

PATTERN OF IMPLANON UPTAKE IN A TERTIARY HOSPITAL IN NIGER DELTA NIGERIA.

Osegi Nkencho¹, Makinde Olakunle I^{1*}, Ozori Ebiogbo S¹, Biakolo Akpobome¹

¹Department of Obstetrics and Gynaecology, Federal Medical Centre, Yenagoa, Bayelsa State, Nigeria.

*Correspondence: Dr. Olakunle I. Makinde; +234 803 213 6315; olakunleife@gmail.com

Abstract

Background: Implants are the most effective of the contraceptive options currently available with 99.95% effectiveness. Implanon is a subdermal implant, which consists of single 4cm x 2mm ethylene-vinyl acetate (EVA) rod embedded with 68mg of etonogestrel. Experience with Implanon at the Federal Medical Centre, Yenagoa has not been documented since its introduction.

Objective: To determine Implanon uptake, socio-demographic characteristics of Implanon users, Implanon discontinuation rate, reasons for discontinuation, and the effectiveness of Implanon.

Method: A retrospective descriptive study of clients that used Implanon at the Federal Medical Centre, Yenagoa from January 2014 to December 2018. A Proforma was used to obtain data from client cards and record books at the contraception and family planning clinic. Statistical analysis was done using IBM SPSS Statistics version 22.

Results: Of the 2,701 women who used a modern contraceptive within the study period, 253 women had Implanon insertion, giving an Implanon uptake of 9.4%. Majority of Implanon users (38.1%) were aged 30-34 years. The mean age was 32.3 ± 5.4 years. Most (81.5%) had secondary education, were Christians (97.4%) and multiparous (70.5%). Most (69.5%) of them used Implanon for child spacing, and 63.1% had never used any modern contraceptive previously. Injectable contraceptives were the most common (31.9%) among previous users. Implanon discontinuation rate was 14.6%. Majority (45.5%) discontinued after two years of use, 36.4% within two years of use, 35.7% discontinued to have another child, and 32.1% because of abnormal menstrual bleeding patterns. Implanon failure rate was 0.2% per 100 women years.

Conclusion: Implanon is effective as a long-acting reversible contraceptive but its uptake is low. Cost of insertion services, level of education of the women and prevalence of family planning myths are possible factors limiting uptake of Implanon. Out-of-pocket cost reduction, awareness programs and counselling in local dialects are recommended.

Keywords: Modern contraceptive, Implanon, Implanon uptake, Implanon discontinuation rate, Implanon failure rate.

Cite this article: Osegi N, Makinde OI, Ozori ES, Biakolo A. Pattern of Implanon uptake in a tertiary hospital in Niger Delta, Nigeria. *Yen Med J.* 2020; 2(1): 119-129.

INTRODUCTION

Contraception is the prevention of conception or impregnation by methods other than abstinence from coitus.¹ Beyond prevention of conception, contraceptives also come in handy to attain the desired spacing and timing of the desired number of

children. Implants are the most effective of the contraceptive options currently available with 99.95% effectiveness, i.e. there is just a 0.05% chance of pregnancy among 100 women with the typical use of the method for one year.²⁻⁴

Implanon is a second-generation non-biodegradable subdermal implant, which consists of single 4 cm x 2 mm ethylene-vinyl acetate (EVA) rod embedded with 68 mg of 3-keto desogestrel (etonogestrel). The onset of its contraceptive action is within 24 hours of insertion, and its action lasts for 3 years.^{5,6} The initial release rate of 3-keto desogestrel from the implant is 60 to 70 µg/day which falls gradually to around 25 to 30µg per day at the end of three years.² The mechanisms of action of Implanon as with other progestogen-only contraceptives are: It makes the cervical mucus thick, viscous, scanty and impervious to sperm; it inhibits ovulation, and it causes endometrial atrophy (thinning) preventing implantation in the unlikely event of failure of the first two mechanisms.

The benefits of Implanon include suitability for long term use, use across all ages, non-user dependent effectiveness, convenience, and rapid return to fertility after removal (within 3 weeks of removal in 90% of women). It does not have oestrogen side effects. It can achieve improvement in endometriosis, primary dysmenorrhoea, and ovulatory pain. It is suitable for breast feeding mothers. Implanon does not protect against sexually transmitted infections (STIs) and human immunodeficiency virus (HIV) infection. Its contraceptive efficacy is reduced by liver enzyme-inducing drugs.

The major side effect of Implanon is menstrual abnormalities ranging from prolongation of menses, to spotting between periods, to unscheduled menstrual bleeding. This is a common reason for discontinuation. Up to 50 – 60% of users report irregular menstrual bleeding during the first year of use, and it is not possible to predict the pattern a particular user may experience. Menstrual irregularities will persist in fewer women by six months of use and more improvement is expected the longer the duration of use. Other side effects are those common to all other hormonal contraceptives including emotional lability, weight increase, headache, depression, abdominal bloating and discomfort, acne, loss of libido and nausea.^{5,6}

Despite the overwhelming effectiveness and convenience associated with use of implants, its uptake has remained low in developing countries,⁶ and also in developed countries⁶⁻⁸. This is despite a huge unmet need for modern contraception in developing countries.⁹ Although the national figure in Nigeria on contraceptive prevalence and use of Implanon is improving, the figures are still very low. The prevalence of modern contraceptives and Implanon use among married women increased from 15.1% and 0.4% respectively in 2013¹⁰ to 16.6% and 3.4% respectively in 2018¹¹.

The more commonly used modern contraceptives were injectables and male condom,¹⁰ but recently while the use of injectables remained at 3.2%, use of Implanon rose above injectables and male condom to 3.4% nationally¹¹. Women's socio-demographic characteristics including low level of education, catholic religion and younger age, and other factors like women without income, husband's disapproval, lack of public awareness of the numerous benefits, lack of knowledge of availability, provider bias in favour of another contraceptive method, unavailability of resources and skills in every community, limited accessibility to resources and skills where available, and cost implication on the women have been associated with low uptake of contraceptive implants.^{6,12} Moodley A, et al¹³ also identified side effects and an invasive method of insertion as major barriers to use of Implanon.

The benefits of Implanon generally outweigh the concerns about side effects. Some side effects are sometimes more anticipated than real. Family planning myths are prevalent at individual and community levels in Africa;¹⁴ contributing to a generally low contraceptive prevalence and may also affect the perception and attitude of current users. Adequate pre-insertion counselling about possible side effects and post insertion follow up is associated with lower discontinuation rate.^{5,15}

The experience with Implanon at the contraception

and family planning unit of the Federal Medical Centre, Yenagoa has not been documented since its introduction. This study aimed to describe the pattern of Implanon uptake, to present objective data for policy making and to serve as a background for further relevant studies at the Federal Medical Centre, Yenagoa. The study objectives were to determine Implanon uptake, socio-demographic characteristics of Implanon users, Implanon discontinuation rate, reasons for discontinuation and the effectiveness of Implanon use in the period under review.

MATERIALS AND METHOD

This was a retrospective descriptive study of clients that accepted Implanon as a contraceptive method, at the contraception and family planning unit of the Federal Medical Centre, Yenagoa. The contraception/family planning unit is one of the units that make up the Obstetrics and Gynaecology department of the Federal Medical Centre, Yenagoa, Bayelsa state, Nigeria. The hospital is a tertiary level health facility in the sub-urban city of Yenagoa in the Niger Delta region of the country. It receives clients from within Bayelsa State, and the neighbouring Rivers and Delta states. The contraception and family planning unit of the hospital is responsible for providing contraceptive services to persons presenting on their own or on referral. The unit is run by a consultant Obstetrician Gynaecologist as head of the unit, a resident doctor rotating through the unit, a family planning nurse practitioner and other nurses. Clinics are run daily during which clients receive counselling on all available options.

Suitable methods are offered to the client based on information obtained from history and examination and they are allowed to make a choice. Side effects of the chosen method are discussed and questions and concerns are addressed. Client information, choice of contraceptive, insertion/administration of contraceptive and appointments are documented in unit client cards and in a designated record book. Clients are offered post insertion services. All clients who had records of Implanon insertion and removal at the Federal Medical Centre, Yenagoa between January 2014 and December 2018 were included in

the study.

Client cards and record books at the contraception and family planning clinic were retrieved and of the 2,701 clients who had contraception from January 2014 to December 2018, data of clients who had insertion and removal of Implanon were obtained. Data including age, level of education, religion, and parity of clients, source of previous information/referral for contraceptive services, previous contraceptive use, type used, discontinuation and duration of use, and reason for discontinuation were collected using a predesigned proforma.

DATA ANALYSIS

Statistical analysis of the data obtained was done using Statistical Package for Social Sciences; IBM SPSS Statistics version 22. The results are presented in tables, frequencies and percentages.

RESULTS

Of the 2,701 women who used a modern contraceptive within the study period, 253 women had Implanon insertion, giving an Implanon uptake of 9.4%. Fifty-one Implanon insertions were recorded in 2014, 46 in 2015, 60 and 69 in 2016 and 2017 respectively and 27 in 2018. Table 1 shows how the socio-demographic characteristics of the women were distributed. Majority (38.1%) of them were aged 30-34 years. The mean age was 32.3 ± 5.4 years. Most (89.4%) of the women had at least a secondary level of education, and most (97.4%) were Christians. Multiparous women accounted for 70.5% of the women who used Implanon.

The most common source of previous information/referral for contraception is the postnatal clinic (65.8%). Other sources of previous information/referral are shown in table 2. The reason why most (69.5%) of the women used Implanon was for child spacing. The rest used Implanon because they had no desire for more children, except 2 (1.1%) nulliparous women who used Implanon for pregnancy prevention. Thirteen

(33.3%) of the grand-multiparous women used Implanon for child spacing. They accounted for 10% of users of Implanon for child spacing, while 78.5% were multiparous and the rest were primiparous. Most (63.1%) of the women who used Implanon during the study period had never used any modern contraceptive, while the rest had history of previous use of modern contraceptive. Table 3 shows the modern contraceptive previously used.

The most common (31.9%) were the injectable contraceptives. Implanon discontinuation rate was 14.6%; 37 women discontinued Implanon before the end of 3 years during the study period. Table 4 shows the timing of Implanon discontinuation. The duration of Implanon use among those who discontinued ranged from 3 days to 35 months. Most (45.5%) Implanon discontinuations were after two years of use. One user discontinued Implanon 3 days from insertion due to husband's request. For most (35.7%) of the women who discontinued Implanon the reason was to have another child. Abnormal menstrual bleeding patterns followed closely (32.1%) as a reason for discontinuation among women who discontinued Implanon. Women who experienced abnormal menstrual bleeding patterns discontinued Implanon after its use for a mean duration of 15 ± 5.9 months, and a range of 9 to 26 months. The other reasons for discontinuation of Implanon are shown in table 5. Three women got pregnant while on Implanon during the study period giving a failure rate of 0.2% per 100 women years. Two of these women were HIV positive on antiretroviral drugs (ARVs).

Table 1: Socio-demographic Characteristics of Implanon Users

Variable	Frequency	Valid %
Age range (In years)		
Valid 15-19	1	.4
20-24	13	5.2
25-29	61	24.2
30-34	96	38.1
35-39	59	23.4
40-44	18	7.1
45-49	2	.8
>49	2	.8
Total	252	100
Missing System	1	
Total	253	
Level of Education		
Valid PRIMARY	20	10.6
SECONDARY	154	81.5
TERTIARY	15	7.9
Total	189	100
Missing System	64	
Total	253	
Religion		
Valid CHRISTIANITY	189	97.4
ISLAM	5	2.6
Total	194	100
Missing System	59	
Total	253	
Parity		
Valid NULLIPARA	3	1.6
PRIMIPARA	14	7.4
MULTIPARA	134	70.5
GRAND-MULTIPARA	39	20.5
Total	190	100
Missing System	63	
Total	253	

Table 2: Source of Previous Contraceptive Information/Referral

Variable	Frequency	Valid %
Valid POSTNATAL CLINIC	123	65.8
FRIEND/RELATIVE	23	12.3
COMMUNITY HEALTH WORKER	15	8.0
MEDICAL OUTREACH	5	2.7
PRINT MEDIA	4	2.1
RADIO	5	2.7
TELEVISION	2	1.1
OTHER CLINIC	10	5.3
Total	187	100.0
Missing System	66	
Total	253	

Table 3: Modern Contraceptives Previously Used

	Variable	Frequency	Valid %
Valid	MALE CONDOM	13	18.1
	COCP	10	13.9
	INJECTABLE	23	31.9
	IMPLANON	10	13.9
	IUCD	8	11.1
	POSTINOR	5	6.9
	MINIPILL	2	2.8
	JADELLE	1	1.4
	Total	72	100.0
Missing System		181	
Total		253	

Table 4: Timing of Implanon Discontinuation

	Variable	Frequency	Valid %
Valid	WITHIN ONE MONTH	1	3.0
	WITHIN SIX MONTHS	2	6.1
	WITHIN ONE YEAR	3	9.1
	WITHIN TWO YEARS	12	36.4
	AFTER TWO YEARS	15	45.5
	Total	33	100.0
Missing System		220	
Total		253	

Table 5: Reasons for Discontinuation of Implanon

	Variable	Frequency	Valid %
Valid	TO HAVE ANOTHER CHILD	10	35.7
	ABNORMAL MENSTRUAL BLEEDING PATTERNS	9	32.1
	FEELING UNWELL	2	7.1
	FEAR OF ILLNESS	1	3.6
	PERSISTENT HEADACHE	2	7.1
	GENERAL BODY PAIN	1	3.6
	HUSBAND'S REQUEST	2	7.1
	ABDOMINAL PAIN	1	3.6
	Total	28	100.0
Missing System		225	
Total		253	

DISCUSSION

The 9.4% Implanon uptake found in this study is higher than the 4.1%, 4.3% and 3.6% recorded in studies done in Port Harcourt, Ibadan and Ilorin respectively.¹⁶⁻¹⁸ It is close to the 10.1% recorded in

Ethiopia¹⁹ and lower than the 16% recorded in South Africa¹³. As seen from the results, Implanon insertions rose in 2016 and 2017 and thereafter dropped markedly in 2018. This trend may be explainable by events that occurred during the period. There was a non-governmental organization (NGO) intervention on contraception that started in the study centre in 2015 by Marie Stopes Nigeria. Free contraceptives were provided to the contraception and family planning unit of the study centre, awareness campaigns promoting long acting reversible contraceptives (LARCs) were organized in the hospital's clinics, in churches and market places etc., and the NGO also ensured free contraceptive services were rendered on some specified days. However, for the most part of this period, women who did not come on days earmarked for free services paid for contraceptive services out of pocket.

According to Amo-Adjei J, et al²⁰, collaborations with interested organizations enhanced ability to increase demand for, and supply of contraceptives. NGO intervention in the study centre and promotion of LARCs including Implanon may explain the rise in uptake of Implanon witnessed in 2016 and 2017. LARCs utilization significantly increases when out-of-pocket cost is low.²¹ In 2017 there was a general upward review of all fees payable for services rendered at the study centre. This may explain the decline in the uptake of Implanon that became very noticeable in 2018.

The mean age of the women that used Implanon in this study of 32.3 ± 5.4 years, most of them being multiparous, all having a formal education with majority at least a secondary education is the same as findings in the study by Ojule JD et al¹⁶. This suggests that the socio-demographic characteristics of Implanon acceptors are similar in the Niger Delta region of Nigeria. Postnatal clinic was the most common source of previous information/referral in this study in keeping with studies by Balogun OR, et al¹⁸ and Ojule JD, et al¹⁶. It is noteworthy that 33.3% of grand-multiparous

women were still desirous of pregnancy and used Implanon for child spacing rather than because they have completed family size. They accounted for 10% of users of Implanon for child spacing in this study. This implies that more needs to be done to expand the use of modern contraceptives to lower fertility rate. From the results on types of contraceptives previously used, 86.1% of the women who used Implanon in this study changed from other methods of modern contraception to Implanon. This is in keeping with the national trend that shows that Implanon use is increasing above previously more commonly used modern contraceptive methods.¹¹

Discontinuation rate of Implanon varies widely across regions and countries. Differences in denominators used in studies may be responsible for the wide variation.²² Quality of contraception/family planning services, pre-insertion counselling on possible side effects, post insertion follow up services, age at insertion, level of education, parity, and nature of side effects are factors in Implanon discontinuation.^{15,23,24} Discontinuation rate of Implanon from this study of 14.6% is lower than the 21.4% recorded in Enugu,²⁵ 26.1% in Ilorin,¹⁸ the 16.7%,²⁶ 23.4%,¹⁵ 38%,²² 46.5%,²⁴ and 65%²⁷ from studies done in Ethiopia, but higher than 5.4% recorded in Port Harcourt¹⁶. The desire to have another child and abnormal menstrual bleeding patterns which were the leading reasons for discontinuation of Implanon from this study is in keeping with the finding by Ojule JD, et al¹⁶.

Although just one out of the 253 women that used Implanon in this study discontinued its use because of fear of illness, observations from interactions in the study area suggests that family planning myths are prevalent at individual and community levels; possibly affecting Implanon uptake and discontinuation. A failure rate of 0.2% was recorded from this study and 2 of the 3 women who got pregnant while using Implanon were HIV positive on ARVs. Effectiveness of contraceptive implants are reduced when co-administered with ARVs especially efavirenz and the risk of unintended pregnancy is high.^{28,29} Levonorgestrel containing

intrauterine system (LNG-IUS) is a suitable option for LARC in HIV positive women.²⁸

CONCLUSIONS AND RECOMMENDATIONS

Implanon is effective as a long acting reversible contraceptive at the Federal Medical Centre, Yenagoa but its uptake is low. It is observed that cost of Implanon insertion services, level of education of the women and prevalence of family planning myths in the study area are possible factors limiting uptake of Implanon and its discontinuation. Out-of-pocket cost reduction, awareness programs and counselling in local dialects are recommended. Further studies to determine the association between the observations made from this study and Implanon uptake and discontinuation is also recommended.

ACKNOWLEDGEMENT

Authors acknowledge assistance rendered by the nurses at the contraception and family planning clinic of the Federal Medical Centre, Yenagoa during the process of data collection for this study.

SOURCE OF FUNDING

The research was funded by the authors.

CONFLIT OF INTEREST

The authors declare that there are no conflicts of interest.

AUTHOR CONTRIBUTIONS

All authors made substantial contributions to the study. Author 1 identified the research problem, contributed to designing the scope of the study, supervised all aspects of the study and approved the final manuscript. Author 2 contributed to designing the scope of the study, designed the tool for data collection, supervised data collection, retrieved and analysed data and was involved with review of literatures and manuscript writing. Author 3 contributed to supervision of data collection, review of literatures, and manuscript writing. Author 4 collected data for the study. All authors read the final manuscript.

REFERENCES

1. Mutihir JT, Emuveyan EE. Advances in Contraception. In: Kwawukume EY, Ekele BA, Danso KA, Emuveyan EE (eds.). *Comprehensive Gynaecology in the Tropics*, 2nd edition. Ghana: G-Pak Limited publishers; 2017. p.305-316.
2. Cameron ST, Glasier A. Contraception and Sterilization. In: Keith Edmonds D (ed). *Dewhurst's Textbook of Obstetrics & Gynaecology*, 8th edition. West Sussex, UK: John Wiley and Sons, Ltd; 2012. p.495-512.
3. Graesslin O, Korver T. The contraceptive efficacy of Implanon: a review of clinical trials and marketing experience. *Eur J Contracept Reprod Health Care*. 2008;13 Suppl(s1):4-12. doi: 10.1080/13625180801942754.
4. Sundaram A, Vaughan B, Kost K, Bankole A, Finer L, Singh S, et al. Contraceptive failure in the United States: estimates from the 2006-2010 National Survey of Family Growth. *Perspect Sex Reprod Health*. 2017;49(1):7-16. doi: 1363/psrh.12017.
5. Ladipo AO, Akinso SA. Contraceptive Implants. *Afr J Reprod Health*. 2005;9(1):16-23.
6. Kolawole OO, Sowemimo OO, Ojo OO, Fasuba OB. Contraceptive Implants: a review and current perspective in southwest Nigeria. *Trop J Obstet Gynaecol*. 2018;35(2):108-112. doi: 10.4103/TJOG.TJOG_6_18.
7. Mazza D, Bateson D, Frearson M, Goldstone P, Kovacs G, Baber R. Current barriers and potential strategies to increase use of long-acting reversible contraception (LARC) to reduce the rate of unintended pregnancies in Australia: an expert roundtable discussion. *Aust N Z J Obstet Gynaecol*. 2017;57(2):206-212. doi: 10.1111/ajo.12587.
8. Joshi R, Khadilkar S, Patel M. Global trends in use of long-acting reversible and permanent methods of contraception: seeking a balance. *Int J Gynaecol Obstet*. 2015;131 Suppl(s1): S60 - S63. doi: 10.1016/j.ijgo.2015.04.024.
9. Darroch JE, Singh S. Trends in contraceptive need and use in developing countries in 2003, 2008, and 2012: an analysis of national surveys. *Lancet*. 2013;381(9879):1756-1762. doi: 10.1016/S0140-6736(13)60597-8.
10. National population commission (NPC) [Nigeria], ICF International. *Nigeria Demographic and Health Survey*. 2013. Abuja, Nigeria and Rockville, Maryland, USA: NPC and ICF International; 2014.
11. National population commission (NPC) [Nigeria], ICF. *Nigeria Demographic and Health Survey*. 2018. Abuja, Nigeria and Rockville, Maryland, USA: NPC and ICF; 2019.
12. Elias B, Hailemariam T. Implants contraceptive utilization and factors associated among married women in the reproductive age group (18 – 49 Years) in southern Ethiopia. *J Women's Health Care*. 2015;4(7):281. doi: 10.4172/2167-0420.1000281.
13. Moodley A, Mahomed O. Prevalence and predictors of Implanon uptake in Ugu (Ugu north sub district) 2016/17. *S Afr Fam Pract*. 2019; 61(2): 48 - 52. doi: 10.1080/20786190.2018.1548725.
14. Gueye A, Speizer IS, Corroon M, Okigbo CC. Belief in family planning myths at the individual and community levels and modern contraceptive use in urban Africa. *Int Perspect Sex Reprod Health*. 2015;41(4):191-199. doi: 10.1363/4119115.
15. Nageso A, Gebretsadik A. Discontinuation rate of Implanon and its associated factors among women who ever used Implanon in Dale District, Southern Ethiopia. *BMC Womens Health*. 2018;18(1):189. doi: 10.1186/s12905-018-0678-x.
16. Ojule JD, Oranu EO, Enyindah CE. Experience with Implanon in Southern Nigeria. *J. Med. Med. Sci*. 2012;3(11):710-714. Available from: <http://www.interestjournals.org/JMMS>. [Accessed 28 November 2019].
17. Roberts AO, Morhason-Bello IO, Okunlola MA, Adekunle AO. Profile of Implanon acceptors and pattern of side effects. *J Reprod Contracept*. 2015;26(1):46-52. doi:

- 10.7669/j.issn.1001-7844.2015.01.0046.
18. Balogun OR, Olaomo N, Adeniran AS, Fawole AA. Implanon sub-dermal implant: an emerging method of contraception in Ilorin, Nigeria. *J Med Biomed Sci.* 2014;3(1):1-5. doi: 10.4314/jmbs.v3i1.1.
 19. Gebre-Egziabher D, Medhanyie AA, Alemayehu M, Tesfay FH. Prevalence and predictors of Implanon utilization among women of reproductive age group in Tigray Region, Northern Ethiopia. *Reprod Health.* 2017;14:62. doi: 10.1186/s12978-017-0320-7.
 20. Amo-Adjei J, Mutua M, Athero S, Izugbara C, Ezeh A. Improving family planning services delivery and uptake: experiences from the "Reversing the Stall in Fertility Decline in Western Kenya Project". *BMC Res Notes.* 2017;10(1):498. doi:10.1186/s13104-017-2821-4.
 21. Broecker J, Jurich J, Fuchs R. The relationship between long-acting reversible contraception and insurance coverage: a retrospective analysis. *Contraception.* 2016;93(3):266–272. doi:10.1016/j.contraception.2015.11.006.
 22. G/Medhin T, Gebrekidan KG, Nerea MK, Gereziher H, Haftu M. Early Implanon discontinuation rate and its associated factors in health institutions of Mekelle City, Tigray, Ethiopia 2016/17. *BMC Res Notes.* 2019;12(1):8. doi:10.1186/s13104-018-3992-3.
 23. Tadesse A, Kondale M, Agedew E, Gebremeskel F, Boti N, Oumer B. Determinant of Implanon discontinuation among women who ever used Implanon in Diguna Fango District, Wolayita Zone, Southern Ethiopia: a community based case control study. *Int. J. Reprod. Med.* 2017;2861207, 8. doi.org/10.1155/2017/2861207.
 24. Siyoum M, Zerfu M, Abuhay M, Habtamu K. Implanon discontinuation rate and associated factors among women who ever used Implanon in the last three years in Debre Markos town, Northwest Ethiopia, 2016, cross sectional study. *ARC J. Public Health Community Med.* 2017;2(1):8-16. doi: 10.20431/2456-0596.0201003.
 25. Ezegwui H, Ikeako L, Ishiekwene C, Oguanua T. The discontinuation rate and reasons for discontinuation of Implanon at the family planning clinic of University of Nigeria Teaching Hospital (UNTH) Enugu, Nigeria. *Niger J Med.* 2010;20(4):448–50.
 26. Wondie AG. Implanon discontinuation rate and its associated factors in Debre Tabor Town, North Central Ethiopia. *Sci. J. Clin. Med.* 2010; 8 (2) : 6 - 1 2 . doi:10.11648/j.sjcm.20190802.11.
 27. Asaye MM, Nigusie ST, Ambaw WM. Early Implanon discontinuation and associated factors among Implanon user women in Debre Tabor Town, Public Health facilities, Northwest Ethiopia, 2016. *Int J Reprod Med.* 2018; 2018 : 3597487 . doi:10.1155/2018/3597487.
 28. Robinson JA, Jamshidi R, Burke AE. Contraception for the HIV-positive woman: a review of interactions between hormonal contraception and antiretroviral therapy. *Infect Dis Obstet Gynecol.* 2012; 2012 : 890160 . doi:10.1155/2012/890160.
 29. Shelton JD. Reduced effectiveness of contraceptive implants for women taking the antiretroviral efavirenz (EFV): still good enough and for how long? *Glob Health Sci Pract.* 2015; 3 (4) : 528 - 531 . doi.org/10.9745/GHSP-D-15-00356.