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Title: Desire for female sterilization among women wishing to limit births in rural Rakai, Uganda

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Abstract

Objective: Uganda has an unmet need for family planning of 34% and a total fertility rate of 6.2. We assessed the desire for female sterilization among sexually active women who wanted to stop childbearing in rural Rakai district, Uganda.

Study design: 7,192 sexually active women enrolled in a community cohort between 2002 and 2008 were asked about fertility intentions. Those stating that they did not want another child (limiters) were asked whether they would be willing to accept female sterilization, if available. Trends in desire for sterilization were determined by Chi-square test for trend, and Modified Poisson regression was used to estimate prevalence rate ratios (PRR) and 95% confidence intervals of the associations between desire for sterilization and socio-demographic characteristics and HIV status.

Results: From 2002 to 2008, the proportion of limiters dropped (47.2% to 43.7%; $p<0.01$). Use of pills and injectables among limiters significantly increased, 38.9% to 50.3% ($p<0.0001$), while use of IUDs and implants declined from 3.3% to 1.7% ($p<0.001$). The desire for sterilization significantly increased from 54.2% to 63.1% ($p<0.0001$), and this was consistently higher among the HIV-positive (63.6% to 70.9%, $p<0.01$) than HIV-negative women (53.3% to 61.2%, $p<0.0001$). Factors significantly associated with the desire for sterilization included higher number of living children (≥ 3), being HIV-infected and having received HIV counseling and testing.

Conclusion: There is latent and growing desire for sterilization in this population. Our findings suggest a need to increase permanent contraception services for women who want to limit childbearing in this setting.

Key words: female sterilization, permanent contraception, limiting births, HIV, women, Uganda

Implications

A large unmet need for permanent female contraception services exists in Uganda. Efforts to increase the method mix by increasing permanent contraception services could reduce fertility rates and undesired births.

1.0 Introduction

Uganda has one of the highest population growth rates, at 3.3%, with a mid-2012 population of 35.6 million [1]. The total fertility rate (TFR) remains high at 6.2 and 44% of pregnancies are unintended [2].

Currently, the most commonly used modern contraceptives are oral contraceptives and injectables [2]. Although these short-term methods can be highly effective, incorrect and inconsistent use or discontinuation is common, leading to unintended pregnancies [3]. Long-acting reversible contraception (LARC, e.g., intrauterine devices and implants) and permanent methods (female and male sterilization) are less vulnerable to user error and discontinuation, and

are thus much more effective [4]. Despite these advantages, use of permanent contraception remains infrequent in Uganda, because of limited knowledge, access and perceived cost barriers [5]. However, advocacy and proper planning can help mitigate these challenges. A review of female sterilization in Kenya revealed that 96% chose sterilization for socio-economic reasons [6]. The majority of clients (97%-99%) reported satisfaction with sterilization and 96-99% stated that they would recommend the method to others. The review found that female sterilization was safe, simple and effective and a well accepted option for most Kenyan couples seeking permanent contraception.

Uganda is also burdened by HIV and some studies suggest that HIV-positive women have lower fertility intentions than their HIV-negative counterparts [7], but almost a quarter of HIV-positive women report unwanted pregnancies [8]. Use of reliable contraception could prevent unwanted pregnancy and mother-to-child HIV transmission.

There is a need to investigate whether Ugandan women reporting a desire to limit childbearing would be willing to use permanent methods, if made available.

We investigated the desire for childbearing, use of modern contraception and the desire for female sterilization among sexually active, non-pregnant women of reproductive age (15-49 years) enrolled in an open cohort in Rakai District, southwestern Uganda, with a high TFR of 5.6 [2] and an HIV prevalence rate of 12.5% among the women [9].

2.0 Methods

Since 1994, the Rakai Health Sciences Program has conducted an open community-based cohort, the Rakai Community Cohort Study (RCCS), which enrolls consenting residents aged 15-49

years in 50 communities in Rakai District, Uganda. The design and conduct of the RCCS have been described elsewhere [10, 11].

Each RCCS participant receives a unique, life-long identification number used to link data over time. RCCS written informed consent covers study participation, sample collection and testing. The RCCS survey, conducted after a census, includes all consenting residents (n ~12,000 per year). Experienced same-sex interviewers, fluent in Luganda, the local language, have been trained to ensure participant privacy and confidentiality and use structured questionnaires to collect detailed socio-demographic characteristics, risk behaviors, fertility intention and contraceptive use, health and care-seeking information. Blood samples are collected for HIV detection and confirmation.

Using four surveys between 2002 and 2008 (survey rounds 9 to 12, 2002/03, 2003/04, 2005/06 and 2006/08, respectively), we examined time trends in modern contraceptive use, fertility intentions and desire for female sterilization and associated factors.

2.1 Ethical approval

The RCCS and its procedures were approved by the Uganda Virus Research Institute's Science and Ethics Committee, the National Council for Science and Technology (Uganda) and the Institutional Review Boards (IRBs) at Johns Hopkins and Columbia Universities. This analysis was approved by the Makerere University School of Public Health IRB.

2.2 Definitions of variables

Women who reported a desire for no further childbearing were defined as limiters, and those who were not pregnant or menopausal were asked whether they would be willing to accept female sterilization if the service was made available. We categorized modern contraception as short-acting (oral contraceptives, injectables, condoms, spermicides), long-acting (IUD,

implants) and permanent contraception (female sterilization). For classification of socioeconomic status (SES), we used a household wealth index, based on the building materials of the respondent's home [7].

2.3 Statistical analysis

For this analysis we included non-pregnant, non-menopausal women aged 15-49 years, who had previously been pregnant and who were sexually active in the 12 months preceding the interview. We first assessed the use of modern contraception, desire to limit childbearing and, among limiters, the desire for female sterilization after excluding those already sterilized.

Associations were assessed using Chi square tests and Chi square test for trends in proportions over time after adjusting for other factors. We used 'modified' Poisson regression models to estimate prevalence rate ratios (PRR) and 95% confidence intervals (95% CI) of the desire for female sterilization with robust variance estimation to adjust for correlation of repeated observations across the survey rounds. The covariates included in the regression models were significant in bivariate analyses at $p < 0.2$ or identified in the literature. Statistical analyses used STATA software version 12 (College Station, Texas, USA).

3.0 Results

A total of 7,192 women were included in this analysis and provided 15,237 person observations from 2002-2008. There were 555 (7.7%) women first included in the analysis when aged 15-19 years, 3974 (55.3%) first included when aged 20-29 years, 1894 (26.3%) were aged 30-39 years and 769 (10.7%) were aged 40-49 years. Among those aged 15-19 years, 201 (36.2%) were included in the analysis only once, 108 (19.5%) were included in all four survey rounds while 246 (44.3%) were included in two or three survey rounds. Similarly, the majority of the other

women first included when aged above 19 years contributed data for this analysis in more than one survey round (tables not shown).

The distribution of selected socio-demographic and behavioral characteristics of limiters and non-limiters at each of the survey rounds is shown in Table 1. Over the period of study, there were significant differences ($p<0.05$) between limiters and non-limiters in age, marital status, education, number of living children and HIV status. Compared to non-limiters, limiters were most likely to be older, divorced/separated or widowed, with no education or having not attended post-primary education, had more living children or were HIV positive. HIV prevalence increased over time largely because of improved survival after the introduction of antiretroviral therapy (ART) in 2004.

Table 2 shows the use of modern contraception overall and separately amongst limiters and non-limiters. Among all women, there was a significant increase over time in the use of the pill/injectables (35.3% to 44.2%, $p<0.0001$), and a small but significant decrease in the use of implants/IUDs (2.4% to 1.4%, $p<0.001$). The use of female sterilization was consistently at 0.1% over the study period. Overall, the proportion of women desiring to limit childbearing decreased from 47.2% to 43.7% ($p<0.01$). Among women who wished to limit childbearing, there was a significant increase in the use of pills or injectables (38.9% to 50.3%; $p<0.0001$), but a significant decline in the use of IUDs or implants (3.3% to 1.7%; $p<0.001$). The use of female sterilization among limiters remained stable at 0.1-0.2%. These trends were similar among HIV-positive and HIV-negative limiters (tables not shown): Among HIV-positive limiters, the use of the pill/injection increased from 47.8% to 69.1% ($p<0.0001$) while use of implants/IUDs declined from 4.0% to 1.7% ($p<0.05$). Among HIV-negative limiters, the use of the pill/injection

significantly increased from 46.5% to 50.5% ($p < 0.01$) and the use of implants/IUDs declined from 4.1% to 2.0% ($p < 0.01$).

3.1 Desire for female sterilization amongst limiters and their use of modern contraception

As shown in Table 3 there was a significant increase in the proportions of limiters with a desire for female sterilization from 54.2% to 63.1% ($p < 0.0001$, after adjusting for number of living children and age). Among those with a desire for female sterilization, there was more use of the pill/injections compared to use of IUD/Implants. The proportion using pill/injections increased from 44.3% to 55.5% while use of Implants/IUDs declined from 3.6% to 2.0%.

The significant increase in the desire for female sterilization was observed among both HIV-positive and HIV-negative limiters (Table 4). The proportion with a desire for female sterilization was consistently and significantly higher among the HIV-positive limiters (63.6%-70.9%, $p < 0.01$) compared to HIV-negative limiters (53.3%-51.7%, $p < 0.0001$) at all survey rounds.

3.2 Factors associated with a desire for female sterilization

The modified Poisson regression analyses are summarized in Table 5. Factors significantly associated with a desire for female sterilization included higher number of living children (≥ 3), being HIV-positive and having ever received HIV results, whereas desire for female sterilization was lower among older women (40-49 years), those with Saved/Pentecostal or Muslim religious affiliation, previously married women and those who did not know their HIV results.

4.0 Discussion

We assessed contraceptive use and desire for female sterilization over time among women who wanted to limit childbearing. Very few studies have assessed the desire for permanent contraceptive methods in rural Uganda. Similar to national data [2], use of female sterilization was low. The 2011 Uganda Demographic and Health Survey (UDHS) reported that only 26% of married women used modern family planning methods, and 34.3% had an unmet need for family planning, with 21% having an unmet need for spacing births and 14% for limiting childbearing [2]. While Uganda's TFR has declined from 7.3 children in 1989 to 6.2 in 2011 this remains high compared to the ideal number of 4.8 children reported by Ugandan married women [2, 12-14]. Most family planning promotional messages in Uganda stress spacing rather than limiting childbearing [5]. This might contribute to the increase in use of short-acting methods like injectables (from 6.4% in 2000-01 to 14.1% in 2011), compared to the modest increases in the use of implants and IUDs, which increased from 0.4% in 1995 to 3.2% in 2011. Female sterilization increased from 1.5% in 1995 to 2.9% in 2011 while male sterilization has consistently been below 1% [2, 12-14].

However, we found high and increasing desire for female sterilization among the limiters in this rural setting. This suggests a need for providers to add sterilization services to the current method mix to meet women's reproductive needs [15]. Limiting births has a greater impact on fertility rates than spacing and is a major factor driving the fertility transition [16]. There could be net benefits to women and society by averting unintended pregnancies [17]. This is especially important for HIV-infected women, to prevent mother-to-child HIV transmission, and HIV-infected women were more willing to accept sterilization than uninfected women. We found that the desire for female sterilization was higher among those who had received their HIV results, and contraceptive counselling of these women should emphasize information on permanent and long-acting methods.

It has been noted that the demand for sterilization exists in Africa, but services are inadequate [18]. In Uganda, use of sterilization remains infrequent because of limited availability, limited knowledge and perceived cost barriers by program managers [5]. In Malawi, despite severe resource constraints, female sterilization was widely provided, and is now the second most commonly used modern family planning method [19]. Marie Stopes International, which provides access to long-acting and reversible contraception and sterilization showed that these methods can be safely provided by clinical officers [20]. In response to the observed high proportion of limiters willing to be sterilized in our study, such training programs (task shifting) should be actively supported and promoted by the government and program managers. In Zimbabwe, one study comparing user satisfaction among women using either implants or sterilization, found that women were equally satisfied and would recommend their chosen method to a friend or relative [21]. Service providers should endeavor to meet the demand for permanent contraception by providing quality information and education, creating sites where high-quality sterilization services are readily available and are responsive to clients' needs.

There are limitations to this study. Desire for female sterilization was only asked during the four survey rounds from 2002 to 2008, thus limiting the analysis to this period. The self-reported data on contraceptive use, fertility intentions and desire for female sterilization are subject to recall and social desirability biases. The results may also not be generalizable to other areas in Uganda. Nevertheless, the findings suggest a potentially important role for female sterilization among women wishing to limit childbearing in Uganda.

There is a need to promote a method mix, including permanent methods to allow for an informed choice appropriate to a woman's requirements. In Uganda, there is a shortage of trained health providers who can offer permanent methods, especially in rural areas, although the government

plans to train midlevel health practitioners [22]. Our findings indicate the need for such training programs to provide quality sterilization services and for program managers to respond to this latent demand for sterilization.

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Table 1: Socio-demographic and behavioral characteristics of limiters and non-limiters in the Rakai Cohort, 2002-2008

Characteristic	Round 9 (2002/03)		Round 10 (2003/04)		Round 11 (2005/06)		Round 12 (2006/08)	
	Limiters	Non-limiters	Limiters	Non-limiters	Limiters	Non-limiters	Limiters	Non-limiters
N	1702	1902	1709	1947	1788	2081	1794	2314
Residence								
Rural	81.6	82.2	81.1	81.7	80.7	82.8	80.5	80.5
Urban	18.4	17.8	18.9	18.3	19.4	17.2	19.5	19.5
Age Years								
15-19	0.8	11.1*	1.1	8.3*	0.2	6.5*	0.1	4.3*
20-29	32.3	70.1	29.6	70.6	26.5	69.2	22.0	64.7
30-39	42.1	16.9	41.9	19.3	45.6	22.2	48.7	27.4
40-49	24.6	1.8	27.4	1.9	27.7	2.2	29.2	3.6
Marital Status								
Married	76.9	84.7*	74.0	85.0*	75.6	83.8*	77.3	83.4*
Never married	5.4	9.6	7.6	9.3	5.3	9.0	4.2	9.6
Div/Sep/Widowed	17.8	5.8	18.4	5.8	19.1	7.2	18.5	7.1
Education								
No education	10.9	6.4*	9.3	6.0*	9.5	6.3*	9.7	5.2*
Some primary	68.3	65.1	68.2	63.9	67.2	61.8	67.9	59.3
Post primary	20.8	28.5	22.5	30.1	23.3	31.8	22.4	35.5
Number of living children								
None	0.8	3.1*	0.9	2.9*	0.6	3.3*	0.8	4.2*
1-2	15.9	49.7	15.0	47.9	14.2	46.4	12.1	45.6
3-5	43.9	41.0	43.8	43.0	44.4	43.6	45.0	42.3
6+	39.5	6.2	40.3	40.3	40.9	40.9	42.0	42.0

			6.2	6.7	7.9
HIV Status					
Positive	14.9	6.8*	14.8 6.6*	16.1 9.1*	20.2 9.0*
Negative	61.6	73.9	70.0 79.6	75.8 84.5	77.9 88.9
Unknown	23.5	19.2	15.2 13.8	8.1 6.4	2.0 2.1
Household wealth index					
Low	39.1	37.0	38.9 35.5	36.8 34.8	35.0 29.7*
Middle	27.7	30.3	28.5 28.5	29.1 28.3	30.0 29.0
High	33.3	32.7	32.6 36.0	34.1 36.9	35.1 41.2

* difference between limiters and non limiters significant at $p < 0.001$

Table 2: Use of modern contraception among Limiters and Non Limiters, 2002-2008

Survey Round	Number of women n (col %)	Proportion using pill or injectables	Proportion using IUD/implants	Proportion using female sterilization	Overall use of modern contraception
9 (2002/03)	3604 (100)	35.3	2.4	0.1	37.5
Overall	1702 (47.2)	38.9	3.3	0.1	41.8
Limiters	1902 (52.8)	32.0	1.7	0.0	33.7
Non-limiters					
10 (2003/04)	3656 (100)	38.5	2.1	0.1	40.5
	1709 (46.8)	39.8	3.0	0.1	42.5
Overall	1947 (53.2)	37.3	1.3	0.1	38.6
Limiters					
Non-limiters	3869 (100)	38.2	1.7	0.1	40.0
11 (2004/05)	1788 (46.2)	43.4	2.1	0.2	45.6
	2081 (53.8)	33.7	1.4	0.0	35.1
Overall					
Limiters	4108 (100)	44.2	1.4	0.1	45.6
Non-limiters	1794 (43.7)	50.3	1.7	0.2	52.0
12 (2006/08)	2314 (56.3)	39.5	1.1	0.0	40.6
Overall					
Limiters					
Non-limiters					

Table 3 Desire for female sterilization* among limiters and their use of modern contraceptives

Survey Round	Total # of limiters	Number and proportion of limiters with a desire for female sterilization n (%)	Proportion using pill/injectables among those with a desire for female sterilization	Proportion using IUD/implants among those with a desire for female sterilization
9 (2002/03)	1700	922 (54.2)	44.3	3.6
10 (2003/04)	1705	958 (56.2)	45.4	3.7
11 (2004/05)	1784	1063 (59.6)	47.5	2.0
12 (2006/08)	1788	1128 (63.1)	55.5	2.0

*excluded those already sterilized and those with missing information on desire for female sterilization

Table 4: Desire for female sterilization amongst limiters by HIV status

Survey Round	HIV-positive Limiters: Number and proportion desiring female sterilization n (%)	HIV-negative Limiters: Number and proportion desiring female sterilization n (%)	HIV status Unknown Limiters: Number and proportion desiring female sterilization n (%)
9 (2002/03)	253 (63.6)	1048 (53.3)	399 (50.6)
10 (2003/04)	253 (60.5)	1192 (56.5)	260 (50.8)
11 (2004/05)	286 (70.3)	1353 (58.2)	145 (51.7)
12 (2006/08)	361 (70.9)	1392 (51.7)	35 (57.1)

Table 5: Unadjusted and adjusted Prevalence Rate Ratios of desire for female sterilization among limiters

Age group	Desire for female sterilization					
	Unadj. PRR	95% CI		Adj. PRR	95% CI	
15-19	1			1		
20-29	1.23	0.90	1.68	0.98	0.71	1.35
30-39	1.25	0.91	1.71	0.91	0.65	1.26
40-49	0.86	0.63	1.19	0.62	0.44	0.86
Education						
None	1			1		
Some primary	1.09	1.00	1.20	1.04	0.96	1.14
Post primary	0.99	0.89	1.09	0.95	0.86	1.05
Household wealth index						
Low	1			1		
Medium	1.06	0.99	1.13	1.02	0.95	1.14
High	1.07	1.01	1.14	1.04	0.98	1.11
Religion						
Catholic	1			1		
Protestant	1.02	0.97	1.09	1.03	0.97	1.09
Saved/Pentecostal	0.67	0.51	0.88	0.70	0.54	0.92
Muslim	0.89	0.82	0.96	0.89	0.82	0.95
None/Other	0.92	0.70	1.21	0.94	0.72	1.24
Residence						
Rural	1			1		
Peri-urban	0.98	0.93	1.05	1.01	0.95	1.08
Number of living children						
None	1			1		
1-2	1.73	1.03	2.92	1.54	0.93	2.55
3-5	2.15	1.28	3.60	1.93	1.17	3.19
6+	2.08	1.24	3.48	2.13	1.28	3.52
Marital status						
Married	1			1		
Not married	0.88	0.78	0.98	0.94	0.84	1.06
Div/Sep/Widowed	0.92	0.86	0.98	0.93	0.87	0.99
HIV Status						
Negative	1			1		
Positive	1.16	1.10	1.23	1.17	1.11	1.24

Unknown	0.89	0.82	0.96	0.91	0.84	0.98
Ever received HIV results						
No	1			1		
Yes	1.12	1.08	1.16	1.10	1.06	1.15