Disparities in Spousal Desired Fertility and Land Tenure Expectations: Experimental Evidence from Rural Tanzania

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Abstract

Fertility decline in rural sub-Saharan Africa has lagged behind other developing countries. The gap in fertility preferences between men and women plays a pivotal role in determining household fertility and reproductive health outcomes, with men desiring more children and exerting more significant influence in household decision-making. This disparity becomes more pronounced in rural regions where patrilineal norms, especially those associated with land inheritance, remain prevalent. We estimate the effect of an informational family planning intervention on male and female fertility preferences in rural Tanzania. The experiment consisted of randomizing household consultations on modern contraception, with sessions conducted either jointly for husbands and wives or exclusively for wives in private. Surprisingly, husbands who engaged in joint consultations increased their desired additional number of children, and their wives mirrored this increase in fertility preferences. In contrast, women in private consultations reduced their additional desired number of children while their husbands' preferences remained unchanged. We provide suggestive evidence that the unintended effects on fertility preferences might be motivated by land inheritance expectations, as our results are driven by households with firstborn daughters (rather than sons).

Keywords: Intrahousehold bargaining, fertility, randomized experiment , fertility preferences
JEL codes:D13, J13, O15

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1 Introduction

The fertility decline in sub-Saharan Africa has been much slower than in other developing countries (Singh et al. [2017]). The unique demographic transition in the region- characterized by high fertility rates despite improvements in child mortality, availability of contraceptives, and female education (Pörtner [2023])- is still a subject of academic debate. The economic and demographic evidence suggests that much of this high fertility is intentional, and that fertility desires are substantially higher in sub-Saharan Africa than in other low-income regions, particularly among poorer households (Zipfel et al. [2022], Pritchett [1994]). The gap in fertility preferences between men and women plays a pivotal role in determining household fertility and reproductive health outcomes, as husbands typically desire more children than their wives and have more intra-household bargaining power (Ashraf et al. [2014], McCarthy [2019], DeRose and Ezeh [2010]). Recent experimental evidence has tested different approaches to involve men in family planning programs to increase contraceptive use and reduce fertility finding mixed results.(Karra et al. [2021], D'Exelle and Ringdal [2022]).

The spousal gap in fertility preferences may be more pronounced in rural areas, where agricultural family labor demands are high and gender-inequitable social norms are pervasive. Land is perhaps the most valuable asset for rural families in sub-Saharan Africa, for both production and generational wealth (Wineman and Liverpool-Tasie [2019]) and because of the abundance of open and affordable land, combined with the prevalence of small-scale agriculture, there is likely a high return to having children in sub-Saharan Africa [Pörtner et al., 2018]. Furthermore, the combination of patrilineal customary laws and the practice of primogeniture[1] implies that oldest sons are valuable inheritors of family farm land. This is especially true in rural Tanzania–our study context- where land inheritance has been based on patrilineal principles, with land passed primarily from father to sons (Wineman and Liverpool-Tasie [2019], Genicot and Hernandez-de Benito [2022]) and disparities in fertility

[1]Patrilineality is a kinship system in which and individual's membership derives from the father's lineage. Primogeniture refers to the right of succession belonging to the firstborn child

preferences are significant: husbands desire twice as many additional children as their wives. Although 89% of women report wanting to delay or prevent pregnancy, only 18 percent of women had ever used modern contraception at baseline.

In this paper, we investigate the effect of a family planning intervention on male and female fertility desires in rural Tanzania and then examine whether expectations about future land bequests are a potential mechanism for changes in fertility preferences. We leverage the experimental variation of an informational family planning intervention that randomized the inclusion of husbands in household consultations. These consultations, conducted by a trained local family planning worker, discussed the benefits of birth spacing, the safety of modern contraception, and gave women (or women and men together) the opportunity to discuss the number of children they would like. We then investigate the motivations behind desired fertility, performing heterogeneity analysis on the treatment effects by the gender of the firstborn child. As the oldest sons are the clear inheritors of family farmland in this context, we measure the way that uncertainty about long-term land bequests affects parents' reported fertility desires.

We find that both men and women in the couples treatment group increase their fertility desires after the joint consultations in the family planning program. Our analysis suggests that this results from the opportunity that the family planning program presented to couples to disclose their fertility goals, mostly for the first time.While women had lower desired fertility than their husbands at baseline, both men and women who participated in these joint conversations reported higher desired fertility at endline. Overall these results indicate that fertility preferences are not stagnant and can respond to information [Bongaarts, 2020]. Despite the fact that McCarthy [2019] demonstrates the short-run success of the family planning program on contraceptive use and pregnancies, in this paper, we show the unintended consequences (at least in terms of reported preferences) against the same program.[2] Consis-

[2]There is additional evidence on well-intended reproductive health and family planning programs finding an unintended consequence of the program. For example, [Friedman, 2018] demonstrated that the availability of antiretrovirals programs to deter HIV/AIDS may increase unintended pregnancies and unprotected sex in Kenya. Similarly, Buckles and Hungerman [2018] demonstrated that a condom distribution program increased

tent with the increase in male fertility preferences due to the couples intervention, we also find that husbands participating in this treatment group are more likely to increase their expected number of wives in the future.Our heterogeneity analysis demonstrates that the “pushback effects" are driven by parents whose firstborn child is a daughter. Lacking sons or an oldest son motivates husbands to push back against the idea of smaller families and expect to have more children and more wives in the future.

We contribute to two literature strands in development economics. First, our paper builds off of previous studies by documenting that the distribution of intra-household bargaining power plays a role in high fertility, as there is a gap between husbands' high fertility desires and wives' relatively lower fertility desires, particularly in Sub-Sahara Africa (Ashraf et al. [2020], Westoff et al. [2010], Doepke and Tertilt [2018]). Several family planning programs have aimed to involve men, expecting to reduce fertility and increase modern contraception uptake (i.e., Miller et al. [2020]). However, the experimental evidence on the effect of men is inconclusive. While the majority of this research finds beneficial results in increasing modern contraception when men are included (i.e., D'Exelle and Ringdal [2022], El-Khoury et al. [2016]), Ashraf et al. [2014] found that women behave strategically to seek out family planning when their husbands are unaware of the option (perhaps by avoiding his “veto” power). Building on McCarthy [2019],[3] we show that the first-order positive impacts of an informational family planning intervention on contraception and short-term fertility can occur simultaneously with husbands' “pushing back” against such programs as men increase their fertility preferences, and their wives seem to align with this uptick in fertility preferences.

Second, we contribute to the literature exploring the consequences of land inheritance and bequeathing motives in sub-Saharan Africa (Wineman and Liverpool-Tasie [2019]). As land markets are limited, inheritance may be the only way to access this important factor

teenage fertility in the US context. Moreover, Brinkman et al. [2016] showed that the infant simulator program (meant to demonstrate the difficulty of child-rearing) actually increased teenage pregnancies in Australia.

[3]McCarthy [2019] leverages the same experiment and sample estimation of this paper and finds that family planning consultations involving husbands and wives increase modern contraceptive use and reduce pregnancy, our study delves into the effects on fertility preferences.

of agricultural production, and this can leave women at a disadvantage. Indeed, evidence has shown that despite being heavily involved in agricultural production, women in most of the region own little land and are concerned about tenure security [Doss et al., 2015, Kudo, 2015, Peterman, 2011]. In Tanzania, land inheritance expectations for parents depend on the gender of their firstborn child [Genicot and Hernandez-de Benito, 2022], and both women and men favor their sons in bequest decisions [Wineman and Liverpool-Tasie, 2019], indicating that patrilineal customary laws are still prevalent. We bridge the gap in the literature between strategic bequests and gender inequality by demonstrating that long-term inheritance planning on the part of parents motivates their (stated) intentions in response to family planning information.

The rest of the paper is organized as follows. Section 2 describes the experiment and household surveys, as well as a landscape of the land tenure in rural Tanzania. Section 3 explains the empirical strategy and Section 4 discusses the results from our analysis. Finally, section 5 presents the conclusions and policy implications.

2 Context and Data Descriptive Statistics

This paper leverages household data from a randomized control trial that disseminated family planning (FP) information among rural households in the Meautu District of northern Tanzania, a region poorer and more rural than other parts of the country. The experiment consisted of a baseline survey collected from August to November 2012, an FP intervention that lasted for 15 months, and an endline survey collected from July 2014 to February 2015. Next, we describe the most relevant features of the experimental design used to analyze the relationship between fertility desires, firstborn child's gender, household land tenure expectations and cultivation decisions.

2.1 Household surveys

The data used in this study were drawn from household surveys conducted in Meatu district of northern Tanzania, encompassing 12 distinct villages. Out of the 19 wards within Meatu, nine were chosen through a random selection process to be included in the sample. These selected wards consisted of a total of 48 villages, with 12 of them being randomly designated for participation in the study. Every village leader from these 12 villages consented to participate in the study. Subsequently, each village leader supplied a comprehensive list of households residing in their respective villages. To streamline the process, these household lists were further categorized by sub-villages, with each village containing between 2 to 8 sub-villages. From each village, a random selection was made, comprising 2 to 5 sub-villages, all of which were incorporated into the study. Within these 2-5 selected sub-villages, an equitable number of households were randomly selected from the household rosters, thereby constituting the study's sample.[4] To be eligible for participation in the study, households needed to have a married woman aged between 13 and 40 years of age, and her husband must reside in the dwelling.[5]

The baseline Meatu household survey took place from August to November 2012 and involved a sample of 660 households. This comprehensive survey consisted of separate questionnaires for both men and women, each covering various key topics including socioeconomic status, health and family planning, intra-household decisions, and agriculture. On average, 55 households were interviewed in each of the 12 study villages, resulting in a total baseline sample size of 660 households. Following the intervention, baseline households were re-interviewed between July 2014 and February 2015. However, some households could not be re-interviewed for various reasons, such as refusal to participate, household separation, or migration. This resulted in an attrition rate of approximately 12 percent varying across the sample villages. Seventy-seven men, 12 women and 66 complete households could not be

[4]Approximately 5 percent of the households originally selected refused to participate in the household survey and they were randomly replaced.

[5]In households with more than one wife, the field staff conducted interviews with the eldest wife under 40 years old, a situation observed in about 10 percent of households. In cases where multiple pairs of spouses were present and eligible for interviews, preference was given to the couple including the head of the household, a scenario encountered in approximately 5 percent of households.

found for endline interviews.[6] The final sample size is 515 households at the endline survey. Although attrition did not occur randomly, McCarthy [2019] shows that this attrition rate is not a concern for the validity of the intervention effects on fertility outcomes. For instance, the attrition levels vary slightly by treatment status, but the differences are not statistically significant.[7] The baseline rate of contraceptive use among women who did not attrit is 13 percent, while this rate among women in attritted households is 9 percent; however, once again, this difference is not statistically different. Similarly, households that were not followed up were, on average, less educated (i.e., the women's primary completion rate is 90 % among attritted households, while it is 88% among non-attrited households); nevertheless, this difference is not statistically significant. Therefore, it is difficult to know *a priori* the direction of how the attrition bias would affect the outcome of interest. The estimate of the impact of the treatment on fertility behavior is unlikely to suffer from such as substantial bias given that it is not significantly correlated with treatment or outcomes. [McCarthy, 2019]

2.2 Intervention

The family planning experiment effectively lowered the cost of fertility control through mediated household conversations about the benefits of birth spacing and the safety of contraceptives. It was a community-led program that began with the district hospital tasking each village executive council in each of the eight treatment villages to select three female community leaders who were literate and had spouses supportive of their employment. These women were trained as "community-based distributors" (CBDs) by family planning educators from the Ministry of Health in February 2013. The two-week training focused on the benefits of birth spacing, the safety of contraceptives (dispelling any myths about infertility), understanding different family planning methods, infant health, maternal health, and

[6]In cases of spousal separation, interviewing the woman was prioritized for the second round of the household survey.

[7]16 percent attrition in the control group, 16 percent in the individual treatment group and 13 percent in the couples treatment group

negotiation skills.[8] After the training, the CBDs returned to their own villages, where they began their (paid) work, visiting and consulting with households about family planning and coordinating with the local dispensary.

To investigate the role of asymmetric spousal information on fertility decisions and preferences throughout the fifteen-month intervention, the treatment villages were divided into two distinct groups. In one treatment group (four villages), the CBDs conducted consultations with women individually (referred to as the individual treatment group). In the other four villages, the CBDs engaged in consultations with both husbands and wives together (referred to as the couples treatment group). Meanwhile, households in the four control villages did not receive any consultations.

During these household visits, CBDs followed a protocol that was similar in content in both the individual and couples villages. First, the CBD would greet all family members and indicate that she was there to discuss family planning, and was the woman of the household (or, woman and her husband) available for a private conversation. She would begin the consultation by mentioning that she took a seminar at the district capital on health and family planning and that she would like to share what she learned. Then, the CBD would mention the benefits of birth spacing (at least 2 years) for mothers and children. Next, she would point out that family planning is free and available at local dispensary, discussing the benefits of different short-term and long-term options and dispelling any myths. Then, she would ask the woman (or the couple) about their desired fertility, and how spaced out they would like future children to be. In many cases, this discussion of fertility goals was the first time many couples learned about their spouse's desired fertility [McCarthy, 2019]. In this way, the couples consultations serve as both an information session about family planning and an opportunity to reveal preferences. Finally, the CBD would ask if the couple was interested in more information about family planning, and discuss the availability of (free)

[8]The training curriculum originated from a UNICEF handbook on family planning and child health. The teachers at the training were employed by the district hospital as public health educators, specializing in sexual and reproductive health.

services at the local dispensary. On her way out, she would indicate that she is working in the village on family planning for the next year, and that she will return in a month or so to check in.

The family planning program was cluster-randomized at the village level and treatment assignment was stratified along village-level baseline contraceptive use. Since exactly three CBDs were chosen for each village and they were assigned with visiting a minimum of forty households each month, the frequency of CBD visits per household varied depending on the size of the village. In general, smaller villages received more intensive treatment, resulting in a greater number of household visits throughout the fifteen-month intervention.[9] The treatment intensity varies from one household visit once every two weeks (in the smaller villages) to a few visits per year. Seventy-three percent of households who were visited by a CBD participated in four to six visits over the course of the intervention.[10]

The spatial distribution of households in the individual treatment, couples treatment, and control group is depicted in Figure 1. In this figure, each blue dot represents a household in the individual treatment group, each black dot represents a household in the couples treatment group, and each red dot represents a control household.

In certain instances, treatment households chose not to participate. While CBDs were encouraged to visit every household in their designated sub-villages or village, they would cease pursuing consultations with households in the event of conflicts or opposition (whether from the husband, wife or an in-law). Although CBDs reported that 5-20% of households refused participation, household survey data indicated that 31 percent of households, originally assigned to the treatment group, reported no CBD visits. Compliance was not markedly differ-

[9]In most instances, the entire village was included in the treatment, but in the case of three larger villages one to two sub-villages were excluded from the treatment to reduce the workload for the CBDs.

[10]The household survey data do not include information on which CBDs visited each home. And due to the decentralized implementation as planned by the district hospital, each household may have been visited by any one of the three CBDs in each village. Although all CBDs received the same training, it is likely that some consultations were higher quality than others. It is also not possible to know *exactly* what took place during CBD visits as they were private meetings. Thus, in the analysis, it is not possible to disentangle program effects from CBD quality effects. Additionally, it is not possible to control for *which* CBD visited each woman, nor to include a CBD fixed effect.McCarthy [2019]

ent between the two treatment arms, with 31 percent of households in the couples treatment group and 30 percent of households in the individual treatment group reporting no visits.

Figure 1 also illustrates the distribution of village health dispensaries, which are akin to small clinics equipped with pharmacies. Notably, numerous villages have their own dedicated dispensaries, although in some instances, multiple villages share a single dispensary or a clinic that provides pharmacy services. The map also displays two types of dispensaries: control dispensaries and treatment dispensaries. The classification of a dispensary as a "treatment dispensary" is based on input from each village, specifically on whether the residents of that village would typically visit that particular dispensary for contraception services. If the dispensary also served women who were part of the treatment group (those receiving CBD visits), it was categorized as a "treatment dispensary." An important point to highlight is that all forms of contraception offered in Tanzanian public dispensaries are provided to women at no cost. Interestingly, during the baseline focus group discussions, a significant number of women revealed that they were unaware of the fact that contraceptives were available free of charge.

2.3 Land Tenure Landscape

Throughout history, land rights and tenure have been shaped by diverse customary laws that vary among different tribes in Tanzania. The concept of land ownership has traditionally been communal, belonging to families, clans, or tribes, with women having low access to property and inheritance land rights (Peterman [2011]). Within our sample group, comprising 95% Sukuma tribe members, a patrilineal societal structure is still prevalent. Under this system, property is passed down through the male lineage, with the primogeniture distribution rule favoring the eldest son in inheritance matters. Consequently, women's access to land is intricately linked to their relationships with male household members, and retaining land following a spouse's death or separation can pose significant challenges. The confluence of patrilocality and polygamy further compounds the issue, intensifying the obstacles faced by women in obtaining land rights. Despite the implementation of land reforms, an enduring tension persists between customary law and the advancement of gender-inclusive land rights ([Genicot and Hernandez-de Benito, 2022, Peterman, 2011]).

2.4 Descriptive Statistics: Fertility Preferences and Land

We use the 2012-2014 Meatu household survey data collected in the experiment for our analysis. In particular, we leverage questions on fertility preferences included separately in the men's and women's questionnaires. To measure husbands' fertility preferences, we use the following survey question *"How many more children do you expect to have?"*. If the respondent has no children, he was asked how many children he would like to have.[11] We use the following two questions to measure women's desired fertility. First, the survey asked the female respondent *"Would you like to have more children,or would you prefer not to have any more children?"*. At baseline, 35 percent of women answered *"It is Up-to-God"* to this question, plausibly suggesting women's uncertainty about their desired fertility (Frye and Bachan [2017]). If women responded that they would like to have more children, they were subsequently asked *"How many more children would you like to have?"*. To distinguish between the numeric preferences and the uncertainty in their answers, we first analyze whether the interventions affect a woman's likelihood of responding *"It is Up-to-God"* and then exclude women who gave this answer when analyzing the program effects on the women's desired number of children.[12]

Our analytical sample includes 515 households who were interviewed both at baseline and endline and for whom fertility preferences and land data are available in both periods. Table 1 presents the main socioeconomic characteristics of our sample at baseline. Variable definitions are described in the Online Appendix. At baseline, most families depend on

[11] Approximately 7 percent of our households do not have children at the time of the baseline survey. As polygamy is widespread, the enumerators instructed respondents not to include births from other wives.

[12] It is worth noting that these fertility preferences questions differ from those used in the Demographic Health Surveys in which respondents are asked *"If you could go back in time, how many children would you like to have?"* regardless of the current number of children. This might avoid ex-post rationalization issues on the number of children.

agricultural for their livelihoods; only 12 percent of men (and 5 percent of women) report having off-farm income. These are relatively poor households: 87% have no access to any electricity and 98% have earth flooring.[13] Furthermore, almost all households (99 percent) had cultivated at least one plot in the long rainy season right before the baseline survey. On average, households cultivate 2.4 plots and the average area of each cultivated plot is almost 5 acres. Thus, a typical household cultivates a total of 11.3 acres of land. Approximately 27% of the households can be considered smallholder farmers as their total cultivated land is less or equal to 5 acres. The most common cultivated crops are cotton (42%) and maize (30%).[14]

Seventy percent of the households reported to have inherited or purchased the majority of land they own at baseline, where customary land tenure laws are prevalent.[15] Indeed, almost a third of the sample husbands at baseline have already inherited land from their fathers; the median household has inherited the total area of their cultivated land.[16] Furthermore, in the survey module related to "future expectations," husbands were asked how much land their sons would inherit if they hypothetically got sick and passed away. [17] Consistent with the patrilineal norms, all the husbands would be willing to bequeath land to their sons, even if they did not have a son at the time of the baseline. Approximately 65% of the husbands reported being willing to bequeath to their sons more than double the land they cultivated at baseline.

Although husbands (average of 37 years) and wives (average of 30 years) are relatively young at baseline, the average number of living children is large: 4.9. However, on average,

[13] We constructed the household asset index using a principal component analysis using dwelling variables such as type of floor and wall, and classified as "poor" those households in the two lowest quintiles of the asset distribution

[14] The question on the survey asking about the crop grown on the plot refers to the crop that takes up the largest portion of the plot. While inter-cropping is common, it is more likely to be on the edges of the plot.

[15] Male respondents were asked, "How did you acquire the land that you currently own?" if they acquired land from multiple sources, they were instructed to answer how the majority of the land was acquired

[16] Half of the sample husbands report to have inherited more land than what they cultivate at baseline. We lack precise information on the households' total owned land area

[17] Male respondents were asked "In many years, if you became sick and passed away, how much land would your son inherit? If husbands did not currently have a son, they were asked to answer as if they had one

women were married at the age of 18. Despite the fact that 89% of women report wanting to delay or prevent pregnancy, only 18 percent of women had ever used modern contraception. Polygamy is widespread, 30% of men reported to have more than one wife. Furthermore, 22% of men expect to marry an additional wife in the future. Consistent with the trends in the region (Zipfel et al. [2022], Doepke and Tertilt [2018]), men's fertility preferences are larger than women's: while husbands would like, on average, 4 *additional* children, their wives only would like to have 2.4 more *additional* children. It is worth noting that these female numeric fertility preferences exclude 35% of wives in our sample who have answered "Up-to-God," at baseline, reflecting that women in this context are relatively uncertain or fatalistic about family size. Figure 2 shows that men's desired number of additional children is larger than their female counterparts across the extension of households' total cultivated land area. Although this desired fertility gap persists regardless of farm size, interestingly, there is a non-monotonic relationship as husbands' fertility preferences generally increase with farm size, but on small farms (< 5 acres), both husbands' and wives' fertility preferences decline with farm size.

Interestingly, we also observe a similar gap in the desired number of children between men and women using the most recent 2014-2015 Tanzania Demographic Health Survey (DHS). Figure 3 shows that husbands desire more children than their wives along the extension of owned land. It is worth pointing out that DHS elicits fertility preferences differently as women and men are asked *"If you could go back in time when you have children, how many children would you like to have?"*, which differs from the question used in our surveys. Also, the DHS does not include extension of cultivated but owned land. Despite these differences, Figures 2 and 3 provide suggestive evidence that the gap in fertility desires between husbands and wives might be related to the extension and cultivation of land. This association between the gap in fertility desires and land is relevant in our context, where rural agricultural households practice patrilineality and primogeniture. The gap in fertility desires can further affect household decision-making as couples may not be cooperative and women in our sample have low bargaining power; indeed, 35% of our sample women have experienced domestic violence at baseline. Thus, we investigate the potential effects of the family planning intervention on women's and men's fertility preferences and whether land inheritance expectations can explain such effects. We also explore the possibility of whether these changes in fertility preferences –due to the intervention– could influence households' decisions regarding expansion of land area cultivated.

3 Empirical Strategy

Following McCarthy [2019], our main econometric specification uses a double difference model (DD) and the local average treatment effect (LATE) estimation to measure the causal impact of the "couples" and "individual" interventions on the outcomes of interest. While the DD allows us to increase the precision of our treatment effect estimation using both baseline and endline observations, the LATE allows us to measure the treatment effect for those individuals who opted to participate in the family planning program accounting for the variation in treatment compliance across villages.

Although our preferred specification estimates the local average treatment affect, we first build our econometric model on the following intent-to-treat DD specification:

$$y_{it} = \beta_0 + \beta_1 T_{i1} t + \beta_2 T_{i2} t + \beta_3 T_{i1} + \beta_4 T_{i2} + \beta_5 t + X_i^{'} \beta_6 + \epsilon_{it} \tag{1}$$

where y_{it} represents the outcome of interest for a man (or a woman) i at time t. T_{i1} and T_{i2} are dummy variables for whether a household was assigned the "couples" or "individuals" interventions, respectively. Although we have balance in most of our covariates and outcomes, as shown in Table 2, we include Xi, a vector of baseline control variables, to improve the precision of our estimates and control for potential factors that affect fertility preferences. X_i includes wife's age and age married to husband, whether she has completed primary school, whether she has ever used family planning, and whether her husband is abusive. We also include in Xi the baseline number of children born per woman, frequency of sex, whether husband has off-farm income, whether the household is polygamous, a standardized rainy season farm income, a household wealth index, distance to the dispensary, and village-level stratification dummy variables.[18] Finally, ϵ_{it} is the error term. We estimate robust standard errors and clustered them at the village level.

Relative to a single difference estimation, the DD estimation method improves precision by accounting for the time-invariant unobservable baseline differences between control and treatment groups (e.g. one group is more motivated to move away from agriculture) and also accounting for any time trends consistent across the groups (e.g. the whole region experiences economic development). Moreover, when the outcome data are not weakly auto-correlated (e.g., auto-correlation is lower than 0.5), the DD model is preferred to the ANCOVA estimation (McKenzie [2012]). In our data, the correlation between baseline and endline fertility preferences outcomes is high (0.54 for men's desired number of additional children). However, there may be additional concerns when using DD models. Although the villages were assigned to control and treatment groups exogenously, it is entirely possible that the parallel trends assumption does not hold in this context. The double difference estimator does not address omitted-variable bias from time-variant characteristics of control and treatment groups. In other words, without the FP intervention taking place, it is possible that the groups may have had different fertility desires. The parallel trends assumption may be questionable if the treatment and control groups differ with regard to factors that may be associated with the dynamics of the outcome variables (Abadie [2005]). We overcome this potential issue by including in the vector Xi factors associated with fertility preferences dynamics, which also helps to mitigate omitted variable bias. [19]

In equation 1, our coefficients of interest β_1 and β_2 measure the ITT effect of the "cou-

[18]This vector of baseline covariates is the same as the one included in McCarthy [2019] except for the addition of the household wealth index.

[19]The factors that may affect fertility desires include variables such as wealth asset index, education and number of children born. The inclusion of these factors as control variables helps to mitigate omitted variable bias (Abadie, 2005). Moreover, Table 2 shows that randomization balance is achieved for most control variables.

ples" and "individual" interventions, respectively. However, given the differences in treatment compliance,[20] in a first stage, we instrument participation to the program with the village-level random assignment to treatment groups, and with a measurement of the "dosage" of treatment in that village (i.e., 3 CBDs/village population) to represent the varying level of household visits as a function of village population. The first stage regression has the following functional form:

$$P_i = \beta_0 + \beta_T Z_i + X_i'\beta + u_i \tag{2}$$

where P_i is a dummy variable for whether a household participated in either in the couples or individual treatment, Z_i is the vector of instrumental variables, X_i is the same vector of covariates earlier described, and u_i is the error term. For this analysis to provide a causal and unbiased estimate of the effect of the treatment on the compliers (i.e. LATE), two assumptions must hold. First, the instruments, Z_i, must have relevant explanatory power for P_i ($Cov[Z_i, P_i] \neq 0$) and this is tested by examining the combined significance of the instruments in the first stage equation. Table A1 shows that the set of instruments are highly correlated with the treatment participation variables and the F-test is substantially larger than the recommended levels for the different estimation samples. Second, the instruments must be exogenous to the second stage equation ($E[T_i'u_i] = 0$). Using the randomly implemented treatment variable (village treatment assignment) and village population CBD dosage (3 CBDs/ village population at baseline) as instruments for having actually been visited by a CBD is the key to the LATE estimation strategy.

Therefore, combining equations 1 and 2, we instrument treatment participation and interact it with time to estimate our main model DD-LATE specification:

$$y_{it} = \beta_0 + \beta_1 \hat{P}_{i1} t + \beta_2 \hat{P}_{i2} t + \beta_3 \hat{P}_{i1} + \beta_4 \hat{P}_{i2} + \beta_5 t + X_i'\beta + \epsilon_{it} \tag{3}$$

[20]Treatment compliance ranges from 42 to 94 percent at the village level.

where y_{it} represents the outcome of interest for a man (or a woman) i at time t. P_{i1} and P_{i2} are the instrumented variables for participation in the "individuals" or "couples" intervention, respectively. X_i represents the set of covariates as described above. In equation 3, our coefficients of interest β_1 and β_2 represent the LATE parameter estimate, which measures the average treatment effect specifically for those who chose to comply with the treatment, that is, those for whom the offer of the family planning conversations persuaded them to participate. In this case, this means that the estimated treatment effect pertains specifically to the participants. Given that we have a small number of clusters (12 villages), in the robustness section, we show that our results are robust to bootstrapping the standard errors.

4 Results

We start our analysis by measuring the effects of our interventions on fertility preferences for both men and women. Next, we explore whether the observed changes in fertility preferences due to the intervention are motivated by the firstborn's sex, a proxy of parents' bequeathing expectations. Moreover, we explore if these changes in the fertility preferences due to the family planning intervention conduce to changes in household agricultural decisions regarding land cultivation.

Table 3 shows the local average treatment effects of the couples and individual interventions on husbands' and wives' fertility preferences. Column (1) of Table 3 shows that husbands who participated in the "couples" treatment increase their desired number of additional children. Participating husbands desire an additional 0.84 children at endline, relative to the individual and control groups. This increase is substantial in magnitude as it represents roughly a 20 percent increase over the control mean. In contrast, we do not observe such an effect on husbands' fertility aspirations in the individual treatment group (as these husbands did not participate in any family planning consultations) with respect to the control group. Regarding women's fertility preferences, columns (2) and (3) of Table 3 show that the joint consultations in the couples intervention reduces fatalism and increases desired fertility for women. Women are slightly less likely to answer *"Up-to-God"* as a response to how many additional children they would like to have; however, this effect is not statistically significant at conventional levels. Among women who provided a numeric response for their desired fertility, column (3) indicates that women in the "couples" treatment group increase their desired number of additional children. Women in the "individual" group, in contrast, decreased their desired fertility as they receive the family planning information privately. Given that women in the couples consultations increase their desired number of additional children (moving closer to their husbands large fertility desires), column (4) of Table 3 indicates that the "couples" treatment reduced the fertility preference gap.[21] This surprising increase in women's fertility desires due to the couples family planning consultations may be a result of women learning about their husbands' (larger) fertility desires (often for the first time) during the joint consultation about family planning and increasing their reported fertility preferences in response to his fertility aspirations. On the other hand, the gap in desired fertility increased as a result of the individual treatment; the private information about family planning lessened women's fertility desires while the non-participating husbands did not change their fertility desires.

Although McCarthy [2019] demonstrated that the couples intervention effectively reduced pregnancy and increased uptake in modern contraception in the short-run,[22] these results potentially suggest a "push-back" effect in husbands' fertility desires. In addition to being an information session about the benefits of birth spacing and family planning options, the couples consultations are an opportunity for husbands and wives to reveal (often for the first time) their fertility preferences. After participating in these conversations throughout the fifteen months, husbands in this group seem to be pushing back on the idea of smaller

[21] The fertility preference gap is defined as the difference between a husband and his wife's desired number of additional children. Thus, these estimates exclude the households where women have answered *Up-to-God*

[22] We show in Appendix Table A2 that the couples treatment reduces pregnancy and increases contraception use in our estimation sample.

families and increasing their desired number of additional children. We provide additional evidence supporting this potential male "push back" effect by examining the impact of both interventions on men's polygamy expectations. During the household surveys, in the section on "Future Expectations", men were asked about the number of wives they expect to have in the future. Column 5 of Table 2 shows that husbands in the "couples" treatment group expect to have 0.2 more wives in the next five years, while we do not observe such an effect for men treated in the "individual" group.

As patrilineality (family ties are recognized through fathers, with land passed primarily from father to sons) and primogeniture (the right of succession belonging to the first-born child) are regular practices in the Sukuma tribe, we investigate whether husbands' increase in fertility preferences as a result of the family planning intervention might be motivated by inheritance expectations. Building on the results of Genicot and Hernandez-de Benito [2022], who leverage the firstborn son as a proxy of customary patrilineal norms in Tanzania, we analyze whether our main treatment effects on fertility preferences differ by the firstborn's gender. We use the sex of the first child at baseline as a plausibly exogenous event, after controlling for other socioeconomic characteristics, to estimate the heterogeneous effects of the intervention on husbands' and wives' desired number of additional children. In rural Tanzania, and more broadly in Sub-Sahara Africa, sex-selective abortion is not common, and sex ratios at birth are considered unbiased ([Chaoa et al., 2019]). Table 4 shows the heterogeneous effects of the interventions on our outcomes of interest, separated by the sex of the firstborn child.

Panel A of Table 4 shows that the push-back effects of the "couples" intervention on men's fertility preferences are more prominent when the firstborn is a girl than when the firstborn is a boy (Panel B). Consistent with Table 2, we do not observe any effect of the individual treatment on men's fertility preferences, regardless of the sex of the firstborn child. Panel A also shows that the increase in women's fertility desires in response to the couples consultations are larger when the firstborn is a daughter. These findings indicate that the push-back effect of the program is more salient in households without an oldest son, as these parents are likely concerned about who will inherit the land in a context where patrilineality is still prevalent. Additionally, we observe that the effect of the "couples" treatment on men's polygamy expectations is larger among households without a firstborn son. These findings, demonstrating a desire for larger families potentially for strategic bequests, is consistent with the results of Genicot and Hernandez-de Benito [2022] in Tanzania, who show that firstborn sons are expected to inherit more land than firstborn daughters and women expect to inherit less jointly-owned land when their firstborn child is a son. Furthermore, the increase in both men and women fertility preferences in our sample is consistent with the results of Wineman and Liverpool-Tasie [2019] as they show that both women and men favor their sons in bequest decisions in Tanzania. It is worth noting that the results of Table 4 are qualitatively similar when we estimate the heterogeneous effects by whether a household has no sons or has at least one son (see Appendix Table A3).

As we documented in section 2.3, fertility preferences are highly correlated with the total land area cultivated (see Figure 2). This may be a result of an external factor that is correlated with both land size and fertility preferences (i.e. wealth). However, to explore whether family planning consultations affected household decisions on land use and agriculture, through the change in fertility preferences, we measure the effect of the treatment on cultivation practices. Table 5 shows that the average area of a plot increased by 2.65 acres, an increase of 45 percent with respect to the control mean, in the "couples" treatment group.We do not observe such as effect in the individual treatment group. Columns 3 and 4 of Table 5 indicate that there were no statistically significant changes in households' decisions regarding the major crops cultivated in the plots (cotton and maize) among participants in both family planning interventions.As documented by McCarthy [2019], women are less likely to be pregnant in the couples groups, so it is plausible that women in this group are more likely to work more in the family agricultural plots.

4.1 Robustness Checks

We test whether our results are robust to alternate modes of inference. Table A4 shows that our main findings regarding the effects of the family planning intervention on men's and women's fertility preferences are robust to implementing wild-clustered bootstrapped errors at the village level. Furthermore, Table A5 indicates that the heterogeneity of these results by the gender of the firstborn childare also robust to bootstrapping the standard errors. Future robustness checks will assess whether our results are robust to multiple hypothesis testing.

5 Conclusion

Although the role of fertility preferences in the demographic transition in sub-Saharan Africa has been an issue of academic debate ([Pritchett, 1994, Casterline and Agyei-Mensah, 2017]), there is broad empirical evidence indicating that the gap in fertility preferences between men and women is a critical factor in defining fertility outcomes as men desire more children than women and have more bargaining power in household decision making ([Ashraf et al., 2014, Doepke and Tertilt, 2018]). Patrilineal and gender-restrictive social norms can enhance the disparity in fertility preferences, particularly in rural areas.

In this paper, we analyze the effect of an informational family planning program on fertility preferences in rural Tanzania. The experiment consisted of randomizing household consultations on modern contraception, with sessions conducted either jointly for husbands and wives (couples group) or exclusively for wives in private (individual group). We leverage the experimental variation as well as baseline and endline surveys to measure the causal effects of the couples and individual treatment groups on both male and female fertility preferences, measured as the desired number of additional children.

Our findings suggest that the family planning program involving husbands and wives in the consultations led to an increase in the reported desired additional children for both men and women, even though joint consultations between spouses increased contraceptive use and decreased pregnancies [McCarthy, 2019]. In contrast, women in private consultations do not increase their fertility preferences, and those of their husbands remain unchanged. We interpret these findings as husbands' resistance to joint household consultations about family planning. Consistent with the male "push-back" in favor of larger families, husbands in the "couples" group also increased their reported expectations about polygamy. At the same time, we do not observe such as an effect among men in the "individual" group.

Next, we explore whether inheritance land expectations associated with customary patrilineal laws might explain the changes in fertility preferences due to the intervention. Our heterogeneous effects, by whether a household has a firstborn son at baseline (a proxy of patrilineality norms), indicate that the increase in the desired number of children is most salient for parents with a firstborn daughter. The families without an oldest son, lacking a clear inheritor of the land and assets (according to the dominant traditional practices), demonstrate a particular affinity for more children.

While it is not entirely clear that the increase in reported preferences will necessarily lead to increased fertility (especially given the measured increase in contraceptive use in this group), the fact that parents report desires for larger families is of potential concern for reproductive health policymakers. It is clear that fertility preferences are malleable and that even with short-term birth spacing, parents may respond to family planning information by pushing their desired fertility upwards. Of particular concern is that women's fertility preferences respond to their husbands' (larger) stated intentions. Practitioners and public health workers will benefit from taking careful consideration of the influence of husbands in family planning decisions by further internalizing restrictive social norms that might deter the primary goals of reducing an unmet need for family planning.

References

Susheela Singh, Akinrinola Bankole, and Jacqueline E Darroch. The impact of contraceptive use and abortion on fertility in sub-saharan africa: estimates for 2003–2014. *Population* *and development review*, 43(Suppl 1):141, 2017.

Claus C Pörtner. How is fertility behavior in africa different? *Available at SSRN 4526153*, 2023.

Céline Zipfel et al. *The demand side of Africa's demographic transition: desired fertility, wealth, and jobs*. STICERD, London School of Economics and Political Science, 2022.

Lant H Pritchett. The impact of population policies: Reply. *Population and Development Review*, 20(3):621–630, 1994.

Nava Ashraf, Erica Field, and Jean Lee. Household Bargaining and Excess Fertility: An Experimental Study in Zambia. *American Economic Review*, 104(7):2210–2237, July 2014. ISSN 0002-8282. doi: 10.1257/aer.104.7.2210. URL `http://pubs.aeaweb.org/doi/10.1257/aer.104.7.2210`.

Aine Seitz McCarthy. Intimate partner violence and family planning decisions: Experimental evidence from rural tanzania. *World Development*, 114:156–174, 2019.

Laurie F DeRose and Alex C Ezeh. Decision-making patterns and contraceptive use: evidence from uganda. *Population research and policy review*, 29:423–439, 2010.

Mahesh Karra, Kexin Zhang, and IFPRI Brown Bag Seminar. Exploring user-centered counseling in contraceptive decision-making: Evidence from a field experiment in urban malawi. 2021.

Ben D'Exelle and Charlotte Ringdal. Women's use of family planning services: An experiment on the husband's involvement. *Journal of Development Economics*, 158:102915, 2022.

Ayala Wineman and Lenis Saweda Liverpool-Tasie. All in the family: bequest motives in rural tanzania. *Economic Development and Cultural Change*, 67(4):799–831, 2019.

Claus C Pörtner, SL Averett, LM Argys, and SD Hoffman. Fertility issues and policy in developing countries. *The Oxford Handbook of Women and the Economy*, page 121, 2018.

Garance Genicot and Maria Hernandez-de Benito. Women's land rights and village institutions in tanzania. *World Development*, 153:105811, 2022.

John Bongaarts. Trends in fertility and fertility preferences in sub-saharan africa: the roles of education and family planning programs. *Genus*, 76(1):1–15, 2020.

Willa Helterline Friedman. Antiretroviral drug access and behavior change. *Journal of Development Economics*, 135:392–411, 2018.

Kasey S Buckles and Daniel M Hungerman. The incidental fertility effects of school condom distribution programs. *Journal of Policy Analysis and Management*, 37(3):464–492, 2018.

Sally A Brinkman, Sarah E Johnson, James P Codde, Michael B Hart, Judith A Straton, Murthy N Mittinty, and Sven R Silburn. Efficacy of infant simulator programmes to prevent teenage pregnancy: a school-based cluster randomised controlled trial in western australia. *The Lancet*, 388(10057):2264–2271, 2016.

Nava Ashraf, Erica M Field, Alessandra Voena, and Roberta Ziparo. Maternal mortality risk and spousal differences in the demand for children. Technical report, National Bureau of Economic Research, 2020.

Charles F Westoff et al. Desired number of children: 2000-2008. *DHS comparative reports*, (25), 2010.

Matthias Doepke and Michèle Tertilt. Women's empowerment, the gender gap in desired fertility, and fertility outcomes in developing countries. In *AEA Papers and Proceedings*, volume 108, pages 358–362. American Economic Association 2014 Broadway, Suite 305, Nashville, TN 37203, 2018.

Grant Miller, Áureo De Paula, and Christine Valente. Subjective expectations and demand for contraception. Technical report, National Bureau of Economic Research, 2020.

Marianne El-Khoury, Rebecca Thornton, Minki Chatterji, Sarah Kamhawi, Phoebe Sloane, and Mays Halassa. Counseling women and couples on family planning: a randomized study in jordan. *Studies in family planning*, 47(3):222–238, 2016.

Cheryl Doss, Chiara Kovarik, Amber Peterman, Agnes Quisumbing, and Mara Van Den Bold. Gender inequalities in ownership and control of land in africa: myth and reality. *Agricultural Economics*, 46(3):403–434, 2015.

Yuya Kudo. Female migration for marriage: Implications from the land reform in rural tanzania. *World Development*, 65:41–61, 2015.

Amber Peterman. Women's property rights and gendered policies: implications for women's long-term welfare in rural tanzania. *The journal of development studies*, 47(1):1–30, 2011.

Margaret Frye and Lauren Bachan. The demography of words: The global decline in non-numeric fertility preferences, 1993–2011. *Population Studies*, 71(2):187–209, 2017.

David McKenzie. Beyond baseline and follow-up: The case for more t in experiments. *Journal of development Economics*, 99(2):210–221, 2012.

Alberto Abadie. Semiparametric difference-in-differences estimators. *The review of economic studies*, 72(1):1–19, 2005.

Fengqing Chaoa, Patrick Gerlandb, Alex R Cookc, and Leontine Alkemad. Systematic assessment of the sex ratio at birth for all countries and estimation of national imbalances and regional reference levels. *PNAS*, 116(27), 2019.

John B Casterline and Samuel Agyei-Mensah. Fertility desires and the course of fertility decline in sub-saharan africa. *Population and Development Review*, 43:84–111, 2017.

6 Tables and Figures

Table 1: Descriptive Statistics at Baseline

Variable	Mean	Std. Deviation	Observation
Covariates in 2012			
Wife's age	29.77	7.65	515
Wife has completed primary	0.88	0.33	515
Wife ever used family planning	0.18	0.39	515
Husband was abusive	0.35	0.48	515
Wife's age married to husband	17.69	2.61	515
Children born per woman	4.87	3.17	515
Wife's reported frequency of sex	0.70	0.46	515
Husband has off-farm income	0.12	0.33	515
Husband was polygamous	0.29	0.46	515
Stand. rainy season farm income	-0.01	0.16	515
Distance to dispensary (km)	0.59	0.34	515
Household wealth index	0.01	0.98	515
Outcomes in 2012			
Husband's fertility preferences	3.94	3.70	515
Up-to-God	0.35	0.48	515
Wife's fertility preferences	2.37	2.44	334
Gap in fertility preferences	0.69	3.17	334
Husband wants more wives	0.22	0.42	515
Number of cultivated plots	2.43	0.79	515
Average plot size in acres	4.89	4.11	515
Plot share for cotton	0.42	0.24	515
Plot share for maize	0.31	0.23	515
Heterogeneity measures in 2012			
Firstborn child is son	0.51	0.50	515

Table 2: Balance at Baseline: Individual and Household Sample Characteristics

Variable	Average			P-value		
	Control	Indiv. Treat.	Couples Treat.	Control VS Indiv. Treat.	Control VS Couples Treat.	Indiv. VS Couple Treat.
Covariates						
Wife's age	29.98	29.51	29.85	0.505	0.717	0.495
Wife has completed primary	0.89	0.84	0.92	0.010	0.061	0.020
Wife ever used family planning	0.20	0.19	0.15	0.859	0.576	0.758
Husband was abusive	0.36	0.35	0.33	0.939	0.505	0.647
Wife's age married to husband	17.95	17.47	17.68	0.242	0.919	0.404
Children born per woman	4.93	4.82	4.87	0.606	0.980	0.758
Wife's reported frequency of sex	0.71	0.66	0.72	0.404	0.647	0.485
Husband had off-farm income	0.11	0.14	0.10	0.495	0.667	0.677
Husband was polygamous	0.29	0.27	0.33	0.475	0.333	0.313
Stand. rainy season farm income	0.02	-0.05	0.00	0.061	0.434	0.101
Distance to dispensary (km)	0.74	0.64	0.39	0.758	0.091	0.283
Household wealth Index	0.21	-0.16	0.02	0.283	0.970	0.505
Outcomes						
Husband's fertility pref.	4.44	3.70	3.73	0.596	0.727	0.929
Up-to-God	0.33	0.35	0.37	0.990	0.798	0.899
Wife's fertility pref.	2.50	2.44	2.13	0.727	0.111	0.263
Gap in fertility pref.	0.85	0.60	0.62	0.849	0.869	0.939
Husband wants more wives	0.25	0.21	0.21	0.818	0.707	0.717
Average plot size in acres	5.79	4.49	4.46	0.485	0.323	0.950
Number of cultivated plots	2.53	2.32	2.47	0.162	0.576	0.212
Plot share for cotton	0.44	0.43	0.38	0.737	0.273	0.434
Plot share for maize	0.23	0.34	0.35	0.576	0.475	0.899
Heterogeneity measures						
Firstborn child is son	0.46	0.55	0.51	0.152	0.889	0.495
F-statistics		3.00	9.26			
Observation	163	187	165			

Notes: P-values calculated using David Roodman et al. (2019) *boottest* Stata command which estimates a bootstrapping adjustment for a small number of clusters. F-test performs overall balance and assesses the combined significance of control variables in determining treatment assignment.

Table 3: Intervention Effects on Male and Female Fertility Preferences

	Husband's Preferences	Up-to-God	Wife's Preferences	Preference gap	Expected More Wives
	(1)	(2)	(3)	(4)	(5)
Couple * Post	0.844***	-0.284	1.715**	-1.417**	0.227***
	(0.286)	(0.188)	(0.689)	(0.650)	(0.049)
Individual * Post	-0.058	0.122	-2.193*	2.227**	-0.124*
	(0.759)	(0.284)	(1.300)	(1.106)	(0.071)
Observations	1,030	1,030	717	717	1,030
Control Mean	4.377	0.367	2.757	0.610	0.270
P-val: Coup. vs Indiv.	0.235	0.095	0.003	0.000	0.000

Notes: *** p<0.01, ** p<0.05, * p<0.1. Husband's (or wife's) preferences: the number of additional children desired by a husband (or wife). Preference gap: the difference between a husband and his wife's desired number of additional children.Expected more wives: a dummy variable for whether a husband wants more wives in the future. In columns 3 and 4, estimates exclude households for which wives answered "Up to God". Baseline control variables include the wife's age, a dummy for whether: i) the wife has completed primary school, ii) the wife has ever used family planning, iii) the husband was abusive, iv) the husband had off-farm income, v) the wife reported frequent sex, and vi) the husband was polygamous. Baseline controls also include the wife's age when married to the husband, the number of children born per woman, the households' standardized rainy season farm income, household wealth index, dummy variables for village-level stratification, and the distance to the dispensary (km). Robust standard errors are in parentheses and clustered at the village level.

Table 4: Intervention Effects on Fertility Preferences by the Sex of the Firstborn Child

	Husband's Preferences. (1)	Up-to-God (2)	Wife's Preferences. (3)	Preference gap (4)	Expected More Wives (5)
Panel A: Firstborn daughter					
Couple * Post	1.124***	-0.474**	2.100***	-1.204**	0.265***
	(0.411)	(0.190)	(0.411)	(0.523)	(0.094)
Individual * Post	-0.618	0.186	-1.558	1.117	-0.099
	(1.006)	(0.342)	(1.275)	(1.200)	(0.163)
Observations	508	508	338	338	508
Control Mean	4.913	0.357	3.149	0.905	0.287
P-val: Coup. vs Indiv.	0.141	0.064	0.004	0.118	0.034
Panel B: Firstborn son					
Couple * Post	0.615	-0.140	1.065	-1.142	0.191**
	(0.392)	(0.196)	(1.140)	(1.318)	(0.095)
Individual * Post	0.146	0.091	-2.713*	2.808	-0.159
	(0.884)	(0.279)	(1.620)	(1.791)	(0.109)
Observations	522	522	379	379	522
Control Mean	3.760	0.380	2.290	0.258	0.250
P-val: Coup. vs Indiv.	0.548	0.266	0.019	0.004	0.000

Notes: *** $p<0.01$, ** $p<0.05$, * $p<0.1$. Husband's (or wife's) preferences: the number of additional children desired by a husband (or wife). Preference gap: the difference between a husband and his wife's desired number of additional children.Expected more wives: a dummy variable for whether a husband wants more wives in the future. In columns 3 and 4, estimates exclude households for which wives answered “Up to God”. Baseline control variables include the wife's age, a dummy for whether: i) the wife has completed primary school, ii) the wife has ever used family planning, iii) the husband was abusive, iv) the husband had off-farm income, v) the wife reported frequent sex, and vi) the husband was polygamous. Baseline controls also include the wife's age when married to the husband, the number of children born per woman, the households' standardized rainy season farm income, household wealth index, dummy variables for village-level stratification, and the distance to the dispensary (km). Robust standard errors are in parentheses and clustered at the village level.

Table 5: Intervention Effects on Households' cultivation decisions

	Average plot area	No. of plots	Cotton plot share	Maize plot share
	(1)	(2)	(3)	(4)
Couple * Post	2.647***	-0.727***	-0.011	0.124
	(0.841)	(0.183)	(0.076)	(0.076)
Individual * Post	0.700	0.053	-0.059	0.028
	(1.045)	(0.354)	(0.081)	(0.056)
Observations	1,030	1,030	1,030	1,030
Control Mean	5.431	2.535	0.427	0.266
P-val: Coup. vs Indiv.	0.138	0.0150	0.717	0.417

Notes: *** p<0.01, ** p<0.05, * p<0.1. Avg. plot area: average size of a cultivated plot per household in acres, No.of plots: number of cultivated plots per household. Cotton plot share: Proportion of the plots used for cotton cultivation. Maize plot share: Proportion of the plots used for maize cultivation. Baseline control variables include the wife's age, a dummy for whether: i) the wife has completed primary school, ii) the wife has ever used family planning, iii) the husband was abusive, iv) the husband had off-farm income, v) the wife reported frequent sex, and vi) the husband was polygamous. Baseline controls also include the wife's age when married to the husband, the number of children born per woman, the households' standardized rainy season farm income, household wealth index, dummy variables for village-level stratification, and the distance to the dispensary (km). Robust standard errors are in parentheses and clustered at the village level.

Figure 1: Control and Treatment Households in Meatu District

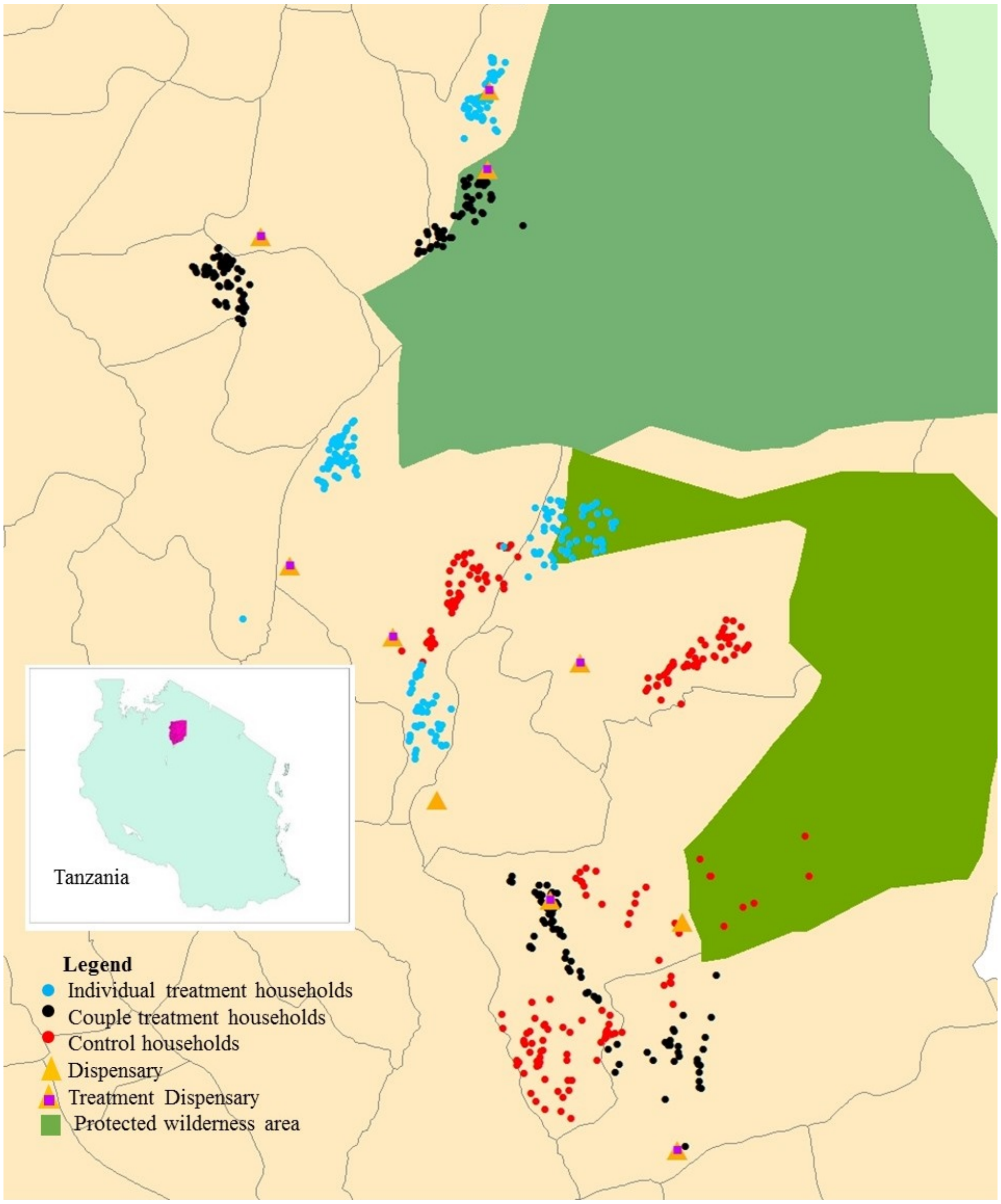
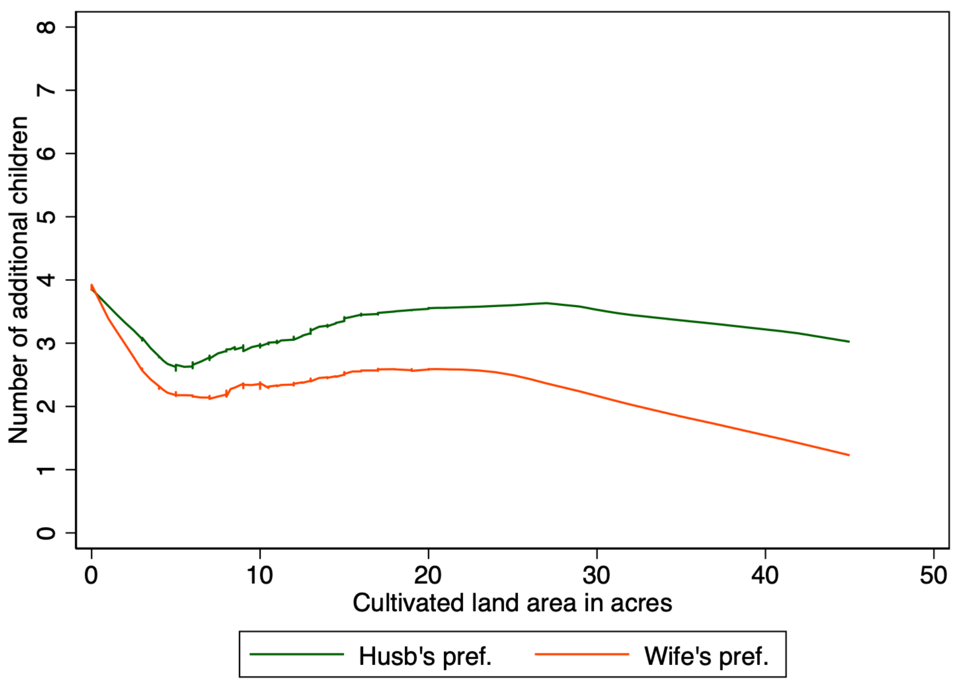
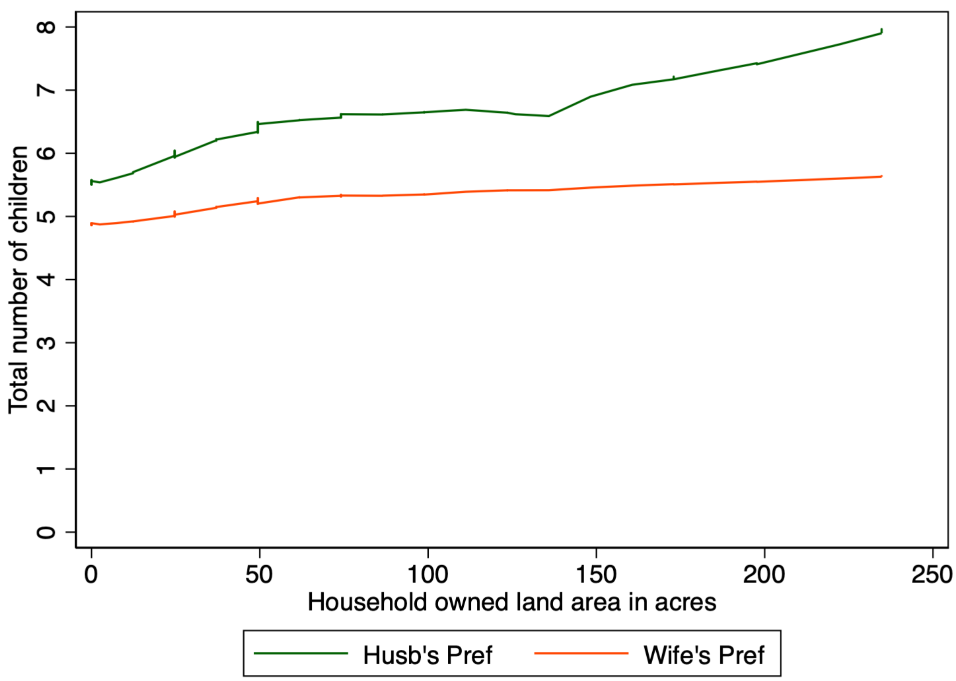


Figure 2: Number of additional desired children and household total cultivated area in 2012, study sample



Notes: The figure depicts the non-parametric local regression (lowess) of the desired number of additional children on the total cultivated land area (in acres) using the baseline sample of households for which husbands' and wives' numeric fertility preferences are available.

Figure 3: Total number of ideal children and household own land area, DHS 2014-15



Notes: The figure depicts the non-parametric local regression (lowess) of the total number of ideal children on the total land area (in acres) of households for which husbands' and wives' preferences are available.

A Online Appendix Tables

Table A1: First Stage Results for the DD-LATE Model Specification

	Husband's Preferences		Wife Preferences	
	Couple * Post	Individual * Post	Couple * Post	Individual * Post
	(1)	(2)	(3)	(4)
Assigned to couples	-0.494***	0.106***	-0.567***	0.116**
	(0.0249)	(0.0195)	(0.0478)	(0.0378)
Assign to couples * Post	0.987***	-0.212***	1.022***	-0.239***
	(0.0499)	(0.0390)	(0.0569)	(0.0482)
Assigned to individual	-0.229***	-0.0974**	-0.273***	-0.0991**
	(0.0440)	(0.0319)	(0.0678)	(0.0360)
Assigned to individual * Post	0.458***	0.195**	0.479***	0.193**
	(0.0878)	(0.0636)	(0.111)	(0.0659)
Dosage of CBDs in village	10.42***	-12.85***	12.55***	-14.11***
	(1.141)	(0.602)	(1.808)	(1.320)
Dosage of CBDs *Post	-20.78***	25.67***	-22.19***	26.85***
	(2.269)	(1.245)	(3.207)	(2.067)
Observations	1030	1030	717	717
F	116.55	120.75	84.61	66.17

Notes: *** p<0.01, ** p<0.05, * p<0.1. Baseline control variables include the wife's age, a dummy for whether: i) the wife has completed primary school, ii) the wife has ever used family planning, iii) the husband was abusive, iv) the husband had off-farm income, v) the wife had frequent sex, and vi) the husband was polygamous. Baseline controls also include the wife's age when married to husband, the number of children born per woman, the households' standardized rainy season farm income, household wealth index, dummy variables for village-level stratification, and the distance to dispensary (km). Standard errors are in parentheses and clustered at the village level.

Table A2: Intervention Effects on Pregnancy and Contraception

	Pregnant during data coll. (1)	Wife is using contraception (2)
Couple * Post	-0.136***	0.072*
	(0.036)	(0.044)
Individual * Post	-0.066	-0.041
	(0.051)	(0.102)
Observations	1,030	1,030
Control Mean	0.265	0.116
P-val: Coup. vs Indiv.	0.194	0.265

Notes: *** p<0.01, ** p<0.05, * p<0.1. Pregnant during data coll.: Dummy variable for whether the wife was pregnant during data collection. Wife is using contraception: Dummy variable for whether the wife as using any contraception during date collection. Baseline control variables include the wife's age, a dummy for whether: i) the wife has completed primary school, ii) the wife has ever used family planning, iii) the husband was abusive, iv) the husband had off-farm income, v) the wife had frequent sex, and vi) the husband was polygamous. Baseline controls also include the wife's age when married to the husband, the number of children born per woman, the households' standardized rainy season farm income, household wealth index, dummy variables for village-level stratification, and the distance to the dispensary (km). Robust standard errors are in parentheses and clustered at the village level.

Table A3: Intervention Effects on Male and Female Fertility Preferences by number of sons

	Husband's Preferences. (1)	Up-to-God (2)	Wife's Preferences. (3)	Preference gap (4)	Expected More Wives (5)
Panel A: Household had no sons					
Couple * Post	1.104	-0.802***	3.945***	-4.715**	0.635***
	(1.073)	(0.222)	(1.252)	(1.956)	(0.200)
Individual * Post	-1.920	0.012	-1.914	-0.586	-0.500
	(1.475)	(0.489)	(2.372)	(3.239)	(0.401)
Observations	200	200	133	133	200
Control Mean	5.756	0.333	4.933	0.367	0.333
P-val: Coup. vs Indiv.	0.062	0.170	0.060	0.343	0.034
Panel B: Household had at least one son					
Couple * Post	0.823***	-0.197	1.625**	-1.114	0.169***
	(0.311)	(0.199)	(0.765)	(0.710)	(0.057)
Individual * Post	0.357	0.161	-2.392*	2.764**	-0.069
	(0.786)	(0.281)	(1.357)	(1.270)	(0.063)
Observations	830	830	584	584	830
Control Mean	4.012	0.376	2.142	0.679	0.253
P-val: Coup. vs Indiv.	0.537	0.106	0.002	0.000	0.000

Notes: *** p<0.01, ** p<0.05, * p<0.1. Husband's (or wife's) preferences: the number of additional children desired by a husband (or wife). Preference gap:the difference between a husband and his wife's desired number of additional children. Expected more wives:a dummy variable for whether a husband wants more wives in the future.In columns 3 and 4, estimates exclude households for which wives answered "Up to God". Baseline control variables include the wife's age, a dummy for whether: i) the wife has completed primary school, ii) the wife has ever used family planning, iii) the husband was abusive, iv) the husband had off-farm income, v) the wife had frequent sex, and vi) the husband was polygamous. Baseline controls also include the wife's age when married to the husband, the number of children born per woman, the households' standardized rainy season farm income, household wealth index, dummy variables for village-level stratification, and the distance to the dispensary (km). Robust standard errors are in parentheses and clustered at the village level.

Table A4: Robustness checks on Fertility Preference

	Husband Preferences (1)	Up-to-God (2)	Wife's Preference (3)	Preference gap (4)	Expected More Wives (5)
Couple * Post	**0.844**	**-0.284**	**1.715**	**-1.417**	**0.227**
Clustered (p-value)	0.003	0.130	0.013	0.029	0.000
WC Bootstrap (p-value)	0.010	0.354	0.101	0.091	0.030
Individual * Post	**-0.058**	**0.122**	**-2.193**	**2.227**	**-0.124**
Clustered (p-value)	0.939	0.668	0.092	0.044	0.082
WC Bootstrap (p-value)	0.929	0.727	0.192	0.101	0.111

Notes: Clustered p-values correspond to the p-values of the main specification of Table 3 after clustering the standard errors at the village level. WC Bootstrap p-values are the p-values after David Roodman et al. (2019) *boottest* Stata command which estimates a bootstrapping adjustment for a small number of clusters using 99 replications.

Table A5: Robustness checks on Fertility Preference for sex of first born child

	Husband Preferences (1)	Up-to-God (2)	Wife's Preference (3)	Preference gap (4)	Expected More Wives (5)
Panel A: First born child is a daughter					
Couple * Post	**1.124**	**-0.474**	**2.100**	**-1.204**	**0.265**
Clustered (p-value)	0.006	0.013	0.000	0.021	0.005
WC Bootstrap (p-value)	0.010	0.101	0.020	0.101	0.040
Individual * Post	**-0.618**	**0.186**	**-1.558**	**1.117**	**-0.099**
Clustered (p-value)	0.539	0.586	0.222	0.352	0.545
WC Bootstrap (p-value)	0.808	0.616	0.394	0.495	0.677
Panel B: First born child is a son					
Couple * Post	**0.615**	**-0.140**	**1.065**	**-1.142**	**0.191**
Clustered (p-value)	0.117	0.476	0.350	0.386	0.045
WC Bootstrap (p-value)	0.232	0.586	0.475	0.465	0.172
Individual * Post	**0.146**	**0.091**	**-2.713**	**2.808**	**-0.159**
Clustered (p-value)	0.869	0.745	0.094	0.117	0.144
WC Bootstrap (p-value)	0.838	0.818	0.202	0.202	0.303

Notes: Clustered p-values correspond to the p-values of the main specification of Table 3 after clustering the standard errors at the village level. WC Bootstrap p-values are the p-values after David Roodman et al. (2019) Stata *boottest* command which estimates a bootstrapping adjustment for a small number of clusters using 99 replications.

A.1 Variables Definition

- Wife's age in 2012: Complete age of the female respondents in years at baseline (2012).
- Wife has completed primary in 2012: A binary indicator of whether a wife has at least completed primary education at baseline.
- Wife ever used family planning in 2012: A binary indicator of whether the wife in the household has ever used any family planning methods (emergency contraception, condoms, female sheaths, pills, intrauterine devices, implants, injections, and sterilization)
- Husband was abusive in 2012: A binary indicator variable for whether the husband ever physically hurt the respondent (the wife) at baseline.
- Wife's age married to husband in 2012: The complete age of the wife in years when she married to her current husband.
- Children born per woman in 2012: Number of children who were given birth by a wife before the baseline survey and who were alive.
- Frequency of sex in 2012: A binary indicator that takes 1 if the wife reported to have had sex at least twice a week at baseline.
- Husband had off-farm income in 2012: A binary indicator for whether the husband was engaged in any labor activities generating income 2012 that were not farming on his land.
- Husband was polygamous in 2012: A binary indicator that takes 1 if the husband has more than one wife at baseline.
- Stand. rainy season farm income in 2012: Standardized household's agricultural income during the rainy season (March-May 2012).
- Distance to the dispensary (km): Distance to the nearest dispensary from a household in kilometers.
- Household Wealth Index in 2012: Household's baseline wealth index, calculated using Principle Component Analysis with a variety of household assets.
- Husband's fertility preferences: A continuous variable that captures a husband's desired number of additional children.
- Up-to-God: A binary indicator that takes 1 if a wife answered fatalistically ("It's Up-to-God") in response to whether she would like to have more children, and 0 otherwise.
- Wife's fertility preferences: A continuous variable that captures a wife's desired number of additional children. This variable excludes women who responded "It's Up-to-God" as their fertility preference.

- Gap in fertility preferences: The difference in husband's and wife's desired number of additional children. It excludes the sample of women who responded "It's Up to-God" as their fertility preference.
- Husband wants more wives: A binary indicator for husband that takes 1 if he reports that he desires additional wives in the future and 0 otherwise.
- Number of cultivated plots: A numeric variable that captures the number of plots a household cultivated in the rainy season (March-May) before the baseline (or endline) survey.
- Average plot area: The average plot size in acres that a household cultivated in the rainy season (March-May) before the baseline (or endline) survey.
- Cotton plot share: Proportion of plots where cotton was the main crop for a household.
- Maize plot share: Proportion of plots where maize was the main crop for a household.
- First born child is son: A binary variable that takes 1 if the first born child is male and 0 is female at baseline.