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How education about maternal health risk can change the gender gap in the demand for family planning in Zambia

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Summary

Married men in Sub-Saharan Africa on average report high desired fertility, both in absolute terms and relative to women (Westoff and Bankole 2002; Westoff 2010). In Zambia, the setting of this study, the mean ideal number of children for married men is 5.9, while for married women it is 5.1 (Central Statistical Office et al. 2015). Spousal disagreement over the desired number of children is a significant factor in fertility choices and the adoption of family planning (Ashraf et al. 2014).

The baseline of this study, conducted in peri-urban Lusaka in the fall of 2014, finds that in addition to higher desired fertility, married men also have limited knowledge of the magnitude of maternal mortality and morbidity risks faced by women on average, as well as by their own wives, when having children. Married women have better knowledge of such risks.

The key research question of this study is whether providing accurate information about maternal mortality and morbidity risks affects fertility outcomes and communication in the household. Hence, this research allows us to understand whether maternal health considerations can shape men's preferences for fertility and family planning. Additionally, it allows us to determine whether disseminating information on maternal health risk to men is an effective way to reduce the unmet need for family planning among women.

The experimental design varied the provision of precise information about maternal health risks to either the husband or the wife in a sample of 562 couples in peri-urban Lusaka. In collaboration with local stakeholders, the information was delivered by local trained facilitators through group meetings. In the control group (177 couples), both spouses in the study sample attended a gender-specific group meeting where family planning information was provided. In one treatment arm (206 couples), the meeting attended by husbands also provided information about maternal health risk, while the wives' meeting only contained information about family planning. In the other treatment arm (179 couples), the husbands' meeting only provided information about family planning, while the wives' meeting also provided information about maternal health risk.

This design allowed us to measure and compare the effect of providing husbands with maternal mortality information to the effect of providing it to wives. After the intervention and relative to the control group, couples in which the husband was treated experienced a 5.5 percentage point decline in the probability of having a child in the year following the intervention (a 46% reduction). They simultaneously experienced a 5 percentage point increase in the regular use of oral contraceptives. Treated husbands also reported lower desired fertility and had more accurate beliefs about their wives' desired fertility.

Couples in which the husband was treated also increased their communication about family planning, and both spouses reported improvements in marital satisfaction. Couples in which the wife was treated did not exhibit a similarly consistent pattern of behavioral change relative to the control group.

These results show that providing targeted information to men on maternal health risk through gender-specific community meetings is a successful avenue to increasing the adoption of family planning.

Contents

List of figures and tables

Abbreviations and acronyms

FP	Family planning
MM	Maternal mortality
OLS	Ordinary least squares
SE	Standard error
WTP	Willingness to pay

1. Introduction

Married men in Sub-Saharan Africa on average report high desired fertility, both in absolute terms and relative to women (Westoff and Bankole 2002; Westoff 2010). In Zambia, the setting of this study, the mean ideal number of children for married men is 5.9, while for married women it is 5.1 (Central Statistical Office et al. 2015). Spousal disagreement over desired number of children is a significant factor in fertility choices and the adoption of family planning (Ashraf et al. 2014).

We document that, in addition to higher desired fertility, married men in peri-urban Lusaka also have limited knowledge of the magnitude of maternal mortality (MM) and morbidity risks faced by women on average, as well as by their own wives. Married women have better knowledge of such risks. How can members of the same household systematically hold different beliefs about maternal health risk? Does the gender gap in knowledge of maternal health risk influence the gender gap in desired fertility? Can information about MM risk influence fertility outcomes by shrinking the gap in desired fertility? If so, should this information be targeted to particular family members?

To answer these questions, we began by developing a theory in which an initial gender gap in ideal fertility prevents effective communication between spouses about the health risks of childbearing incurred by women. We study a setup where a wife, who is perfectly informed about her own maternal health risk, has to share this information with her husband. We show that, when the husband has a substantially higher desired fertility to start with (due to the fact that he receives higher social status from having children and the wife has a higher cost associated with childbearing and child-rearing), the wife cannot properly inform him about her individual risk. Therefore, household decisions about contraceptive use and fertility end up being suboptimal. This is particularly true when husbands have ex-ante biased beliefs, as is the case in societies in which traditional beliefs about maternal health exist.

Guided by insights from the theory, we designed an intervention to experimentally vary the provision of precise information about maternal health risk to either the husband or wife in a sample of approximately 500 couples in peri-urban Lusaka. In collaboration with local stakeholders, we designed a health information curriculum on family planning and MM, which was delivered by locally trained facilitators through group meetings.

In the control group, both spouses in the study sample attended a gender-specific group meeting where family planning information was provided. In one treatment arm, the meeting attended by husbands also provided information about maternal health risk, while the wives' meeting only contained information about family planning. In the other treatment arm, the husbands' meeting only provided information about family planning, while the meeting attended by wives also provided information about maternal health risk.

This design allowed us to measure and compare the effect of providing MM information to husbands and the effect of providing the same information to wives. After the intervention, relative to the control group, couples in which the husband was treated experienced a 5.5 percentage point decline in the probability of having a child in the year following the intervention (a 46% reduction). They simultaneously experienced a 5 percentage point increase in regular use of oral contraceptives.

Treated husbands also reported lower desired fertility and had more accurate beliefs about their wife's desired fertility. Couples in which the husband was treated increased their communication about family planning, and both spouses reported improvements in marital satisfaction. Couples in which the wife was treated did not exhibit a similarly consistent pattern of behavioral change relative to the control group.

2. Intervention, theory of change and research hypotheses

2.1 Research hypotheses

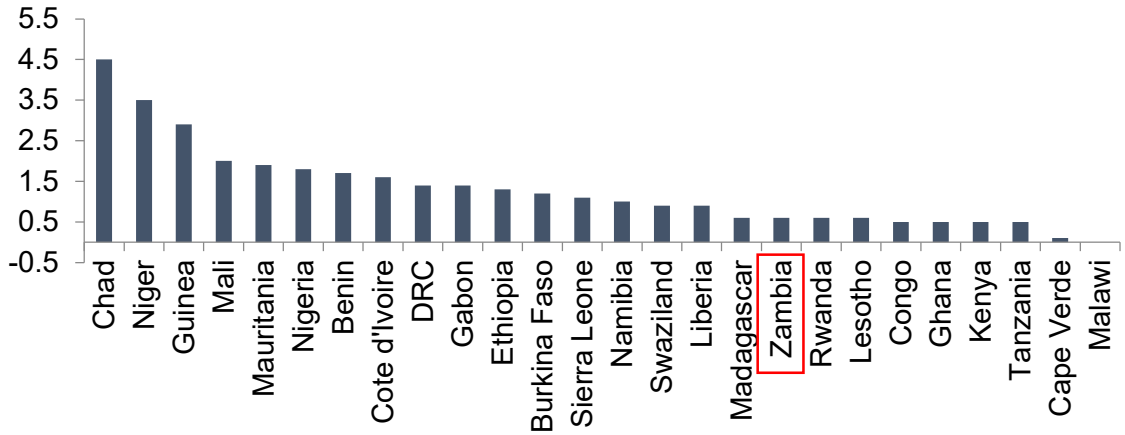
Married men in Sub-Saharan Africa on average report high desired fertility. Figure 1 illustrates the difference between the ideal number of children reported by married men and women in recent demographic and health surveys collected by Westoff (2010) in all countries in Sub-Saharan Africa. Men report on average substantially higher ideal fertility compared to women. In Zambia, the setting of this research project, women are significantly more likely to report not desiring any more children compared to men (Figure 2).

Sub-Saharan African countries are also characterized by high actual fertility and an unmet need for family planning. In Zambia, the total fertility rate is estimated to be 5.3 children per woman, and 21 percent of married Zambian women between the ages of 15 and 49 have an unmet need for family planning (Central Statistical Office et al. 2015).

Understanding the gender gap in fertility preferences is key to understanding fertility transitions in Sub-Saharan Africa, which were notably late to begin and have more recently been stalling in many parts of the region (Bongaarts 2008). According to demographic and health survey statistics, while women's demand for children has fallen over the past decade, men's preferences have been relatively constant, leading to a widening gender gap in preferences.

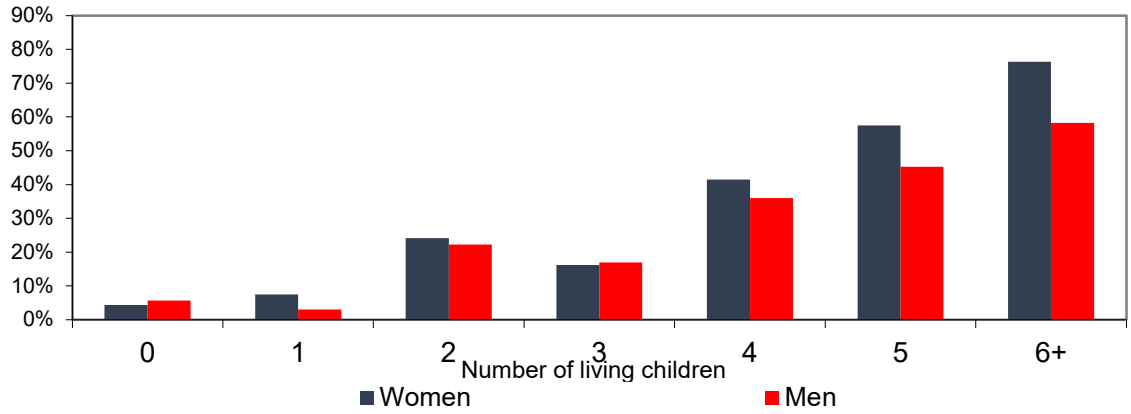
The trend among men is important because, during a fertility transition, a drop in desired family size generally precedes reductions in fertility. In Sub-Saharan Africa, the gap between desired and completed family size among men is very small and has remained relatively stagnant, despite increases in education and reductions in child mortality (Westoff 2010).

Figure 1: Gender gap in average ideal number of children by country



Source: Westoff 2010.

Figure 2: Percentage that desires no more children, by number of living children and gender (Zambia Demographic and Health Survey 2013)



Source: Central Statistical Office et al. 2015

Indeed, there is increasing evidence that male preferences are a strong determinant of contraceptive use and fertility. For instance, it has been documented in many settings that men's preferences are stronger predictors of contraceptive use than their wives' preferences (Dodoo 1998; Dodoo and van Landewijk1996; Bankole and Singh 1998). Consistent with this evidence, a recent field experiment conducted in Lusaka indicated that the gender gap in desired fertility has a significant impact on couples' take-up of contraceptives and, ultimately, fertility.

In the experiment, women who were offered family planning services when by themselves were significantly more likely to use them compared to women who were offered the same services in the presence of their husbands, leading to a 60 percent reduction in unwanted births (Ashraf et al. 2014). This finding was concentrated among households in which the husband reported higher desired fertility than the wife.

Research hypothesis 1: The gender gap in demand for children is a strong determinant of unwanted births and intra-household conflicts.

Reducing unplanned or unwanted pregnancies is important for economic growth, children's outcomes (Do and Phung 2010; Jensen 2011), and women's well-being and empowerment (Goldin and Katz 2002; Bailey 2006; Chiappori and Orrefice 2008; Pezzini 2005). Despite its crucial implications for development and growth, the determinants of fertility remain poorly understood (Pritchett 1994; Joshi 2011).

In particular, there has been surprisingly little research regarding the determinants of men's fertility preferences, both in general and relative to women, and on the fertility decision-making process in the household.[1] The primary gender difference from which such a gap is likely to originate is that women directly bear the cost of childbearing (Rasul 2008). In countries like Zambia, with high MM ratios, the physical cost of childbearing – and hence the gender difference in total costs of childbearing – is particularly high.[2]

[1] One notable exception is Doepke and Kindermann (2016), who study disagreement about fertility in Europe.
[2] The MM ratio is equal to 470 maternal deaths per 100,000 live births. The lifetime risk is equal to 1 in 59 women (Central Statistical Office et al. 2015).

Maternal mortality risk has, in other contexts, appeared to have had an impact on the demand for children: in the United States, the drop in MM in the first half of the 20th century was associated with the baby boom (Albanesi and Olivetti 2010).[3] However, high rates of MM and morbidity are likely to differentially affect the demand for children across men and women. Only women face MM and morbidity risk. In addition, in many countries in Sub-Saharan Africa where stigma and superstition are associated with MM, men may also have fewer opportunities to learn about the magnitude of such risks.

In Sub-Saharan Africa, it is also the case that pregnancy and childbirth continue to be viewed as solely a women's issue, and men rarely accompany women to the labor room during delivery (Babalola and Fatusi 2009). Consistent with this tradition, survey data from our study area indicate that men are less likely to have known women who have died in childbirth, and have a more limited understanding of the risk factors compared to their wives. In addition, the belief that infidelity is the primary cause of health complications at delivery is widespread in many Sub-Saharan African countries, including Zambia (Maimbolwa 2004; Lawoyin et al. 2007; Ashraf et al. 2017).

Gender differences in information about MM and morbidity risks represent a critical subject of analysis for a number of reasons. First, if men report higher desired fertility than they would if they had more accurate information, then providing such information may be weakly welfare improving (Della Vigna and Gentzkow 2010). Second, from a policy perspective, information asymmetries may be a more actionable target for decreasing unmet need for family planning compared to asymmetries in costs. Third, understanding how information asymmetries between decision makers affect household choices can shed new light on the process of intra-household decision-making.

Research hypothesis 2: Despite the existence of several important factors affecting the gender gap in demand for children, the information gap about the health cost of childbearing plays a non-negligible role.

Despite growing policy emphasis on male involvement in family planning, current evidence on the effect of formal male involvement in fertility programs is mixed. Although some randomized public health studies found that providing health education to husbands may increase uptake of modern contraceptives (Wang et al. 1998; Terefe and Larson 1983; Fisek and Sumbuloglu 1978), one large study found no effect (Freedman and Takeshita 1969).

However, recent evidence from rural Malawi suggests that campaigns to promote contraceptive use among men have the potential to substantially increase take-up (Shattuck et al. 2011). Additionally, informational interventions appear to have a substantial impact on health and educational choices in developing countries (Jensen 2010; Dupas 2011). Disseminating information about maternal health risk to men could then provide an inexpensive and easily scalable way to affect a crucial aspect of fertility demand.

The vast literature on intra-household decision-making has been primarily focused on the process through which decision-making takes place (Manser and Brown 1980; McElroy

[3] Reductions in MM were also associated with higher fertility in Sri Lanka (Jayachandran and Lleras-Muney 2009).

and Horney 1981; Chiappori 1992; Lundberg and Pollak 1996) and whether the outcome of such decision-making is efficient (Udry 1996; Browning and Chiappori, 1998, and, in a dynamic setting, Mazzocco 2007; Voena, 2015). The workhorse models of household decision-making, such as the unitary model and the collective model, assume that spouses have identical information about the costs and benefits of each choice. Little work has been done in economics on whether asymmetric information exists in the household and how much such asymmetries – regarding income, savings and outside options – matter for household decision-making (Ashraf 2009; Chen 2013; de Laat 2005; Stern and Friedberg 2010).

2.2 Theory of change

Needs: Zambian males, on average and relative to women, prefer more children. This leads to an intra-household gap in desired fertility, which can increase unwanted births and cause conflict within the household.

Inputs: Our intervention posits that the demand gap is partly driven by a gap in understanding about maternal risk between men and women. We address this issue by providing standardized information on the causes of MM and morbidity. The curriculum has been designed to provide this information in a credible way without directly confronting our participants' currently held beliefs.

Outputs: If our study participants accept the project's information on MM and morbidity, they will update their beliefs regarding what cause them and incorporate this information into their family planning and fertility decisions.

Outcomes: Contraceptive take-up will increase. To ensure that some of the issues that prevent contraception use (lack of availability, lack of information and limited choice) will not hamper our efforts, our study has a dedicated nurse to provide access to and information on a variety of contraceptives. Communication around fertility decisions will also increase. We predict that exposing men to issues associated with pregnancy and childbirth will eliminate some of the information asymmetries that undermine open communication on these issues. This reduction in informational asymmetries will encourage more cooperation and collaborative decision-making within the household.

Impact: Realized fertility will decrease as men's and women's fertility demands align, and increased communication will improve marital satisfaction.

2.3 Intervention

The intervention involved 562 households. For all households, both spouses were invited to attend a gender-specific community workshop in which the informational content varied experimentally. Each married couple was randomly assigned to one of three study arms. In the control group, both spouses attended a gender-specific meeting that relayed information about family planning only.[4] In one treatment arm, the husbands' meeting additionally provided information on women's health during pregnancy and the risk of

[4] This means that husbands and wives belonging to households assigned to the control group received the same kind of information, despite not taking part in the workshop together, as each workshop was gender specific.

MM and morbidity, while the wives' meeting provided family planning education only. In the other treatment arm, the husbands received family planning education only and the wives received the additional maternal health information.

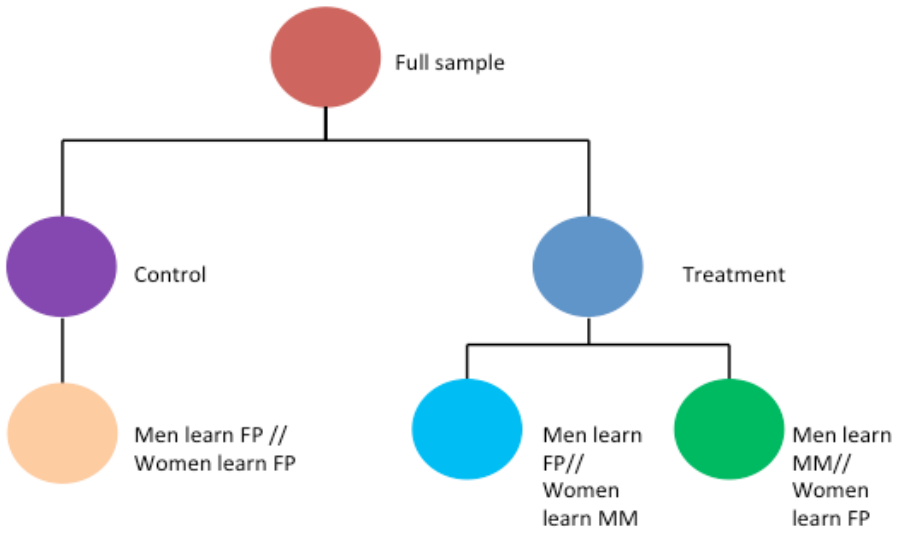
During control workshops, two trained educators (a man and a woman in each workshop) illustrated the types of modern contraceptives available at the clinic, discussed common misconceptions surrounding family planning, and referred the participants to a nurse in the public clinic. During treatment workshops, the educators delivered this same information, but also added content about maternal health regarding the magnitude of the risk of MM in Zambia; the primary medical causes of MM and morbidity; and the risk factors by birth spacing, parity and age.

In sum, the intervention design consisted of the following three intervention arms (Figure 3 and Table 1):

- Wife received the MM curriculum and husband received the FP curriculum^{h} and MM + FP^{w};
- Husband received MM and wife received FP^{h} and MM + FP^{w}; and
- Both husband and wife received FP^{h} and FP^{w}.

Note: FP = family planning

Figure 3: Study treatment arms



Note: FP = family planning

Table 1: Study design

	Husband	Wife
Treatment 1	FP	MM + FP
Treatment 2	MM + FP	FP
Control	FP	FP

Note: FP = family planning

After the intervention, a voucher that granted access to the services of a family planning nurse was distributed, allowing for several measures of demand for family planning to be recorded at the time of intervention:

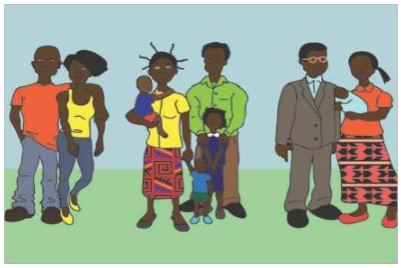
- Wife's willingness to pay (WTP) for her spouse to receive MM treatment: this shed light on barriers to household communication about maternal risk and any demand for services provided by the intervention. This option was only offered to treated wives; and
- Husband's WTP for a voucher to get priority access to family planning services: this allowed us to measure the effect of the intervention on the valuation of family planning services by the main target group of our study (men) immediately after the intervention, while also helping to mitigate the issue of tracking husbands at follow-up.

This design generated three household groups that had (randomly) different information exposure. Using this variation, we were able to compare the groups' fertility behavior, desired fertility, contraceptive use, maternal health knowledge, marital satisfaction and voucher take-up in order to identify the causal effect of information exposure.

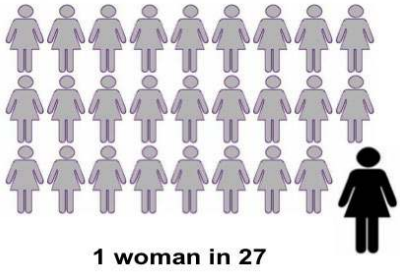
The trained facilitators followed a scripted curriculum, aided by visual material designed for the study (Figure 4). These materials were developed by the research team in close collaboration with the Zambia Ministry of Health and health personnel from Chipata clinic, and through multiple focus groups conducted in-country. The scripts were delivered through group meetings, which allowed our team to extensively monitor the information presented and ensure consistency across all groups. Highly trained facilitators proved to be crucial for the credibility of the information delivered.

Figure 4: Example of illustrative material used during intervention[5]

(a) Control group *FP*^{i}: "Family planning can help many couples"



(b) Treatment group *(MM + FP)*^{j}: "In Zambia, 1 in 27 women dies at childbirth"



(c) Treatment group *(MM + FP)*^{j}, risk factors: "Women over 35 have a higher risk of complications"

(d) Treatment group *(MM + FP)*^{j}, risk factors: "Women who have had more than four children have a higher risk of complications"

Note: FP = family planning

[5] Illustrative materials drawn by a professional graphic designer were shown to study participants in each treatment arm.

The experiment was carefully designed to address the challenge of imperfect compliance that arises from inviting participants to attend group meetings. Because one of the goals of the experiment was to compare the impact of providing information about MM to men versus women, it was crucial for internal validity that we ensured self-selection into participation was the same across genders (see subsection on identification). This challenge was addressed by inviting both spouses in a couple to attend community workshops at the same time. A more detailed discussion of the identification challenge that the experiment design overcomes is featured in Section 7.1.

We tested a number of incentives schemes to maximize participants' attendance in the community workshops and to finalize our implementation plan. First, workshops with 10–20 participants were held on a weekly basis on Saturdays and Sundays. Since only married couples were invited, scheduling the meeting sessions during weekends appeared to be the best choice to allow the highest number of couples to participate.[6] The exact time of the workshops was decided based on insights gained from focus group discussions and a small survey.[7]

Second, couples who missed a community workshop were reinvited several times.[8] Third, each spouse received 25 Zambian kwacha (approximately 5 US dollars) as transport reimbursement – which is comparable to the amount households receive in Lusaka for attending this type of event – plus 15 kwacha to play willingness-to-pay games. These measured demand for contraceptives (among men) or demand for MM information (among treated women). In addition, a raffle was conducted at each set of workshops, and only participants in the workshop received a raffle ticket. Each couple had approximately a 1 in 10 chance of winning the prize of a small stove.

At the end of these workshops, husbands were invited to participate in a WTP exercise where they were offered the chance to obtain a voucher for free family planning services that could be redeemed at the Chipata and Chaisa clinics within six months of the intervention. The facilitators explained to the participants that the voucher granted access to a nurse dedicated to the study, who would provide them with information about family planning and any contraception method of their choice, without the risk of long waits normally associated with accessing modern contraceptives in Zambia.

During this exercise, husbands were asked to report a price they were willing to pay for obtaining the voucher. If the price they reported was higher than or equal to a randomly generated voucher price, they received the voucher. Hence, despite the voucher being offered to all husbands who joined the community meetings, only a fraction of participants obtained it.

[6] In fact, most people in our catchment areas reported they would be available during weekends. This was particularly true for husbands, who tended to be less likely to attend than women and were less likely to be working during this time.

[7] Note that the assignment of workshop time to study arms was randomized.

[8] The number of times households were reinvited was randomized.

3. Context

In Zambia, 36 percent of the population resides in urban cities (WHO 2012). As of the last national census, population growth in the capital of Lusaka was 4.9 percent per year, which is among the highest rates in the world (Census of Population and Housing 2010). High fertility rates in Lusaka, coupled with rapid rural-urban migration, have led to the establishment of overcrowded and inadequately serviced informal settlements (or "compounds"), in which a growing proportion of Lusakans reside.

This study was conducted in low-income urban settlements of Lusaka. The research team selected 15 neighboring compounds around Chipata and Chaisa clinics, which are two government-run facilities that serve low-income areas in Lusaka. During community meetings, we provided a portion of our study participants with a voucher that allowed them to receive a consultation from a nurse and redeem contraceptives while minimizing the wait time at the clinics. Therefore we selected areas at a reasonable distance from the two health care centers. We also closely collaborated with Chipata and Chaisa clinics to adjust and develop the information curriculum and monitor clinic activities during the data collection rollout. In this context, approximately 967 married couples of child-bearing age were invited to participate in our study.[9]

4. Timeline

The project consisted of the following four main phases:

- Baseline data collection (including surveyor training): August–December 2014;
- Intervention (in the form of community meetings): November 2015–May 2016;[10]
- Voucher redemption data collection (at the clinics): November 2015–December 2016; and
- Follow-up data collection (including surveyor training): October 2016–May 2017.

Specifically, a first wave of data collection occurred between August and December 2014. A total of 715 couples were interviewed, with the husband and the wife surveyed separately. Baseline measures were collected regarding knowledge of maternal health, use of and attitudes toward contraception, balance of power, and fertility demand. Between October 2015 and February 2016, an additional 442 households were included in the sample. For these households, a subset of baseline questions was asked of the wife for stratification purposes.

The baseline sample was rescreened prior to the actual start of the intervention in November 2015 in order to ensure participants' compliance with the study inclusion criteria. Between baseline and intervention, 21.8 percent of the total sample (249 out of 1,137 households) became ineligible (mostly due to pregnancy and/or moving outside of

[9] Refers to the total number of couples invited to participate in the full study since initial baseline recruitment.

[10] During the baseline data collection, we experienced difficulties in finalizing interviews for both husbands and wives. This resulted in a smaller sample size than initially planned. The time gap between the baseline and the intervention was required in order to develop alternative measures of demand for family planning (such as the WTP game) that then allowed the researchers to measure the impact of the intervention with a smaller sample size.

the catchment area). On top of the attrition due to ineligibility, 51 households were not found at the time of invitation and 65 refused to participate. Thus, 772 households were invited to the intervention and 562 attended.

Finally, between October 2016 and May 2017, we collected follow-up data for the households that attended the intervention, with an attrition rate of 10 percent. In doing so, we re-collected measures of knowledge of maternal health, use of and attitudes toward contraception, balance of power, fertility demand, and realized fertility.

5. Evaluation: design, methods and implementation

5.1 Ethical review and approval

We acknowledge the importance of conducting research in strict accordance with ethical standards. The project was monitored and approved by the following research ethics committees and institutions:

- University of Zambia: the last amendment was submitted and approved in June 2016. We also continue to submit regular progress reports every semester;
- University of Chicago: the last amendment was submitted and approved in February 2016;
- London School of Economics: the last amendment was submitted and approved in February 2016; and
- Innovations for Poverty Action: initial study approval was granted.

5.2 Sampling design

The project comprises two waves of a panel household survey, administered to both the husband and wife of each household separately, and a randomized controlled trial. The sample that took part in our intervention consisted of 562 married couples recruited from the catchment area of Chipata and Chaisa clinics, located in the poor suburbs of Lusaka. The sample is representative of the peri-urban population of Zambia, exhibiting common characteristics of the rural population: high rates of MM and fertility as well as high rates of unmet need for family planning.[11]

The definition of the study population of interest followed the exclusion criteria outlined below. Couples in which the wife was aged between 18 and 40 and lived in the catchment area of the Chipata and Chaisa clinics were eligible to be recruited. A random-address generator was used to recruit couples. The following exclusion criteria were agreed upon with the competent research ethics committees:

- Households in which the wife had diabetes, heart disease or high blood pressure at baseline;
- Households in which the wife was younger than 18 years of age or older than 40 at baseline;
- Households in which the wife was less than eight weeks postpartum;

[11] Zambia has one of the world's highest MM ratios, yet also has very high fertility rates (an estimated 6.2 children per woman), exacerbating the risk associated with childbirth for Zambian mothers (Central Statistical Office et al. 2009).

- Households in which the wife had been sterilized or had a hysterectomy;
- Men or women who were not currently married;
- Households in which the wife became pregnant at any point between the recruitment and the intervention phase;
- Households in which the spouses were actively trying to have a baby when invited to the intervention; and
- Households in which the wife was on long-term contraceptives when invited to the intervention.

Exclusion criteria (4) to (7) relate to our study objectives but were not medically motivated. There were no inclusion or exclusion criteria based on race or ethnic origin, nor any explicit targeting by income, although this population was likely to be fairly representative of the low- to middle-income population in Lusaka. Exclusion criteria were also not based on reading ability or language spoken.

At the beginning of the study, we recruited study participants with the help of community health workers. We randomly selected a list of households for each health worker to visit for screening. These workers visited couples at their homes to provide a brief explanation of the project and then returned with trained data collectors. The data collectors explained the purpose and approximate length of the baseline survey to participants and asked for their consent to participate in the study. A total of 715 couples took part in the baseline data collection.

In order to implement exclusion criteria (7) and (8), we had to exclude 100 couples from our sample (13.6%) and needed to recruit an additional 100 couples to replace them. Additionally, the sample was further expanded due to high mobility and attrition in the study catchment areas. Thus, in total, we recruited an additional 422 couples in order to have a sufficient sample size to observe results on outcomes of interest.

These additional couples were recruited randomly and enrolled in the study if they satisfied the eligibility criteria and consented to participation. Although all of the other study participant took part in a baseline survey before being invited to community meetings, in the interest of saving money and time these couples did not undergo a full baseline interview.[12] We recruited them first, then went back and conducted the invitations to community meetings, just like for the rest of the sample.

After screening and invitations were completed, 562 couples took part in the community meetings held around Chipata and Chaisa. About one year after the end of intervention, 511 couples (90% of the intervention sample) took part in a follow-up interview, where we collected measures of knowledge of maternal health, use of and attitudes toward contraception, balance of power, fertility demand, and realized fertility.

Below, we present an overview of the number and composition of study participants in each survey wave, showing the fraction of husbands and wives in each stage, as well as whether they participated in the baseline.

[12] During follow-up interviews, we administered a set of baseline questions to the households that did not take part in the baseline survey.

Table 2: Baseline participants

DATA COLLECTION ROUND 1: BASELINE	
Couples	
715	
Husbands	Wives
715	715

Table 3: Intervention participants

INTERVENTION	
Couples	
562	
Husbands	Wives
562	562

INTERVENTION	
Couples	
562	
Baseline	Non-baseline
350	216

Table 4: Follow-up participants

DATA COLLECTION ROUND 2: FOLLOW-UP	
Couples	
511	
Husbands	Wives
516	534

DATA COLLECTION ROUND 2: FOLLOW-UP	
Study participants	
1,050	
Baseline	Non-baseline
653	397

During the follow-up round of data collection (Table 4), we targeted all spouses who attended the community meetings. However, in some cases we were not able to interview both spouses, mainly due to the high mobility of respondents and unwillingness to take part in the study. As a result, 511 matched couples participated in the follow-up interviews. In addition, the following participants joined the study: 19 wives whose husband could not be interviewed; 4 husbands whose wives could not be reached; 23 couples where none of the spouses could be interviewed; and 5 respondents with a deceased spouse. Our results, presented in Section 6, are based on the full sample of respondents who took part in the follow-up survey.

5.3 Power calculations

Initial power calculations for sample size were performed based on voucher take-up rates from the 2010 pilot study. Observations were clustered at the level of the community workshop, assuming a 5 percent intra-cluster correlation. Attendance rates at the community meeting were assumed to be 80 percent. When conditioning on the subsample of households for which the husband was eligible to participate in the study ($[MM + FP]^h$ and FP^h), we are able to detect a 15 percentage point difference in voucher take-up between the treatment and control group at a 5 percent significance level with 0.9 power with 250 observations per treatment arm.

Moreover, prior to the start of the intervention, we conducted power calculations for a sample size of 1,140 households for men's WTP for a voucher to access family planning (this measure was collected at the information stage just after the community meetings). Observations were clustered at the level of the community workshop, assuming a 5

percent intra-cluster correlation and an average group size of 15 participants. Compliance rates (attendance of the community meeting and non-attrition) were assumed to be 80 percent. When conditioning on the subsample of households for which the husband received MM information, we detected a 0.91 power difference in WTP between the treatment and control group at 5 percent significance with 0.9 power with 380 observations per treatment arm. The control mean was assumed to be 9.5 kwacha.

5.4 Treatment randomization

In order to determine the information treatment to which each household was to be assigned, the research team randomized treatment at the couple level (for a more detailed explanation of treatment arms, see Section 2), stratifying on the following characteristics:

- Whether the couple had a child or not;
- Whether the wife was older or younger than 35 years of age;
- Whether the couple wanted another child at baseline;
- Residential size of the block in which the couple lived;
- Whether the wife believed that the husband wanted another child;
- Whether the wife believed that the husband wanted another child soon; and
- Whether the husband knew someone who had died at childbirth.

Innovations for Poverty Action's research team, based in Lusaka, executed the randomization by computer under their management and the principal investigators' close supervision. Randomization was performed independent of race, ethnic origin, income, education or any other personal characteristics. Because the study recognizes but aims to limit potential family conflict due to concealing behavior between spouses, prior to the meeting, all couples were informed that they might receive different information from that received by their spouse.

5.5 Data collection

The research team collected information about study participants through primary data collection. Data-related activities were conducted around the catchment areas of Chipata and Chaisa in Lusaka, with multiple levels of supervision and data quality monitoring. As previously outlined, we sought to interview both spouses in each couple, but they were interviewed separately from each other. We used the following instruments to collect data in different stages of the project:

- Baseline survey (quantitative);
- Intervention survey (quantitative); and
- Follow-up survey (quantitative).

We also kept track of the clinic visits and activities of our study participants through paper registers that were digitized and matched with our data.

The research team trained and hired a team of surveyors who were in charge of interviewing study participants in every round of data collection. Surveyors took part in a 5- to 7-day training, where they learned about the structure and questions of the interview and practiced the instrument in the field with electronic equipment and pilot participants. After training, we selected the most promising surveyors for the final team of

interviewers. Surveyors were then grouped into smaller teams of 5 to 7 people, and each team was monitored by a supervisor. All supervisors reported directly to a field manager, who was in charge of supervising, conducting quality checks and providing regular support to the field team during the rollout. The research associates collected feedback from both the field manager and the supervisors on a regular basis.

In addition to tightening supervision, we enforced a few control mechanisms to ensure the highest data quality and consistency level:

- *Field back-checks*: a few days after the regular survey had been finalized, back-check surveyors reinterviewed a portion of our study participants with a pruned survey version. The back-check data were then compared to the previously collected data to verify consistency. The field team conducted back-check controls on 11 percent of our sample;
- *Field audits*: supervisors, field managers and research associates conducted random audits throughout the whole rollout in order to minimize absenteeism, ensure professionalism and increase attention to detail;
- *Survey controls during data entry*: the research team programmed control measures in the survey in order to minimize logic inconsistencies while conducting a computer-assisted interview; and
- *Logic checks on incoming data*: during data collection, the research team conducted data checks on a daily basis and kept constant contact with the field team to address and limit inconsistencies.

Finally, the research team wanted to be cognizant of the time that individuals were giving up to participate in the study, and therefore offered a token of appreciation. As suggested by the ethical review board at the time of baseline, we compensated participants with 10 kwacha for the time they took to answer the lengthy baseline questionnaire. In line with this and the most updated guidelines, we compensated each respondent with 18 kwacha for completing the follow-up survey. At this point, all participants had already consented and been part of the research study for several months and two rounds of surveys, so the token of appreciation should in no way have influenced their decision to participate.

6. Results

In the results that follow, using either the wife or the husband sample, we estimate the following linear model using ordinary least squares (OLS) regression:

$$Y_i = \alpha + \beta I_{MM}^{H} + \gamma I_{MM}^{W} + \theta X_i + \omega Z_i + \varepsilon \qquad (5)$$

where Y_i is the outcome variable of interest; I_{MM}^{H} and I_{MM}^{W} are indicators for assignment to either the “MM husband” or the “MM wife” condition; X_i is a vector of controls from the baseline survey (including wife age, husband age, wife education, husband education, number of children, age of last child born before meeting, meeting attendance, modern contraceptive use at baseline, and quadratic weekly income); Z_i is a vector of stratification variables (including wife over 35 couple; no children; wife thinks that husband wants another child later; wife thinks husband does not want another child; husband never known of women who died at childbirth; wife is actively trying to get pregnant; block size; and baseline data present).

In Section 6.3, we present different sets of results estimated on the full sample of follow-up participants. We also refine our empirical predictions to better fit the conceptual framework motivating our analysis by isolating the subsample of couples for whom we expected that maternal health knowledge would be particularly relevant with respect to influencing contraceptive behavior. Respectively, those subsamples are: the wife was not actively trying to get pregnant at baseline,[13] the wife was worried about complications at baseline and the couple disagreed over the number of desired children at baseline.

Finally, we look at an important set of outcomes in our study: the demand for family planning vouchers. Since intervention participants were offered a family planning voucher after the community meeting sessions, Section 6.4 looks at the results on voucher take-up, estimated on the sample of intervention participants.

6.1 Balance

The intervention sample is balanced on both demographic characteristics and baseline fertility preferences (Table 5). The follow-up sample does not present selective attrition.

Table 5: Balance at intervention

	Mean			Mean diff			Joint test
	(1) MMH	(2) MMW	(3) FP	1 v 3	2 v 3	1 v 2	(p-value)
Panel A: Demographic variables							
Wife's age	29.16	30.04	30.09	-0.93	-0.05	-0.88	0.2
	(0.41)	(0.42)	(0.44)	(0.60)	(0.60)	(0.59)	
Husband's age	34.97	35.92	35.8	-0.83	0.12	-0.95	0.35
	(0.52)	(0.52)	(0.52)	(0.73)	(0.73)	(0.73)	
Wife's highest schooling	7.85	7.31	7.51	0.34	-0.2	0.54*	0.21
	(0.20)	(0.23)	(0.23)	(0.31)	(0.33)	(0.31)	
Husband's highest schooling	9.17	9.29	9.28	-0.11	0.01	-0.12	0.91
	(0.20)	(0.20)	(0.23)	(0.31)	(0.31)	(0.29)	
Husband does not work [baseline only, n = 343]	0	0.03	0.01	-0.01	0.02	-0.03*	0.16
	(0.00)	(0.02)	(0.01)	(0.01)	(0.02)	(0.01)	
Wife does not work [baseline only, n = 343]	0.56	0.65	0.59	-0.03	0.06	-0.08	0.41
	(0.04)	(0.05)	(0.05)	(0.07)	(0.07)	(0.06)	
Husband's weekly income** [baseline only, n = 332]	403.23	354.95	489.13	-85.89	-134.17*	48.28	0.14
	(41.62)	(38.78)	(58.30)	(69.77)	(111.59)	(57.82)	

[13] This specific analysis implies a baseline sample restriction, which explains the presence of households that were actively trying to have a baby. In fact, we could have such cases at the time of baseline. Participants were then rescreened and only couples who were not actively trying to have a baby at the time of rescreening were invited to attend the community meetings, while couples that were actively trying to have a baby were excluded from the study as per exclusion criteria.

	Mean			Mean diff			Joint test
	(1) MMH	(2) MMW	(3) FP	1 v 3	2 v 3	1 v 2	(p-value)
Panel B: fertility preferences							
Wife uses modern contraceptive	0.56	0.48	0.55	0.01	-0.07	0.08	0.26
	(0.04)	(0.04)	(0.04)	(0.05)	(0.05)	(0.05)	
Wife's ideal children	4.16	4.17	4.26	-0.1	-0.09	-0.01	0.71
	(0.08)	(0.09)	(0.10)	(0.13)	(0.14)	(0.12)	
Wife's belief husband ideal children	4.33	4.17	4.21	0.12	-0.04	0.16	0.59
	(0.10)	(0.11)	(0.14)	(0.17)	(0.18)	(0.15)	
Diff. (wife belief husband – wife ideal)	0.19	0.04	0.07	0.12	-0.04	0.16	0.53
	(0.09)	(0.09)	(0.14)	(0.16)	(0.16)	(0.13)	
Husband ideal children	4.29	4.42	4.45	-0.15	-0.03	-0.13	0.7
	(0.13)	(0.14)	(0.17)	(0.20)	(0.22)	(0.19)	
Husband belief wife ideal children	4.16	3.86	4.17	-0.01	-0.31	0.3	0.27
	(0.13)	(0.15)	(0.18)	(0.22)	(0.24)	(0.20)	

Notes: FP = family planning; *p < 0.10, **p < 0.05, ***p < 0.01. Standard errors (SE) in parentheses. ** Top percentile omitted due to outliers.

6.2 Baseline evidence

At baseline, we document significant differences between men and women in our sample, in terms of both fertility preferences and knowledge about MM risk. Table 6 compares, among matched couples, the husband and wife's fertility preferences. In approximately 38 percent of couples, husbands want more children than their wives, and on average, men want significantly more children than women.

Table 6: Differences in fertility preferences

	Mean	SD	N	p-value
Husband's ideal number of children	4.43	1.73	707	
Wife's ideal number of children	4.19	1.33	711	
Husband wants more children	0.378	0.485	712	
Husband ideal number children = wife ideal number children				0.0038**

*(p < 0.05), **(p < 0.01), ***(p < 0.001)

In the baseline survey, we also recorded gender differences in individuals' knowledge about and perceptions of MM risk. These results are summarized in Table 7. First, to measure the perceived likelihood of complications, respondents were given a ladder and asked to estimate their own or their wife's probability of complications if she were currently pregnant. As shown in the first row of Table 7, women estimate a significantly higher probability than men (43% versus 35%).

Second, we provided respondents with a set of hypothetical situations and asked them to rate the probability of complications in each one, again using the ladder method. These

hypothetical women varied in the biological risk factor faced: birth spacing (more than 2 years between children), parity (fewer than 4 children) and age (being younger than 40). Rows 2–4 of Table 7 show that both men and women estimate lower probabilities for all three factors. Women, however, exhibit higher perceived risk variability.

Relative to the average perceived risk in the population, perceived risk for women with sufficient birth spacing is 46% lower among female respondents versus 41% lower among male respondents. For low parity, the reduction is 31% among women versus 18% among men, and for age, it is 16% among women versus 9% among men.

Third, we asked respondents, without prompting, to list the factors they believed contribute to maternal health risk. Infidelity was the most cited cause for men and women, though a significantly larger percentage of men cited it (56% versus 44%).[14] Then respondents were given 30 buttons to allocate across 3 categories of maternal risk – underlying health conditions, use of health care services and infidelity – in accordance with the perceived importance of each. As shown in row 5 of Table 7, men placed a significantly higher weight on infidelity relative to the two other categories (33% compared with 30%). In addition, a higher share of women (nearly 10% relative to 5%) assigned zero importance to infidelity.

Table 7: Perceptions of risk of birth complications at baseline

	Women	Men	SE
Likelihood of complications	0.434	0.356	(0.015)***
Two years after delivery	0.236	0.211	(0.010)**
Fewer than four children	0.298	0.291	(0.010)
Younger than 40 years old	0.366	0.324	(0.011)***
Infidelity weight	0.304	0.330	(0.008)***
Infidelity belief	0.444	0.558	(0.022)***
Observations	1241	886	

*(p < 0.05), **(p < 0.01), ***(p < 0.001)

6.3 Endline survey data analysis

6.3.1 Realized fertility

In Table 8, we report estimates for three measures of realized fertility at endline: whether the wife is currently pregnant (column 1); the number of months since the last pregnancy (column 2); and the probability of giving birth in the eight months following the intervention (column 3). When the husband is treated, we observe a 5.5 percentage point decrease both in the probability of the wife being pregnant at endline and in the probability of giving birth after the intervention (in both cases, $p < 0.10$). The latter corresponds to a 32 percent decrease with respect to the control group. No significant effect is observed when the wife is treated.

[14] Other commonly cited factors were the woman's overall health, age (too young or too old), not seeking care and not delivering at a health facility.

Table 8: OLS – Realized fertility (wife sample)

	(1) Currently pregnant	(2) Birth spacing since meeting (months)	(3) Pregnant/delivered at least 8 months after meeting
Husband treated	-0.055*	0.11	-0.055*
	(0.029)	(0.24)	(0.03)
Wife treated	-0.043	-0.19	-0.031
	(0.03)	(0.23)	(0.032)
Stratification variables	Yes	Yes	Yes
Demographic controls	Yes	Yes	Yes
Husband treated = Wife treated (F-test p-value)	0.68	0.25	0.47
Outcome mean in control group	0.12	11.54	0.17
Observations	534	534	534

*** p < 0.01, ** p < 0.05, * p < 0.1. SE clustered at the meeting level in parentheses.

6.3.2 Desired fertility

In Table 9, we examine the effect of the intervention on two measures of desired fertility for both husband and wife: a dummy for whether the respondent wants another child (column 1), and a dummy for whether the respondent wants another child over the next year and a half (column 2). We also examine each respondent's belief about their spouse's desired fertility, using: a dummy for whether the respondent believes that the spouse wants more children (column 3) or fewer children (column 4) than him/her; and a dummy for whether the respondent believes that the spouse wants at least one other child (column 5). The top panel examines the husbands' sample, and the bottom panel examines the wives' sample.

First, we notice that treated husbands are 7.1 percentage points less likely to report to want another child ($p < 0.10$, an 11 percent reduction relative to the control group), and more likely to believe that their spouse does not want another child (they are 13 percentage points less likely to believe that their wife wants another child, a 17 percent reduction relative to the control group with $p < 0.01$). Husbands whose wives are treated do not exhibit any statistically significant change in their desired fertility or in their belief about their wives' desired fertility.

Treated wives, and wives of treated husbands, do not report a statistically significant difference in desired fertility relative to the control group. However, wives of treated husbands are 5.7 percentage points less likely to believe that their husband wants fewer children ($p < 0.10$). This result suggests that the perceived gap in desired fertility is not filled by the intervention, but that treating husbands may increase informative communication about desired fertility.

Table 9: OLS – Desired fertility (husband and wife sample)

Panel A: Husband sample	(1) Want another child	(2) Want another child within 1.5 years	(3) Belief spouse wants more kids	(4) Belief spouse wants fewer kids	(5) Belief spouse wants another child
Husband treated	-0.071*	-0.062	-0.078*	0.011	-0.13***
	(0.038)	(0.044)	(0.041)	(0.039)	(0.034)
Wife treated	0.032	-0.0022	-0.013	-0.013	-0.022
	(0.035)	(0.045)	(0.047)	(0.045)	(0.04)
Stratification variables	Yes	Yes	Yes	Yes	Yes
Demographic controls	Yes	Yes	Yes	Yes	Yes
Husband treated = Wife treated (F-test p-value)	0.01	0.23	0.12	0.59	0.02
Outcome mean in control group	0.67	0.31	0.23	0.19	0.75
Observations	516	516	515	515	503
Panel B: Wife sample	**(1) Want another child**	**(2) Want another child within 1.5 years**	**(3) Belief spouse wants more kids**	**(4) Belief spouse wants fewer kids**	**(5) Belief spouse wants another child**
Husband treated	-0.012	0.037	0.075	-0.057*	-0.0072
	(0.04)	(0.053)	(0.055)	(0.031)	(0.043)
Wife treated	0.041	0.0068	-0.0012	0.019	0.025
	(0.039)	(0.05)	(0.055)	(0.033)	(0.038)
Stratification variables	Yes	Yes	Yes	Yes	Yes
Demographic controls	Yes	Yes	Yes	Yes	Yes
Husband Treated = Wife treated (F-test p-value)	0.28	0.56	0.1	0.02	0.43
Outcome mean in control group	0.7	0.25	0.24	0.15	0.73
Observations	534	534	532	532	515

*** p < 0.01, ** p < 0.05, * p < 0.1. SE clustered at the meeting level in parentheses.

6.3.3 Contraceptive use

In Table 10, we examine contraceptive use, particularly the use of oral contraceptives (the “pill"). When the husband is treated, we observe a 3.7 percentage point increase in pill usage and a 5 percentage point increase in regular pill usage, measured through prolonged frequency of pill intake (a 33% increase, $p < 0.15$) relative to the control group. We do not observe any significant effect when the wife is treated.

Table 10: OLS – Contraceptive use (wife sample)

	(1) Currently using modern CCT	(2) Currently using pill	(3) Using pill correctly (last taken max 1 day ago)	(4) Using pill correctly (last taken max 5 days ago)	(5) Ever used CCT while partner unaware
Husband treated	-0.018	0.037	0.05	0.049	-0.026
	-0.049	-0.043	-0.04	-0.043	-0.021
Wife treated	-0.037	-0.019	-0.0044	-0.015	-0.027
	-0.05	-0.033	-0.029	-0.031	-0.023
Stratification variables	Yes	Yes	Yes	Yes	Yes
Demographic controls	Yes	Yes	Yes	Yes	Yes
Husband treated = Wife treated (F-test p-value)	0.74	0.18	0.18	0.12	0.96
Outcome mean in control group	0.68	0.18	0.15	0.16	0.05
Observations	534	534	534	534	534

Note: CCT = contraception

6.3.4 Communication between spouses

In order to measure whether (and how) our intervention affected interaction between spouses, we employed several measures of intra-household communication, as reported by each spouse: a dummy measuring whether spouses agree on using contraceptives (Table 11, columns 1 and 5); whether the respondent tried to convince his or her spouse to use contraceptives (columns 2 and 6); whether the respondent managed to change his or her spouse’s mind (columns 3 and 7); and whether the respondent changed his or her mind because of the spouse (columns 4 and 8).

When the husband is treated, we observe a shift in all of these variables in the husbands’ reports: a decrease in the probability of agreement (by 9.7 percentage points, $p < 0.05$); an increase in the probability that the husband reports trying to convince his wife to use contraceptives (by 6.9 percentage points, $p < 0.05$); and an increase in the probability that the husband reports changing his wife’s mind or his own mind. A similar pattern of responses arises from reports by wives of treated husbands.

We find no change in these variables reported by husbands of treated wives or by the treated wives themselves.

Table 11: OLS – Communication between spouses (husband and wife sample)

	Panel A: Husband sample				Panel B: Wife sample			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Agree-ment on CCT use	Tried convincing partner to use CCT	Changed partner's mind on CCT use	Partner changed resp's mind on CCT use	Agreement on CCT use	Tried convincing partner to use CCT	Changed partner's mind on CCT use	Partner changed resp's mind on CCT use
Husband treated	-0.097**	0.069**	0.083***	0.051*	-0.032	0.047*	0.027	0.023
	(0.044)	(0.032)	(0.03)	(0.03)	(0.044)	(0.027)	(0.023)	(0.02)
Wife treated	-0.048	0.02	0.029	0.046	-0.015	0.033	0.018	0.032
	(0.04)	(0.029)	(0.026)	(0.029)	(0.04)	(0.023)	(0.022)	(0.022)
Stratification variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Demographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Husband treated = Wife treated (F-test p-value)	0.25	0.19	0.12	0.89	0.67	0.63	0.68	0.69
Outcome mean in control group	0.86	0.05	0.03	0.05	0.83	0.04	0.04	0.02
Observations	515	515	515	515	531	531	531	531

Note: CCT = contraception; *** p < 0.01, ** p < 0.05, * p < 0.1. SE clustered at the meeting level in parentheses.

6.3.5 Maternal health knowledge

In Tables 12 and 13, we examine changes in maternal health knowledge, both directly on the treated spouse (as manipulated by our experiment) and indirectly on the partner. We consider three main sets of outcomes. In the first set, reported in Table 12, we measure whether the respondent considers the actual factors affecting MM and morbidity (age in column 1, parity in column 2, birth spacing in column 3 and an index of the three in column 4) as important determinants of maternal health. As expected, we find that treated husbands are more likely to identify these variables as key risk factors in their reports, relative to the control group (a 14 percentage point increase in total, $p < 0.01$). A similar but less stark increase can be observed in reports of the husbands of treated wives.

Treated wives are also more likely to identify these variables as key risk factors in their reports, relative to the control group (a 10 percentage point increase in total, $p < 0.10$). However, wives of treated men exhibit small and imprecise changes in their understanding of risk factors.

In the second set of outcomes in Table 12, we measure risk perceptions for women who belong to risky groups (women older than 40 in column 4, women with high parity in column 5 and women who just gave birth in column 6).[15] The effect of the treatment is generally positive for treated respondents, and in the case of treated husbands, it was positive for their spouse.

[15] Study participants were asked to indicate, on a ladder ranging from 0 to 10, the likelihood of experiencing complications for a woman in each of the following risky groups:
(1) Imagine a woman in your community with the same physical and mental health that you have. She has two children. Her last delivery was more than two years ago. She is older than 40. She is pregnant. Pick the point on the ladder that reflects how likely you think it is that [...] she would experience any complication;
(2) Imagine a woman in your community with the same physical and mental health and age as you. Her last delivery was more than two years ago. She has more than four children. She is pregnant. Pick the point on the ladder that reflects how likely you think it is that she would experience any complication; and
(3) Imagine a woman in your community with the same physical and mental health, the same age and the same number of children as you. She just delivered and became pregnant after 24 months. Pick the point on the ladder that reflects how likely you think it is that she would experience any complication.

Table 12: OLS – Maternal health knowledge (husband and wife sample)

	Panel A: Husband sample				Panel B: Wife sample			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	Age	Many kids	No birth spacing	Main factors	Age	Many kids	No birth spacing	Main factors
Husband treated	0.086	0.053	0.065*	0.14***	0.03	-0.038	0.038	0.031
	(0.053)	(0.037)	(0.039)	(0.052)	(0.049)	(0.039)	(0.045)	(0.043)
Wife treated	0.041	0.064*	0.012	0.067	0.082	0.053	0.092*	0.10*
	(0.052)	(0.035)	(0.034)	(0.051)	(0.052)	(0.046)	(0.054)	(0.051)
Stratification variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Demographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Husband treated = Wife treated								
(F-test p-value)	0.34	0.73	0.16	0.12	0.36	0.04	0.28	0.19
Outcome mean in control group	0.23	0.08	0.09	0.3	0.35	0.26	0.3	0.47
Observations	515	515	515	515	534	534	534	534

	Panel A: Husband sample			Panel B: Wife sample		
	(1)	(2)	(3)	(4)	(5)	(6)
	Older than 40	More than 4 kids	Pregnant right after delivery	Older than 40	More than 4 kids	Pregnant right after delivery
Husband treated	0.40*	0.092	0.082	0.45**	-0.11	0.052
	(0.2)	(0.18)	(0.27)	(0.22)	(0.24)	(0.21)
Wife treated	-0.11	-0.24	-0.079	0.38	0.3	0.15
	(0.23)	(0.23)	(0.27)	(0.23)	(0.26)	(0.25)
Stratification variables	Yes	Yes	Yes	Yes	Yes	Yes
Demographic controls	Yes	Yes	Yes	Yes	Yes	Yes
Husband treated = Wife treated						
(F-test p-value)	0.02	0.13	0.51	0.73	0.07	0.68
Outcome mean in control group	7.4	6.45	7.77	7.81	6.44	7.47
Observations	516	516	516	532	532	532

*** p < 0.01, ** p < 0.05, * p < 0.1. SE clustered at the meeting level in parentheses.

The third set of outcomes is reported in Table 13, where we look at the evolution of traditional beliefs on the causes of MM and morbidity. In particular, since there is a widespread belief in Zambia that complications during pregnancy are due to infidelity within the couple, we construct an index measuring how many times infidelity is mentioned as a risk factor in a set of questions.[16] We observe an imprecisely estimated decrease in the index when the husband is treated.

Table 13: OLS – Beliefs on causes of death during pregnancy/childbirth (husband and wife sample)

	Panel A: Husband sample		Panel B: Wife sample	
	(1)	(2)	(3)	(4)
	FP prevents death	Infidelity superstition index	FP prevents death	Infidelity superstition index
Husband treated	0.03	-0.33	0.046	-0.043
	(0.025)	(0.2)	(0.037)	(0.19)
Wife treated	0.018	-0.33	0.02	0.056
	(0.022)	(0.21)	(0.047)	(0.2)
Stratification variables	Yes	Yes	Yes	Yes
Demographic controls	Yes	Yes	Yes	Yes
Husband treated = Wife treated (F-test p-value)	0.65	0.98	0.61	0.64
Outcome mean in control group	0.03	3.6	0.21	5.44
Observations	515	516	534	534

*** p < 0.01, ** p < 0.05, * p < 0.1. SE clustered at the meeting level. FP = family planning

6.3.6 Marital well-being

In Table 14, we study four different measures of self-reported marital satisfaction. We find that treated husbands and their wives both report higher marital satisfaction. For instance, treated husbands are 6.5 percentage points more likely to report being happy with their own marriage (an 8% increase relative to control, p < 0.10), while their wives are 7.1 percentage points more likely to report being happy with their own marriage (a 9.5% increase, p < 0.10). Husbands of treated wives also report comparable increases in marital satisfaction, while treated wives themselves report worse marital satisfaction, albeit not statistically significantly.

[16] In detail, we measured:

- Whether infidelity is considered as a risk factor for complications;
- Whether infidelity is a concern related to use of family planning;
- Whether unfaithful women are more likely to die;
- Whether in the community unfaithful women confess lovers' names before delivery to avoid complications;
- Whether unfaithful women should confess lovers' names before delivery to avoid complications;
- Whether in the community unfaithful women do not look at their blood or child during delivery to avoid complications;
- Whether unfaithful women should not look at their blood or child during delivery to avoid complications; and
- Whether it is easier for a woman who uses contraception to be unfaithful to her husband.

Table 14. OLS – Marriage well-being (husband and wife sample)

	(1) Positive interaction	(2) Marriage quality (diagram)	(3) Happy with own marriage	(4) Very happy with own marriage	(5) Positive interaction	(6) Marriage quality (diagram)	(7) Happy with own marriage	(8) Very happy with own marriage
Husband treated	0.04	0.27**	0.065*	0.10**	0.072	0.049	0.071*	-0.0021
	(0.067)	(0.13)	(0.038)	(0.047)	(0.074)	(0.18)	(0.037)	(0.038)
Wife treated	0.0022	0.16	0.078*	0.063	-0.019	-0.042	-0.068	0.0032
	(0.071)	(0.16)	(0.039)	(0.055)	(0.079)	(0.19)	(0.048)	(0.054)
Stratification variables	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Demographic controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Husband treated = Wife treated (F-test p-value)	0.61	0.34	0.69	0.42	0.19	0.63	0	0.92
Outcome mean in control group	2.68	6.06	0.81	0.54	2.62	5.63	0.75	0.42
Observations	516	502	502	502	534	515	515	515

*** p < 0.01, ** p < 0.05, * p < 0.1. SE clustered at the meeting level in parentheses.

6.4 Demand for family planning voucher

The first set of results focuses on WTP for a voucher, which was offered to all husbands who participated in the community meetings, with the purpose of ensuring priority access to contraception. As shown in Table 15, we do not observe any significant difference between the WTP of treated husbands as compared to the husbands of both treated and control wives.

Table 15: OLS – Willingness to pay for family planning voucher

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Husband treated	0.37	0.41	0.52	0.68	0.14	0.17	0.24	0.51
	(0.61)	(0.62)	(0.61)	(0.55)	(0.52)	(0.56)	(0.55)	(0.47)
Wife treated	0.46	0.49	0.58	0.35				
	(0.56)	(0.55)	(0.51)	(0.52)				
Stratification variables	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Demographic controls	No	No	Yes	Yes	No	No	Yes	Yes
WTP for soap	No	No	No	Yes	No	No	No	Yes
Price soap	No	No	No	Yes	No	No	No	Yes
Observations	543	543	543	536	543	543	543	536
R-squared	0.02	0.05	0.06	0.2	0.02	0.05	0.06	0.2

*** p < 0.01, ** p < 0.05, * p < 0.1. SE clustered at the meeting level in parentheses.

However, when we look at the probability of getting the voucher right after the community meetings, we find that treated husbands are almost 6 percentage points more likely to get it as compared to control and 3.6 percentage points more likely as compared to the husbands of both treated wives and controls (though this effect is not statistically significant). See table 16.[17]

Table 16: OLS – Obtained family planning voucher

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Husband treated	0.059*	0.053	0.051	0.05	0.036	0.031	0.028	0.032
	(0.034)	(0.033)	(0.034)	(0.031)	(0.028)	(0.027)	(0.027)	(0.025)
Wife treated	0.048	0.045	0.047	0.037				
	(0.035)	(0.035)	(0.035)	(0.037)				
Stratification variables	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Demographic controls	No	No	Yes	Yes	No	No	Yes	Yes
WTP for soap	No	No	No	Yes	No	No	No	Yes
Price soap	No	No	No	Yes	No	No	No	Yes
Observations	554	554	554	546	554	554	554	546
R-squared	0.24	0.26	0.26	0.29	0.23	0.25	0.26	0.28

*** p < 0.01, ** p < 0.05, * p < 0.1. SE clustered at the meeting level in parentheses.

[17] Despite the voucher being offered to all husbands who joined the community meetings, only a fraction of participants obtained it. During a WTP exercise, participants were asked to report a price they were willing to pay for the voucher. They only received the voucher if the price they reported was higher than or equal to a randomly generated voucher price.

Lastly, no significant effect is found for voucher redemption at the clinics (Tables 17 and 18).

Table 17: OLS – Redemption of family planning voucher if received voucher[18]

	(1)	(2)	(3)	(4)
Husband treated	0.047	0.038	0.051	0.046
	(0.045)	(0.046)	(0.048)	(0.048)
Wife treated	-0.0087	-0.012	-0.016	-0.011
	(0.040)	(0.041)	(0.043)	(0.044)
Constant	0.12***	0.022	-0.25	-0.2
	(0.026)	(0.059)	(0.170)	(0.190)
Stratification variables	No	Yes	Yes	Yes
Demographic controls	No	No	Yes	Yes
WTP for soap	No	No	No	Yes
Price soap	No	No	No	Yes
Husband treated = Wife treated (F-test p-value)	0.24	0.3	0.16	0.23
Observations	466	466	466	461
R-squared	0.01	0.03	0.06	0.08

*** p < 0.01, ** p < 0.05, * p < 0.1. SE clustered at the meeting level in parentheses.

Table 18: OLS – Redemption of family planning voucher if received voucher for free[19]

	(1)	(2)	(3)	(4)
Husband treated	0.037	0.023	0.04	0.038
	(0.051)	(0.052)	(0.055)	(0.056)
Wife treated	-0.025	-0.025	-0.03	-0.032
	(0.040)	(0.042)	(0.045)	(0.046)
Constant	0.14***	0.033	-0.50**	-0.42
	(0.028)	(0.045)	(0.220)	(0.260)
Stratification variables	No	Yes	Yes	Yes
Demographic controls	No	No	Yes	Yes
WTP for soap	No	No	No	Yes
Price soap	No	No	No	Yes
Husband treated = Wife treated (F-test p-value)	0.23	0.34	0.18	0.2
Observations	342	342	342	340
R-squared	0.01	0.04	0.09	0.1

*** p < 0.01, ** p < 0.05, * p < 0.1. SE clustered at the meeting level in parentheses.

[18] The sample was restricted to respondents who received a family planning voucher, including those who got it for free, and those who didn't.

[19] The sample was restricted to respondents who received a family planning voucher for free. In other words, this set of respondents obtained a voucher without paying during the WTP exercise.

7. Discussion

7.1 Internal validity

Our experiment focuses on two empirical quantities. First, we are interested in estimating the impact of delivering both *MM* and *FP* information to spouse $j = h,w$ compared to just delivering family planning information on an outcome of interest *Y,* which may be measured at the household level (e.g. take-up of family planning and fertility) or at the individual level (e.g. knowledge of maternal health, attitudes toward family planning. In order to estimate this object, we would ideally estimate:

$$ATE^j = E[Y(MM + FP)^j] - E[Y\ (FP)^j] \qquad (1)$$

Note: ATE = average treatment effect; FP = family planning

Second, we are interested in estimating a comparison of the impact of maternal health information on men compared to women; that is:

$$\Delta ATE = ATE^h - ATE^w \qquad (2)$$

The main challenge associated with estimating these objects is that, in our design, participants chose to attend a community meeting (we denote participation of spouse *j* to a particular meeting as $P[MM+FP]^j = 1$ and $P[FP]^j$), thereby generating an imperfect compliance problem. In addition to the usual external validity considerations, this type of selection may pose threats to internal validity as well. To preserve internal validity (i.e. the comparability of treatment groups), we undertook a number of crucial steps.

Our first concern is that people's willingness to participate in a meeting about family planning and maternal health may differ from their willingness to participate in a meeting about family planning alone. To ensure that the invitation process to treatment (*MM + FP*) and control (*FP*) meetings was the same, we adopted a double-blind approach: the surveyors who invited households to the community meetings did not know what type of meeting the individual was invited to, and only one type of invitation was printed for all community workshops.

Nevertheless, we are left with a second concern; namely that the pool of women and men who decide to attend the community meeting may come from different households. The selection forces affecting men's participation decisions may differ from those affecting women's decisions (i.e. men may have a higher opportunity cost of time than women, or women may have less control over their own activities compared to men). If this is the case, then the difference in the intention-to-treat may not only be driven by the differential impact of maternal health information on men and women, but also by differential selection into the workshops.

Any study that compares gender effects with imperfect compliance is bound to face such a challenge. We addressed this issue by inviting both spouses to attend workshops together, and hence had a three-arm design in which men and women in all households received information on family planning. Spouses were required to show up at the community meetings together and were then separated into two different rooms, where gender-specific community meetings took place. Considering households in which both

spouses attended a community workshop means we estimate ΔTOT, which identifies the difference in the treatment on the treated effects estimated on similar samples, preserving internal validity:

$$\Delta TOT = E[(Y(MM + FP)^h - Y(FP)^h, Y(FP)^w) \mid P^h = 1, P^w = 1] - E[(Y(FP)^h, Y(MM + FP)^w - Y(FP)^w \mid P^h = 1, P^w = 1]$$

Note: FP = family planning

7.2 Attrition

The attrition between different waves of the survey was quite challenging due to high mobility in our project catchment areas. To track as many households as possible, we implemented several strategies in the field, such as frequent follow-ups with neighbors and family members or repeated visits to family addresses. To preserve power, we also increased sample size.

Despite the team's efforts, between the baseline and invitation stage 4.9 percent of the sample became ineligible due to participants moving outside the catchment areas of the reference clinics. Additionally, 15.9 percent of the sample was excluded due to couples meeting one or more of the other exclusion criteria. Furthermore, 4.5 percent of households were lost due to them moving to unknown locations, and 5.7 percent refused to participate in the intervention. Between intervention and follow-up data collection,[20] we had a 10 percent attrition rate.

However, selective attrition does not seem to be an issue in our case, as confirmed by empirical tests. Table 5 shows that the sample is balanced at intervention. Indeed, once the randomization into the different treatment arms had been completed, and in order to have an external (randomly varied) factor that helped determine attendance across treatment arms, we designed a new reinvitation strategy that randomized the number of times the couples were reinvited to the community meetings. We also randomized the order in which the different treatment arms were distributed over the intervention weekends.

For the follow-up sample, we managed to interview 95.51% of wives in the treatment arm in which the wife was treated, 95.52% of wives in the treatment arm in which the husband was treated and 93.22% of wives in the control group. These compliance rates are not statistically different from one another.

As for the husbands, we managed to interview 92.09% of husbands in the treatment arm in which the wife was treated, 93.07% of husbands in the treatment arm in which the husband was treated and 89.83% of husbands in the control group. Again, these compliance rates are not statistically different one from one another.

[20] At this stage, the exclusion criteria were not binding anymore, so all attrition is due to relocations due to unknown residence or to refusals.

8. Specific findings for policy and practice

Given the strength of the results of this study, community meetings on maternal health do seem an effective tool to involve husbands in family-planning-related issues and decisions. From a policy perspective, these findings will provide useful insights for designing effective paths to deliver maternal health information. Hence, we believe it would be particularly interesting to present the results of our study to government partners, NGOs and multilaterals; engage with government partners to develop implementation and expansion strategies; and develop a scale-up of the program, especially targeting rural areas.

We believe that the most important message from this experiment is that information, and particularly health information, does not flow seamlessly inside the household. Hence, targeting information about MM to husbands is an important policy tool for promoting family planning. When piloting the study, we came to the conclusion that gender-specific group meetings would be most effective in conveying information to men. While inviting couples to attend the community meetings together was necessary to ensure the internal validity of the experiment in the evaluation stage, in the implementation and scale-up case it may be feasible to only invite husbands. Indeed, the meetings were gender-specific and therefore can be replicated in a more cost-effective way by inviting husbands only.

8.1 Dissemination activities

This study arose in collaboration with the Government of Zambia, who felt that the focus of many multinational organizations on pushing contraceptive supplies misses the fundamental value of promoting family unity that is core to Zambian culture. We believe that our results will also be relevant to the large set of Sub-Saharan countries that exhibit high fertility rates, high unmet need for family planning and a large gender gap in desired fertility (Westoff 2010).

Therefore, we plan to continuously engage with the Ministry of Health and maintain strong relationships with government partners.[21] On March 14, 2017, the research team met with Dr. Phiri, acting director of the Ministry of Community Development, Mother and Child Health, to discuss the history and future of the project. They provided recommendations on actors we should stay engaged with and made very useful suggestions for possible scale-up pathways (discussed below). As a follow-up to these meetings, the research team met with the chief maternal health officer at the end of April 2017 to understand synergies between the intervention and the Safe Motherhood Action Group Program.

Aside from government officials, we also plan to keep engaging with policy NGOs and the Ministry of Health more broadly. Various organizations, such as USAID and Marie Stopes International, expressed interest in obtaining final results, particularly to see if increasing the involvement of men in contraceptive decisions could increase contraceptive take-up.

[21] For example, Dr. Eugine Kaunda, an obstetrician at Chipata clinic, has supported the project as local principal investigator, and Dr. Francis Bwalya, deputy director of public health, has supported it as a key ministry advisor.

The research team also presented the study in March 2018 at the national Evidence for Impact Symposium, a joint collaboration of the Zambian Ministry of Health, Innovations for Poverty Action Zambia, USAID and the Population Council. We also planned to discuss study findings at a dissemination event at Zambia's International Growth Centre in September 2018.

The research team is also committed to engage with the policy and program communities in the near future. In particular, we plan to continue working with the Ministry of Health's Family Planning Technical Working Group, and to discuss possible paths to scale up with them. Potential vehicles for scaling up the curriculum include Safe Motherhood Action Groups and community-based distributors – volunteer groups that deliver essential information on safe motherhood practices and family planning, respectively, to their communities. They work closely with community health assistants, a low-cost government cadre in which community-based health workers conduct household visits and group meetings to provide education and referrals for mainly maternal and child health services. We believe involving communities would be an asset, especially in rural areas.

Promisingly, our partners also suggested bringing the study results to the attention of the Parliamentarian Committee on Health. They believed the curriculum could be a powerful way to decrease fertility without sacrificing the Zambian value of family unity, and therefore the results could be a useful way for the government to respond to international pressure to decrease fertility, even at the risk of harming family life.

Finally, we expect to closely engage with local partners and communities in order to ensure effective delivery of our findings to a range of target audiences. Depending on the interest in our results and scale-up prospects, a broader engagement with other ministerial bodies could also be achieved at a later stage.

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Note: It was not possible to ensure that all references are complete and/or correct.

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