RESEARCH ARTICLE

Understanding factors associated with continuation of use of injectable contraceptives in Karnataka and Maharashtra, India: a cross-sectional household study [version 1; peer review: awaiting peer review]

Sunita Singal[1], S K Sikdar[2], S Kaushik[3], Jennifer Kniss[4], Pragati Singh[2], Nidhi Bhatt[2], Ghazaleh Samandari[5], Manoj Pal[1], Harshwardhan Dere[3], Levent Cagatay[6], Kathryn A O'Connell[4]

[1]EngenderHealth, New Delhi, India
[2]Ministry of Health and Family Welfare, Govt. of India, New Delhi, India
[3]EngenderHealth (at the time of writing), New Delhi, India
[4]EngenderHealth, Washington D.C., USA
[5]University of North Carolina, Chapel Hill, USA
[6]Engenderhealth, Izmir, Turkey

v1 **First published:** 08 Jun 2022, **6**:69
https://doi.org/10.12688/gatesopenres.13614.1
Latest published: 08 Jun 2022, **6**:69
https://doi.org/10.12688/gatesopenres.13614.1

Abstract

The Government of India has worked to expand access to injectable contraceptives through the introduction of a three-monthly injectable contraceptive MPA under the 'Antara' program in 2017. However, the uptake of injectable contraceptives has remained low, and few studies have investigated the experiences of public health facility injectable clients in India. We examined factors associated with continuing, discontinuing, and switching methods among injectable users obtaining services from public health facilities in the Indian states of Karnataka and Maharashtra.

The study team recruited respondents (N=1009) that had received their first injectable dose from in public sector facilities between February – May 2019 and conducted a follow-up visit at their residence in December 2020. We used multivariate logistic regression to study the association of the demographic characteristics, service quality, satisfaction with services, follow-up visits, and decision-making on injectable continuation and switching to other family planning methods.

Injectable usage rates declined significantly, with 44% of clients receiving a second dose and only 16% receiving a third dose. Over half of women (54%) cited problems related to periods as the reason for

Open Peer Review

Approval Status *AWAITING PEER REVIEW*

Any reports and responses or comments on the article can be found at the end of the article.

discontinuing injectable use after the first dose. Respondents were more likely to continue their method at third dose if they were older (25-35 years) (OR:1.68, p<0.05) and had received a reminder for a follow-up dose (OR: 2.41, p
Our results also highlight the importance of addressing side-effects experience by women, which may be better managed by community-based follow-up visits and high-quality counselling services.

Keywords
DMPA, injectable, continuation, switching, India, side-effects

Corresponding authors: Sunita Singal (SunitaSingal@engenderhealth.org), S Kaushik (skaush@gmail.com), Kathryn A O'Connell (koconnell@engenderhealth.org)

Author roles: Singal S: Conceptualization, Formal Analysis, Methodology, Project Administration, Supervision, Writing – Original Draft Preparation, Writing – Review & Editing; **Sikdar SK**: Conceptualization, Supervision, Writing – Review & Editing; **Kaushik S**: Conceptualization, Data Curation, Formal Analysis, Methodology, Project Administration, Writing – Original Draft Preparation, Writing – Review & Editing; **Kniss J**: Formal Analysis, Methodology, Writing – Original Draft Preparation, Writing – Review & Editing; **Singh P**: Conceptualization, Methodology, Writing – Review & Editing; **Bhatt N**: Conceptualization, Methodology, Writing – Review & Editing; **Samandari G**: Conceptualization, Formal Analysis, Writing – Original Draft Preparation, Writing – Review & Editing; **Pal M**: Conceptualization, Formal Analysis, Funding Acquisition, Methodology, Project Administration, Writing – Original Draft Preparation, Writing – Review & Editing; **Dere H**: Conceptualization, Methodology, Project Administration, Writing – Review & Editing; **Cagatay L**: Conceptualization, Methodology, Writing – Review & Editing; **O'Connell KA**: Conceptualization, Formal Analysis, Methodology, Supervision, Writing – Original Draft Preparation, Writing – Review & Editing

Competing interests: No competing interests were disclosed.

Grant information: This work was supported by the Bill and Melinda Gates Foundation OPP1178680.
The funders had no role in study design, data collection and analysis, decision to publish, or preparation of the manuscript.

How to cite this article: Singal S, Sikdar SK, Kaushik S *et al.* **Understanding factors associated with continuation of use of injectable contraceptives in Karnataka and Maharashtra, India: a cross-sectional household study [version 1; peer review: awaiting peer review]** Gates Open Research 2022, **6**:69 https://doi.org/10.12688/gatesopenres.13614.1

First published: 08 Jun 2022, **6**:69 https://doi.org/10.12688/gatesopenres.13614.1

Introduction

From 1999 to 2018, India significantly reduced the maternal mortality rate, from 540 to 113 deaths per hundred thousand live births (Agarwal; General Registrar, 2020). This success was primarily due to India's investment in improving the delivery of maternal health care initiatives and increasing access to modern contraceptives (Agarwalla *et al.*, 2020). This decline in maternal mortality is in tandem with the observed increase in modern contraceptive usage, from 42.8% in 1999 to 56.5% in 2021 (1999-NFHS I to 2021-NFHS V). Despite these achievements, one in ten women of reproductive age in India report an unmet need for modern contraceptive methods (NFHS V). Access is even more limited among rural, impoverished, or uneducated populations within the country (Gogoi *et al.*, n.d.; Gupta *et al.*, 2017). Evidence highlights that the most widely adopted modern contraceptive method among married women in India is sterilization (36%). Although the use of spacing methods including injectables has increased in recent years, female sterilization still continues to dominate the method mix.

To expand contraceptive choices and address unmet need for family planning, several initiatives have taken place over the past twenty years. Almost thirty years ago, there was international and in-country approval for the use of depot medroxyprogesterone acetate (DMPA) in India, which was initially promoted as a safe, injectable contraceptive method and made available through the private sector in 2015. Despite the approval in 1993 and global popularity, the use of DMPA in India faced opposition by women's health and rights activists who opposed injectables, raising concerns such as the quality of service provision, side effects of the method, and concerns about hormonal effects (Khan & Bhatnagar, 2015). However, the lone efforts of the private sector to offer DMPA to women have not results in any significant change in the overall contraceptive use. Between 2005 and 2015, the adoption of injectables among married women of reproductive age increased minimally, from 0.1% to 0.2% (IIPS & ICF, 2017).

To address the relatively low adoption of injectables, in 2015 the Ministry of Health and Family Welfare held a national consultation with representatives of government medical colleges and leading civil society organizations and other key players, including the Indian Council of Medical Research (ICMR) and the FOGSI. A key outcome of the national consultation was to introduce and scale up DMPA in public health facility under National Family Planning Program, with support from the Drug Technical Advisory Board (DTAB). The injectable contraceptive program was launched in 2016 and by 2017, public health facilities commenced the provision of DMPA through a phased roll out plan.

Despite these public health facility strategies, the adoption of injectables only marginally increased from 0.2% to 0.6 % in 2019-21. Across different States, achievements were even lower. For example, in Karnataka, injectable use increased from 0.0 in 2015 to 0.5% in 2019 and in Maharashtra, injectable use remained constant between 2015 and 2019 (0.2%) (NFHS-4; NFHS-5, IIPS & ICF, 2021a; IIPS & ICF, 2021b). Reasons for this slow uptake in India, as compared to other countries, may be partially explained by women's negative perceptions and low knowledge of injectables (Manna *et al.*, 2019). For example, a study in Uttar Pradesh, India found that only 16.3% of respondents knew about injectables, with awareness only lower for female condoms at (0.8%) (Singh *et al.*, 2016). Data also suggest that injection discontinuation rates were are high, with several studies reporting that less than half on injectable users continue with their method after 12 months (IIPS & ICF, 2017; Mozumdar *et al.*, 2020). Reasons for discontinuation have centered around studies from private-sector clients in India, where barriers not only included side effects related to changes in menstruation such as irregular vaginal spotting, and amenorrhea (Gupta *et al.*, 2020; Mozumdar *et al.*, 2020), as well as spousal opposition, but also private-sector related costs and accessibility (Mozumdar *et al.*, 2020) (Gupta *et al.*, 2020; Mozumdar *et al.*, 2020).

There is notably a dearth of evidence that address reasons for adoption, continuation and discontinuation of injectables injectable users in India. As evidence has centered around clients adopting a method from the private sector, results may not be applicable to clients who have received counseling for family planning in the public sector and their voluntary adoption and decision to continue with an injectable. This study examines factors associated with continuing, discontinuing, and switching methods among injectable users obtaining services from public health facilities in the Indian states of Karnataka and Maharashtra. Findings can provide guidance for both the current roll-out of injectables in public health facilities in India as well as future initiatives to improve counseling and support for contraceptive clients.

Methods

Intervention

This research study was conducted as part of the *Strengthening Institutional Capacity for the Sustainable Delivery of Quality Postpartum Family Planning (PPFP) and Postabortion Family Planning (PAFP) Methods in Karnataka and Maharashtra' (KARMA)* project, EngenderHealth's technical assistance intervention supporting the governments of Karnataka and Maharashtra states in India to expand contraceptive method mix and improve PPFP and PAFP services. The project operated in 140 facilities (80 in Maharashtra and 60 in Karnataka) in 34 priority intervention districts (14 in Karnataka and 20 in Maharashtra). Providers in intervention facilities were trained on injectable administration as well as on a range of counseling and quality improvement methods to increase the quality of FP care and ensure the rights and choice of all clients. The KARMA project adopted three strategic approaches: 1) strengthening clinical capacities at service delivery points with high delivery caseloads; 2) identifying and addressing demand-side barriers for FP by increasing the breadth of methods available to include newer contraceptives (e.g., injectables and weekly oral contraceptives); and 3) institutionalizing successful project interventions within the existing government health system. Specifically, the project strengthened access to quality Intrauterine Device (IUD), injectables, and Centchroman1 services, through capacity building of service providers,

improved infection prevention (IP) practices, improved record keeping and reporting, and enhanced contraceptives logistics management and service delivery quality monitoring. EngenderHealth worked with 89 new facilities to initiate injectable services. The project also focused on building inter-personal communication skills of counselors and service providers at facilities using EngenderHealth's REDI approach (Rapport-building, Exploring, Decision-making, Implementation) (EngenderHealth, 2018), as well as orienting Accredited Social Health Activist (ASHA) workers on counselling skills focusing on clients' rights, voluntary decision making, and sexual health and reproductive rights (SRHR) to address barriers to demand for FP services. The project also focused on improving quality of services and activated a system of self-monitoring of quality at all intervention facilities. Finally, the KARMA project worked towards institutionalizing the project interventions within the government health system.

Study design and sampling

This retrospective study uses client-level service data from 20 districts in intervention states (10 districts in each state of Maharashtra and Karnataka). The study team purposively selected districts based on high client load of injectables and considered geographical and regional representation within the two states. The sampling frame only included clients who received injectables.

In each district, the project team visited intervention facilities and obtained a list of clients who had received injectables from the facility health records. The study team included women that received their first injectable dose from an intervention facility between February – May 2019 into the sampling frame. The rationale for taking this reference period for obtaining the first dose was that these women would have been eligible to get the third dose before the national COVID-19 lockdown in March 2020. The COVID-19 pandemic has influenced the family planning behavior of women and we did not want this factor to confound the results for the study. We therefore collected the data from women in December 2020. The list of women who obtained the first dose was then pooled to create a sampling frame for the district from which clients were randomly selected using a random starting point and sampling interval.

Sample Size

The main indicator of interest in this study is the continuation rates for injectable clients at 2nd to 3rd dose. Our analysis of HMIS data revealed that there is generally a 50% continuation from the 1st dose to the 2nd dose and 50% of those who get the 2nd dose continue to get the 3rd dose. The respondent continuation rate of 50% at 2nd dose was defined as the key outcome variable. We adopted a 95% confidence interval, 80% power, with the degree of accuracy desired (p=0.05) that results in a sample size of 400 clients. To obtain 400 clients who obtained the 2nd dose, we started with a sample size of 800 clients who obtained the first dose. After factoring in non-response rate of 20%, a final sample of 1000 clients who have obtained the first dose of injectable is required.

To be included in the sampling frame, women had to have obtained their injectable from an intervention facility. The sample was distributed among the two intervention states in proportion to the number of clients in each state. Analysis of the HMIS data over the past two years indicated that intervention facilities in Maharashtra accounted for two-thirds of injectable clients, while Karnataka accounted for the remaining third; clients were sampled from the states in proportion to this estimation (n=670 and n=330, respectively). Only women who had obtained their injectable dose at an intervention facility and consented to the study were included in the final sample.

Data collection and tools

Once women were sampled from the frame, they were contacted either through a home visit or through assistance of a local ASHA (for those who had incomplete address information in their files) and invited to participate in the study. Women who expressed interest in the study were interviewed either at their home or at a location of their preference. Data collectors obtained verbal consent at the time of data collection and conducted the interview in a private setting that ensured auditory and visual privacy of the participant. If the eligible woman was not found at home at the time of first visit, the investigator made three more attempts during the same day to complete interview. If the eligible selected respondent was unavailable or refused to participate, data collectors moved on to the next eligible household.

Trained data collectors used a structured questionnaire to collect data during face-to-face interviews conducted in the local language (Marathi or Kannada). The investigators were provided with a three-day training on interviewing techniques, ethical protocols and on the questionnaire. The questionnaire was initially developed in English and translated to Kannada and Marathi. It was back translated to English to ensure accuracy of the translation.

The questionnaire collected information on respondents continuation behavior at second and third dose and the basic socio-economic and demographic profile of respondents, including the quality of counselling received by the clients, the reasons for choosing injectable and the experience with the method in terms of problems faced and actions initiated to resolve the problem, the place and dates of obtaining the three doses of injectable, the reasons of discontinuation, subsequent use of family planning in the case of discontinuation. The interview took approximately 45 minutes to complete. All data collection tools were field tested prior to survey launch.

Data analysis and variables

The primary outcome of interest in this analysis was injectable continuation. Women who returned for a second or third dose of injectables were considered "continuers" (and further subdivided into those who received a second versus a third dose of injectable) while women who did not return for any more injectables after the first dose were categorized as "discontinuers." Continuation was then analyzed against demographic characteristics (age, parity, education, etc.), clinical

quality (counseling, received reminder for second dose, etc.), general satisfaction with services, method side effects and husband's involvement in decision-making. Descriptive, bivariate, multivariate, and multinomial logistic regressions were conducted using SPSS Version 24 to determine the key predictors of continuation among women using injectable contraceptives. We used multivariate logistic regression to study the association of the demographic characteristics, service quality, satisfaction with services, follow-up visits, and decision-making on injectable continuation and switching to other family planning methods. We classified clients who took the third dose as continuers and those who were using other family planning methods after discontinuing injectables as switchers. In the multinomial logistic regression, we compare the odds of the two categories of continuers and switchers in reference to those who have discontinued injectables at the time of the third dose. Given the overlapping nature of some of our independent variables, we assessed the multivariate model for multicollinearity between all independent variables in the model so that we could identify sets of variables that had linear associations. We removed variables that had a correlation coefficient with another predictor that was greater than 0.5.

Ethical considerations

This study was designed to uphold the principles of respect for persons, confidentiality, beneficence, and justice in research. Efforts were made to protect individual autonomy, minimize harm, and maximize benefits and equitably distribute risks and benefits by using procedures which are consistent with sound research designs that take these issues into consideration. Only consenting respondents were included in the study. The investigator obtained and recorded the verbal consent from the respondent after explaining the purpose of the study, the procedures to be followed and the risks and benefits involved. In case the respondent did not consent, the interview did not proceed further. Consent in verbal form was taken as a sizeable proportion of the respondents were illiterate or with limited education. Further, there were cultural concerns regarding signing contract-like documents could compromise the respondent providing correct and frank responses. The use of verbal consent was part of the approved protocol of the study. This study protocol was reviewed and approved by the Institutional Ethics Committee for Research of the State Health Resource Center, Government of Maharashtra.

Results

The study included 1,006 female respondents aged between 19 to 43 years. Respondents had a mean age of 26.5 years, and the majority had at least a secondary education (Table 1). Most respondents in the study had one (35%) or two (49%) children. Respondents were largely from the highest wealth quintiles (85% were in the combined top two quintiles). The most common source of injectables for this group was the district hospital (48%) and approximately 40% of the respondents received injectables from sub-district hospitals (including rural and taluk hospitals) and only 9% received from lower-level health facilities like primary health centers.

Table 1. Demographics study participants.

	Injectable Contraceptives Clients
	n=1006
Mean age (years)	26.5
Education level	
Illiterate	4.7%
Primary school passed (up to 5th Class)	6.4%
Middle school passed (6th to 9th Class)	17.0%
Secondary / Matric passed (Class-10)	31.3%
Hr./Sr. Secondary passed (Class-12)	25.0%
Above school	15.7%
Done any paid work in the past 12 months	22.8%
Currently living children	
0	2.4%
1	34.8%
2	49.3%
3	10.2%
4 +	3.3%
Mean number of children	*1.83*
Currently pregnant (n=885)	15.7%
Used any contraceptive before injectable	43.9%
Wealth quintile	
1st	0.5%
2nd	4.2%
3rd	10.4%
4th	43.6%
5th	41.3%
Place client received FIRST DOSE Injectable	
District Hospital	47.9%
Sub district hospital	19.1%
Taluka hospital	11.7%
Rural hospital	11.3%
Primary Health Center	9.0%
Subcenter	0.6%
Other	0.3%

Table 2 describes rates and factors associated with injectable continuation. Less than half of the sample continued injectables past the first dose; 44% received a second dose while only 16% received a third dose. The continuation from 2nd to 3rd dose was 35.9%. Most respondents (81%) reported receiving a reminder for injectable follow-up, primarily from ASHAs (64%) or facility providers (25%). Over 70% of women reported experiencing a side effect after the first dose, the most common among them being irregular period (47%), excessive bleeding (47%) and amenorrhea (31%). To resolve, side effects, most women reported: visiting the facility where they received the injection (59%), visiting an ASHA (50%), seeing a private provider (20%) or an auxiliary nurse midwife (18%). In two-thirds of the cases, the side effects were resolved after consultation with the provider. However, 27% of women reported that their problem was not resolved, and they thus discontinued injectable use. Furthermore, 44% of discontinuers reported using a different contraceptive method after injectable discontinuation. We observed that 64% of the women who switched to another method used condoms followed by 14% who used oral pills and 11% who adopted an IUCD. In the majority of cases, 73% of women reported making the decision to use injectables with their husband.

We observed that 70% of women reported experiencing a side effect of the injectable, and 54% cited problems related to periods as the reason for discontinuing injectable use after the first dose (47% after the second dose) (Table 3). The next most

Table 2. Continuation rate, method-related issues and decision-making.

	n=1006
Continuation Rate	
Second dose	43.7%
Third dose	15.7%
Did you receive a reminder for the follow-up dose?	
Yes	80.7%
Who reminded you about follow up?	**n=812**
ASHA	63.8%
Provider from facility	25.2%
Phone from call center/ helpline	7.9%
SMS	1.1%
Whatsapp	0.1%
Other	1.8%
	n=1006
Experienced side effects	70.7%
Type of side effect	**n=711**
Irregular periods	47.3
Missed period	43.2
Excessive bleeding	47.1
Abnormal vaginal discharge	7.2
Other	8.6
What was done after problem occurred?	
Visited ASHA	49.9
Visited ANM	18
Visited facility where injectable was provided	58.6
Visited other government facility	10.3
Visited private practitioner	19.8
Did not do anything	2.5
What was the outcome of the visit?	
Problem was resolved	67.1
Problem was not resolved but continued with injectable	4.5
Problem was not resolved and discontinued	27.3
Who made the decision to choose the injectable?	
I myself	24.5
Provider	0.8
My husband	0.9
I and my Husband together	72.6
Others	1.3
Using no method after discontinuation	40.3 %
Using any other method of family planning after discontinuation	44.0%
If yes, then which contraceptive method?	**n=443**
Female Sterilization	5.6
Oral Pills - daily pills	14.4
Oral Pills - Weekly	3.2
Condoms	63.7
IUCD	11.5
Traditional method	1.4
Other	0.2

Table 3. Reasons for discontinuation after first and second dose.

	Discontinuation after first dose	Discontinuation after second dose
Wish to plan next pregnancy	23.7	28.6
Do not like the method	20.7	15.1
Problems related to periods	53.7	46.6
Got pregnant (method failure)	2.3	2.1
Injectable was not available at facility	7.4	13.4
Repeated cost of travel	0.9	1.7
Poor quality of service	0.8	1.3
Opposition from family members/ husband	19.0	22.3
Other	5.9	8.4

common reason for discontinuation was a desire to plan the next pregnancy; a factor for which 24% discontinued use after the first dose and 29% after the second dose. Some women also cited opposition to injection use from family members/ husband as a reason for discontinuation after the first (19%) or second dose (22%). Non-availability of injectables at the facility was also reported as the reason for discontinuation by 7.4% of women who discontinued after the second dose and 13.4% of women after the second dose. Access to services, travel to the health centers to get the subsequent injections and method failure was cited as the reason by a very small proportion of women who discontinued the use of injectables.

The regression analyses (Table 4) reveal several variables predict the odds of injectable continuation (N=131) and method switching at third dose in relation to those who have discontinued (N=350) the injectables at the time of the third dose. Respondents were significantly more likely to continue their method at third dose if they were older (25–35 years) (OR:1.68, p<0.05). The odds of continuation decrease among women who experienced side effects (OR: 0.48, p<=0.001) and among respondents who responded affirmatively towards provider confidentiality (OR: 0.50,p<=0.04). Respondents who received a reminder for a follow-up dose of injectables were over two times as likely to continue (OR: 2.41, p<l=0.01). Respondent's wealth quintile was significantly and incrementally associated with continuation. For example, respondents were significantly more likely to continue their method if they were from the highest wealth quintile as compared to the lowest (OR: 11.07, p<0.001).

The odds of switching to a different method of family planning increased among women who experience side effects (OR: 1.9, p<=0.001). The likelihood of switching also increased among respondents who were not satisfied with their services (OR: 0.40, p<=0.05). The odds of switching to another method also increased among respondents with prior family planning use (OR: 4.95, p<=0.001). Respondent's wealth quintile was significantly and incrementally associated with continuation. For example, respondents were significantly more likely to continue their method if they were from the highest wealth quintile as compared to the lowest (OR: 3.56, p<0.05).

The other factors like education, work status and parity of women, type of health facility from which injectables were obtained and the person who decided on adopting injectable contraceptives did not have a statistically significant relationship with injectable continuation and switching (Farogh & Palve, 2019; Singal *et al.*, 2022).

Discussion

Given the recency of injectable contraceptives being introduced in the public health system in India, the experiences of injectable users in the government health facilities and factors that influence continuation and switching methods is important. Our study found several factors that were associated with injectable continuation and method switching in areas of Karnataka and Maharashtra. Key factors identified include experiencing side effects, satisfaction with services, receiving reminders for subsequent doses, and/or previous use of family planning. Demographic characteristics that were associated with injectable continuation include age and economic status of the household.

Overall, this study found significantly lower continuation rates at six months (15.7%) as compared with other studies, where continuation rates were higher. For example, one study observed injectable continuation rates were much higher at 43.5% after 12 months (Mozumdar *et al.*, 2020). However, this may be attributable to the types of facilities from where the women obtained this method, which included a greater mix of facilities, including NGOs and the private sector. In contrast, our study only included women who received their method from the public health sector, and we observed that that the unavailability of injectables at facilities contributed to discontinuation after the first and second injectable doses. These public

Table 4. Results of the multinomial logistic regression analysis of odds of continuing at 3rd dose and switching of contraceptive methods.

	Continuing at third dose (Continuers N=131; Discontinuers=350)		Switching to other methods (Switchers N= 360; Discontinuers=350)	
	Odds	**p-val**	**Odds**	**p-val**
Age of the woman				
18–24 years (Ref)				
25–34 years	1.68	0.05	1.12	0.57
35+	1.72	0.30	1.17	0.71
Education of the woman				
College and above (Ref)				
illiterate	0.64	0.53	0.90	0.85
primary	0.60	0.34	0.60	0.28
middle	0.83	0.64	1.47	0.24
10th standard	0.64	0.19	1.24	0.43
12th standard	0.69	0.27	1.02	0.94
Work status of the woman				
Did not work (Ref)				
Worked for cash in past year	1.38	0.23	1.03	0.88
Parity				
1 child (Ref)	.	.	.	.
2 children	1.19	0.47	1.29	0.19
3 children	0.85	0.70	1.23	0.52
4 or more children	1.54	0.47	1.27	0.65
Experienced side effects of injection				
No (ref)	.	.	.	.
Yes	0.48	0.001	1.90	0.001
Received counselling before injection				
No (ref)	.	.	.	.
Yes	0.71	0.70	0.54	0.44
Satisfied with services				
No (ref)	.	.	.	.
Yes	3.42	0.25	0.40	0.03
Use FP before injection				
No (ref)	.	.	.	.
Yes	1.53	0.07	4.95	0.00

	Continuing at third dose (Continuers N=131; Discontinuers=350)		Switching to other methods (Switchers N= 360; Discontinuers=350)	
	Odds	**p-val**	**Odds**	**p-val**
Who decided on using injectable				
Self only (ref)	.	.	.	.
Self with husband	1.41	0.20	1.08	0.71
Others	1.46	0.61	0.97	0.96
Sure of confidentiality of conversation with provider				
No (ref)	.	.	.	.
Yes	0.50	0.04	1.86	0.07
Told about what to do when side effects occur				
No (ref)	.	.	.	.
Yes	1.39	0.60	1.84	0.31
Type of facility where first dose was given				
DH (ref)	.	.	.	.
SDH	0.92	0.79	1.46	0.10
other (RH/TH/CHC)	0.94	0.83	0.82	0.36
Wealth index				
1st and 2nd quintile (Ref)	.	.	.	.
3rd quintile	8.91	0.04	1.72	0.33
4th quintile	11.25	0.02	3.44	0.02
5th quintile	11.07	0.02	3.56	0.02
Received reminder on followup dose			.	.
No				
Yes	2.41	0.01	1.26	0.34

health facility stockouts may help to explain some of the reasons for greater discontinuation among our study. This is supported by research which found that over 10% of public facilities in India either did not provide injectable contraceptives or had stockouts in each quarter (Muhoza *et al.*, 2021). Ensuring the availability of injectables at primary health centers and sub-centers may be an effective way to increase accessibility, especially for those in the lower wealth quintile who were also significantly less likely to continue with their method. Expansion of injectable service provision and ensuring supplies in lower-level facilities will also improve access of the method and ensure higher continuation of the method.

The most common reason given for why women discontinued injectables was from experiencing problems related to menstruation (48.4%) such as irregular periods, excessive bleeding, and amenorrhea. Women who faced a problem after using injectable contraceptives significantly more likely to discontinue or switch to another method of contraception. These findings are consistent with several other studies that report side effects and changes in menstruation as a major reason for discontinuation (Gupta *et al.*, 2020; Mozumdar *et al.*, 2020). The findings that irregular periods, amenorrhea, and missed period accounted for over 40% of the problems faced is also consistent with other findings, which is consistent with other research. For example, a study conducted in Southern Haryana, India that similarly found irregular spotting (69.5%) amenorrhea (17.1%) and scanty periods (9.5%) as some of the most common side effects experienced and as a major reason for discontinuation (Gupta *et al.*, 2020). We also observed that injectable side-effects or other associated problems were often resolved after a visit with an Accredited Social Health Activist (ASHA) or at a facility.

These findings indicate the importance follow-up to help resolve the problems faced and are suggestive of the need for high-quality counselling to dispel myths and manage side-effects when a woman seeks subsequent injectable doses. Follow-up meetings with clients in the community level either through ASHAs or follow up messages from the health facility may be an effective means to promote voluntary and informed choice.

We also observed several other important findings. First, the study highlighted the importance messages from the health facility call-centers to remind women of when their next injectable dose was due. This highlights the critical importance of follow-up reminders and check-ins for the continuation of injectable use. Second, while not statistically significant, this study found opposition from family members/ husband was another reason given for injectable discontinuation. This finding is consistent with other studies that similarly found opposition from the husband or other family members such as the mother-in-law as a reason for discontinuation (Gupta *et al.*, 2020; Jejeebhoy & Zavier, 2012; Mozumdar *et al.*, 2020). These findings point to the importance of the husband's role in injectable contraceptive continuation. Third, around one in four women discontinued injectables before the 3rd dose because they wished to plan their next pregnancy. This result could indicate that some women view injectables as a short-term method to help space out births. This is supported by other evidence that suggests women adopt injectables as they perceive this as a short-term method (Khadilkar, 2018). Furthermore, women who were sure of the confidentiality of their conversations with providers were less likely to continue with their method. This unusual finding points to the need for additional research to better understand the provider-client role and the importance of confidentiality in the contraceptive decision-making process for women in India. Finally, the wealth index was one of the most significant factors in injectable continuation found in this study. This significant difference in wealth quintiles could indicate financial barriers to accessing injectable contraceptives such as travel costs to reach the health facilities. Because of these challenges, ensuring the availability of injectables at primary health centers and sub-centers could be an effective way to increase accessibility, especially for those in the lower wealth quintile. Therefore, increasing accessibility in harder to reach areas could be an effective way of ensuring equity among all wealth quintiles.

These findings are subject to multiple limitations. As the data was collected through interviews, there could be social desirability or recall bias that affects the results. To minimize bias, we conducted the interviews in private spaces and assured participants that their responses would remain utterly confidential; however, we are unable to report that this was sufficient to prevent such bias from affecting our data. Additionally, we chose the districts with the highest client load of injectables for this study and as the study only included public health facilities that were intervention sites of the EngenderHealth project, the sample may not be representative of injectable users from other types of facilities or of the entirely of the Maharashtra and Karnataka states.

In conclusion, the evidence presented in this study will inform initiatives to promote injectable contraceptives and meet the contraceptive needs of women in India and provide information that is specific to continuation among women who received services in the public sector. Results from this study can be used to inform future activities designed to expand contraceptive choice among women with unmet need. Our results also highlight the importance of addressing side-effects experience by women, which may be better managed by community-based follow-up visits and high-quality counselling services.

Data availability

Underlying data

Harvard Dataverse: Understanding factors associated with continuation of use of injectable contraceptives in Karnataka and Maharashtra, India: a cross-sectional household study, https://doi.org/10.7910/DVN/EF7H6A (Singal *et al.*, 2022).

This project contains the following underlying data:

- antara for upload.tab

Extended data

Harvard Dataverse: Understanding factors associated with continuation of use of injectable contraceptives in Karnataka and Maharashtra, India: a cross-sectional household study, https://doi.org/10.7910/DVN/EF7H6A (Singal *et al.*, 2022).

This project contains the following extended data:

- Client questionnaire.pdf

References

Agarwalla R, Panda M, Gupta E, *et al.*: **Snapshot of an Improved Maternal Health in India: The Pillars of Strength.** *Pan Asian J Obs Gyn.* 2020; **2**(1): 37–42.
Reference Source

EngenderHealth: **REDI: A Client-Centered Counseling Framework**. Washington D.C. 2018.
Reference Source

Farogh A, Palve T: **Study of choices of contraception in postpartum women in a tertiary care institute in Mumbai, Maharashtra, India.** *Int J Reprod Contracept Obstet Gynecol.* 2019; **9**(1): 348.
Publisher Full Text

General Registrar: **India: Special bulletin on maternal mortality in India 20016-18**. Sample registration system bulletin. 2020.

Gogoi K, Hazarika PJ, Chanu NS, *et al.*: **A Study on Status of Family Planning Practices and its Association with Socio-economic and Demographic Factors in Manipur, India.** 16, n.d.

Gupta R, Singh P, Gupta R, *et al.*: **Contraceptive use: Its prevalence, awareness, practices and determinants in a rural population of Northern India.** *Int J Med Sci Public Health.* 2017; **6**(10): 1543-1547.
Publisher Full Text

Gupta V, Chawla S, Gour N, *et al.*: **Determinants of injectable depot medroxyprogesterone acetate contraception among women of reproductive age: A study from Southern Haryana, India.** *Indian J Community Fam Med.* 2020; **6**(2): 144–149.
Publisher Full Text

International Institute for Population Sciences (IIPS) and ICF: **National Family Health Survey (NFHS-4): 2015-16: India.** Mumbai: IIPS. 2017.
Reference Source

International Institute for Population Sciences (IIPS) and ICF: **National Family Health Survey (NFHS-5): India, 2019-20: Karnataka.** IIPS. 2021a.

International Institute for Population Sciences (IIPS) and ICF: **National Family Health Survey (NFHS-5): India, 2019-20: Maharashra.** IIPS. 2021b.

Jejeebhoy S, Zavier AJ: **Injectable contraceptives: Perspectives and experiences of women and health care providers in India**. Population Council. 2012.
Publisher Full Text

Khadilkar SS: **Short-Term Use of Injectable Contraception: An Effective Strategy for Safe Motherhood.** *J Obstet Gynaecol India.* 2018; **68**(2): 82–87.
PubMed Abstract | **Publisher Full Text** | **Free Full Text**

Khan ME, Bhatnagar I: **Challenges in Introducing New Contraceptive Methods: A Case Study of India.** *Int Q Community Health Educ.* 2015; **35**(4): 387–401.
PubMed Abstract | **Publisher Full Text**

Manna DN, Bhattacharjee DA, Kundu DA, *et al.*: **Non-acceptance of Injectable Contraceptives from Antara Clinic: A Qualitative Study in West Bengal, India.** *IOSR Journal of Dental and Medical Sciences (IOSR-JDMS).* 2019; **18**(3): 48–51.
Publisher Full Text

Mozumdar A, Tobey E, Aruldas K, *et al.*: **Contraceptive use dynamics in India: A prospective cohort study of modern reversible contraceptive users**. Population Council. 2020.
Publisher Full Text

Muhoza P, Koffi AK, Anglewicz P, *et al.*: **Modern contraceptive availability and stockouts: A multi-country analysis of trends in supply and consumption.** *Health Policy Plan.* 2021; **36**(3): 273–287.
Publisher Full Text

Singal S, Sikdar SK, Kaushik S, *et al.*: **"Understanding factors associated with continuation of use of injectable contraceptives in Karnataka and Maharashtra, India: a cross-sectional household study"**, Harvard Dataverse, V1, [Dataset], 2022.
http://www.doi.org/10.7910/DVN/EF7H6A

Singh A, Singh KK, Verma P: **Knowledge, attitude and practice GAP in family planning usage: An analysis of selected cities of Uttar Pradesh.** *Contracept Reprod Med.* 2016; **1**: 20.
PubMed Abstract | **Publisher Full Text** | **Free Full Text**