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The promise of affordable implants: is cost recovery possible in Kenya?☆

Katherine Tumlinson[a,*], Markus J. Steiner[b], Kate H. Rademacher[b], Alice Olawo[c], Marsden Solomon[c], John Bratt[b]

[a]Department of Epidemiology, School of Public Health, The University of North Carolina at Chapel Hill, Chapel Hill, NC 27599, USA
[b]Division of Global Health and Development, FHI, Durham, NC 27713, USA
[c]Division of Global Health and Development, FHI, African Regional Office, Nairobi, Kenya

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Abstract

Background: Contraceptive implants are one of the most effective methods of family planning but remain underutilized due to their relatively high upfront cost. The increasing availability of a low-cost implant may reduce financial barriers and increase uptake of implants. The commodity cost of Sino-implant (II) is approximately 60% less than two other widely available implants, and a direct service delivery cost of approximately US$12 makes it one of the most cost-effective methods available. This study was conducted to assess whether implant clients in Kenya are paying as much or more than the direct service delivery cost of Sino-implant (II).

Study Design: A study was conducted in 22 facilities throughout Kenya, including public (n=8), private for-profit (n=6) and private not-for-profit facilities (n=8). Interviews were conducted with a convenience sample of 293 current and returning implant clients after at least 6 months of product use.

Results: The median price for implant insertion paid by clients in the public, private for-profit and private not-for-profit sectors was US$1.30, US$13.30 and US$20.00, respectively.

Conclusion: Patient fees in both private sectors allow for 100% recovery of the direct cost of providing Sino-implant (II). Currently in Kenya, all sectors can receive donated commodities free of charge; Sino-implant (II) has the potential to reduce reliance on donor-supplied implants and thereby improve contraceptive security.

Keywords: Sino-implant (II); Contraceptive implants; Cost recovery; Cost-effectiveness; Contraceptive security; Kenya

1. Introduction

With an annual pregnancy rate of less than 1%, the contraceptive implant is one of the most effective family planning methods ever developed [1]. In addition to being a highly effective method, implants are long acting, totally user independent, and completely and immediately reversible upon removal. Implants are also safe and effective for use by most women, including those who are at risk of cardiovascular disease and sexually transmitted infections including HIV infection, and those living with HIV [2]. Unlike some other hormonal forms of contraception, implants can be used safely by cigarette smokers and women who are breastfeeding immediately postpartum [3].

Although contraceptive implants have the potential to substantially reduce unwanted pregnancies and are known to be acceptable to many women around the world, implants remain underutilized [4,5]. The relatively high upfront per-unit cost of implants is one of the chief reasons that their use is not widespread in resource-constrained countries where decision makers are inclined to procure the greatest number of commodities possible with limited budgets. As a result, many programs and clinics are unable to offer the method and stock-outs are frequent [4]. Women who want implants but cannot get them go on waiting lists or choose another method. A 2007 study conducted by FHI found that while the true demand for implants is not known (due to shortage

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* Corresponding author.
E-mail address: ktumlin@email.unc.edu (K. Tumlinson).

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of supplies), evidence suggests that many more women would choose implants if they were available [6].

Within the last 5 years, however, governments and donors have negotiated lower prices and the per-unit price of two widely available implants, Jadelle (two 43-mm dimethylsiloxane/methylvinylsiloxane copolymer rods containing 150 mg of levonorgestrel) and Implanon (one 4-cm ethylene vinylacetate copolymer rod containing 68 mg of etonogestrel), has decreased by 13% and 37%, respectively[1] [4,7]. Partially in response to this reduction in price, as well as user-driven demand, donors have made substantial increases in the number of commodities they donate each year [4]. According to the Reproductive Health Supplies Coalition (RHSC), in 2005 donors contributed fewer than 100,000 implants to sub-Saharan Africa, at a total cost of US$2.5 million. By 2009, just 4 years later, annual donations to this region rose *15-fold* to more than 1.5 million units at a cost of more than US$32 million[2] [7]. This flood of donated commodities comes at a steep price for international donors[3] even accounting for the recent per-unit price reductions. It is unclear how long donors can continue such high levels of support for implants in the face of other competing needs for resources.

The economic landscape of implants continues to evolve with the emergence of a low-cost implant commonly referred to as Sino-implant (II). Sino-implant (II), currently labeled for 4 years of use, is marketed under the brand name Zarin in much of Africa and has the same amount of active ingredient (150 mg of levonorgestrel) as Jadelle which is labeled for 5 years of use (Implanon, by comparison, is labeled for 3 years of use) [8]. To date, Sino-implant (II) is registered in 11 countries (China, Indonesia, Kenya, Sierra Leone, Madagascar, Zambia, Malawi, Fiji, Uganda, Burkina Faso and Pakistan) and is under active review in 8 additional countries. Sino-implant (II) (two 44-mm rods made of medical-grade silicone and containing 150 mg of levonorgestrel) is supplied with a CE marked[4] disposable trocar, which indicates conformity with mandatory requirements for distribution of this medical device in European Union member states [9]. Family planning donors providing commodities to sub-Saharan Africa in 2009 were able to procure Sino-implant (II) for US$8.00, making it approximately 60% less expensive than Jadelle and Implanon [7]. In addition to being less expensive than other widely available implants, the lower commodity cost may make provision of Sino-implant (II) self-sustaining in some sectors. A lower commodity cost may also make Sino-implant (II) cost-effective when compared with shorter-term methods. We conducted this study to assess the potential for recovering the direct costs of service delivery of Sino-implant (II) in Kenya.

2. Materials and methods

We interviewed current implant users and service providers and then compared prices charged for implant insertion and removal as well as willingness to pay among Kenya's three service sectors: (1) public; (2) private for-profit; and (3) private not-for-profit. We also conducted short exit interviews with family planning clients who did not select a contraceptive implant in order to explore reasons why these family planning clients chose their current method and to assess their willingness to consider implants in the future.[5]

A convenience sample of 22 health facilities in six different regions throughout Kenya was selected for inclusion in this study. Of the 22 facilities, eight were public, six were private for-profit and eight were private not-for-profit facilities operated by Family Health Options Kenya (FHOK), an affiliate of the International Planned Parenthood Federation. Geographic distribution was driven by the presence of FHOK clinics which are known to serve high volumes of implant clients. At each clinic, we interviewed up to 55 implant users and ensured that all clients interviewed had been using a contraceptive implant for at least 6 months. A total of 293 implant clients were enrolled in this study.

To assess the price charged, participants were asked how much they paid for their insertion and the date of insertion. Participants who returned for implant removal were also asked how much they paid for the removal and the date of the removal. To assess willingness to pay, we used the approach outlined in Foreit and Foreit's [10] 2004 *Willingness to Pay User's Manual*. Using this approach, we designed a sequence of questions to ask women whether they would be willing to pay more than a certain amount, over what they are currently paying, for implant insertion or removal. Finally, to compare the direct costs of service delivery of a low-cost implant relative to other contraceptive methods, we computed estimates of service delivery costs per couple year of protection (CYP) in USAID's 13 tier one family planning/reproductive health priority countries.

[1] Working with staff from RH Interchange, we determined the total quantity of implants donated to all countries in sub-Saharan Africa between 2005 and 2009 (inclusive), categorized by brand name, and the average cost per unit each year. We then compared the price in 2005 with the price in 2009 to determine the percent decrease in price during that time period. See Table 1 in Supplemental Data for specifics.

[2] See Table 2 in Supplemental Data for value and quantity donated each year 2005–2009.

[3] The value of implant commodities donated to sub-Saharan Africa in 2009 was approximately 21% of the value of all donated contraceptive commodities [7]. See Table 3 in Supplemental Data.

[4] http://ce-mark-us.com/ce-certification-process/what-is-the-ce-mark/ (This acronym originally stood for "European Conformity").

[5] This exit interview was conducted among a convenience sample of 412 exiting family planning clients at the same 22 facilities where implant clients were interviewed. Of the initial 412 clients in this sample, 95 exited the facility without a contraceptive method and 27 selected an implant. Therefore, the total number of family planning clients in this sample who chose a method other than implants was 290.

Table 1
Percentage of implant clients and the median price of implant insertion and removal in each of Kenya's three service sectors

	Service sector type		
	Public	Private for-profit	Private not-for-profit
Percent of survey participants in each sector (*N*=293)	45	13	42
Percent of implant clients in Kenya[a]	61	20	18
Median price of implant insertion (and range) in US dollars	1.30 (0–47)	13.30 (0–33)	20.00 (0–53)
Median price of implant removal (and range) in US dollars	1.30 (0–8)	4.70 (0–20)	17.30 (0–27)

[a] According to the 2003 Demographic and Health Survey (page 76, Table 5.10).

FHI's Protection of Human Subjects Committee (PHSC) and the Kenyatta National Hospital Ethics and Research Committee (KNH-ERC) reviewed and approved the study protocol and informed consent process.

3. Results

3.1. Background characteristics

The average age of implant users in our survey was 32 years. A large majority (82%) had at least completed high school and half of those went on to pursue post-secondary studies. The vast majority (91%) were married and nearly two-thirds (61%) reported a monthly family income above 10,000 Kenyan shillings (KES; equivalent to US$130, approximately). On average, respondents had two living children.

3.2. Price of implant insertion

Of the 293 implant clients in our sample, 45% were served in the public sector, 13% in the private for-profit sector and 42% in the private not-for-profit sector (Table 1).[6] The self-reported median price paid for implant insertion among survey respondents in the public sector was US $1.30[7] (range US$0–46.60)[8] compared to US$13.30 (range US$0–33.30) in the private for-profit sector and US$20 (range US$0–53.30) in the private not-for-profit sector (Table 1). It is surprising to learn that prices charged within the private not-for-profit sector are higher than in the for-profit sector. One explanation may be that not-for-profit providers are influenced both by their client's ability to pay and by prices charged by competitors.

To test the validity of this self-reported data, we also reviewed service statistics during the facility assessment to determine the average price paid for implant insertion at each facility during the previous 4 weeks. This assessment revealed that the median of all of the average prices paid by clients in the public sector was US$2.30 (range US$0.20–5.30) compared to US$13.30 (range US$12.20–30.60) in the private for-profit sector and US$26.60 (range US$13.30–40.00) in the private not-for-profit sector. The facility assessment also revealed that the implants available to clients were Implanon, Jadelle and Norplant. Because the study took place in 2007, Sino-implant (II) was not yet available in Kenya.

3.3. Willingness to pay

According to participants' self-reports, the median of the maximum price clients were willing to pay for insertion was US$6.60, US$26.60 and US$26.60[9] in the public, private for-profit and private not-for-profit sectors, respectively. When asked what they would do if the price of implants was greater than the maximum price they are willing to pay, 62% of respondents said they would switch to another method if they were not able to afford an implant. Of those who would switch, more than three-fourths (76%) indicated that they would use pills, injectables, condoms or natural methods as an alternative to implants, all of which are shorter-term and highly user-dependent methods with lower rates of effectiveness than the implant. Another 13% said they would use an IUD, while 4% reported that they would opt for tubal ligation. About one in 15 was undecided about what they would do if the implant were not available to them at a price they could afford.

3.4. Price of implant removal

Among respondents in the public sector, the self-reported median price of implant removal was US$1.30 (range US $0–8) (Table 1). For respondents obtaining services in the private for-profit sector, the median price was US$4.60 (range US$0–20) compared to those in the private not-for-profit sector who paid a median price of US$17.30 (range US $0–26.60). In addition, data revealed that 92% of implant clients interested in removal were successful in getting their implant removed upon request. Of the nine clients originally requesting implant removal, three decided that they no longer wanted the implant removed and an additional three clients had scheduled their removal for a future date (although two of these clients were under the mistaken impression that their implant had to expire before it could be removed). This means that three of the original 111 clients,

[6] According to the 2003 Kenya Demographic and Health Survey (page 76, Table 5.10), 61% of implant clients in Kenya are served in the public sector, 20% in the private for-profit and 18% in the private not-for-profit sector [11].

[7] Throughout this article, we use an exchange rate of KES75 per US$1 and round down to one decimal place.

[8] A sliding scale payment scheme is implemented in many facilities in Kenya, which may explain the wide range of prices paid. The sliding scale system influenced our decision to not rely on posted facility prices for this analysis.

[9] US$26.60 is a rounded value corresponding to KES2000, which was the median value of the maximum price clients in both private sectors were willing to pay.

or about 3%, who requested implant removal were unsuccessful. These three clients did not offer details on why they experienced problems with removal or whether they would make a second request for implant removal.

3.5. Potential barriers to successful introduction of a low-cost implant

In order to assess potential barriers to introduction of a low-cost implant in Kenya, we talked to 290 women who exited facilities with a family planning method other than implants. More than one in three current family planning users in the study did not choose the implant because they were afraid of side effects (24%) or afraid of pain upon insertion or removal (10%) (Table 2). Additionally, of participants who had their implants removed, 28% did so due to side effects. Another 13% of current family planning users had never heard of, or lacked sufficient information about, implants.

Regarding bleeding patterns, approximately one-third (33%) of current implant users reported that their bleeding pattern was unacceptable to them. However, 89% of the women we interviewed reported that, overall, they are satisfied with this method. Of those who reported being satisfied, more than a third (41%) reported that they were *very* satisfied.

Table 2
Reasons respondents chose a family planning method other than the implant

Reason for not choosing an implant	Percent (n=290)
Afraid of insertion/removal	10.3
Afraid of side effects	24.5
Contraindicated	7.2
Does not want a long-term method	16.2
Happy with current method	11.7
Lack of information	5.2
Never heard of the method	7.9
Previous bad experience	6.6
Other, miscellaneous	10.3

4. Discussion

This study provides evidence that the direct cost of Sino-implant (II) insertion can be recovered from a substantial proportion of acceptors in Kenya. The direct cost of Sino-implant (II) insertion in Kenya, which includes staff time and disposable equipment, is approximately US$12.10[10] [12]. In the private for-profit and in the private not-for-profit sectors, where clients are currently paying US$13.30 and US$20, respectively, the direct cost of Sino-implant (II) can be fully recovered by patient fees. In the public sector, some subsidies will continue to be needed although the reported highest price clients in this sector are willing to pay (US $6.60) is more than half the direct cost of approximately US $12.10.

4.1. Comparison of direct costs of Sino-implant (II) to other methods in USAID priority countries

In addition to considering the potential for cost recovery of Sino-implant (II) through patient fees, we also investigated the direct service delivery costs of a low-cost implant relative to other contraceptive methods. Because different methods provide varying duration of contraceptive protection, standard conversion factors are needed to make comparisons across methods. For this reason, when comparing different contraceptive methods, it is typical to use CYP in the denominator [13].

Based on varying labor costs across 13 USAID tier one reproductive health priority countries, Sino-implant (II) has a cost per CYP of approximately US$4, making it one of the most affordable methods of reversible contraception, second only to the IUD which has the lowest service delivery cost per CYP (Fig. 1) [7,14]. This CYP cost for Sino-implant (II) compares favorably to the median CYP cost of depot medroxyprogesterone acetate (DMPA) (US$7.9) and combined oral contraceptives (COCs) (US$7.8), two popular methods across sub-Saharan Africa. Sensitivity analysis reveals that even if the commodity cost of Sino-implant (II) were to increase by 50%, the relative ranking of the methods' cost per CYP would remain the same. Within this multi-country analysis, Sino-implant (II) is now competitive with methods with which implants were not previously competitive.

Furthermore, existing evidence indicates that Jadelle and Implanon are only cost-effective relative to several shorter-term methods after use for 3 to 5 years [4,15]. However, with the introduction of Sino-implant (II), direct service delivery costs are comparable to DMPA and COCs *after just 2 years of use*. In 13 USAID tier one reproductive health priority countries, the average 2-year direct service delivery cost of Sino-implant (II) was US$13.30 compared with US$13.00 for DMPA and US$13.50 for COCs (Table 3).

Although the lower cost of Sino-implant (II) may reduce existing cost barriers, this does not address other obstacles to widespread uptake of implants including controversy around access to removal and concerns about disruptions to normal bleeding patterns. In the past, some groups have raised concerns over appropriate access to implant removal. In 1991 in Bangladesh, controversy surrounding Norplant introduction erupted in response to reports that women were denied immediate access to removal [16]. Donors and the Bangladesh government responded by conducting a study of the quality of Norplant services and access to removal. Only half the women in the study (of those who requested removal) had their implant removed at their first request. In comparison with findings from the 1991 Bangladesh study, less than 3% of participants in the Kenya assessment experienced problems with access to removal. However, given the importance of this concern, continued attention and monitoring are merited. Ensuring

[10] This figure is computed by adding together the commodity cost (US $8), the cost of supplies (US$1.24) and the cost of labor for insertion (30 min at US$0.097 per minute=US$2.91).

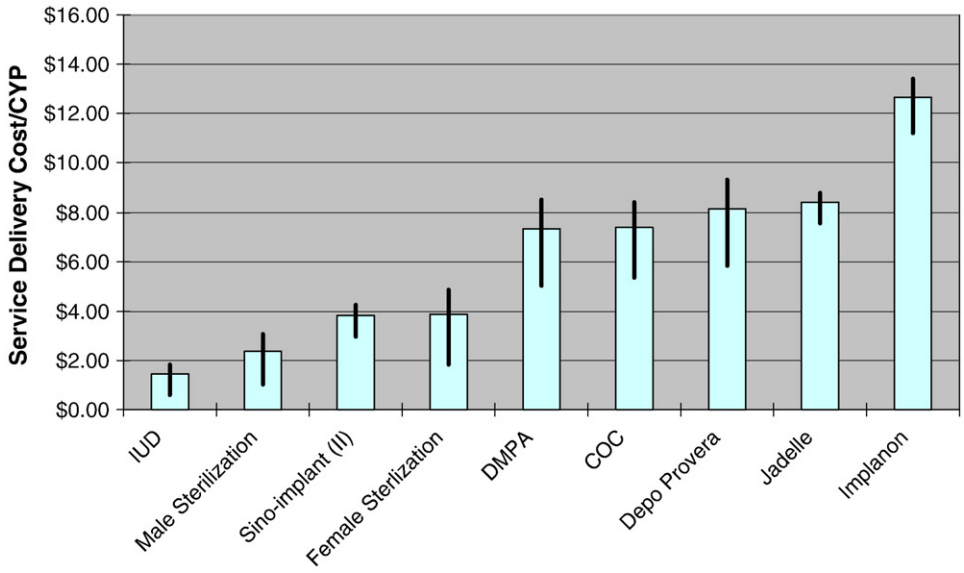

Fig. 1. Service delivery costs per CYP of selected family planning methods. For each method, the direct service delivery cost per CYP (not including facility overhead or demand creation activities) is calculated across USAID's 13 tier one family planning/reproductive health priority countries. The height of each bar shows the average value of the direct service delivery cost per CYP across the 13 USAID priority countries, while the height of the line represents the range of costs across these same countries. Data used to determine service delivery costs came from RH Interchange (http://rhi.rhsupplies.org/rhi/index.do?locale=en_US) and UNFPA's RH costing model (http://www.k4health.org/sites/default/files/Reproductive%20health%20NA%20model.pdf).

that providers are adequately sensitized to this topic and advocating for reduced fees for removal in the private non-for-profit sector may be necessary steps towards ensuring successful introduction of a low-cost implant.

Changes in women's menstrual patterns are a major cause of early termination of all hormonal methods [17]. While a third of women in the study did not like the changes in their bleeding patterns, it was not enough to deter them from continued use. According to a recent study, while implants are known to produce menstrual changes, these changes do not appear to deviate from normal patterns as much as the changes from DMPA [17]. Approximately half (50%) of implant users in this study had previously used DMPA.

Table 3
Average direct service delivery cost of provision of various methods assuming 2 years of use; at 2 years of use, direct costs of Sino implant are comparable to DMPA and COCs over the same period of time

Country	IUD (US$)	Sino-implant (II) (US$)	DMPA (US$)	COC (US$)	Jadelle (US$)	Implanon (US$)
Democratic Republic of Congo	5.73	14.07	13.87	14.31	30.07	26.07
Ethiopia	5.73	14.07	13.87	14.31	30.07	26.07
Haiti	2.11	10.45	9.53	10.33	26.45	22.45
India (UP)	3.92	12.26	11.71	12.32	28.26	24.26
Kenya	5.73	14.07	13.87	14.31	30.07	26.07
Madagascar	3.52	11.86	11.23	11.88	27.86	23.86
Malawi	5.73	14.07	13.87	14.31	30.07	26.07
Nigeria	3.52	11.86	11.23	11.88	27.86	23.86
Pakistan	6.48	14.82	14.78	15.14	30.82	26.82
Rwanda	5.73	14.07	13.87	14.31	30.07	26.07
Tanzania	5.73	14.07	13.87	14.31	30.07	26.07
Uganda	5.73	14.07	13.87	14.31	30.07	26.07
Zambia	5.73	14.07	13.87	14.31	30.07	26.07
Mean	5.03	13.37	13.03	13.54	29.37	25.37

4.2. Limitations

The primary limitations of this study are the use of convenience sampling and restriction to one country. In addition, all participating not-for-profit clinics in our study were affiliates of International Planned Parenthood Federation and therefore results on prices paid at these facilities may not be generalizable to other not-for-profit clinics within Kenya. Within the affiliates included in our study, the median price for insertion ranged from US$13 (Meru) to US $29 (Nairobi), according to client self-reports. We are unsure why there was such a wide range of prices within FHOK. It could be based on different cost structures of providing services across these different facilities. It might also be due to women's abilities to pay different amounts in different geographic locations. If prices were standardized across all locations, it is unclear what the effect these price changes would have on demand.

Another limitation is that it is possible that our results were biased by poor recall on the part of the implant clients, given that their interviews took place at least 6 months after insertion. However, while study participants may not have accurately recalled the price of their implant insertion and/or removal, it appears that their estimates are consistently lower than the median price facilities reported charging during the facility assessment. Therefore, any recall bias would result in conservative (lower) estimates of the price paid by implant clients.

Finally, while the results of this study indicate that the direct cost of Sino-implant (II) can be recovered in the private sector, our cost measure only includes direct service delivery costs which are the cost of the commodity, provider time and disposable equipment. Items not included in this figure are facility overhead and the cost of demand creation activities. With the inclusion of demand creation costs, the relative ranking of methods based on their cost per CYP may change. For example, costs associated with generating and sustaining client demand may be higher for IUDs and sterilization than for implants, but further research is needed in this area.

5. Conclusion

Approximately 40% of Kenya's implant clients are served in the private sector [11]. This study demonstrates that private sector implant clients in Kenya are currently paying a price for implant insertion that is greater than the direct cost of Sino-implant (II) insertion. In addition, as a result of the lower commodity cost of Sino-Implant (II), implants can now compete in terms of cost-effectiveness with shorter-term methods after just 2 years of use. A low-cost implant like Sino-implant (II) offers a unique opportunity to provide an affordable method in low resource settings and potentially diminish long-standing reliance on donor supplied implants. Clients can contribute to improving contraceptive security in places where they can bear some or all of the cost of family planning provision.

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Appendix A. Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.contraception.2010.06.016.

References

[1] Raymond EG. Contraceptive implants. In: Kowal D, editor. Contraceptive technology. New York: Ardent Media, Inc.; 2008. p. 145–156

[2] World Health Organization Department of Reproductive Health and Research (WHO/RHR) and Johns Hopkins Bloomberg School of Public Health/Center for Communication Programs (CCP), INFO Project. Family planning: a global handbook for providers. Baltimore and Geneva: CCP and WHO; 2008.

[3] Centers for Disease Control. U S. Medical Eligibility Criteria for Contraceptive Use. Adapted from the World Health Organization Medical Eligibility Criteria for Contraceptive Use, Appendix C, 4th edition, 2010. Available from: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr59e0528a4.htm.

[4] Ramchandran D, Upadhyay U. Implants: the next generation. In: Rinehart W, editor. Population Reports, Series K. Baltimore: INFO Project. Baltimore: Johns Hopkins Bloomberg School of Public Health; 2007. p. 1–20

[5] Janowitz B, Kanchanasinith K, Auamkul N, Amornwichet P, Soonthorndhada K, Hanenberg R. Introducing the contraceptive implant in Thailand: impact on method use and costs. Internat Fam Plann Perspec 1994;20:131–6.

[6] Hubacher D, Kimani J, Steiner MJ, Solomon M, Ndugga MB. Contraceptive implants in Kenya: current status and future prospects. Contraception 2007;75:468–73.

[7] Reproductive health supplies coalition. RH Interchange. The RH Interchange is a free, web-based tool that provides accurate information on past, present, and future supply orders for over 144 countries, 2010. Available from: http://rhi.rhsupplies.org/rhi/index.do?locale=en_US.

[8] Steiner MJ, Lopez LM, Grimes DA, et al. Sino-implant (II)—a levonorgestrel-releasing two-rod implant: systematic review of the randomized controlled trials. Contraception 2010;81:197–201.

[9] Steiner MJ, Boler T, Obhai G, Hubacher D. Assessment of a disposable trocar for insertion of contraceptive implants. Contraception 2010;81:140–2.

[10] Foreit JR, Foreit KGF. Willingness to pay surveys for setting prices for reproductive health products and services: a user's manual. Washington, DC: The Population Council; 2004. Available from: http://www.popcouncil.org/pdfs/frontiers/Capacity_Bldg/WTP_Manual.pdf.

[11] Central Bureau of Statistics (CBS). Kenya demographic and health survey. Calverton, MD: Macro International, Inc.; 2003, p. 2004.

[12] Janowitz B, Bratt J, Rademacher K, Steiner M. Are contraceptive implants finally affordable to programs? Oral presentation at the International Conference on Family Planning, Kampala, Uganda; 2009.

[13] Bertrand JT, Escudero G. Compendium of indicators for evaluating reproductive health programs, Volumes 1 & 2. In Measure Evaluation Manual Series, 2002. Available from: http://www.cpc.unc.edu/measure/publications/html/ms-02-06.html.

[14] Weissman E. Reproductive health needs assessment model: user guide. UN Millenium Project, 2005. Available from: http://www.unmillenniumproject.org/documents/UserGuide-MaternalHealth.pdf.

[15] Caucus on New and Underused Reproductive Health Technologies. Reproductive Health Supplies Coaltion: contraceptive implants; 2009 [Technical Brief]. Available from: http://www.rhsupplies.org/working-groups/caucus-on-newunderused-rh-technologies.html, http://www.path.org/files/RH_caucus_new_underused_implant_br.pdf.

[16] Hardee K, Balogh S, Villinski MT. Three countries' experience with Norplant introduction. Health Policy Plan 1997;12:199–213.

[17] Hubacher D, Lopez L, Steiner MJ, Dorflinger L. Menstrual pattern changes from levonorgestrel subdermal implants and DMPA: systematic review and evidence- based comparisons. Contraception 2009;80:113–8.