantly more likely to have independent control over income; they are 54 percentage points (150%) more likely to have savings and 36 percentage points (61%) more likely to report having worked in the last year. These increases could lead respondents to be able to fund visits for contraception and other health services, even without improved engagement with their husbands.

Table 7: Economic Outcomes

	(1) Saving Money (d)	(2) Worked in Last Year (d)	(3) Husb Help Access Care (d)	(4) Comm Help Access Care (d)	(5) Resp Funded Care (d)
Treat	0.540 (0.017)*** {0.000}*** <0.001>***	0.357 (0.019)*** {0.000}*** <0.001>***	0.313 (0.031)*** {0.000}*** <0.001>***	0.064 (0.029)** {0.212} <0.008>***	0.087 (0.022)*** {0.031}** <0.001>***
Lee Bounds	[.524 .57]	[.327 .378]	[.281 .333]	[.059 .113]	[.084 .145]
Pair FE	Yes	Yes	Yes	Yes	Yes
Control Mean	0.360	0.587	0.585	0.113	0.065
Observations	1141	1140	1145	1145	1145

Note: Robust standard errors clustered at the community level in parenthesis, randomization inference p-values within pairs with 1,000 repetitions in braces, and sharpened q-values in angled brackets. Lower and upper Lee Bounds are reported in square brackets. The regressions include the baseline value of the outcome, pair fixed effects, and other baseline covariates as selected by LASSO. Significance is indicated at * $p < .1$, ** $p < .05$, *** $p < .01$.

Our data on access to funding, however, suggests that support from others – particularly husbands – are key to our findings. At endline, roughly 94% of women in the sample had some help from others in accessing care; 58% received help from their husbands. Women in the treatment group have a 5.3 percentage point increased likelihood of receiving help overall and an 8.7 percentage point increased likelihood of self-funding, but a far larger likelihood of receiving help from their husbands; there was an increase of 31 percentage points, or roughly 53%, in the likelihood that the husbands of women in the treatment group helped them access care.²¹ This is inconsistent with an explanation where women self-fund access to care, and instead consistent with a shift in household resources to women’s needs. We posit that it is far more likely that changes in intra-household decision-making led to women being more likely to participate in the labor force, as in Kala and McKelway (2025); in other words, that economic effects, rather than causing changes in intra-household dynamics, are instead driven by those same changes.

9 Conclusion

We present evidence from the evaluation of an intervention for married adolescents in northern Nigeria. MAS changes none of the typical determinants of outside options: it does not affect the laws that government property ownership or divorce, nor does it provide women with bank accounts or other ways to control household finances. Instead, MAS teaches adolescent girls life skills, like negotiation and community, alongside a package that includes remedial education and reproductive health.

We find that MAS nonetheless has substantial impacts on domains believed to be governed by intra-household dynamics. Girls in communities assigned to receive MAS are 38% less likely to be pregnant one year after the start of the program and access significantly more health services for themselves and their children up to three years later according to both self-reports and health center data. We also show direct

²¹This outcome was not pre-specified.

evidence that MAS increases girls' participation in household decision-making, and also find evidence that the intervention decreases experiences of IPV and her husband's control over a girl's movements – all consistent with better negotiating skills leading to changes in outcomes. Through evidence on economic outcomes and funding of health services, we show it is unlikely these results are due to effects on girls' earning potential.

These findings also relate to a broader literature on early marriage. Globally, evidence suggests that girls who marry as children experience worse outcomes in health services access, experience of intimate partner violence and labor force participation, and increases fertility - yet we find that MAS, which exclusively targets married adolescents, improves each of these outcomes. The results suggest that the effects of early marriage are not immutable; targeted interventions that improve girl's ability to navigate their new households can have large effects even after marriages have taken place.

Overall, our results shed light on the complexity of intra-household decision-making; they suggest that how women approach intra-household negotiation may greatly affect whether, and to what extent, they are able to direct household resources.

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A Additional tables and figures

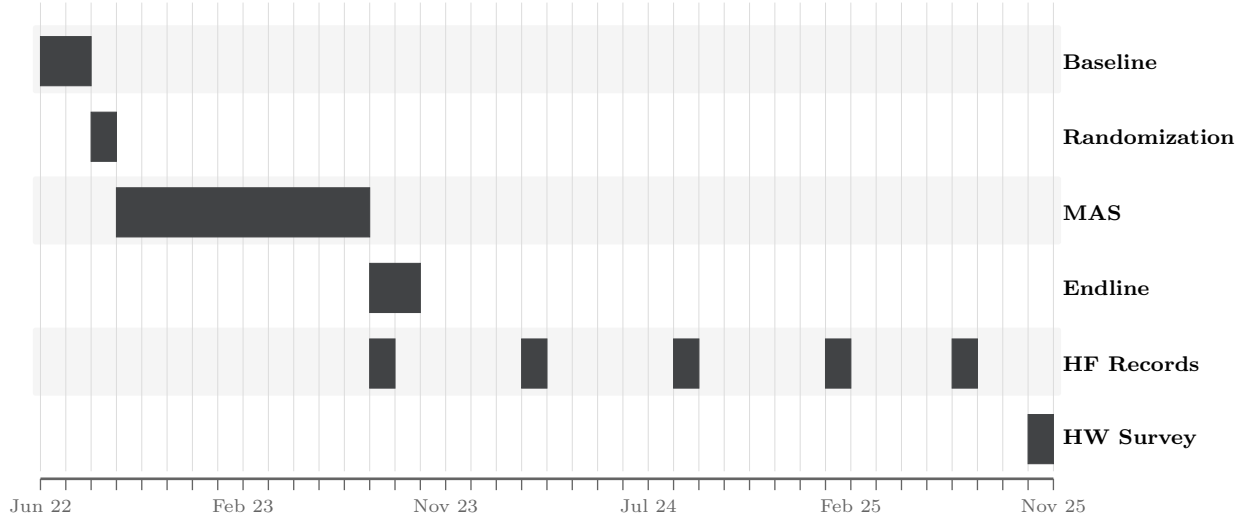


Figure A1: Evaluation timeline

Table A1: Program take-up

	(1) Ever in CGE Program (d)	(2) Attended MAS (d)	(3) Husband Attended MAS (d)	(4) Friend Attended MAS(d)
Treat	0.969 (0.006)*** {0.000}*** <0.001>***	0.968 (0.007)*** {0.000}*** <0.001>***	0.789 (0.024)*** {0.000}*** <0.001>***	0.556 (0.031)*** {0.000}*** <0.001>***
Lee Bounds	[.971 .987]	[.969 .986]	[.792 .798]	[.553 .637]
Pair FE	Yes	Yes	Yes	Yes
Control Mean	0.015	0.015	0.005	0.081
Observations	1145	1145	1143	1134

Note: Robust standard errors clustered at the community level in parenthesis, randomization inference p-values within pairs with 1,000 repetitions in braces, and sharpened q-values in angled brackets. Lower and upper Lee Bounds are reported in square brackets. The regressions include the baseline value of the outcome, pair fixed effects, and other baseline covariates as selected by LASSO. Significance is indicated at * $p < .1$, ** $p < .05$, *** $p < .01$.

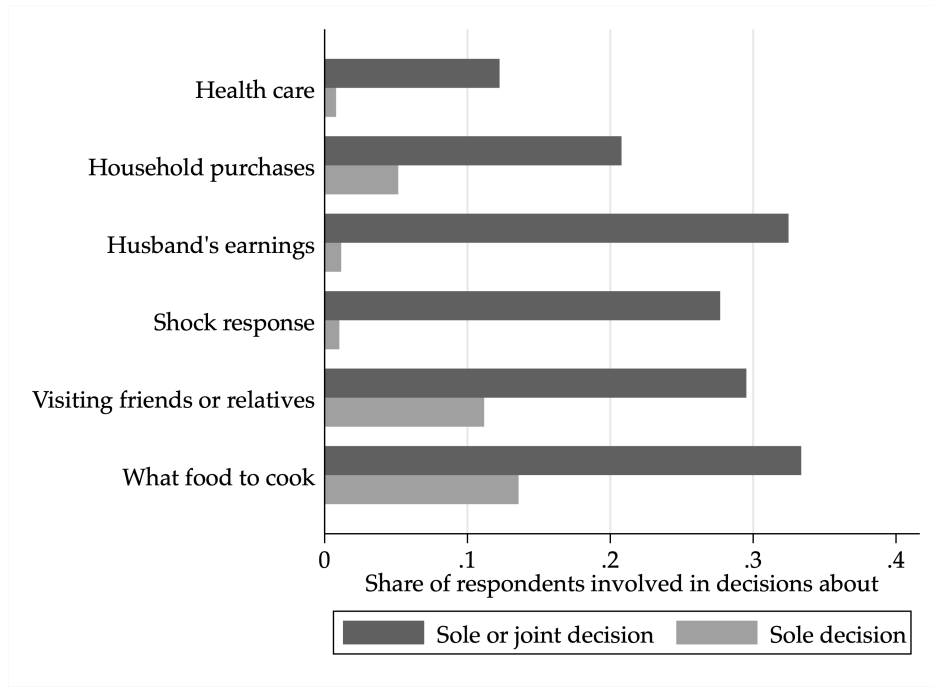


Figure A2: Household decision-making authority at baseline

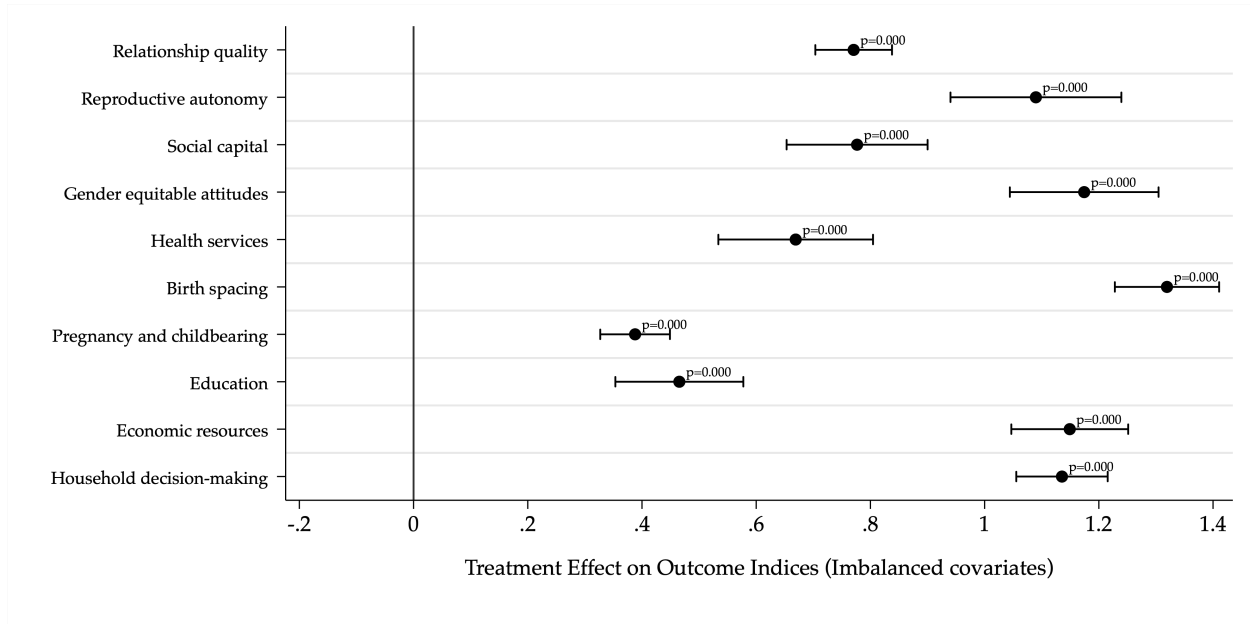


Figure A3: Effects of MAS (Imbalanced covariates)

Notes: The estimated effect is the coefficient on an indicator for assignment to treatment. 95% confidence intervals are constructed based on robust standard errors clustered at the community levels, and reported p-values are randomization inference p-values with 1,000 repetitions. The regressions include the baseline value of the outcome, pair fixed effects, and all imbalanced baseline covariates.

Table A2: Treatment Effect Heterogeneity

	Baseline mean	Relation- ship quality	Repro- ductive autonomy	Social capital	Gender equality attitude index	Health services	Birth spacing	Pregnancy and child- bearing	Education	Economic resources	Household decision- making
Current age	17.38	-0.06	-0.03	0.02	-0.11	-0.01	-0.07	0.03	0.11**	-0.02	-0.00
Hausa (d)	0.93	0.02	0.15	0.05	0.23	0.08	-0.07	-0.09	-0.29	-0.05	-0.24
Disability (d)	0.48	0.04	-0.10	-0.14	-0.08	-0.05	-0.01	0.06	0.11	-0.02	-0.04
Age at marriage	15.85	0.00	-0.02	0.01	-0.02	0.02	0.00	-0.04	0.03	-0.03	0.02
Polygamous (d)	0.26	0.03	0.08	-0.00	0.04	-0.04	-0.06	0.14	0.23*	-0.03	-0.04
Husband over 25 (d)	0.81	0.03	0.10	0.09	0.18	-0.06	-0.12	0.08	0.02	0.17	-0.08
Pre-marriage decisions (d)	0.10	-0.12	-0.13	0.13	0.18	-0.12	0.13	0.01	0.04	0.04	0.18
Mother literate (d)	0.46	0.08	-0.01	0.03	0.20	-0.13	0.02	-0.13	-0.14	-0.00	-0.06
Mother alive (d)	0.90	-0.11	-0.11	-0.02	0.09	-0.05	0.08	0.13	0.14	-0.12	-0.02
Father alive (d)	0.80	-0.06	-0.03	0.09	0.29	0.13	0.01	0.02	0.11	0.10	0.14
Nr in household	15.76	-0.00	-0.00	-0.00	0.00	0.00	0.00	-0.00	-0.00	-0.00	-0.00
Nr other wives	0.53	-0.00	0.05	0.01	-0.00	-0.01	-0.02	0.05	0.09	-0.01	-0.02
Any secondary (d)	0.63	0.10	0.05	-0.00	0.10	-0.07	0.10	0.02	-0.19	-0.10	-0.06
Asset index (sd)	0.00	0.06	-0.01	-0.06	0.08	0.09	0.00	-0.03	-0.06	0.05	-0.03
Husband in profession (d)	0.16	-0.04	0.04	0.13	-0.05	0.11	0.08	0.09	0.11	0.00	-0.10
Husband in agriculture (d)	0.32	-0.08	0.09	-0.05	-0.13	0.23	-0.07	-0.01	0.14	-0.06	-0.17
Husb any secondary (d)	0.82	0.17	0.01	0.03	0.15	0.01	-0.13	-0.09	-0.07	0.02	-0.01
Moved for marriage (d)	0.27	0.04	0.17	0.07	0.08	0.02	-0.03	0.13	0.16	0.38**	0.06
Ever moved (d)	0.48	-0.04	0.15	0.07	0.05	0.00	0.05	0.14	0.15	0.10	0.12
Ever displaced (d)	0.07	0.01	0.07	0.19	0.11	0.18	0.14	-0.18	0.21	0.17	-0.15
Nr shocks	2.41	0.03	-0.03	-0.04	-0.04	0.02	0.00	-0.01	0.04	-0.01	-0.02
Is pregnant (d)	0.22	0.18*	0.05	0.30**	0.18	0.06	0.14	0.23**	0.11	0.13	0.20
Any children (d)	0.71	0.07	-0.25*	-0.27*	-0.30*	-0.17	-0.46**	0.11	-0.05	-0.13	-0.16
Nr children	1.05	0.06	-0.11	-0.10	-0.08	-0.04	-0.16	0.10**	-0.04	-0.02	-0.09

This table contains estimation of heterogeneous treatment effects across various factors. The second column shows the control group mean at baseline for a given factor. The remaining columns contain the coefficient of a regression of the outcome family indicated in the header on the interaction between a dummy indicating treatment status and the factor. The regression controls for treatment status, the factor, pair IDs, and covariates selected by LASSO. Significance, based on randomization inference p-values within pairs with 1,000 repetitions, is indicated at * $p < .1$, ** $p < .05$, *** $p < .01$

Table A3: Comfort with health center

	(1) Overall comfort	(2) With Provider	(3) With FP	(4) Relative comfort
Treat	4.080 (0.206)*** {0.000}*** ⟨0.001⟩***	4.020 (0.201)*** {0.000}*** ⟨0.001⟩***	4.208 (0.218)*** {0.000}*** ⟨0.001⟩***	1.894 (0.163)*** {0.000}*** ⟨0.001⟩***
Control Mean (e)	4.020	4.019	3.740	2.236
Observations	38	38	38	38
Pair FE	Yes	Yes	Yes	Yes

Note: Robust standard errors clustered at the community level in parenthesis, randomization inference p-values with 1,000 repetitions in braces, and sharpened q-values in angled brackets. Data comes from health worker surveys; we specifically use community-level aggregates weighting all responses equally. Significance is indicated at * p<.1, ** p<.05, *** p<.01.

B Index family tables

Table B1: Effects on relationship quality index outcomes

	(1) Summary Index	(2) Husband Control Index	(3) Intimate Partner Violence Index
Treat	0.762 (0.032)*** {0.000}*** <0.001>***	-0.507 (0.045)*** {0.000}*** <0.001>***	-0.590 (0.045)*** {0.000}*** <0.001>***
Lee Bounds	[.652 .827]	[-.55 -.40]	[-.62 -.44]
Pair FE	Yes	Yes	Yes
Control Mean	0.000	0.000	-0.000
Observations	1145	1145	1136

Note: Robust standard errors clustered at the community level in parenthesis, randomization inference p-values within pairs with 1,000 repetitions in braces, and sharpened q-values in angled brackets. Lower and upper Lee Bounds are reported in square brackets. The regressions include the baseline value of the outcome, pair fixed effects, and other baseline covariates as selected by LASSO. Indices are defined in Appendix D. Significance is indicated at * p<.1, ** p<.05, *** p<.01.

Table B2: Effects on reproductive autonomy index outcomes

	(1) Summary Index	(2) Reproductive Autonomy Index	(3) Access to Health Care Provider	(4) Birth Dangers Knowledge Index
Treat	1.068 (0.069)*** {0.000}*** <0.001>***	0.519 (0.053)*** {0.000}*** <0.001>***	0.350 (0.028)*** {0.000}*** <0.001>***	0.967 (0.058)*** {0.000}*** <0.001>***
Lee Bounds	[.967 1.19]	[.434 .637]	[.342 .384]	[.84 1.02]
Pair FE	Yes	Yes	Yes	Yes
Control Mean	0.000	-0.000	0.498	-0.000
Observations	1145	1143	1145	1145

Note: Robust standard errors clustered at the community level in parenthesis, randomization inference p-values within pairs with 1,000 repetitions in braces, and sharpened q-values in angled brackets. Lower and upper Lee Bounds are reported in square brackets. The regressions include the baseline value of the outcome, pair fixed effects, and other baseline covariates as selected by LASSO. Indices are defined in Appendix D. Significance is indicated at * p<.1, ** p<.05, *** p<.01.

Table B3: Effects on social capital index outcomes

	(1) Summary Index	(2) Support in Disagreement	(3) Self Efficacy Index	(4) Number of Friends	(5) Friend Quality Index
Treat	0.763 (0.050)*** {0.000}*** <0.001>***	0.234 (0.021)*** {0.000}*** <0.001>***	0.730 (0.043)*** {0.000}*** <0.001>***	-0.199 (0.178) {0.471} <0.073>*	0.584 (0.052)*** {0.000}*** <0.001>***
Lee Bounds	[.64 .892]	[.203 .247]	[.582 .776]	[-.44 .536]	[.458 .64]
Pair FE	Yes	Yes	Yes	Yes	Yes
Control Mean	0.000	0.721	-0.000	6.884	0.000
Observations	1145	1141	1143	1145	1143

Note: Robust standard errors clustered at the community level in parenthesis, randomization inference p-values within pairs with 1,000 repetitions in braces, and sharpened q-values in angled brackets. Lower and upper Lee Bounds are reported in square brackets. The regressions include the baseline value of the outcome, pair fixed effects, and other baseline covariates as selected by LASSO. Indices are defined in Appendix D. Significance is indicated at * p<.1, ** p<.05, *** p<.01.

Table B4: Effects on gender equity attitudes index outcomes

	(1) Gender Equitable Attitudes Index
Treat	1.175 (0.061)*** {0.000}*** <0.001>***
Lee Bounds	[1.10 1.28]
Pair FE	Yes
Control Mean	0.000
Observations	1142

Note: Robust standard errors clustered at the community level in parenthesis, randomization inference p-values within pairs with 1,000 repetitions in braces, and sharpened q-values in angled brackets. Lower and upper Lee Bounds are reported in square brackets. The regressions include the baseline value of the outcome, pair fixed effects, and other baseline covariates as selected by LASSO. Indices are defined in Appendix D. Significance is indicated at * p<.1, ** p<.05, *** p<.01.

Table B5: Effects on health services index outcomes

	(1) Summary Index	(2) Health Services Visits for Child	(3) Health Services Visits for Self	(4) Husb Help Access Care (d)	(5) Comm Help Access Care (d)
Treat	0.686 (0.064)*** {0.000}*** <0.001>***	1.672 (0.215)*** {0.001}*** <0.001>***	2.267 (0.237)*** {0.000}*** <0.001>***	0.313 (0.031)*** {0.000}*** <0.001>***	0.064 (0.029)** {0.273} <0.016>**
Lee Bounds	[.604 .807]	[1.30 2.36]	[2.17 2.60]	[.28 .33]	[.05 .102]
Pair FE	Yes	Yes	Yes	Yes	Yes
Control Mean	-0.000	2.567	1.860	0.585	0.113
Observations	1145	880	1145	1145	1145

Note: Robust standard errors clustered at the community level in parenthesis, randomization inference p-values within pairs with 1,000 repetitions in braces, and sharpened q-values in angled brackets. Lower and upper Lee Bounds are reported in square brackets. The regressions include the baseline value of the outcome, pair fixed effects, and other baseline covariates as selected by LASSO. Indices are defined in Appendix D. Significance is indicated at * p<.1, ** p<.05, *** p<.01.

Table B6: Effects on birth spacing index outcomes

	(1) Summary Index	(2) Uses Birth Spacing (d)	(3) Heard of Birth Spacing (d)	(4) Discuss with Husband (d)	(5) Discuss with Health Prof (d)	(6) Discuss with Friends (d)
Treat	1.311 (0.045)*** {0.000}*** <0.001>***	0.679 (0.026)*** {0.000}*** <0.001>***	0.683 (0.016)*** {0.000}*** <0.001>***	0.371 (0.021)*** {0.000}*** <0.001>***	0.648 (0.025)*** {0.000}*** <0.001>***	0.283 (0.022)*** {0.000}*** <0.001>***
Lee Bounds	[1.27 1.36]	[.678 .73]	[.686 .701]	[.346 .399]	[.635 .685]	[.259 .311]
Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Control Mean	-0.000	0.060	0.320	0.047	0.115	0.151
Observations	1090	904	1090	1079	1079	1079

Note: Robust standard errors clustered at the community level in parenthesis, randomization inference p-values within pairs with 1,000 repetitions in braces, and sharpened q-values in angled brackets. Lower and upper Lee Bounds are reported in square brackets. The regressions include the baseline value of the outcome, pair fixed effects, and other baseline covariates as selected by LASSO. Indices are defined in Appendix D. Significance is indicated at * p<.1, ** p<.05, *** p<.01.

Table B7: Effects on pregnancy and childbearing index outcomes

	(1) Summary Index	(2) Is Pregnant (d)	(3) Number of Births	(4) Has Desired Time for Next Pregnancy (d)	(5) Number of Pregnancies	(6) Number of Children
Treat	0.402 (0.034)*** {0.000}*** ⟨0.001⟩***	-0.140 (0.016)*** {0.001}*** ⟨0.001⟩***	-0.132 (0.039)*** {0.035}** ⟨0.001⟩***	0.281 (0.020)*** {0.000}*** ⟨0.001⟩***	-0.160 (0.052)*** {0.107} ⟨0.008⟩***	-0.132 (0.028)*** {0.003}*** ⟨0.001⟩***
Lee Bounds	[.321 .502]	[-.15 -.13]	[-.18 -.07]	[.273 .314]	[-.17 -.02]	[-.16 -.09]
Pair FE	Yes	Yes	Yes	Yes	Yes	Yes
Control Mean	-0.000	0.367	1.476	0.685	1.744	1.252
Observations	1143	1127	1138	754	1131	1140

Note: Robust standard errors clustered at the community level in parenthesis, randomization inference p-values within pairs with 1,000 repetitions in braces, and sharpened q-values in angled brackets. Lower and upper Lee Bounds are reported in square brackets. The regressions include the baseline value of the outcome, pair fixed effects, and other baseline covariates as selected by LASSO. Indices are defined in Appendix D. Significance is indicated at * p<.1, ** p<.05, *** p<.01.

Table B8: Effects on education index outcomes

	(1) Summary Index	(2) In School (d)	(3) Would complete secondary or tertiary (d)	(4) Would complete tertiary (d)
Treat	0.481 (0.055)*** {0.000}*** ⟨0.001⟩***	0.054 (0.014)*** {0.028}** ⟨0.001⟩***	0.101 (0.014)*** {0.002}*** ⟨0.001⟩***	0.204 (0.023)*** {0.000}*** ⟨0.001⟩***
Lee Bounds	[.38 .522]	[.048 .067]	[.074 .101]	[.181 .206]
Pair FE	Yes	Yes	Yes	Yes
Control Mean	-0.000	0.018	0.862	0.577
Observations	1145	1142	1121	1121

Note: Robust standard errors clustered at the community level in parenthesis, randomization inference p-values within pairs with 1,000 repetitions in braces, and sharpened q-values in angled brackets. Lower and upper Lee Bounds are reported in square brackets. The regressions include the baseline value of the outcome, pair fixed effects, and other baseline covariates as selected by LASSO. Indices are defined in Appendix D. Significance is indicated at * p<.1, ** p<.05, *** p<.01.

Table B9: Effects on economic resources index outcomes

	(1) Summary Index	(2) Tracks Money (d)	(3) Saving Money (d)	(4) Has Emergency Savings (d)	(5) Worked in Last Year (d)
Treat	1.140 (0.048)*** {0.000}*** <0.001>***	0.505 (0.023)*** {0.000}*** <0.001>***	0.540 (0.017)*** {0.000}*** <0.001>***	0.542 (0.028)*** {0.000}*** <0.001>***	0.357 (0.019)*** {0.000}*** <0.001>***
Lee Bounds	[1.1 1.20]	[.495 .538]	[.531 .576]	[.532 .577]	[.333 .38]
Pair FE	Yes	Yes	Yes	Yes	Yes
Control Mean	-0.000	0.418	0.360	0.376	0.587
Observations	1143	1138	1141	1141	1140

Note: Robust standard errors clustered at the community level in parenthesis, randomization inference p-values within pairs with 1,000 repetitions in braces, and sharpened q-values in angled brackets. Lower and upper Lee Bounds are reported in square brackets. The regressions include the baseline value of the outcome, pair fixed effects, and other baseline covariates as selected by LASSO. Indices are defined in Appendix D. Significance is indicated at * p<.1, ** p<.05, *** p<.01.

Table B10: Effects on household decision-making index outcomes

	(1) Summary Index	(2) Partic in Decision-Making Index	(3) Confident Husband Supports Her Saving (d)	(4) Participates in Shock-Related Decisions (d)	(5) Discuss Shocks with Husband (d)
Treat	1.116 (0.036)*** {0.000}*** <0.001>***	1.280 (0.063)*** {0.000}*** <0.001>***	0.453 (0.016)*** {0.000}*** <0.001>***	0.580 (0.020)*** {0.000}*** <0.001>***	0.310 (0.020)*** {0.000}*** <0.001>***
Lee Bounds	[1.07 1.21]	[1.23 1.42]	[.44 .478]	[.583 .614]	[.296 .334]
Pair FE	Yes	Yes	Yes	Yes	Yes
Control Mean	-0.000	-0.000	0.463	0.186	0.604
Observations	1142	1142	1136	1128	1128

Note: Robust standard errors clustered at the community level in parenthesis, randomization inference p-values within pairs with 1,000 repetitions in braces, and sharpened q-values in angled brackets. Lower and upper Lee Bounds are reported in square brackets. The regressions include the baseline value of the outcome, pair fixed effects, and other baseline covariates as selected by LASSO. Indices are defined in Appendix D. Significance is indicated at * p<.1, ** p<.05, *** p<.01.

Table B11: Effects on climate change index outcomes

	(1) Summary Index	(2) Climate Change Awareness Index	(3) Personal Climate Action Index	(4) Any Climate Action (d)
Treat	0.459 (0.068)*** {0.003}*** <0.001>***	0.262 (0.052)*** {0.009}*** <0.001>***	0.297 (0.096)*** {0.073}* <0.001>***	0.284 (0.040)*** {0.001}*** <0.001>***
Lee Bounds	[.387 .582]	[.202 .403]	[.276 .479]	[.26 .305]
Pair FE	Yes	Yes	Yes	Yes
Control Mean	0.000	0.000	0.000	0.423
Observations	1145	1145	1145	1145

Note: Robust standard errors clustered at the community level in parenthesis, randomization inference p-values within pairs with 1,000 repetitions in braces, and sharpened q-values in angled brackets. Lower and upper Lee Bounds are reported in square brackets. The regressions include the baseline value of the outcome, pair fixed effects, and other baseline covariates as selected by LASSO. Indices are defined in Appendix D. Significance is indicated at * $p < .1$, ** $p < .05$, *** $p < .01$.

C Author contributions

Isabelle Cohen was responsible for study design, data cleaning and analysis, as well as the writing of the academic paper. She also contributed to fundraising for the evaluation.

Aisha Bello and Bilkisu Abba were responsible for implementing the Safe Spaces for Married Adolescents program at the Centre for Girls Education, as well as coordinating data collection from health centers.

Aminu Bello Gurin was responsible for overseeing data collection for the girls survey at the Centre for Girls Education, as well as overseeing internal monitoring for intervention.

Daniel Perlman spearheaded the design of the Safe Spaces for Married Adolescents Program. He was responsible for fundraising, contributed to study design, and helped make sense of the context and findings for the paper.

D Data construction

This appendix contains details on the construction of variables used in the analysis of the MAS program, in particular the construction of indices. The construction of these indices follows Anderson (2008), with measures standardized in direction and relative to the control group before being combined into aggregate measures. Bold text indicates primary prespecified outcomes. Reversed items are indicated with parenthesis.

Table D12: Variable Definition

Index/Outcome	Variable
Relationship quality index	Husband control index (reversed)
	Intimate partner violence index (reversed)
Husband control index	In the last six months, husband has forbidden respondent from: "Use a mobile phone"
	In the last six months, husband has forbidden respondent from: "Listen to the radio"
	In the last six months, husband has forbidden respondent from: "Travel to visit nearby friends or relatives"
	In the last six months, husband has forbidden respondent from: "Receive visits from friends or relatives"
	In the last six months, husband has forbidden respondent from: "Go to the market"
	In the last six months, husband has forbidden respondent from: "Seek health care/visit a health center"
	In the last six months, husband has forbidden respondent from: "Seek paid work"
	In the last six months, husband has forbidden respondent from: "Participate in religious activities in the community"
Intimate partner violence index	In the last six months, a man has: "Insulted or humiliated you"
	In the last six months, a man has: "Threatened you or someone close to you"
	In the last six months, a man has: "Touched you indecently"
	In the last six months, a man has: "Hit, slapped, kicked, or beat you"
	In the last six months, a man has: "Withheld money or resources for you"
	In the last six months, a man has: "Forced you to do anything sexually you did not want"
	In the last six months, a man has: "Teased or harassed you"
Reproductive autonomy index	Reproductive empowerment index
	Access to nurse, midwife or health worker

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Table D12 (continued)

Index	Variable
Reproductive empowerment index	Knowledge of birth dangers index
	Answered true: "Girls like you often fear that men will pressure them to do things sexually they do not want to" (reversed)
	Answered true: "Girls like you have enough of a say in deciding when to marry"
	Answered true: "Girls like you have enough of a say in deciding whom to marry"
	Answered true: "Since marrying, you have had the power to make decisions about matters that are important to you and your well-being"
	Answered true: "You feel comfortable talking with your husband about how many children you want to have"
	Answered true: "You would feel comfortable talking with your husband about when you want to next become pregnant, including whether you want to become pregnant soon, or delay a pregnancy."
	Answered true: "You feel you have the power to control when you have children"
	Answered true: "You feel you have the power to control how many children you have"
	Answered true: "You have a parent or other adult who accepts you as you are"
	Answered true: "You have a parent or other adult who trusts you to make the right decisions"
	Answered true: "You can do the things you want to do without worrying about your safety"
Knowledge of birth dangers index	Answered true: "Walking around the community, girls like you can feel like they have control over their own bodies"
	Answered yes to indication of needing care for postpartum medical attention: "Bleeding"
	Answered yes to indication of needing care for postpartum medical attention: "Fever or high body temperature"
	Answered yes to indication of needing care for postpartum medical attention: "Chill or low body temperature"
	Answered yes to indication of needing care for postpartum medical attention: "Swelling in hands or feet"
Social capital index	Answered yes to indication of needing care for postpartum medical attention: "Headache or trouble seeing"
	Have someone who could speak with husband on own behalf under disagreement
	Self-efficacy index
	Number of friends
Self-efficacy index	Friendship quality index
	Strongly agrees with statement: "Your parents/family listens to you when you speak"
	Strongly agrees with statement: "Your parents/family takes your concerns into account when making decisions"
	Strongly agrees with statement: "Your parents/family trusts you with important tasks for the household (such as caring for children, taking care of livestock, or generating income)"
	Strongly agrees with statement: "You feel as important as other members of your family"
Friendship quality index	Strongly agrees with statement: "People like you can make a positive impact in the community"
	Answered true: "Your friends really try to help you."
	Answered true: "You can count on your friends when things go wrong."
	Answered true: "You have friends with whom you can share your joys and sorrows."
	Answered true: "You can talk about your problems with your friends."
Gender equitable attitudes index	Answered true: "You have someone to borrow money from in an emergency."
	Answered true: "Your female relatives and friends ask for your advice."
	Answered agree: "It is important that sons have more education than daughters"
	Answered agree: "Daughters should be sent to school only if they are not needed to help at home." (reversed)
	Answered agree: "The most important reason that sons should be more educated than daughters is so that they can better look after their parents when they are older." (reversed)

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Table D12 (continued)

Index	Variable
	Answered agree: "If there is a limited amount of money to pay for tutoring, it should be spent on sons first." (reversed)
	Answered agree: "A woman should take good care of her own children and not worry about other people's affairs." (reversed)
	Answered agree: "Women should leave politics to the men." (reversed)
	Answered agree: "A woman has to have a husband or sons or some other male kinsman to protect her." (reversed)
	Answered agree: "A good woman never questions her husband's opinions, even if she is not sure she agrees with them." (reversed)
	Answered agree: "When it is a question of children's health, it is best to do whatever the father wants." (reversed)
	Answered agree: "Daughters should be able to work outside the home after they have children if they want to."
	Answered agree: "Daughters should have just the same chance to work outside the homes as sons."
Health services index	Number of health service visits for children in the last six months
	Number of health service visits for self in the last six months
	Received money or transportation to help access health services from in-laws, own relatives, co-wife, friend, neighbor or other community member or someone else in the last six months
	Received money or transportation to help access health services from husband
Birth spacing index	Currently uses birth spacing
	Has heard of birth spacing
	Has discussed birth spacing with husband
	Has discussed birth spacing with medical professional
	Has discussed birth spacing with friends
Pregnancy and childbearing index	Respondent currently pregnant (reversed)
	Has intended timing for next pregnancy
	Number of pregnancies (reversed)
	Number of births (reversed)
	Number of live children (reversed)
Education index	Currently in school
	Would complete senior secondary or beyond if she could choose
	Would complete higher than senior secondary if she could choose
Economic resources index	Keeps track of money
	Currently saving money
	Has savings in case of emergency
	Worked in the last year
Household decision-making	Participation in decision-making index
	Very confident husband would support her saving money
	Participates in shock-related decision-making
	Discussed response to recent shock with husband
Participation in decision-making index	Answered respondent solely decides or respondent decides joint with husband to: "Who usually decides how your husband's earnings will be used?"
	Answered respondent solely decides or respondent decides joint with husband to: "Who usually makes decisions about health care for members of your household?"
	Answered respondent solely decides or respondent decides joint with husband to: "Who usually makes decisions about household purchases?"
	Answered respondent solely decides or respondent decides joint with husband to: "Who usually makes decisions about what food to cook for the household?"

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Table D12 (continued)

Index	Variable
Climate change index	Answered respondent solely decides or respondent decides joint with husband to: “Who usually makes decisions about when you will visit relatives or friends?”
	Answered respondent solely decides or respondent decides joint with husband to: “When you think about this shock/the most serious shock [recently experienced], who was mostly responsible for deciding what to do in response?”
	Awareness of climate change index
Awareness of climate change index	Personal climate action index
	Took any climate action
	Answered ‘Is changing’ to: “Longer dry seasons”
	Answered ‘Is changing’ to: “Heavier rain storms or worsening flooding”
	Answered ‘Is changing’ to: “Changes in timing of weather signs that it is planting seasons”
	Answered ‘Is changing’ to: “Colder cold seasons”
	Answered ‘Is changing’ to: “Hotter hot seasons”
	Answered ‘Is changing’ to: “Worse harvests”
	Answered ‘Is changing’ to: “Water shortages”
	Answered ‘Is changing’ to: “Water contamination”
	Answered ‘Is changing’ to: “Drought”
	Answered ‘Is changing’ to: “Soil erosion”
	Answered ‘Is changing’ to: “Leaching”
	Answered ‘Is changing’ to: “Other changes”
Personal climate action index	Took action: “Participated in a tree planting campaign, or collected plastics or other litter”
	Took action: “Tried new ways of collecting, storing, or sharing water”
	Took action: “Developed emergency plans for the whole community”
	Took action: “Collected or distributed food, supplies, or money to support families in need”
	Took action: “Shared concerns or sought government officials’ assistance for problems related to weather, seasonal change, deforestation, or their effects”
	Took action: “Shared concerns or sought assistance from local leaders for problems related to weather, seasonal change, deforestation or their effects”
	Took action: “Tried new farming items, such as new types of seeds or crops”
	Took action: “Sought new sources of livelihoods in response to changes in seasons, weather, or condition of soil/land”
Asset index (baseline only)	Household has radio
	Household has mobile phone
	Household has electricity
	Household has television
	Household has bicycle
	Household has motorcycle
	Household has flooring made of vinyl, tiles, cement, or carpet
	Household has roof made of metal or cement
	Household has a water source other than a well