Research Article

Does the fulfillment of contraceptive method preferences affect contraceptive continuation? Evidence from urban Kenya, Nigeria, and Senegal

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Contents

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Abstract

BACKGROUND
Although interest in patient-centered family planning measures is growing, little is known about women's preferences for contraceptive methods and whether these preferences influence contraceptive behaviors.

OBJECTIVE
We assessed whether the fulfillment of contraceptive preferences affected women's decisions to continue, switch, or stop using contraception.

METHODS
Data came from a panel of urban Kenyan, Nigerian, and Senegalese women collected between 2010–2015. Women who were not using contraception at baseline and intended to use reported their preferred contraceptive method, and then at the second round reported their contraceptive use, which permits us to measure whether they fulfilled their baseline preference. We then examined whether fulfilling their contraceptive preference was associated with the decision to continue, switch, or stop using contraception by the third round by estimating a set of probit and bivariate probit models.

RESULTS
After controlling for individual, household, and health system characteristics, women with fulfilled contraceptive preferences were 25 percentage points less likely to stop or switch contraceptive methods than women with unfulfilled contraceptive preferences.

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CONCLUSIONS
Fulfilling contraceptive preferences is associated with later contraceptive behavior, which demonstrates the importance of these preferences for achieving family planning goals.

CONTRIBUTION
This study is important because it is the first research looking at the relationship between the fulfillment of contraceptive method preferences and contraceptive continuation in low- and middle-income countries. Women have a high probability of adhering to their contraceptive method when using a method that satisfies their contraceptive preferences.

1. Background

Women[4] who are using contraception have three options for future use: (1) discontinue their use of contraception; (2) switch to a different method of contraception; or (3) continue using the same method of contraception. The discontinuation of contraception is not problematic if a woman wants to become pregnant or is practicing sexual abstinence, but it is problematic when she wants to avoid pregnancy. In low- and middle-income countries (LMICs), contraceptive discontinuation was responsible for more than one-third (38%) of unintended pregnancies between 2009 and 2014 (Jain and Winfrey 2017). The estimated average 12-month rates of contraceptive discontinuation for a sample of 19 LMICs between 2002 and 2009 was 38% and was higher for 24-months (55%) and 36-months (64%) rates (Ali, Cleland, and Shah 2012). Although switching methods is sometimes seen as a form of contraceptive discontinuation (e.g., Croft et al. 2018), this behavior differs in terms of its impact on fertility preferences, and it is of concern for family planning programs when it leads to method failure (Bradley, Schwandt, and Khan 2009).

In this study we focused on three diverse countries in terms of levels of contraceptive use and socioeconomic features: Kenya, Nigeria, and Senegal. The modern contraceptive prevalence rates ranged from 39.1% in Kenya (2018) to 10.5% in Nigeria (2018), and in Kenya, half of the women using contraception use an injectable, while in Nigeria, the most prevalent method of contraception is traditional contraception (ICF 2015). Discontinuation rates are also different across these three countries: the 12-month all-reason discontinuation rate was 40.6% for Nigerian women in 2018, 30.5% for Kenyan women in 2014, and 28.5% for Senegalese women in 2019 (ICF 2015). And even though

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[4] For ease of exposition, we use the words 'woman'/'women' throughout this manuscript as all study participants identified as women, but we recognize that, in general, transgender men, nonbinary people, and those of additional genders can have pregnancies and abortions as well.

these three countries are classified as lower middle income, their GDP per capita ranges substantially from 1,598.7 USD in Senegal to 2,184.4 USD in Nigeria. We focus on the urban areas of these three countries because the evidence about the relationship between urban–rural residence on contraceptive discontinuation across different countries is inconsistent (e.g., Bradley, Schwandt, and Khan 2009; Ali and Cleland 1995). However, the proportion of women who stop using contraception is higher among urban women than among rural women in Kenya (Kungu, Agwanda, and Khasakhala 2022).

Understanding why women stop using contraception despite wanting to avoid pregnancy is critical as this can provide insights to reduce unwanted pregnancies, improve family planning service delivery, and design better family planning programs. Among women who want to delay or avoid pregnancy, discontinuation occurs mainly due to method-related reasons and health concerns, such as experiencing side effects from the method used (Ali and Cleland 2010a, 2010b; Bradley, Schwandt, and Khan 2009; Vaughan et al. 2008). Method dissatisfaction with oral contraceptives ranged from 15% in Indonesia to over 40% in Bolivia and Peru and was primarily driven by experiencing side effects from the method used and health concerns (Ali, Cleland, and Shah 2012). Similarly, estimates produced by Bellizzi, Sobel, Obara, and Temmerman (2015) suggest that experiencing side effects from the method used, health concerns, and underestimation of the risk of pregnancy accounted for about two-thirds of discontinuation episodes among sexually active women who wanted to avoid pregnancy in a sample of 35 LMICs.

Women's demographic and socioeconomic characteristics also influence their decision to stop using contraception – such as age, education, and marital status (Bradley, Schwandt, and Khan 2009). Less is known about the influence of the health system on contraceptive discontinuation due to data limitations, but studies find these are important for contraceptive use – for example, the provision of method-related information (Barden-O'Fallon et al. 2018; Feeser et al. 2019), respectful care, satisfactory services, and supporting women during method selection (Cardona et al. 2022; Jain et al. 2019). Another potential reason for discontinuation that has been hypothesized is the use of an unpreferred method of contraception (Potter et al. 2019), but we have no empirical evidence for LMICs.

There is an increasing focus on creating patient-centered metrics that prioritize women as the central decision-makers of their reproductive health (Bingenheimer et al. 2023; Burke and Potter 2023; Senderowicz 2020; Senderowicz et al. 2023). Current proposals suggest focusing on contraceptive autonomy, which links the desired demand for contraception with informed, full, and free choice (Senderowicz et al. 2023), although the operationalization of this construct is not clear yet. Other studies have focused on assessing contraceptive preferences, either asking about preferred attributes of contraception (e.g., Callahan et al. 2021; Callahan et al. 2019; Huber-Krum et al. 2021;

Keogh et al. 2021) or about the preferred contraceptive (e.g., Callahan et al. 2019; Huber-Krum et al. 2021), but these are few in number. Clearly, focusing on women's contraceptive method preferences naturally fits with the women-centered approach, which is central to this study.

Women use family planning information and knowledge to develop preferences that reflect their tastes for different contraceptive options to attain their fertility goals (Schultz 1969). Evidence suggests that informed women are better positioned to choose a contraceptive method that suits their specific needs, compared to women with limited information who lack a more thorough understanding of contraceptive options (Ferreira et al. 2010; Madden et al. 2015). Hence, given that contraceptive preferences are an integral part of the calculus of the contraceptive decision-making process, it calls into question how fulfilling these preferences is related to contraceptive discontinuation. Are women who fulfill their contraceptive preferences more likely to continue to use contraception?

This research examined a potentially understudied influence on contraceptive discontinuation: whether matching a woman's contraceptive method preferences with later contraceptive use (which we refer to as a 'preference-use match' or 'fulfillment of contraceptive preferences') affected a woman's decision to continue using the same method of contraception instead of switching or stopping. Specifically, we investigated whether women with a contraceptive method preference-use match were more likely to continue using the same contraceptive method than women with a preference-use mismatch using data collected across urban cities located in Kenya, Nigeria, and Senegal. We hypothesized that many women simply do not get the contraceptives they want and that those who stick with a wanted method would continue using it for an extended time.

2. Conceptual framework

Our approach was guided by a consumer behavior model. The behavior we modeled was the individual decision to persist in using a method of contraception. We hypothesized that this decision would be influenced by the degree to which the method obtained satisfied a prior set of contraceptive preferences. Our framework was analyzed from a woman's perspective.

In theory, one could quantify preferences through a utility function, denoted by U, that would express numerically the satisfaction obtained by consuming a particular contraceptive method. Vector $A_t^j \in \left\{ A_t^1, A_t^2, \ldots, A_t^J \right\}$ represents an individual's preferences over j contraceptive method alternatives observed at time t. Vector A_t^j is a mathematical construct emerging from a woman's ability to rank the intrinsic appeal of different

contraceptive methods according to her preferences. Hence, A_t^j would be one of the determinants of the decision to choose method j at $t + 1$, which is denoted as a dichotomous variable Z_{jt+1}. The choice would also be influenced by a set of socioeconomic and demographic characteristics of a woman, X, the number of children already born, P, and unobserved conditions, η. Then a woman's choice would be summarized as the maximization of the following utility function:

$$\max_{j \in A^j} \{U_{t+1}(Z_{jt+1}, A_t^j, P_{t+1}, X_{t+1}, \eta)\}.$$

In this study, data about whether the top preference was actually fulfilled at time t carry information about whether A_t^j influenced a women's later decision to continue using contraception, Z_{t+1}, controlling for her desire to have more children, her level of parity, and socioeconomic, demographic, and health system characteristics.

3. Methods

3.1 Analytical sample

Data for this analysis came from the Measurement, Learning & Evaluation (MLE) Project. The MLE Project was designed to evaluate the Urban Reproductive Health Initiative (URHI), which aimed to improve the reproductive health of the urban poor across cities located in Kenya, Nigeria, and Senegal by increasing accessibility, quality, and use of family planning services through a set of interventions on both the demand and supply sides. URHI implemented these interventions over four years in 11 cities: Nairobi, Mombasa, and Kisumu in Kenya; Abuja, Ibadan, Ilorin, and Kaduna in Nigeria; and Dakar, Guédiawaye, Pikine, and Mbao in Senegal.

In these cities, MLE-URHI collected longitudinal data from women of reproductive age and health facilities using standardized questionnaires (MLE Kenya 2017; MLE Nigeria 2017; MLE Senegal 2017). The first round of data (Round 1) were collected in 2010 in Kenya and Nigeria and in 2011 in Senegal. Women were followed up over two additional rounds implemented every two years – Rounds 2 and 3 – with attrition rates[5] that ranged from 35% between Rounds 1 and 2 to 58% between Rounds 2 and 3 in Nigeria. In the three settings, health facility data were collected twice and four years apart from 696 facilities in Round 1 (2010–2011) and 777 facilities in Round 3 (2014–2015).

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[5] Attrition rates were as follows: Attrition in Kenya was 45.4% between Rounds 1 and 2 and 46.4% between Rounds 2 and 3; attrition in Nigeria was 58.2% between Rounds 1 and 2 and 34.8% between Rounds 2 and 3; attrition in Senegal was 46.7% between Rounds 1 and 2 and 28.9% between Rounds 2 and 3.

Facilities included were hospitals, clinics, health centers, nursing homes, maternity homes, dispensaries, and other private and public facilities.

Women included in the analytical sample of this study participated in all three rounds of data collection and fulfilled the following three conditions: (1) were a non-contraceptive user at Round 1 (in order to report their contraceptive method preferences and intentions to adopt a method in the next 12 months); (2) adopted a contraceptive method at Round 2; and (3) were less than 49 years of age at the time of Round 3.

The analytical sample consisted of 1,150 women,[6] 497 were from Kenya, 712 from Nigeria, and 301 from Senegal.[7] Figure 1 illustrates the path of the women included in this study. The box labeled A represents women who were not using contraception at Round 1. Responses from Round 1 determined whether we classified a woman into Group 1 (intention to use contraception and contraceptive preferences were reported), Group 2 (no intention to use contraception and contraceptive preferences were not reported), or Group 3 (ambivalent intention to use contraception and contraceptive preferences were not reported). At Round 2, Group 1 intenders decided whether to adopt their most preferred contraceptive (see box labeled B in Figure 1) or a less preferred contraceptive (see box labeled C in Figure 1). Non-intenders, ambivalent women, and women who have never used also adopted contraception at Round 2 (see box labeled D in Figure 1), but their contraceptive preferences were unobserved. We decided to retain women in box D because it is not that these women do not have contraceptive preferences, but rather they were not asked about their preferences and represent women who did not intend to adopt contraception in the future yet adopted a method. Finally, all Round 2 adopters reported at Round 3 whether to continue using the same method they were using at Round 2 (see box labeled G in Figure 1), switch to a different method than the one used at Round 2 (see box labeled F in Figure 1), or stopped using contraception (see box labeled E in Figure 1).

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[6] Figure A-1 shows a path diagram of the inclusion and exclusion criteria employed to create the analytical sample and the number of women who were lost in the follow-up interviews across survey rounds.
[7] The distribution of women included in the analytical sample across countries is shown in Table A-1.

Figure 1: **Sample inclusion diagram**
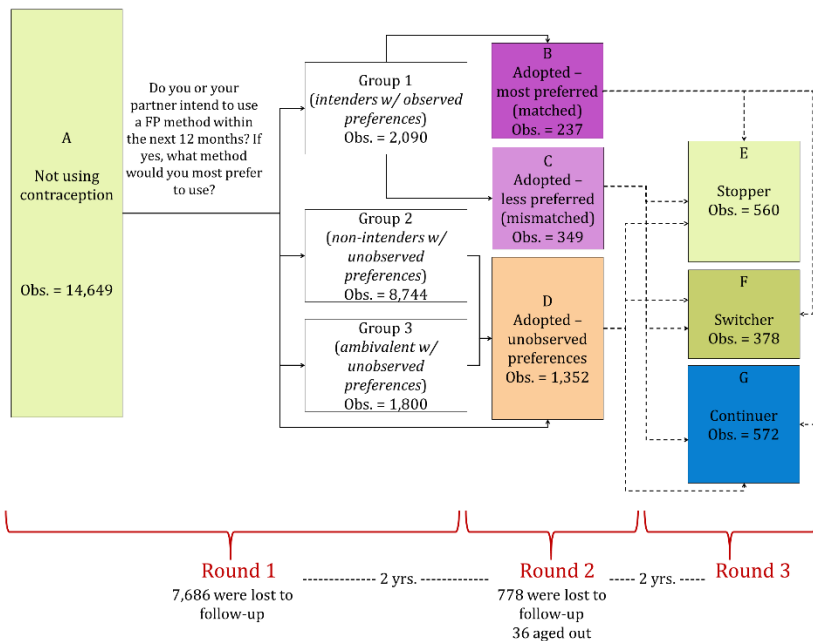
Notes: FP = Family Planning

3.2 Measures

3.2.1 Contraceptive preference-use matching

Women who were not using contraception at the time of the Round 1 interview and have heard of at least one method of contraception were asked to report whether they intended to use contraception in the future. Specifically, they were asked, "Do you or your partner intend to use a method to delay or avoid pregnancy within the next twelve (12) months?" (with response options of "did not intend," "were ambivalent," or "intended"). Those who answered "intended" were further asked to report, "What method would you prefer MOST to use, if you do use a method in the future?" Women could indicate one method out of a list o 12 methods or specify a method of contraception that was not on the list, which MLE-URHI coded as "other." The methods on the list were female sterilization, male sterilization, implant, intrauterine device (IUD), injectable, daily pill, emergency

pill, male condom, female condom, diaphragm with spermicide foam or jelly, natural methods, breastfeeding/lactational amenorrhea (LAM), or other.

Women's contraceptive preference-use matching was a three-way categorical variable assigned to all women who adopted contraception by the time of the Round 2 interview. First, women who did not report their contraceptive preferences at Round 1 were put in the category of "unobserved preferences." Second, women who reported a preferred method of contraception at Round 1 were categorized as "matched observed preferences" if the method adopted by Round 2 matched their original preference. Third, women who reported their preferred method of contraception at Round 1 were categorized as "mismatched observed preferences" if the method adopted by Round 2 did not match their baseline preference. We also constructed a dichotomous variable indicating a contraceptive preference-use match or mismatch that included only the subset of women with observed contraceptive preferences.

3.2.2 Contraceptive continuation

We measured two types of contraceptive continuation: continuation of the same method and the continuation of any method of contraception after switching, both of which were binary. The continuation of the same method equaled one if a woman in Round 3 was using the method she was using in Round 2, and it equaled zero if she switched to a different method or stopped using contraception. The continuation of any method of contraception equaled one if a woman was using contraception in Round 3, and it equaled zero if she stopped using contraception.

The three end states were continuing a method, switching methods, and stopping all methods. We ran models that combined switching and continuing compared to stopping as a reference outcome when the hypothesis we wanted to test was whether contraceptive preference fulfillment was related to the persistence of any method that could reduce the risk of unintended pregnancy. We ran models in which continuing on the same method was the outcome compared to the reference category of either switching or stopping when the hypothesis we wanted to test was whether a woman who adopted her preferred method of contraception would have a higher probability of continuing using the same method of contraception. Under the assumption of stable preferences, a woman would be receiving a lower utility if she switched to a contraceptive method that was different from the method she reported as her preferred method. Hence this model would test whether initial preference fulfillment was associated with continuing to achieve a high utility.

3.2.3 Individual and household characteristics

Other measures included in this analysis are those that previous research has shown to be related to contraceptive method knowledge, use, and change, including age (separated into three categories: 15 to 24, 25 to 34, 35 to 49), fertility preferences (more or can't get pregnant, no more or undecided), highest level of school attended (none or primary, secondary or higher than secondary), parity (none to one, two to three, four or more), and marital status (in union, not in union). Household wealth was proxied with a wealth index constructed by MLE-URHI following a principal component analysis that included household assets and housing characteristics.

We also included proxies of women's knowledge about and prior use of family planning methods because women need family planning information to rank their contraceptive preferences. We proxied exposure and prior knowledge about family planning products by counting the number of media outlets where a woman heard about family planning[8] (separated into three categories: none to one, two to three, four or more), the number of methods ever heard about (1 to 6, 7 to 10, 11 or more), and whether a woman used modern contraception in the past.

3.2.4 Health system characteristics

We added characteristics of the health system to the analysis because prior studies show that the source of care was associated with a successful contraceptive preference-use matching (Hopkins et al. 2018) and that the quality of family planning services influences women's decision to continue using contraception (e.g., Jain et al. 2019; RamaRao et al. 2003; and Cardona et al. 2022). We grouped these characteristics into four vectors that contained elements representing community perceptions of family planning services, supply of health services, supply of family planning services, and frequency of family planning method stockouts.

Measures of the community perceptions of family planning services came from the women's questionnaire.[9] We aggregated these answers at the cluster level and averaged

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[8] MLE-URHI asked women "In the past 12 months, from whom or where have you seen or heard out contraception and family planning?" Women could choose from an extensive list that grouped more than forty outlets into media sources, public sector, private sector, interpersonal sources, and other sources.

[9] Specifically, women were asked to rank three statements on a 4-point Likert-type scale (range: 1 = strongly disagree to 4 = strongly agree). The three statements were (1) "Family planning providers around here treat clients very badly," (2) "Women don't like the way they are treated in family planning clinics around here," and (3) "Family planning sellers/providers make women like you feel bad when obtaining contraceptives." In each question, we combined strongly disagree with disagree and strongly agree with agree.

them to create a continuous non-self-mean[10] measure. We choose a non-self-mean to attenuate the potential endogeneity between women's perception of family planning services and women's inclination to use contraception. We computed these non-self-mean metrics in the full sample of women, not only in the analytical sample, in order to capture the perception of all the women who participated in the survey. Kenya had an average of 20.5 (min = 4, max = 38) sampled women per cluster who reported their perception of family planning services. Nigeria and Senegal had 32.9 (min = 2, max = 71) and 36.6 (min = 4, max = 74) women sampled, respectively. The MLE-URHI study was not weighted nor powered to be representative at the cluster level. Thus, the results of these non-self-mean variables are meant to be only suggestive of areas where further data collection would be promising.

To identify a woman's health system environment, we created a distance boundary around a woman's home to identify a subset of health facilities that fell within a two-kilometer radius, as this distance is justified by prior research (Cronin, Guilkey, and Speizer 2018). GPS coordinates on women were not available, so we used the centroid of the cluster as a proxy for the women's house location. The MLE-URHI study included GPS coordinates for health and family planning facilities. We measured access to health and family planning services by counting the number of services and facilities that fell inside the distance boundary. Aggregated facility characteristics were the same for all women residing in the same cluster.

To proxy the availability of family planning services, we first counted the number of facilities that offered family planning counseling, worked under a family planning protocol, provided permanent methods, provided long-acting methods, and provided short-acting methods within the distance boundary. We then divided these numbers by the total number of facilities that provided family planning services within the distance boundary to determine the proportion of facilities that provided such services. Finally, we measured family planning stockouts by computing the proportion of facilities that reported at least one stockout of long-acting or short-acting methods[11] (separately) in the last 12 months preceding the survey out of all facilities located within the distance boundary providing such services.

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[10] A non-self mean is a cluster-level variable that averages the individual-level responses within each cluster, after excluding the woman's own response.

[11] Permanent methods included female sterilization and male sterilization. Long-acting methods included implants and IUDs. Short-acting methods included injectables, daily pills, emergency pills, male condoms, and female condoms.

3.3 Statistical approach

We first computed descriptive statistics of the individual, household, and health system characteristics collected at Round 1 and for the sample of women with observed contraceptive preferences (Table 1). The last column of Table 1 shows the F-statistic from a test of independence for all characteristics between all women in the analytical sample and women with observed contraceptive preferences, computed using a one-way analysis of variance.[12]

To assess the relationship between the fulfillment of a woman's contraceptive method preferences and her follow-up contraceptive behavior, we first estimated a set of probit models where we had two outcomes of interest. The first outcome was consistent with a patient-centered approach in which $C_{it+2} = 1$ if a woman continued using at time *t+2* the same contraceptive method reported at time *t+1*, and it equaled zero if she switched to a different method or if she stopped using contraception. The second outcome was consistent with current family planning metrics that classify programs as successful if women are using contraception; hence, $C_{it+2} = 1$ if a woman i continued using at time *t+2* any method of contraception, and it equaled zero if she stopped using contraception. We assumed C_{it+2} was a function of the contraceptive preference-use matching (M_{it+1}), the observed individual and household characteristics (X_{it}), and health system characteristics (HSC_{it} and HS_{it}). $M_{it+1} \in \{0, 1, 2\}$, where 0 represented women with unobserved preferences, 1 represented women with a contraceptive preference-use mismatch, and 2 represented women with a contraceptive preference-use match. The vector HSC_{it} represented a woman's perception of family planning services offered in their communities and the vector HS_{it} represented characteristics of the health system related to the supply of health services, the supply of family planning services, and contraceptive stockouts. We included country fixed effects (CO_{it}) to control for the variation in the family planning environment and characteristics of the women we could not observe across countries. ε^C_{it+2} is the error term. Model fit was informed by the Akaike information criterion (AIC).

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[12] To assess the multicountry composition of the analytical sample and the problem of attrition, we prepared country-specific comparisons of the analytical sample to the full Round 1 sample and to the sample of adopters (see Appendix, Tables A-2 and A-3). We found significant differences across many individual, household, and health system characteristics when we compared all non-contraceptive users surveyed in Round 1 to the analytical sample. There were a few exceptions: For example, wealth and education in Nigeria were not affected substantially by attrition. We found few significant differences across many individual, household, and health system characteristics when we compared all adopters (between Rounds 1 and 2) to the analytical sample. There were a few exceptions: For example, age and wealth in Kenya were not substantially affected by attrition, nor were community perceptions about family planning in the three countries, nor were some health system characteristics in Senegal.

$$C_{it+2}^* = \sum_{m=0}^{2} \beta_m^C M_{mit+1} + \beta_X^C X_{it} + \beta_{HSC}^C HSC_{it} + \beta_{HS}^C HS_{it} + \sum_{c=1}^{3} \beta_c^C CO_{cit} + \varepsilon_{it+2}^C$$

(1)

We estimated the same model for women with observed contraceptive method preferences to assess whether the differences in contraceptive use between matched and mismatched women held after removing women with unobserved contraceptive preferences. As a robustness check, we estimated Equation 1 with X, HSC, and HS measured at time *t+2* (or Round 3). We estimated these models because the characteristics measured at time *t+2* were closer to the continuation, switching, and stopping episodes. However, these characteristics occurred after the contraceptive preference-use matching, which is why we present the models using control variables at time *t* as the main results.

In addition, we estimated Equation 1 separately for Kenya, Nigeria, and Senegal to assess if the relationship between the contraceptive preference-use matching and contraceptive continuation and switching had the same direction in all countries as in the pooled sample. We conducted these country regressions because pooling data from three different countries raises concerns about whether the phenomenon of interest could be considered to be similar in three different contexts. These results are presented in the Appendix, Table A-5.

The probit models assumed that the unobserved characteristics influencing a woman's decision to continue, switch, or discontinue contraception at time *t+2* were not correlated with the unobserved characteristics influencing her prior contraceptive preference-use matching at time *t+1*. However, this assumption is potentially invalid because some of the unobserved characteristics that determine a woman's contraceptive preference-use matching could also determine a woman's decision to continue using contraception – mainly those related to the provision of family planning services that were not captured in the facility audit (such as any prior interactions to discuss contraception with family planning providers). To test if this assumption held, we estimated a seemingly unrelated bivariate probit model (Table 4), in which contraceptive continuation and the contraceptive preference-use matching were assumed to be interrelated with jointly distributed error terms.

The bivariate probit model approach is outlined in Equation 2 and was estimated only for women with observed contraceptive preferences because it would be incorrect to assume that women who did not intend to adopt contraception – and adopted a method at Round 2 – did not have preferences or had unfulfilled preferences. Hence, the contraceptive preference-use matching $M_{it+1} = 1$ for whether a woman adopted at time *t+1* her most preferred contraceptive method reported at time *t*, and it took the value of zero if she adopted a less preferred method. We assumed that both C_{it+2}^* and M_{it+1}^*

depended on the same observed individual and household characteristics (X_{it}). We also assumed they were a function of the same observed health system characteristics but measured at different times. For M^*_{it+1}, we measured *HSC* and *HS* at time *t*, and for C^*_{it+2}, we measured them at time *t+2*. We measured *HSC* and *HS* at different times because C^*_{it+2} and M^*_{it+1} occurred at different times, and we chose the characteristics of the health system that were closer to the occurrence of episodes C^*_{it+2} and M^*_{it+1}. More importantly, URHI had the goal of improving the reproductive health of the urban poor by increasing accessibility, quality, and use of family planning services through a set of interventions on both the demand and supply sides (Krenn et al. 2014). Hence, the health system women accessed at Round 1 differs from the health system they accessed at Round 3. We took advantage of these improvements in the health system to specify the following equation:

$$
C^*_{it+2} = \beta^C_m M_{it+1} + \beta^C_X X_{it} + \beta^C_{HSC} HSC_{it+2} + \beta^C_{HS} HS_{it+2} + \sum_{c=1}^{3} \beta^C_c CO_{cit} + \varepsilon^C_{it+2}
$$
$$
M^*_{it+1} = \beta^M_X X_{it} + \beta^M_{HSC} HSC_{it} + \beta^M_{HS} HS_{it} + \sum_{c=1}^{3} \beta^M_c CO_{cit} + \varepsilon^M_{it+1} \qquad (2)
$$

All descriptive statistics and models were weighted to account for the likelihood of attrition from participating in all three survey rounds using inverse propensity weights with control variables measured at time t. To do so, we estimated a probit model for the probability that a woman who participated of time *t* was surveyed at time *t+1* and *t+2* using a set of individual and household variables. The variables included on this estimation were the respondent's marital status, age, education, assets owned (watch, stove, electric fan, TV, VCR, DVD, radio, sewing machine, sofa, car/jeep, bicycle, motorcycle, air conditioner, mobile phone, landline phone, computer, internet, refrigerator, camera, digital camera, number of rooms, separate kitchen, fuel, water source, toilet), and duration of the interview at time *t*. The resulting attrition weight was the inverse of this predicted probability.

4. Results

Table 1 presents descriptive statistics for all women in the analytical sample and for the subsample of women with observed contraceptive method preferences. Among all 1,510 women included in the analytical sample, 37.8% continued using in Round 3 the same method they adopted in Round 2, 25.0% switched to a different method, and 37.1% stopped using contraception. The contraceptive prevalence rates from this group of women were not that different from those of women with observed contraceptive

preferences. Nonetheless, the percentage of women who continued using the same method of contraception was higher among women with observed contraceptive preferences than women in the analytical sample – 50.9% and 37.8%, respectively. As for the contraceptive preference-use matching, there were 1,040 women with unobserved contraceptive preferences and 470 with observed contraceptive preferences. Among those with observed preferences, 41.5% satisfied their contraceptive preferences.

Table 1: **Descriptive statistics of women who continued, switched, or stopped using contraception at Round 3, given they were using a method at Round 2**

Characteristics	Analytical sample (Obs. = 1,510)			Subsample of women w/ observed contraceptive preferences (Obs. = 470)			F-statistic
	Prop.	SD	Freq.	Prop.	SD	Freq.	
Contraceptive status at Round 3							
Continuer	0.378		572	0.509		242	0.73
Switcher	0.250		378	0.202		94	
Stopper	0.371		560	0.289		134	
Contraceptive preference-use matching							
Unobserved preferences	0.691		1,040				
Mismatched	0.181		275	0.585		275	
Matched	0.128		195	0.415		195	
Individual and household characteristics							
In union (Ref. not in union)	0.737		1,502	0.856		469	28.1
Fertility preferences, more/can't get pregnant (Ref. no more/undecided)	0.689		1,493	0.610		466	9.8
Parity							
None–1	0.452		623	0.356		155	13.2
2–3	0.326		516	0.366		173	
4+	0.222		371	0.278		142	
Age categories							
15–24	0.365		477	0.331		137	0.0
25–34	0.432		676	0.495		238	
35–49	0.203		357	0.174		95	
Education, secondary/higher (Ref. no education/primary)	0.543		1,506	0.451		470	12.2
Wealth quintile							
Poorest	0.210		295	0.249		111	4.7
Poorer	0.230		335	0.267		120	
Middle	0.207		315	0.163		78	
Richer	0.201		318	0.180		90	
Richest	0.152		247	0.141		71	
Number of outlets offering FP							
None–1	0.315		475	0.272		126	2.0
2–3	0.456		691	0.487		230	
4+	0.229		344	0.241		114	

Table 1:   (Continued)

Characteristics	Analytical sample (Obs. = 1,510)			Subsample of women w/ observed contraceptive preferences (Obs. = 470)			F-statistic
	Prop.	SD	Freq.	Prop.	SD	Freq.	
Number of methods ever heard of							
1–6	0.359		535	0.231		108	20.5
7–10	0.427		646	0.505		236	
11+	0.215		329	0.264		126	
Any modern method ever used (Ref. never used/ traditional)	0.417		1,510	0.574		470	36.0
Health system characteristics							
Community perception of FP services							
Non-self-mean, Providers treat badly	0.143	0.084	1,368	0.146	0.084	457	0.6
Non-self-mean, Women dislike FP clinics	0.151	0.085	1,366	0.155	0.083	457	0.9
Non-self-mean, Providers judge women	0.140	0.080	1,368	0.145	0.080	457	1.3
Supply of health services							
Ln(No. health facilities)	2.1	0.8	1,510	2.1	0.8	470	1.1
Supply of FP services							
% facilities providing FP counseling	0.925	0.115	1,464	0.921	0.107	452	0.6
% facilities with FP protocol	0.555	0.312	1,461	0.608	0.303	452	9.7
% facilities providing permanent methods	0.141	0.181	1,464	0.137	0.161	452	0.2
% facilities providing long-acting methods	0.701	0.224	1,464	0.698	0.215	452	0.0
% facilities providing short-acting methods	0.917	0.118	1,464	0.909	0.112	452	1.7
FP stockouts							
% facilities w/ stockout of long-acting methods	0.094	0.133	1,464	0.109	0.134	452	4.7
% facilities w/ stockout of short-acting methods	0.312	0.270	1,464	0.387	0.262	452	27.2

Notes: Descriptive statistics were weighted for the inverse propensity of participating in all three rounds. Characteristics were measured at Round 1. SD = standard deviation. FP = family planning.

Most of the women in the analytical sample were in union (73.7%), had at least one child (76.2%), were below age 34 (79.7%), and were educated (54.3% with secondary or higher education). One-quarter did not want to have more children in the future, 6.7% were undecided, and virtually none had problems getting pregnant (0.5%). They also had a fairly high level of information and knowledge about family planning methods. In the past 12 months, 68.5% heard at least once about contraception and family planning methods in media outlets or through friends and family. All women heard of at least one method of contraception over their life course, and 41.7% were prior contraceptive users of modern methods.

As for the characteristics of the health system, few women perceived that providers mistreated women (14.3%), judged them (14.0%), or disliked family planning clinics (15.1%). On average, they had access to 9.4 health facilities within the two-kilometer distance surrounding their cluster (or *ln(no. of health facilities)* = 2.1). Almost all facilities provided family planning counseling (92.5%), and half of them operated under a family planning protocol (55.5%). Virtually all facilities provided short-acting methods (91.7%), fewer provided long-acting methods (70.1%), and even fewer provided

permanent methods (14.1%). Among facilities providing long-acting methods, 9.4% experienced at least one stockout of long-acting methods in the last 12 months preceding the survey. This proportion was higher for short-acting methods, 31.2%.

In the subsample of women with observed contraceptive preferences, only 41% were using a preferred method at Round 2. In this group, the percentage of in-union women was higher (85.6%), fewer wanted to have more children (61.0%), were of higher parity (27.8% had four or more children), were less educated (45.1% had secondary or higher education), and were slightly poorer (51.5% were in the poorest or poorer categories) than women in the analytical sample. These women were also more knowledgeable about contraception: 57.4% were prior users of modern contraception, and 76.9% had heard of at least seven different contraceptive methods. The two groups of women had a similar age distribution and had similar exposure to family planning messages. The proportion of facilities working under a family planning protocol (55.5%) and the proportion of facilities that experienced at least one stockout of long-acting and short-acting contraception in the last 12 months preceding the survey – 10.9% and 38.7%, respectively – were higher than in the analytical sample.

Figure 2 describes the time progression of the three contraceptive preference-use matching categories: women with unobserved preferences, women who were using a less preferred method (denoted as 'mismatched preferences'), and women who were using their most preferred contraceptive (denoted as 'matched preferences'). For each category, Figure 2 shows the percentage of women who continued, switched, or discontinued their contraceptive method at Round 3. Women with unobserved contraceptive method preferences registered a lower continuation rate (31.9%) and higher rates of switching (27.2%) and discontinuation (40.9%) compared to women with observed preferences. Among women with observed preferences, the percentage of women who continued using the same method of contraception was higher for women with fulfilled contraceptive preferences than for women with unfulfilled preferences – 60.0% compared to 44.5%, respectively. In addition, women with fulfilled contraceptive method preferences registered lower rates of switching and discontinuation than women with unfulfilled preferences – 16.0% and 23.2% for switching and 24.0% and 32.3% for discontinuation, respectively.

Figure 2: **Percentage of women who continued, switched, or stopped using contraception at Round 3, given they were using a method at Round 2, stratified by contraceptive preference-use matching categories**

Contraceptive use at *Round 3*
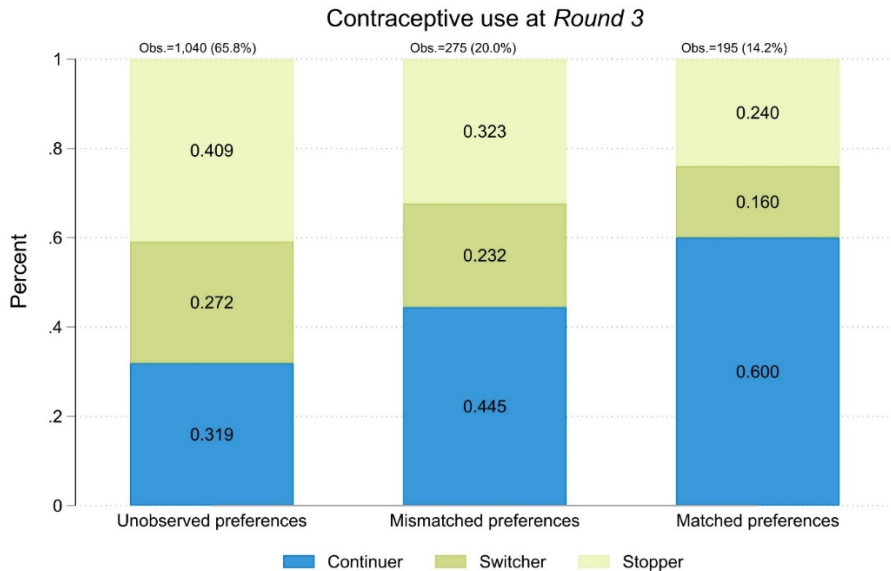
Notes: Percentages were weighted for the inverse propensity of participating in all three rounds. For contraceptive use at Round 3: F-statistic = 0.67, p-value = 0.5128.

Table 2 presents models focused on the continuation of the same method as opposed to switching or stopping. In Model 3, which includes all control variables and reported the lowest AIC, we find that women with a contraceptive preference-use match had a 14 percentage point (95% confidence interval (CI): 5–23) higher probability of continuing using the same method of contraception than women with a contraceptive preference-use mismatch. In the subsample of women with observed preferences, Model 3 shows that women with a contraceptive preference-use match had a 12 percentage point (95% CI: 3–21) higher probability of continuing using the same method of contraception than women with a contraceptive preference-use mismatch. Table 3 presents models of the continuation of any method (switching or continuing) as opposed to stopping. The difference in the probability of continuing using any method of contraception was nominally different when comparing women with a contraceptive preference-use match to women with a contraceptive preference-use mismatch, an 8 percentage point (95% CI: 1–17) difference (see Model 3). In the subsample of women with observed contraceptive

preferences, the difference in the continuation of any method was not nominally different when the contraceptive preference-use match group was compared to the mismatch group (see Model 3). Among women with observed contraceptive preferences, we found that the difference between matches and mismatches was nominally different when switchers were part of the reference category, and the difference was not nominally different when switchers were not part of the reference category. This finding suggests that switchers are an interesting group of women, and whether or not they are counted as discontinuers matters.

Table 2: **Results from the probit regressions, outcome: (1) continuers, or (0) switchers or stoppers**

Variables	Model 1		Model 2		Model 3	
	Contraceptive continuation (Ref. Switcher or stopper)		Contraceptive continuation (Ref. Switcher or stopper)		Contraceptive continuation (Ref. Switcher or stopper)	
	Coeff.	Marginal effects	Coeff.	Marginal effects	Coeff.	Marginal effects
A: Analytical sample						
Contraceptive preference-use matching (Ref. Mismatched)						
Unobserved preferences	−0.19	−0.07	−0.15	−0.05	−0.14	−0.05
	[-0.37 – -0.01]	[-0.14 – -0.00]	[-0.34 – 0.04]	[-0.13 – 0.02]	[-0.33 – 0.05]	[-0.12 – 0.02]
Matched	0.35	0.13	0.38	0.14	0.37	0.14
	[0.13 – 0.58]	[0.05 – 0.22]	[0.15 – 0.60]	[0.06 – 0.23]	[0.14 – 0.61]	[0.05 – 0.23]
Observations	1,481		1,346		1,300	
AIC	7,747		7,171		6,909	
B: Women w/ observed contraceptive preferences						
Contraceptive preference-use matching (Ref. Mismatched)						
Matched	0.33	0.12	0.34	0.12	0.35	0.12
	[0.09 – 0.57]	[0.03 – 0.21]	[0.10 – 0.59]	[0.03 – 0.21]	[0.10 – 0.61]	[0.03 – 0.21]
Observations	465		452		434	
AIC	2,464		2,347		2,226	
Individual and household controls	YES		YES		YES	
Health system controls: community perception of FP services	NO		YES		YES	
Health system controls: supply of health services, supply of FP services, FP stockouts	NO		NO		YES	

Notes: Reporting probit coefficients with 95% CIs computed with standard errors clustered at the location level in brackets. Reporting marginal effects with 95% CIs computed with the delta method. All regressions were weighted for the inverse propensity of participating in all three rounds. All regressions included country fixed effects. All control variables were measured at Round 1. Full regression results are available upon request.

The estimates presented in Tables 2 and 3 assumed that the unobservable factors influencing a woman's contraceptive behavior reported in Round 3 were not correlated with the unobservable factors influencing a woman's contraceptive preference-use matching. This restrictive assumption puts women in a passive role and would not account for women who actively did things to obtain their most desired method because they wanted to persistently use that method. The seemingly unrelated bivariate probit

regression model relaxes that assumption in models for the continuation of the same method as opposed to switching or stopping.[13] The Wald test of our model indicated that the unobserved characteristics influencing a woman's contraceptive continuation and her contraceptive preference-use matching were correlated ($\rho = -17.42$, 95% CI: –20.14 to –14.69) (Table 4). The model found that among women with observed contraceptive method preferences, women who fulfilled their contraceptive preferences had a 25 percentage point higher probability of continued use of the same method of contraception than women with unfulfilled contraceptive preferences. This difference was larger than the estimated difference using the probit specification.

Table 3: **Results from the probit regressions, outcome: (1) continuers or switchers, or (0) stoppers**

Variables	Model 1 Contraceptive continuation or switching (Ref. Stopper)		Model 2 Contraceptive continuation or switching (Ref. Stopper)		Model 3 Contraceptive continuation or switching (Ref. Stopper)	
	Coeff.	Marginal effects	Coeff.	Marginal effects	Coeff.	Marginal effects
A: Analytical sample						
Contraceptive preference-use matching (Ref. Mismatched)						
Unobserved preferences	–0.10	-0.04	-0.05	-0.02	-0.04	-0.02
	[–0.30 – 0.09]	[–0.11 – 0.03]	[–0.26 – 0.15]	[–0.09 – 0.05]	[–0.25 – 0.16]	[–0.09 – 0.06]
Matched	0.22	0.08	0.23	0.08	0.22	0.08
	[–0.03 – 0.47]	[–0.01 – 0.16]	[–0.03 – 0.48]	[–0.01 – 0.17]	[–0.04 – 0.49]	[–0.01 – 0.17]
Observations	1,481		1,346		1,300	
AIC	7,874		7,091		6,859	
B: Women w/ observed contraceptive preferences						
Contraceptive preference-use matching (Ref. Mismatched)						
Matched	0.14	0.04	0.12	0.04	0.12	0.04
	[–0.12 – 0.41]	[–0.04 – 0.13]	[–0.15 – 0.39]	[–0.05 – 0.12]	[–0.16 – 0.41]	[–0.05 – 0.12]
Observations	465		452		434	
AIC	2,160		2,069		1,968	
Individual and household controls	YES		YES		YES	
Health system controls: community perception of FP services	NO		YES		YES	
Health system controls: supply of health services, supply of FP services, FP stockouts	NO		NO		YES	

Notes: Reporting probit coefficients with 95% CIs computed with standard errors clustered at the location level in brackets. Reporting marginal effects with 95% CIs computed with the delta method. All regressions were weighted for the inverse propensity of participating in all three rounds. All regressions included country fixed effects. All control variables were measured at Round 1. Full regression results are available upon request.

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[13] In this model, we took advantage of the improvements between Rounds 1, 2, and 3 recorded in the health system environment and in women's perception of family planning services. For example, the proportion of facilities working under a family planning protocol increased by 15 percentage points, as well as the provision of contraceptives, and the proportion of facilities providing permanent, long-acting, and short-acting methods increased by 3, 13, and 2 percentage points, respectively.

Table 4: **Results from the seemingly unrelated bivariate probit regressions, outcome: (1) continuers, or (0) switchers or stoppers**

Variables	Model 2		Model 3	
	Contraceptive continuation (Ref. Switcher or stopper)		Contraceptive continuation (Ref. Switcher or stopper)	
	Coeff.	Marginal effects	Coeff.	Marginal effects
B: Women w/ observed contraceptive preferences				
Contraceptive preference-use matching (Ref. Mismatched)				
Matched	1.67	0.25	1.66	0.25
	[1.51 – 1.83]	[0.21 – 0.28]	[1.49 – 1.82]	[0.22 – 0.29]
Inverse hyperbolic tangent of $\hat{\rho}$	–6.26		–17.42	
	[–34.48 – 21.96]		[–20.14 – –14.69]	
Wald test of $\hat{\rho}$=0, χ^2	0.19		92.24	
Observations	451		432	
AIC	4,790		4,589	
Individual and household controls	YES		YES	
Health system controls: community perception of FP services	YES		YES	
Health system controls: supply of health services, supply of FP services, FP stockouts	NO		YES	

Notes: Reporting probit coefficients with 95% CIs computed with standard errors clustered at the location level in brackets. Reporting marginal effects with 95% CIs computed with the delta method. All regressions were weighted for the inverse propensity of participating in all three rounds. All regressions included country fixed effects. Individual and household control variables were measured at Round 1. Community perceptions of family planning, supply of health services, supply of family planning services, and family planning method stockouts were measured at Round 1 for the contraceptive preference-use matching outcome and at Round 3 for the contraceptive continuation outcome. Full regression results are available upon request. The Wald test reports the x^2 statistic.

5. Discussion

In this research, we tested the hypothesis that women with fulfilled contraceptive preferences were more likely to continue using the same method of contraception than women with unfulfilled contraceptive preferences. To do so, we used three rounds of longitudinal data collected from women of reproductive age living in poor urban areas of Kenya, Nigeria, and Senegal.

Adjusting for individual, household, and health system characteristics, we found that women with fulfilled contraceptive preferences were 14 percentage points more likely to continue using the same method of contraception than women with unfulfilled preferences. When we restricted the sample to women with observed preferences, we found a 12 percentage point difference in the probability of continuing using the same method than switching or stopping between women with fulfilled and unfulfilled contraceptive preferences. This difference increased to 25 percentage points when we performed a bivariate probit estimation designed to adjust for the endogeneity of matching preferences and continued use of contraception.

We consistently found a positive relationship between the fulfillment of women's contraceptive preferences and the likelihood that they will continue using the same method of contraception. This finding is coherent with the expectations in the literature (e.g., Madden et al. 2015; Senderowicz 2020; Potter et al. 2019). Although Madden et al. (2015) focuses on identifying contraceptive attributes that can reveal contraceptive preferences, they expect that women who use contraceptive methods that are consistent with their contraceptive preferences are more likely to continue using that method than women with an inconsistent contraceptive preference-use. Similarly, Karra and Zhang (2021b) hypothesize in their experiment that family planning counseling and partner involvement could improve women's fulfillment of their family planning preferences – including contraception – in order to increase contraceptive adherence in Malawi.

It is important to highlight that in the sample of women with observed contraceptive preferences, only 41.5% of women adopted at Round 2 the preferred method they reported in Round 1. This proportion is low. However, surveys such as MLE-URHI, Performance Monitoring for Action (PMA), and Huber-Krum et al. (2021) find a similar proportion of a contraceptive preference-use matching ranging from 34% to 40% in LMICs.

5.1 Policy and programmatic implications

The policy and programmatic implications of this finding are threefold. First, because informed women are well positioned to choose a contraceptive method that satisfies their needs (Madden et al. 2015), providing (high-quality) counseling for and information on family planning could increase contraceptive continuation by shifting women with unexpressed preferences to a preferred method of contraception. For example, Madden et al. (2015) find that among US women, the lack of contraceptive knowledge was a barrier to obtaining a method that satisfied their set of valued contraceptive attributes, such as side effects, effectiveness, and pregnancy risk. Moreover, evidence shows that improving women's family planning education was associated with higher contraceptive knowledge – such as side effects, effectiveness, and pregnancy risk (e.g., Pazol et al. 2015; Little et al. 1998; Steiner et al. 2003) – and higher contraceptive use (e.g., Bertrand et al. 1982; Whitaker et al. 2010).

Second, family planning programs could improve the supply of contraceptive methods by having contraceptive stocks informed by contraceptive preferences. This action was highlighted as an important element in a study included in a report published by the National Academies of Science, Engineering, and Medicine (National Academies of Sciences 2016), but because there is limited evidence about women's contraceptive preferences, the specifics of how this would work were unknown. We believe that

focusing on contraceptive preferences is appropriate for urban populations because urban life is characterized by myriad consumer choices that demand product preferences. In the family planning space, resource poverty does not count as much as the poor being systematically denied a voice. Our work is intended to nudge family planning systems toward acknowledging this voice by eliciting everyone's preferences and incorporating them into the provision of services.

Third, family planning programs could also expand the basket of contraceptive choices in order to give women more options and improve reproductive health outcomes. A recent experiment in Nigeria and Zambia finds that adding the hormonal and copper IUDs to the basket of contraceptive choices resulted in high continuation rates above 85% (Brunie et al. 2021). Similarly, Jacobstein (2018) finds a drastic increase in the use of implants in sub-Saharan Africa driven by a combination of increased supply, lower prices, and government commitment. However, the extent to which the basket of contraceptive choices can be expanded is subject to budgetary constraints (National Academies of Sciences 2016).

5.2 Strengths

This study has several strengths. First, MLE-URHI is one of the few longitudinal studies measuring women's preferences for contraceptive methods and following the contraceptive behavior (of these women) for two consecutive rounds. Other longitudinal surveys that investigated contraceptive preferences, such as the Indonesian Family Life Survey, did not capture variation in these preferences. Even though they successfully followed women throughout several rounds, the framing of their contraceptive preference question suffered from post-purchase rationalization bias because they asked women if they were using the method they wanted at the time of the interview. Under this approach, many women indicated they were using the method they wanted.

A second strength of this study, associated with the longitudinal design of MLE-URHI, is the prospective measurement of contraceptive behavior. Much of the literature assessing contraceptive discontinuation in LMICs utilizes the contraceptive calendar (e.g., Ali and Cleland 2010a, 2010b; Ali, Cleland, and Shah 2012; and Bradley, Schwandt, and Khan 2009). Although the calendar is a useful tool for understanding changes in contraceptive behavior, it has a number of limitations, the foremost of which is the recall bias when women are retrospectively reporting their monthly contraceptive behavior (Strickler et al. 1997; Tumlinson and Curtis 2021). Recent evidence finds that prospective measures of contraceptive use are more robust in measuring changes in contraceptive behavior than retrospective measures during a short follow-up of four to six months (Tsui et al. 2021). Nonetheless, a limitation of using prospective data is that

the contraceptive behavior between survey rounds is not observed, it is only observed at the time of the interview.

Finally, we benefit from our estimation strategy employed to measure the relationship between women's contraceptive preference-use matching and women's decision to continue, switch, or stop using contraception. We started with a multinomial probit regression to first assess our definition of continuation because we wanted to measure the continuation of the same method of contraception, not any method (Appendix, Table A-4). We then measured the association of the contraceptive preference-use matching on contraceptive continuation of the same method and (separately) of any method, assuming these are endogenous events. We then relaxed this assumption and estimated the relationship in the subsample of women with observed contraceptive preferences. The direction of the results was consistent across these strategies, with some differences in the magnitude of the relationship.

5.3 Limitations

The foremost limitation of this research is the small sample of women with observed contraceptive preferences who participated in all three survey rounds. To circumvent this limitation, we conducted a separate analysis including women with unobserved contraceptive preferences to retain the original sample size of women who adopted contraception at Round 2 and participated in Round 3 ($n = 1,510$). Using this sample, we conducted a Wald test to determine whether the difference in the probability of continued use of the same method between women with a contraceptive preference-use match and unobserved preferences (19 percentage points) contrasted from the difference between women with a contraceptive preference-use mismatch and unobserved preferences (5.2 percentage points). The test indicated these were different (χ^2 statistic = 9.78, p-value = 0.002). In addition, Appendix, Figure A-1 evidenced that the sample reduction occurred mainly due to loss of a follow-up and not necessarily by the inclusion and exclusion criteria we implemented in this study. Women with observed preferences had some features that were different from the analytic sample (Table 1); because of these differences, the regression models controlled for individual, household, and health system covariates as a way to control for them. The sample of women with observed preferences could also differ in terms of unobservable features; hence, one has to be cautious with the interpretation of the sample of women with observed preferences as representative of a defined population of reproductive-age women in any of the countries.

A second limitation is the representativeness of the pooled sample. The criteria for entry into the analytical sample were restrictive: A woman had to be a non-user in Round 1 and adopt contraception in Round 2. The analytical sample had a slightly higher

proportion of women who wanted to have more children, was slightly poorer, and had access to more health facilities than women in the full sample who were not using contraception at Round 1 and adopted a method at Round 2 (Appendix, Table A-3). Any single country sample was underpowered to conduct a country-level analysis. We know that continuation rates vary by method type. For example, continuation rates are higher for long-acting compared to short-acting reversible contraception (Ali and Cleland 2010a). Hence, it was important to check whether the three countries had a similar distribution across permanent, long-acting reversible, short-acting reversible, and traditional methods (Appendix, Figure A-2). After checking the ability to combine the three countries and overcome the sample size limitation, we pooled the information collected by MLE-URHI from Kenya, Nigeria, and Senegal. Out of the 1,510 women, 47.2% were from Nigeria, 32.9% were from Kenya, and 19.9% were from Senegal. In the subsample of women with observed preferences, the composition of women was 44.3% Kenyan, 29.4% Nigerian, and 26.4% Senegalese. These distributions suggested that Nigerian women could be driving the findings in the all-women sample, and Kenyan women could be driving the findings in the sample of women with observed preferences. The country-level probit regressions (Appendix, Tables A-5 and A-6) suggested that no country subsample was driving the results for the analytical sample, but Kenyan women could have been driving the results in the sample of women with observed preferences. In this sample (women with observed contraceptive preferences), the difference in the probability of continuing to use the same method of contraception was nominally higher for women with matched contraceptive preferences compared to women with mismatched contraceptive preferences in Kenya (obs. = 197), and although it was not nominally different in Nigeria (obs. = 122) and Senegal (obs. = 115), the difference remained positive. Because the three countries showed a positive relationship, and each had a small sample size, the phenomenon observed could be summarized as a multicountry effect. Prior multicountry studies that were underpowered at the country level pooled their data to measure joint effects; the caveat is they have to be specified as such ex ante (e.g., Vega-Redondo et al. 2019). MLE-URHI was conceived as a multicountry study with the same goal across countries, very similar instruments, and had the same duration –six years.

Other limitations related to the study design and data collection are loss of a follow-up and the assumption that women's preferences for contraceptive methods were stable over time. Our models assumed that contraceptive preferences were stable over two years (Rounds 1 and 2). To our knowledge, there are no published studies that have assessed the stability of contraceptive preferences. To assess this assumption, we conducted two separate analyses. First, we measured the predictive utility of these contraceptive method preferences reported at baseline on subsequent contraceptive adoption and method-specific adoption two and four years later among non-contraceptive users (Cardona,

Anglewicz, and Bishai 2022). We found that contraceptive preferences drove the type of method adopted, and women who reported a preferred method of contraception were more likely to adopt contraception than women whose preferences were unobserved. Second, in the group of women who persistently indicated they intended to adopt contraception but did not adopt any method of contraception in the following rounds, we calculated the proportion of women who reported different preferred methods across survey rounds. The MLE-URHI data showed that 40% of women had unstable preferences over two years. We also cannot know the reason behind women's decision to stop using contraception at Round 3, given that only a select and small group of women were asked about the reasons for not using contraception, which unfortunately did not include all women who were not using contraception at Round 3 – only 10.4% of women in the analytical sample were asked this question. As a sensitivity analysis, we repeated our regressions with a sample that dropped 103 women who reported being pregnant at the Round 3 interview. Our conclusions did not change when we dropped these women.

6. Conclusion

This study is important because it is the first research looking at the relationship between the fulfillment of contraceptive method preferences and contraceptive continuation in LMICs. The findings from this study support the idea that women have a high probability of adhering to their contraceptive method when they are using a method that satisfies their contraceptive preferences. These findings can inform policymakers and family planning programs of the importance of satisfying women's contraceptive method preferences not only because women should be able to use the method they want but because it can also support women in planning their pregnancies.

7. Acknowledgments

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Appendix

Figure A-1:   Analytic sample diagram, loss of women across survey rounds
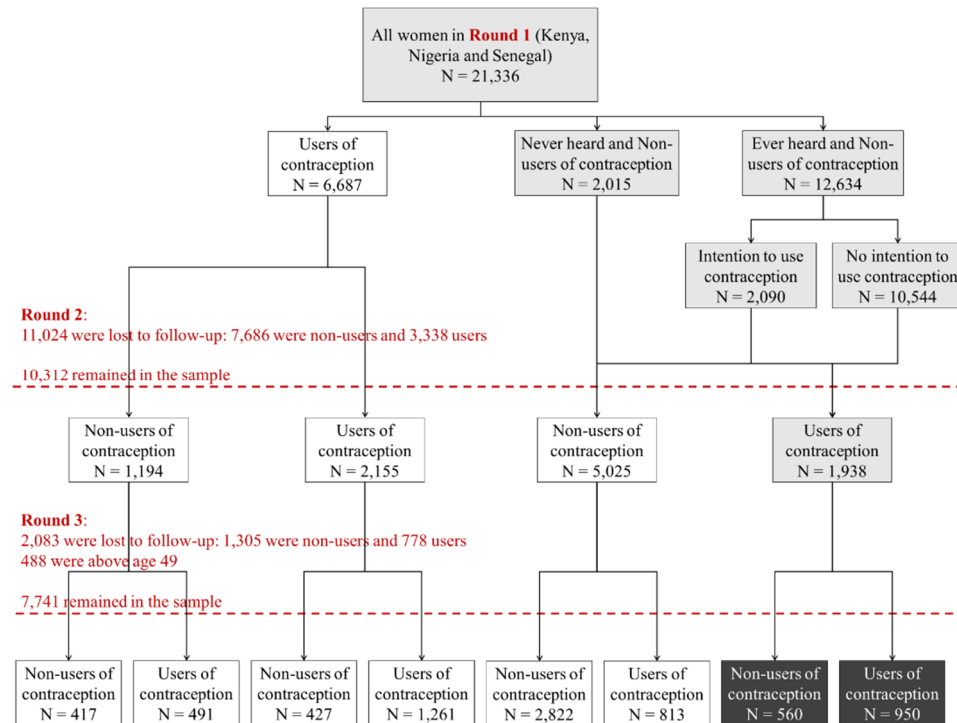
Notes: The two boxes colored in dark gray contain the women included in the analytical sample.

Table A-1:   Women included in the sample by country

Country and year	Round 1, Round 2, Round 3			
	Analytical sample		Women with observed contraceptive preferences	
	Obs.	%	Obs.	%
Kenya (2010, 2012, 2014)	497	0.329	208	0.443
Nigeria (2010–2011, 2012, 2014)	712	0.472	138	0.294
Senegal (2011, 2013, 2015)	301	0.199	124	0.264
Total	1,510		470	

Figure A-2: Distribution of women according to the method of contraception reported using in Round 2 by country
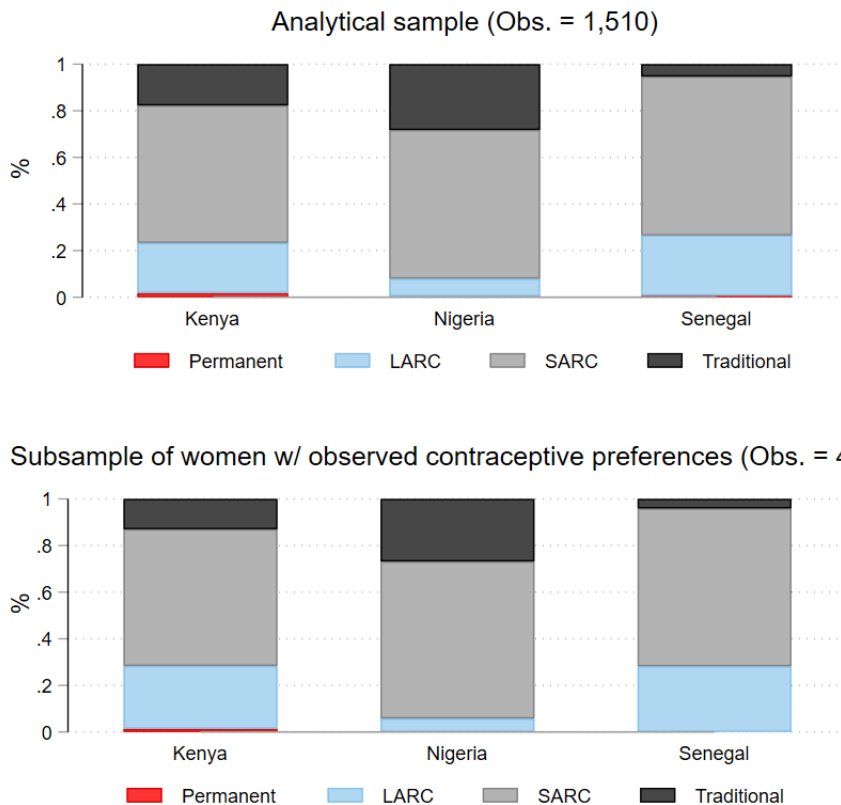
Notes: LARC = Long-Acting Reversible Contraception, SARC = Short-Acting Reversible Contraception

Table A-2: Descriptive statistics of characteristics reported in Round 1, all non-contraceptive users surveyed in Round 1 and analytical sample by country

	Kenya					Nigeria					Senegal				
	All non-contraceptive users (Obs. = 3,193)		Analytical sample (Obs. = 497)		F-statistic	All non-contraceptive users (Obs. = 7,145)		Analytical sample (Obs. = 712)		F-statistic	All non-contraceptive users (Obs. = 4,311)		Analytical sample (Obs. = 301)		F-statistic
	Mean/ Prop.	Freq.	Mean/ Prop.	Freq.		Mean/ Prop.	Freq.	Mean/ Prop.	Freq.		Mean/ Prop.	Freq.	Mean/ Prop.	Freq.	
Contraceptive status at Round 3[Ω]															
Never user	0.444	561				0.501	1,204				0.737	1,361			
Adopter	0.158	178				0.185	452				0.106	198			
Continuer	0.138	166	0.320	157		0.125	301	0.406	289		0.059	114	0.383	114	
Switcher	0.162	223	0.440	220		0.100	219	0.299	215		0.066	140	0.450	137	
Stopper	0.098	121	0.240	120		0.089	212	0.295	208		0.032	50	0.168	50	
Contraceptive preference-use matching[Λ]															
Unobserved preferences	0.727	617	0.587	289	26.1	0.933	2,195	0.811	574	93.1	0.765	370	0.597	177	20.0
Mismatched	0.153	154	0.217	109		0.050	123	0.139	101		0.124	72	0.214	65	
Matched	0.120	129	0.196	99		0.017	41	0.051	37		0.110	67	0.188	59	
Individual and household characteristics															
Married	0.407	3,185	0.627	497	159.6	0.563	7,036	0.778	704	298.4	0.467	4,304	0.838	301	356.1
Fertility preferences, more/can't get pregnant	0.661	3,175	0.620	493	5.8	0.690	7,012	0.677	699	1.1	0.897	4,303	0.836	301	22.7
Parity															
None–1	0.689	2,045	0.540	252	51.5	0.565	4,007	0.392	249	140.4	0.675	2,861	0.436	122	130.1
2–3	0.221	789	0.351	184		0.223	1,644	0.319	221		0.171	790	0.296	91	
4+	0.090	359	0.109	61		0.212	1,494	0.288	222		0.154	660	0.268	88	
Age categories															
15–24	0.487	1,564	0.490	221	7.8	0.420	2,955	0.267	157	60.7	0.479	2,004	0.368	99	8.7
25–34	0.314	986	0.381	201		0.329	2,337	0.476	346		0.295	1,330	0.422	129	
35–49	0.200	643	0.129	75		0.251	1,853	0.257	209		0.226	977	0.210	73	
Education, secondary/higher	0.463	3,191	0.510	497	7.2	0.260	7,074	0.258	708	0	0.647	4,311	0.821	301	83.6
Wealth quintile															
Poorest	0.194	867	0.307	144	117.4	0.186	1,248	0.136	90	0.4	0.196	733	0.209	61	39.6
Poorer	0.192	643	0.225	110		0.183	1,353	0.221	150		0.192	920	0.259	75	
Middle	0.166	514	0.184	95		0.188	1,279	0.202	143		0.200	995	0.259	77	
Richer	0.206	588	0.169	88		0.201	1,421	0.235	172		0.190	835	0.182	58	
Richest	0.243	581	0.115	60		0.242	1,844	0.206	157		0.223	828	0.092	30	
Number of outlets heard FP															
None–1	0.296	897	0.217	107	21.7	0.386	2,748	0.348	246	3.9	0.456	2,014	0.413	122	2.4
2–3	0.430	1,449	0.465	232		0.387	2,862	0.424	304		0.464	1,981	0.512	155	
4+	0.273	847	0.317	158		0.227	1,535	0.228	162		0.080	316	0.076	24	
Number of methods ever heard															
1–6	0.281	854	0.189	90	26.8	0.639	4,671	0.550	383	35.6	0.366	1,556	0.218	62	46.6
7–10	0.414	1,367	0.459	228		0.250	1,701	0.321	231		0.502	2,165	0.615	187	
11+	0.305	972	0.352	179		0.112	773	0.130	98		0.132	590	0.167	52	
Ever used, modern method	0.455	3,193	0.604	497	71.3	0.184	7,145	0.279	712	81.5	0.194	4,311	0.407	301	159.6
Health system characteristics															
Community perception of FP services															
Non-self-mean, Providers treat badly	0.149	2,917	0.127	475	53.2	0.144	5,685	0.134	609	13.6	0.164	3,642	0.189	284	65.7
Non-self-mean, Women dislike FP clinics	0.159	2,916	0.133	476	75.0	0.148	5,684	0.142	608	5.0	0.172	3,632	0.200	282	79.2
Non-self-mean, Providers judge women	0.139	2,914	0.125	476	27.1	0.131	5,686	0.130	608	0.4	0.168	3,641	0.187	284	42.7

Table A-2: (Continued)

| | Kenya | | | | | Nigeria | | | | | Senegal | | | | |
	All non-contraceptive users (Obs. = 3,193)		Analytical sample (Obs. = 497)		F-statistic	All non-contraceptive users (Obs. = 7,145)		Analytical sample (Obs. = 712)		F-statistic	All non-contraceptive users (Obs. = 4,311)		Analytical sample (Obs. = 301)		F-statistic
	Mean/ Prop.	Freq.	Mean/ Prop.	Freq.		Mean/ Prop.	Freq.	Mean/ Prop.	Freq.		Mean/ Prop.	Freq.	Mean/ Prop.	Freq.	
Supply of health services															
Ln(No. health facilities)	2.2	3,193	2.1	497	7.8	1.9	7,145	1.9	712	3.9	2.5	4,311	2.5	301	0.0
Supply of FP services															
% facilities providing family planning counseling	0.936	3,095	0.930	481	4.1	0.932	6,908	0.947	689	17.8	0.869	4,252	0.869	294	0.0
% facilities with a family planning protocol	0.622	3,095	0.609	481	1.6	0.378	6,840	0.395	686	5.2	0.736	4,252	0.825	294	167.2
% facilities providing permanent methods	0.166	3,095	0.172	481	1.4	0.176	6,908	0.164	689	4.1	0.081	4,252	0.035	294	264.8
% facilities providing long-acting methods	0.674	3,095	0.655	481	6.7	0.724	6,908	0.743	689	8.1	0.648	4,252	0.684	294	40.4
% facilities providing short-acting methods	0.934	3,095	0.926	481	5.7	0.932	6,908	0.947	689	17.8	0.786	4,252	0.835	294	93.7
FP stockouts															
% facilities w/ stockout of long-acting methods	0.140	3,095	0.146	481	1.7	0.030	6,908	0.038	689	6.1	0.126	4,252	0.130	294	1.8
% facilities w/ stockout of short-acting methods	0.562	3,095	0.532	481	13.5	0.104	6,908	0.109	689	1.6	0.375	4,252	0.386	294	3.8

Notes: Descriptive statistics are weighted for the inverse propensity of participating in all three rounds. Characteristics are measured at Round 1. Ω contraceptive status at Round 3 measures the change in contraceptive behavior between Rounds 2 and 3. λ contraceptive preference-use matching measures the match between contraceptive preferences stated at Round 1 and contraceptive method adopted at Round 2.

Table A-3: **Descriptive statistics of characteristics reported in Round 1, all adopters (between Rounds 1 and 2) and analytical sample by country**

	Kenya					Nigeria					Senegal				
	All adopters (Obs. = 691)		Analytical sample (Obs. = 497)		F-statistic	All adopters (Obs. = 884)		Analytical sample (Obs. = 712)		F-statistic	All adopters (Obs. = 363)		Analytical sample (Obs. = 301)		F-statistic
	Mean/ Prop.	Freq.	Mean/ Prop.	Freq.		Mean/ Prop.	Freq.	Mean/ Prop.	Freq.		Mean/ Prop.	Freq.	Mean/ Prop.	Freq.	
Contraceptive status at Round 3															
Continuer	0.346	166	0.320	157		0.400	301	0.406	289		0.375	114	0.383	114	
Switcher	0.408	223	0.440	220		0.318	219	0.299	215		0.420	140	0.450	137	
Stopper	0.246	121	0.240	120		0.282	212	0.295	208		0.206	50	0.168	50	
Contraceptive preference-use matching															
Unobserved preferences	0.630	408	0.587	289	2.4	0.823	720	0.811	574	0.4	0.617	224	0.597	177	0.2
Mismatched	0.208	154	0.217	109		0.132	123	0.139	101		0.203	72	0.214	65	
Matched	0.162	129	0.196	99		0.045	41	0.051	37		0.180	67	0.188	59	
Individual and household characteristics															
Married	0.608	691	0.627	497	0.4	0.785	870	0.778	704	0.1	0.832	363	0.838	301	0.0
Fertility preferences, more/can't get pregnant	0.576	685	0.620	493	1.9	0.640	868	0.677	699	1.9	0.820	363	0.836	301	0.2
Parity															
None–1	0.591	365	0.540	252	2.5	0.376	311	0.392	249	0.5	0.432	156	0.436	122	0.6
2–3	0.317	248	0.351	184		0.318	293	0.319	241		0.246	105	0.296	91	
4+	0.092	78	0.109	61		0.306	280	0.288	222		0.322	102	0.268	88	
Age categories															
15–24	0.412	308	0.490	221	7.7	0.248	205	0.267	157	1.6	0.312	114	0.368	99	2.8
25–34	0.413	275	0.381	201		0.463	410	0.476	346		0.421	162	0.422	129	
35–49	0.175	108	0.129	75		0.289	269	0.257	209		0.266	87	0.210	73	
Education, secondary/higher	0.487	691	0.510	497	0.5	0.249	878	0.258	708	0.1	0.780	363	0.821	301	1.3
Wealth quintile															
Poorest	0.229	201	0.307	144	15.9	0.132	123	0.136	90	0.7	0.197	70	0.209	61	2.6
Poorer	0.190	149	0.225	110		0.203	186	0.221	150		0.241	90	0.259	75	
Middle	0.179	122	0.184	95		0.205	175	0.202	143		0.210	91	0.259	77	
Richer	0.243	129	0.169	88		0.235	205	0.235	172		0.194	67	0.182	58	
Richest	0.159	90	0.115	60		0.225	195	0.206	157		0.158	45	0.092	30	
Number of outlets heard FP															
None–1	0.232	152	0.217	107	0.5	0.333	292	0.348	246	0.7	0.368	142	0.413	122	0.5
2–3	0.468	324	0.465	232		0.420	386	0.424	304		0.561	193	0.512	155	
4+	0.300	215	0.317	158		0.247	206	0.228	162		0.071	28	0.076	24	
Number of methods ever heard															
1–6	0.192	134	0.189	90	0.2	0.538	485	0.550	383	0.7	0.192	73	0.218	62	0.1
7–10	0.433	305	0.459	228		0.311	274	0.321	231		0.645	228	0.615	187	
11+	0.375	252	0.352	179		0.151	125	0.130	98		0.163	62	0.167	52	
Ever used, modern method	0.603	691	0.604	497	0.0	0.278	884	0.279	712	0.0	0.407	363	0.407	301	0.0
Health system characteristics															
Community perception of FP services															
Non-self-mean, Providers treat badly	0.139	655	0.127	475	5.8	0.144	758	0.134	609	3.1	0.180	337	0.189	284	2.0
Non-self-mean, Women dislike FP clinics	0.149	656	0.133	476	9.2	0.150	757	0.142	608	1.8	0.186	336	0.200	282	5.0
Non-self-mean, Providers judge women	0.137	655	0.125	476	5.4	0.134	757	0.130	608	0.7	0.180	338	0.187	284	1.5
Supply of health services															
Ln(No. health facilities)	2.2	691	2.1	497	0.0	1.9	884	1.9	712	0.7	2.2	363	2.5	301	25.1

Table A-3: (Continued)

	Kenya			Nigeria			Senegal		
	All adopters (Obs. = 691)	Analytical sample (Obs. = 497)	F-statistic	All adopters (Obs. = 884)	Analytical sample (Obs. = 712)	F-statistic	All adopters (Obs. = 363)	Analytical sample (Obs. = 301)	F-statistic
	Mean/ Prop. Freq.	Mean/ Prop. Freq.		Mean/ Prop. Freq.	Mean/ Prop. Freq.		Mean/ Prop. Freq.	Mean/ Prop. Freq.	
Supply of FP services									
% facilities providing family planning counseling	0.935 668	0.930 481	0.8	0.946 854	0.947 689	0.0	0.855 356	0.869 294	1.3
% facilities with a family planning protocol	0.635 668	0.609 481	2.1	0.404 851	0.395 686	0.3	0.760 356	0.825 294	13.6
% facilities providing permanent methods	0.159 668	0.172 481	2.0	0.162 854	0.164 689	0.0	0.040 356	0.035 294	1.3
% facilities providing long-acting methods	0.666 668	0.655 481	0.7	0.738 854	0.743 689	0.1	0.638 356	0.684 294	10.7
% facilities providing short-acting methods	0.933 668	0.926 481	1.4	0.946 854	0.947 689	0.0	0.825 356	0.835 294	0.8
FP stockouts									
% facilities w/ stockout of long-acting methods	0.134 668	0.146 481	1.7	0.037 854	0.038 689	0.0	0.116 356	0.130 294	5.4
% facilities w/ stockout of short-acting methods	0.536 668	0.532 481	0.1	0.100 854	0.109 689	1.0	0.354 356	0.386 294	5.1

Notes: Descriptive statistics are weighted for the inverse propensity of participating in all three rounds. Characteristics are measured at Round 1. The difference between 'All adopters' and 'Analytical sample' is that women in the analytical sample participated of Round 3 and were below age 49 at the time of Round 3.

Table A-4:   Results from the multinomial probit regressions, outcome: (1) continuers, (2) switchers, and (3) stoppers

Variables	Model 1		Model 2		Model 3	
	Contraceptive continuation (Ref. Continuer)		Contraceptive continuation (Ref. Continuer)		Contraceptive continuation (Ref. Continuer)	
	Switcher	Stopper	Switcher	Stopper	Switcher	Stopper
A: Analytical sample						
Contraceptive preference-use matching (Ref. Unobserved preferences)						
Mismatched	-0.26	-0.24	-0.23	-0.16	-0.22	-0.15
	[-0.53 – 0.00]	[-0.52 – 0.04]	[-0.50 – 0.05]	[-0.46 – 0.13]	[-0.50 – 0.06]	[-0.45 – 0.16]
Matched	-0.74	-0.68	-0.76	-0.63	-0.74	-0.60
	[-1.08 – -0.40]	[-0.99 – -0.37]	[-1.10 – -0.42]	[-0.94 – -0.31]	[-1.10 – -0.39]	[-0.92 – -0.29]
Observations	1,481		1,346		1,300	
AIC	12,815		11,608		11,141	
B: Women w/ observed contraceptive preferences						
Contraceptive preference-use matching (Ref. Mismatched)						
Matched	-0.50	-0.36	-0.58	-0.35	-0.63	-0. 36
	[-0.88 – -0.12]	[-0.73 – 0.01]	[-0.97 – -0.20]	[-0.73 – 0.04]	[-1.03 – -0.23]	[-0.76 – 0.04]
Observations	465		452		434	
AIC	3,668		3,475		3,271	
Individual and household controls	YES		YES		YES	
Health system controls: community perception of FP services	NO		YES		YES	
Health system controls: supply of health services, supply of FP services, FP stockouts	NO		NO		YES	

Notes: Reporting probit coefficients and 95% CIs computed with standard errors clustered at the location level in brackets. All regressions were weighted for the inverse propensity of participating in all three rounds. All regressions included country fixed effects. All control variables were measured at Round 1. All women, Wald tests of equality between two probit coefficients: -0.74 compared to -0.68, x^2 statistic = 0.09, p-value > 0.1; -0.76 compared to -0.63, x^2 statistic = 0.48, p-value > 0.1; and -0.74 compared to -0.60, x^2 statistic = 0.47, p-value > 0.1. Women with observed contraceptive preferences, Wald tests of equality between two probit coefficients: -0.50 compared to -0.36, x^2 statistic = 0.39, p-value > 0.1; -0.58 compared to -0.35, x^2 statistic = 1.17, p-value > 0.1; and -0.63 compared to -0.36, x^2 statistic = 1.52, p-value > 0.1.

Table A-5: **Results from the probit regressions, analytical sample, control variables measured at Round 1, by country**

Variables	Kenya	Nigeria	Senegal	Kenya	Nigeria	Senegal
	Continuer (Ref. Discontinuer/switcher)			Switcher/continuer (Ref. Discontinuer)		
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
Contraceptive preference-use matching (Ref. Mismatched)						
Unobserved preferences	-0.08	-0.13	-0.25	0.03	0.02	-0.27
	[-0.40 – 0.25]	[-0.43 – 0.16]	[-0.69 – 0.19]	[-0.28 – 0.35]	[-0.30 – 0.35]	[-0.79 – 0.25]
Matched	0.46	0.37	0.13	0.31	-0.06	0.08
	[0.10 – 0.82]	[-0.14 – 0.89]	[-0.29 – 0.56]	[-0.08 – 0.71]	[-0.58 – 0.46]	[-0.49 – 0.65]
Individual and household controls						
Marital status (Ref. Not in union)						
In union	0.38	0.22	-0.07	0.60	0.29	-0.07
	[0.09 – 0.67]	[-0.12 – 0.56]	[-0.66 – 0.53]	[0.31 – 0.89]	[-0.05 – 0.62]	[-0.54 – 0.40]
Fertility preferences (Ref. No more/undecided)						
More/can't get pregnant	0.06	-0.17	0.11	0.08	-0.37	0.22
	[-0.25 – 0.36]	[-0.46 – 0.12]	[-0.47 – 0.69]	[-0.23 – 0.40]	[-0.66 – -0.07]	[-0.38 – 0.82]
Parity (Ref. None–1)						
2–3	0.42	0.33	0.77	0.39	0.36	0.32
	[0.07 – 0.77]	[-0.02 – 0.67]	[0.29 – 1.26]	[-0.01 – 0.79]	[0.03 – 0.69]	[-0.16 – 0.81]
4+	0.58	-0.02	1.18	0.63	0.10	0.59
	[0.02 – 1.13]	[-0.45 – 0.42]	[0.58 – 1.79]	[0.04 – 1.22]	[-0.28 – 0.49]	[0.04 – 1.14]
Age group (Ref. 15–24)						
25–34	-0.28	-0.24	-0.27	-0.39	-0.14	-0.07
	[-0.58 – 0.02]	[-0.61 – 0.13]	[-0.70 – 0.16]	[-0.73 – -0.05]	[-0.47 – 0.20]	[-0.46 – 0.33]
35–49	-1.01	-0.22	-0.36	-1.08	-0.24	-0.14
	[-1.49 – -0.53]	[-0.68 – 0.23]	[-0.95 – 0.23]	[-1.58 – -0.57]	[-0.65 – 0.16]	[-0.71 – 0.43]
Education (Ref. No education/primary)						
Secondary/higher	-0.08	0.07	-0.10	-0.13	0.28	-0.07
	[-0.33 – 0.17]	[-0.24 – 0.38]	[-0.53 – 0.34]	[-0.41 – 0.16]	[0.01 – 0.56]	[-0.48 – 0.34]
Wealth quintiles (Ref. Poorest)						
Poorer	-0.19	0.02	0.55	-0.14	0.17	0.38
	[-0.56 – 0.18]	[-0.36 – 0.39]	[0.06 – 1.04]	[-0.50 – 0.23]	[-0.18 – 0.53]	[-0.04 – 0.81]
Middle	-0.03	-0.05	0.42	-0.16	0.06	0.10
	[-0.39 – 0.32]	[-0.45 – 0.36]	[-0.07 – 0.92]	[-0.54 – 0.22]	[-0.33 – 0.45]	[-0.37 – 0.58]
Richer	0.09	-0.28	0.56	0.14	-0.34	0.69
	[-0.29 – 0.46]	[-0.68 – 0.13]	[-0.04 – 1.17]	[-0.29 – 0.57]	[-0.73 – 0.06]	[0.12 – 1.27]
Richest	0.00	-0.04	0.20	0.11	-0.07	-0.36
	[-0.42 – 0.43]	[-0.47 – 0.39]	[-0.44 – 0.85]	[-0.31 – 0.53]	[-0.50 – 0.35]	[-1.01 – 0.29]
Number of outlets heard FP (Ref. None–1)						
2–3	0.26	0.10	-0.14	0.21	-0.11	-0.03
	[-0.09 – 0.60]	[-0.16 – 0.36]	[-0.47 – 0.18]	[-0.12 – 0.54]	[-0.37 – 0.15]	[-0.35 – 0.29]
4+	0.06	0.14	-0.23	0.16	-0.09	-0.14
	[-0.28 – 0.41]	[-0.15 – 0.44]	[-0.94 – 0.49]	[-0.17 – 0.50]	[-0.41 – 0.22]	[-0.77 – 0.48]
Number of methods ever heard (Ref. 1–6)						
7–10	0.04	-0.03	-0.08	0.13	-0.12	0.17
	[-0.30 – 0.38]	[-0.28 – 0.21]	[-0.59 – 0.43]	[-0.25 – 0.50]	[-0.37 – 0.14]	[-0.32 – 0.65]
11+	-0.09	0.09	-0.08	0.24	0.11	0.06
	[-0.47 – 0.29]	[-0.25 – 0.43]	[-0.66 – 0.51]	[-0.16 – 0.64]	[-0.26 – 0.47]	[-0.49 – 0.60]
Ever used, method (Ref. Never used)						
Modern contraceptive	-0.12	-0.00	-0.22	-0.08	-0.02	0.00
	[-0.40 – 0.15]	[-0.26 – 0.25]	[-0.55 – 0.11]	[-0.34 – 0.19]	[-0.26 – 0.21]	[-0.33 – 0.34]

Table A-5:   (Continued)

Variables	Kenya	Nigeria	Senegal	Kenya	Nigeria	Senegal
	Continuer (Ref. Discontinuer/switcher)			Switcher/continuer (Ref. Discontinuer)		
	Coef.	Coef.	Coef.	Coef.	Coef.	Coef.
Health system controls						
Community perception of FP services						
Non-self-mean, Providers treat badly	1.75	0.65	-2.91	0.75	-3.00	-2.27
	[-2.65 – 6.16]	[-3.41 – 4.71]	[-10.18 – 4.35]	[-4.29 – 5.80]	[-7.47 – 1.47]	[-8.74 – 4.19]
Non-self-mean, Women dislike FP clinics	-1.33	-0.85	3.94	0.22	2.15	4.31
	[-5.94 – 3.29]	[-5.02 – 3.31]	[-3.07 – 10.95]	[-4.66 – 5.11]	[-2.34 – 6.65]	[-1.90 – 10.52]
Non-self-mean, Providers judge women	-0.06	1.05	-1.61	1.18	1.17	-0.69
	[-3.74 – 3.63]	[-2.00 – 4.10]	[-6.88 – 3.66]	[-2.67 – 5.02]	[-2.13 – 4.47]	[-6.02 – 4.65]
Supply of health services						
Ln(No. of health facilities)	-0.05	-0.03	-0.21	0.16	0.02	-0.02
	[-0.25 – 0.15]	[-0.21 – 0.15]	[-0.90 – 0.48]	[-0.06 – 0.39]	[-0.17 – 0.22]	[-0.69 – 0.65]
Supply of FP services						
% facilities providing family planning counseling	1.95	1.58	0.13	-2.36	1.40	1.43
	[-8.86 – 12.77]	[0.17 – 2.98]	[-5.22 – 5.48]	[-9.95 – 5.23]	[-0.08 – 2.89]	[-3.64 – 6.51]
% facilities with a family planning protocol	0.11	0.09	0.31	0.07	0.03	-0.23
	[-0.42 – 0.63]	[-0.33 – 0.51]	[-1.45 – 2.06]	[-0.50 – 0.64]	[-0.43 – 0.49]	[-1.80 – 1.33]
% facilities providing permanent methods	0.09	-0.05	0.73	0.83	-0.49	0.70
	[-0.79 – 0.97]	[-0.66 – 0.55]	[-3.43 – 4.88]	[-0.11 – 1.76]	[-1.08 – 0.11]	[-3.76 – 5.17]
% facilities providing long-acting methods	0.44	-0.08	0.02	-0.11	-0.34	-0.69
	[-0.23 – 1.10]	[-0.64 – 0.48]	[-2.38 – 2.42]	[-0.83 – 0.60]	[-1.00 – 0.33]	[-2.75 – 1.37]
% facilities providing short-acting methods	-0.87		1.20	2.43		-0.48
	[-11.29 – 9.56]		[-4.50 – 6.91]	[-4.69 – 9.54]		[-5.95 – 4.99]
FP stockouts						
% facilities w/ a stockout of long-acting methods	-0.39	-0.54	0.40	-0.56	-0.49	1.66
	[-1.31 – 0.52]	[-1.44 – 0.37]	[-3.06 – 3.86]	[-1.60 – 0.48]	[-1.40 – 0.42]	[-1.83 – 5.15]
% facilities w/ a stockout of short-acting methods	0.05	0.06	-0.62	0.63	-0.45	0.72
	[-0.59 – 0.68]	[-0.84 – 0.96]	[-2.65 – 1.40]	[-0.08 – 1.34]	[-1.26 – 0.36]	[-1.31 – 2.74]
Constant	-1.76	-2.08	-1.36	-1.06	-0.82	-1.38
	[-3.32 – -0.21]	[-3.48 – -0.69]	[-3.47 – 0.75]	[-2.74 – 0.61]	[-2.26 – 0.63]	[-3.37 – 0.61]
Observations	456	569	275	456	569	275
AIC	2511	2831	1454	2252	2974	1434

Notes: Reporting probit coefficients with 95% CIs computed with standard errors clustered at the location level in brackets. All regressions are weighted for the inverse propensity of participating in all three rounds.