

Menstrual pattern, sexual behaviors and contraceptive use among postpartum women in Nairobi slums

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Abstract

Introduction:

Postpartum months provide a challenging period for poor women with less access to contraceptives. Short birth intervals and unwanted pregnancies present increased low survival chances for the born baby and have worse health outcomes for both the expected child and mother.

Methods:

Women who gave birth during the period 2006 to 2008 in Nairobi urban slum communities were recruited and interviewed on matters of reproductive and child health. A monthly calendar type questionnaire was administered retrospectively to cover the period since birth to the interview date and data on sexual behaviour, menstrual resumption, breastfeeding patterns, and contraception was collected. These data were combined and used to assess patterns of contraceptive use, sexual behaviour and menstrual resumption during the postpartum period. Descriptive statistics and survival analysis techniques are used for the analysis.

Results:

Sexual resumption seems to occur earlier than menses and postpartum contraceptive resumption among women in informal settlements. However, menses resumption acts as a trigger for initiating postpartum contraceptive use with a heightened peak of first contraceptive use occurring shortly after the first time menses have appeared. Minimal differences in contraceptive method choice were observed between women who are early adopters than late adopters in respect of menstrual resumption. Only a few mothers tend to use condoms, a method that provides for dual protection against sexually transmitted infections and pregnancy. Out of all postpartum months where women were exposed to the risk of another pregnancy, about 28% were months where no contraceptive method was used.

Conclusions:

Postpartum poor women need increased access to family planning and reproductive health services in order to reduce the numbers of unwanted births, abortions and increase the length of subsequent birth intervals. Postnatal visits and other subsequent health system contacts are promising opportunities for serving postpartum women with a desire to use family planning services.

BACKGROUND

Maternal health remains a major global concern since pregnancy and childbirth are the leading causes of death, disease and disability among women 15-45 years of age (WHO 2005). Research on causes of adverse maternal health outcomes such as premature births, low birth weight, perinatal mortality, foetal loss, and maternal mortality, etc supports the evidence that many of these outcomes could be avoided by encouraging early antenatal care visits, delivering in health facilities, seeking postnatal care, and adopting appropriate family planning methods during the postpartum period (Conde-Agudelo and Belizan 2000; Magadi et al. 2004; Magadi et al. 2001). One of the few strategies to ensure safe motherhood is to prevent unwanted pregnancies, encourage longer birth intervals and address issues of unsafe abortion by providing access to contraception (Clinton 1997; Conde-Agudelo et al. 2007; WHO 2005).

Women are classified as having an unmet need for either limiting or spacing if they are not using any contraception and yet express the desire to either cease further childbearing or want to postpone the next birth for at least two more years, respectively (Westoff 1994). The total demand for family planning is the sum of those women with an unmet need and those who are currently using a method of contraception. Levels of unmet need are highest in the developing world with an estimated 105-122 million married women having an unmet need annually (Ross and Winfrey 2002). Other studies have shown that in developing countries, within a one year period following delivery, about two-thirds of women have an unmet need for family planning (Casterline and Sinding 2000; Ketting 1994). The unique feature of unmet need in sub-Saharan Africa is the fact that a large proportion of the contraception demand is for birth spacing and less likely for birth limiting (Ross and Winfrey 2001; Westoff 1988; Westoff 2006). Disaggregation of the total unmet need shows that the levels of unmet need are highest among women who are poor, live in rural areas and those with poor educational backgrounds (Ashford 2003; Westoff 2006). In addition, the bulk of unmet need falls within the first year of the postpartum period (Casterline and Sinding 2000; Ross and Winfrey 2001). In a study of unmet need in 27 countries, Ross and Winfrey (2001) showed that the distribution of all unmet need during the postpartum period ranged from 37 - 41% in the first year after birth, to 20–27% in the second year and 32–41% in later years (Ross and Winfrey 2001).

In Sub-Saharan Africa, the proportion of women who are exposed to the risk of pregnancy by having sex while using no contraceptive method within two years after childbirth is nearly one-third (Clements and Madise 2004; Magadi et al. 2003; Ronsmans 1996). Understanding and addressing unmet need for family planning in the postpartum period is very crucial for child survival as well as maternal health. Various studies have shown that there are heightened odds of unfavorable birth outcomes for higher order births than lower order especially when the period between births is less than 2 years (Conde-Agudelo and Belizan 2000; Conde-Agudelo et al. 2006; Hill et al. 2007; Magadi et al. 2001; Rafalimanana and Westoff 2000). Apart from enormous health benefits both to the mother and child, research has demonstrated an inverse relationship between birth spacing and the infant mortality risk (Rutstein 2005). Similarly, higher risks for maternal mortality have been observed for women with shorter birth intervals versus women with longer inter-pregnancy intervals (Conde-Agudelo and Belizan 2000). It is such statistics that form the backbone of the maternal health Millennium Development Goal (MDG) 5 that aims to reduce maternal deaths and provide universal access to sexual and reproductive health services by 2015 (Konotey-Ahulu 2008; Shankar et al. 2008). Since majority of the women with an unmet need are women who gave birth recently, efforts to improve infant, maternal and child health outcomes should focus on addressing contraceptive use needs during the postpartum period.

Historically, postpartum women in the developing world have for long relied on traditional birth spacing methods involving lactational amenorrhea and postpartum sexual abstinence (Cleland et al. 1999; Kirk and Pillet 1998; Van Balen and Ntabomvura 1976; Zulu 2001). This mechanism of fertility regulation was culturally controlled and regulated in some societies until the introduction of modern contraceptive methods (Desgrees-du-Lou and Brou 2005). There are huge ethnic and regional differences in the duration of postpartum sexual abstinence (see, for example, Zulu 2001). In some West African countries, long durations of postpartum sexual abstinence are still being reported with durations of about 12.5 months in Burkina Faso and 8.8 months in Ghana in 2003 (BFDHS 2004; GDHS 2004). In contrast, shorter periods are reported in most of Eastern and Southern Africa; for example, durations of 2.5 and 2.9 were recorded in Uganda and Kenya in 2006 and 2003, respectively (KDHS 2003; UDHS 2006). Similar differences can be observed in median durations of breastfeeding (Desgrees-du-Lou and Brou 2005; Ravera et al. 1995).

The effect of the introduction of modern contraceptives, cultural transformations and increasing urbanization in the developing world is partly responsible for the reduced role of traditional birth spacing mechanisms such as postpartum sexual abstinence and long breastfeeding durations (Cleland et al. 1999; Desgrees-du-Lou and Brou 2005). For instance, in a study that examined the effect of social transformations on the length of abstinence in Cote d'Ivoire, Ghana, and Cameroon, Benefo showed that modernization and social change negatively affected the duration of postpartum sexual abstinence (Benefo 1995). The urban population of developing countries is projected to grow at an average annual rate of 2.4%, twice the annual population growth rate of 1.2% in the developing world (UN-HABITAT 2008). Because of this rapid population growth, rising poverty levels, weak policy frameworks and inadequate public institutions, city and town authorities in developing countries face an enormous challenge to provide adequate shelter, basic services including access to safe water, sanitation, education and health services, employment opportunities and ensure food security to their inhabitants.

Indeed, in many African countries, increasing rates of urbanization amidst declining economies have been documented (UN-HABITAT 2008). Kenya presents a typical example of the effects of rising urbanization as reflected in the many informal settlements that house over 50% of the Nairobi city population (APHRC 2002b; UN-HABITAT 2008). Informal settlements that are often characterized by congestion, crime, poor hygiene, poverty, etc., present many public health challenges. For instance, women in the slum communities initiate sexual activities earlier than their counterparts living in other urban areas in the city as well as those in the rural communities (APHRC 2002b; Dodoo et al. 2007; Zulu et al. 2002). Research on maternal health behavior shows that majority of the women in informal settlements give birth without the assistance of a trained health worker (APHRC 2002b; Fotso et al. 2009). Livelihoods are fragile in the slum settings, as evidenced in data showing that only about one in ten of all women in slums are employed in salaried employment, yet over 80% of the residents in the slum setting live below the poverty line (APHRC 2002a).

Urbanization that is associated with high levels of poverty has also been linked to food security with the underlying fear that in many developing countries a shift in the locus of poverty, food insecurity, and malnutrition from rural to urban areas is likely (Atkinson 1993; UN-HABITAT 2003). Nutrition has been documented to play a significant role in fertility regulation

through its role on timing of menstrual resumption (Black et al. 2008). Women and children in slums show evidence of poor nutrition as a result of high levels of food insecurity as well as deterioration of nutritional statuses resulting from infections that are rampant in slums (APHRC 2002b; Haidar et al. 2003; Wray 1986). Pathways through which nutrition could affect postpartum amenorrhea include deficient nutrition that may affect a woman's reproductive system directly and cause a delay in the resumption of menses and indirectly through breastfeeding where a malnourished woman may produce less amounts of breast milk such that her child has to suckle more intensely to obtain adequate nutrition (Knodel 1978). In fact, some studies have shown that when breastfeeding is prolonged and intensive, the average postpartum amenorrhea period may last from one to two years (Diaz et al. 1988; Huffman et al. 1987).

Overall, the little available information on the health of the urban population shows large disparities in indicators such as child mortality, burden of disease, unmet need, contraception use and access to reproductive health services between better-off and poorer inhabitants (APHRC 2002b; Fotso et al. 2009). While urban areas may have numerous health facilities, there are disparities in access and provision of reproductive health services with the better off neighbors in wealthier parts of the cities having more access to these facilities than their counterparts from the lower socio-economic groups (Boerma et al. 2008; Magadi et al. 2003). Therefore it is important to look at the reproductive health needs of poor urban residents because future population growth will mostly depend on the reproductive health policies adopted in urban areas today. Understanding the menstrual patterns, sexual behaviors, and contraceptive use among post-partum women in general and those living in poor urban settlements in particular, has the potential to contribute to achieving the MDGs on maternal and child health. Indeed, the provision of family planning services in the postpartum period may contribute considerably to reducing maternal and child mortality or morbidity, as well as helping to avoid possible abortions (Desgrees-du-Lou and Brou 2005; Jakobsen et al. 2003; Ronsmans 1996). The objective of this study is to understand the menstrual patterns, resumption of sexual activities and contraception practice among postpartum women living in slum settlements in Nairobi city. The study aims to clarify the extent and nature of postpartum protection against pregnancy afforded by amenorrhea and sexual abstinence using rich longitudinal data collected from the two slum settlements in the city. Contraceptive use modalities are investigated particularly the timing of contraception in relation to resumption of

menses, whether timing influences method choice, and whether there are differences in rates of contraceptive continuation among early adopters versus late adopters. The use of longitudinal data allows us to control our analysis of contraceptive use and unmet need dynamics to exposure to sex and risk of pregnancy on a month to month basis, which is typically not possible using cross-sectional data.

DATA AND METHODS

The data used for this study come from the Maternal and Child Health (MCH) component of a 5-year Urbanization, Poverty and Health Dynamics longitudinal study carried out by the African Population and Health Research Center in two slum settlements namely Korogocho and Viwandani in Kenya's capital, Nairobi. This is an on-going open cohort, where women are recruited to the study and their reproductive behavior and patterns are recorded. Women were recruited into the study if they had a birth from September 2006 onwards and they were living in the Nairobi Urban Health and Demographic Surveillance area (DSA). The Nairobi Urban Health and Demographic Surveillance System (NUHDSS) is an ongoing longitudinal study conducted by the African Population and Health Research Centre in the Korogocho and Viwandani slum settlements of Nairobi with routine updates conducted every four months since 2002. The MCH study is nested onto the NUHDSS and routinely relies on previously collected socio-demographic data from all women resident in the study area.

The first baseline survey of the Maternal and Child Health component was conducted between February and April 2007 and since then several waves of data collection have been conducted, providing a total of 2,994 women by the end of August 2008 (Table 1). Specifically, women were asked questions regarding their marital status, timing of resumption of menstruation, timing of resumption of sex, pregnancy and contraceptive use during each follow-up visits. A questionnaire that captures cross-sectional type data as well as retrospective longitudinal data was designed and translated into Swahili, the commonly spoken national language in the Nairobi informal settlements. During every visit, trained fieldworkers recruit new mothers who form a new cohort and updates are conducted for those mothers previously recruited. In addition, details of reproductive events such as breastfeeding, postpartum abstinence, postpartum amenorrhea, sex, contraceptive use and condom use are documented in a month-to-month calendar format since

giving birth to the index child. For the current analysis, data from four cohorts of women collected between February 2007 to August 2008 are utilized (Table 1). The fieldwork duration for the third wave was relatively long because o data collection was disrupted by the presidential election campaigns that covered most of December 2007 and later resulted into post-election violence in the first few months of 2008. Because of this effect, the cohorts recruited in the later months of 2008 are relatively larger than those captured at baseline and wave 2.

Table 1. Number of women recruited / interviewed for the study during the period 2007 - 2008

		Baseline	Wave 2	Wave 3	Wave 4
		<i>Feb-Apr 07</i>	<i>Jul-Aug 07</i>	<i>Oct07-May08</i>	<i>May-Aug 08</i>
Cohort 1	N	617	490	312	233
Cohort 2	N		458	344	258
Cohort 3	N			948	691
Cohort 4	N				971

Using the calendar data, a working definition of a woman-month was adopted that was used to analyze the monthly postpartum experiences. A woman followed up for a one year period contributed 12 woman-months. This allowed us to measure exposure to pregnancy and contraceptive use on a month to month basis and was very useful in assessing the total shares of several event-states such as the total share of amenorrheric months from all women during the first 12 months of postpartum. In order to jointly assess the timing and interactions of menstrual and sexual resumption, the time since birth of the child was classified into ordinal months of mutually exclusive categories of protection and risk periods in relation to contraceptive use. For a specific woman-month, a woman was protected if she was amenorrheric and not having sexual intercourse or had resumed menses but was not sexually active. Months of low protection were defined as months when the woman was amenorrheric but reported having sexual relations since it is possible for a woman to fall pregnant during the first postpartum ovulation if she is sexually active. Months of exposure were defined as months when the woman was not amenorrheric and she was involved in sexual relations. A fifth group included months when women were pregnant after giving birth to the index child.

In analyzing the timing and adoption of contraception in relation to the timing of resumption of menses, women who had not experienced resumption of menses were excluded because the two

event time points were required for this analysis. Therefore, for women who began using contraception before their menses appeared, if the corresponding date for timing of their menses was unavailable, they were excluded.

Survival analysis techniques were used to assess the time-to-event (resumption of menstrual flow and resumption of sexual activities and time to first contraceptive use during postpartum period). Descriptive statistics were used to assess patterns of postpartum infecundity (amenorrhea), desire to have another child, use of contraception and having an unwanted pregnancy and to determine the effect of factors such as delivery facility, desire for more children, etc on the selected outcome variables. For some analysis such as the profiles of menstrual or sexual resumptions, the focus was on the experiences in the 12 months following the birth of the index child.

RESULTS

By August 2008, about 2994 women resulting from 4 cohorts had been interviewed (Table 1). One of the key features of carrying out longitudinal research in slum settlements is very high attrition rates due to migration. About 21% of the first cohort was lost to follow-up by the second wave. The corresponding figures for cohort two and three were 25% and 27 % respectively. The political instability that affected Kenya during the early months of 2008 is largely responsible for the relatively high attrition for the first and second cohort. Other reasons accounting for loss to follow-up include deaths of mothers and internal changes of residence that are not yet linked to their original identification numbers.

Information on selected demographic characteristics is summarized in Table 2. About 51% of all women in the study were resident in Korogocho, leaving about 49% who were resident in Viwandani. Majority of the women were aged between 20-30 years and about 8% were teenage mothers. Most women reported to have had at most a primary school level of education at the time of their recruitment into the study (70.9%). A considerable number of women reported to have been married or living with a partner at the time of the first wave (83.8%). The most common ethnicity was Kikuyu (26%), followed by Kamba, Luo and Luhya (Table 2). About 34% of the mothers reported to have given birth to one child and the corresponding figures for two, three and four or more births was 29% 16% and 21%, respectively.

For fertility desires, women who had not began sexual relations since giving birth were asked whether they would like to have another child or would prefer not to have any more children. Majority of the women (63%) indicated a desire to have more, while about 5% were undecided, leaving about 32% who expressed a desire not to have any more children (Table 2).

Table 2. Demographic characteristics of women recruited into the study from two slum settlements in Nairobi 2007-2008

Variable	Characteristics	Cohort 1	Cohort 2	Cohort 3	Cohort 4	Total
		%	%	%	%	%
Slum location	<i>Korogocho</i>	58.2	58.3	47.6	46.7	51.1
	<i>Viwandani</i>	41.8	41.7	52.4	53.4	48.9
Age at recruitment*	<i>11-15</i>	0.2	0.9	0.8	0.3	0.5
	<i>15-19</i>	8.9	8.4	6.9	7.5	7.8
	<i>20-25</i>	45.7	47.4	43.4	44.8	45.1
	<i>26-30</i>	27.1	23.1	29.4	28.2	27.4
	<i>31-40</i>	16.6	18.0	17.0	18.0	17.4
	<i>40-52</i>	1.6	2.1	2.5	1.1	1.8
Marital status	<i>Currently Married</i>	71.5	76.4	80.3	82.5	78.6
	<i>Cohabiting</i>	11.4	9.4	2.7	1.8	5.2
	<i>Separated/divorced/widowed</i>	7.0	5.5	7.2	5.4	6.3
	<i>Never married</i>	10.2	8.7	9.8	10.4	9.9
Education levels*	<i>None</i>	3.4	6.3	4.3	3.5	4.2
	<i>Primary</i>	72.5	70.7	70.6	70.2	70.9
	<i>Secondary+</i>	23.1	22.1	24.8	26.0	24.2
	<i>Missing</i>	1.1	1.0	0.4	0.3	0.6
Ethnicity*	<i>Kikuyu</i>	29.8	24.5	25.9	24.0	26.1
	<i>Luhya</i>	18.3	16.6	18.7	15.8	17.5
	<i>Luo</i>	16.6	19.4	20.1	20.2	19.2
	<i>Kamba</i>	19.7	23.4	19.0	23.4	21.1
	<i>Other</i>	15.5	16.1	16.4	16.6	16.2
Children Ever Born	<i>1</i>	28.4	31.7	35.8	36.4	33.8
	<i>2</i>	31.9	29.9	26.1	29.3	28.9
	<i>3</i>	16.5	15.1	16.0	16.7	16.2
	<i>4+</i>	23.2	23.4	22.1	17.6	21.0
Fertility desires** (N=2606)	<i>Want more children</i>	41.6	66.2	64.9	65.3	63.0
	<i>Want no more</i>	44.8	30.3	31.9	30.4	32.3
	<i>Undecided</i>	13.6	3.5	3.3	4.3	4.7

*Results based on N=2397 with available demographic information from DSS

** Only women who have not began sexual relations since birth were asked this question

Table 3 presents the descriptive results of ever-use of contraception as well as contraceptive use after giving birth to the index child. The results are presented for women at the time of their

recruitment into the study. On average, about 42% of the women reported that they were using a method of contraception to delay or avoid getting pregnant since giving birth to the index child at the time of their first recruitment.

Table 3. Ever-use of contraception and contraception use following recent births among women in Nairobi informal settlements.

		Ever- use of any method of contraception?	Used any method of contraception since birth of index child-all	Total N
		Yes %	Yes %	
Marital status	Currently Married	76.2	46.2	2353
	Living together	70.5	46.2	156
	Separated/Div/Widow	76.0 $\chi^2(3) = 81.4;$	30.8 $\chi^2(3) = 72.7;$	187
	Never married	44.4 Pr = 0.000	14.2 Pr = 0.000	287
Child sex	Male	71.5 $\chi^2(1) = 2.3;$	40.7 $\chi^2(1) = 1.9;$	1531
	Female	74.0 Pr = 0.130	43.2 Pr = 0.165	1442
Wanted index child	Wanted at that time	76.1	47.1	1491
	Wanted later	69.8 $\chi^2(3) = 43.6;$	38.2 $\chi^2(3) = 36.2;$	1113
	Not at all	70.4 Pr = 0.000	33.3 Pr = 0.000	372
	Unsure	0.0	0.0	11
Menses resumed	No	66.2 $\chi^2(1) = 92.2;$	24.3 $\chi^2(1) = 517.9;$	1726
	Yes	82.0 Pr = 0.000	65.9 Pr = 0.000	1268
When menses returned*	0-6months	83.0	66.9	1154
	7-12 months	72.5 $\chi^2(2) = 7.1;$	56.1 $\chi^2(2) = 4.8;$	97
	12+ months	76.9 Pr = 0.028	61.5 Pr = 0.091	17
Resumed sex**	No	58.1 $\chi^2(1) = 184.8;$	11.3 $\chi^2(1) = 646.2;$	1072
	Yes	81.2 Pr = 0.000	59.2 Pr = 0.000	1735
Currently pregnant***	No	81.8 $\chi^2(2) = 11.85;$	60.0 $\chi^2(1) = 14.5;$	1901
	Yes	52.4 Pr = 0.001	19.1 Pr = 0.000	21
Total		72.7	41.9	2994

*Only for those where menses returned

** excludes divorced and widowed

*** Women who reported not having resumed sexual intercourse were not asked about pregnancy status at time of recruitment.

Contraceptive prevalence was higher among women who were currently married (46%) or living together with a partner (46%) and lower among those who had never married (14%). No child

gender-specific differences were observed in the rates of contraceptive prevalence among postpartum women, however, differences in prevalences of contraceptive use were observed among women depending on whether the index pregnancy was wanted at that time (47%) or later (38%) or not wanted at all (33%). Contraceptive prevalence was also slightly higher among women whose menses resumed within 6 months following delivery (67%) in contrast to those whose menses resumed between 7 to 12 months (56%) (Table 3). Post-partum contraceptive use was also higher among women who had resumed sex (59%) versus those who had not resumed sex relations (11%). The most common contraceptive methods that were reported to have been used by the women included several modern contraceptive methods such as injectibles (47%), pills (28%) and condoms (11%).

Time to menstrual, sexual and contraceptive use resumption

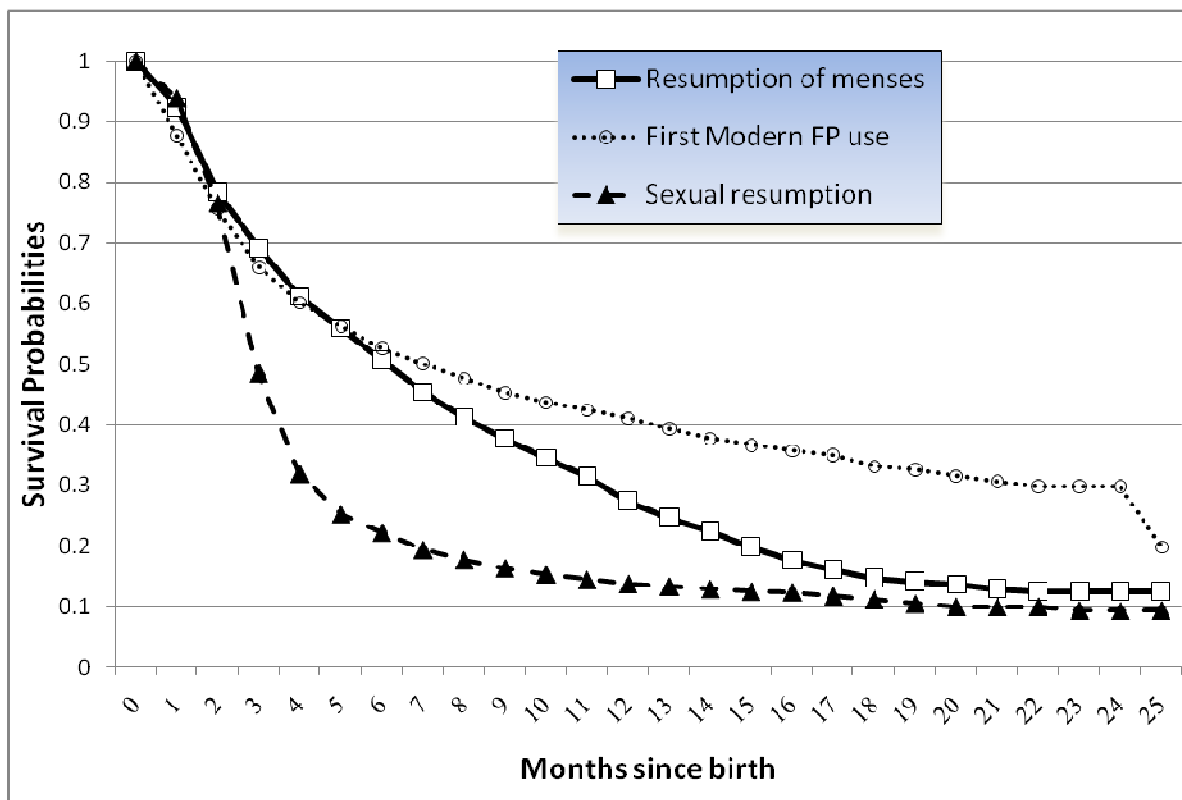
Using the monthly calendar follow-up data since birth of the index child, time to first occurrence of the event of interest was analyzed using survival analysis. The monthly time was classified into ordinal months since birth, and indicators of months of menstrual resumptions, resumption of contraceptive use as well as sexual activity were identified. Five women who had information that was missing in one of the months of follow-up were excluded. Figure 1 shows the survival curves for time to first menstrual resumption, time to first sexual resumption and time to first contraceptive use by ordinal postpartum month. The results from the survival curves show that the time at which 50% and 75% of the women report to have resumed their menses following birth is 7 and 14 months, respectively.

The survival curve for sexual resumptions indicates that 50% and 75% of the women had resumed their sexual relations within the first 4 and 6 months after giving birth, respectively. These figures suggest that more than half of the women initiate sexual relations before they resume their menses and therefore run the risk of pregnancy during their first ovulation and before the return of menses if they are not using any contraception once they resume having sex.

In terms of patterns of contraceptive use among postpartum women, we assessed the time to first use of a modern contraceptive method during postpartum period. Here, the survival curve shows

that about 50% of the women reported having used a modern contraceptive method by the seventh month of postpartum (Figure 1).

Figure 1. Survival curves to first menstrual resumption, first use of modern contraceptives and sexual resumption among women who gave birth in Nairobi slums during the period 2006-2008.



Profiles of Menstrual resumption, sexual activity and contraceptive use by months since birth

To the extent that women who resume sex remain sexually active thereafter, the gap between the survival curve for first resumption of menses and first use of contraception in Figure 1 represents women who are exposed to pregnancy but not under any protection. Our longitudinal data allow us to control our analysis of unmet need for contraception by the actual monthly exposure to sex as well as postpartum infecundity. Monthly contraceptive use was, therefore, summarized for the various monthly postpartum protection and risk categories and the results are presented in Table 4. The results are presented for all the 2994 women recruited in the MCH study and covers a maximum of 12 months of observation period since giving birth to the index child.

Table 4. Women-months of exposure and protection during the 12 postpartum months by categories of contraceptive use

Protection categories of postpartum months	Current contraception (All methods)			Total	
	None	Yes		N	(%)
		Modern	Traditional		
	(%)	(%)	%		
Protected (amenorrhea and no sex)	87.6	10.8	1.6	7549	(100)
Protected (no sex but have menses)	76.2	21.3	2.5	2904	(100)
Low protection (amenorrhea but have sex)	52.8	39.3	7.9	8237	(100)
Exposed (has both menses and sex)	27.5	63.3	9.2	6907	(100)
Currently pregnant	98.0	1.4*	0.6*	350	(100)
Total	59.4	34.9	5.7	25947	

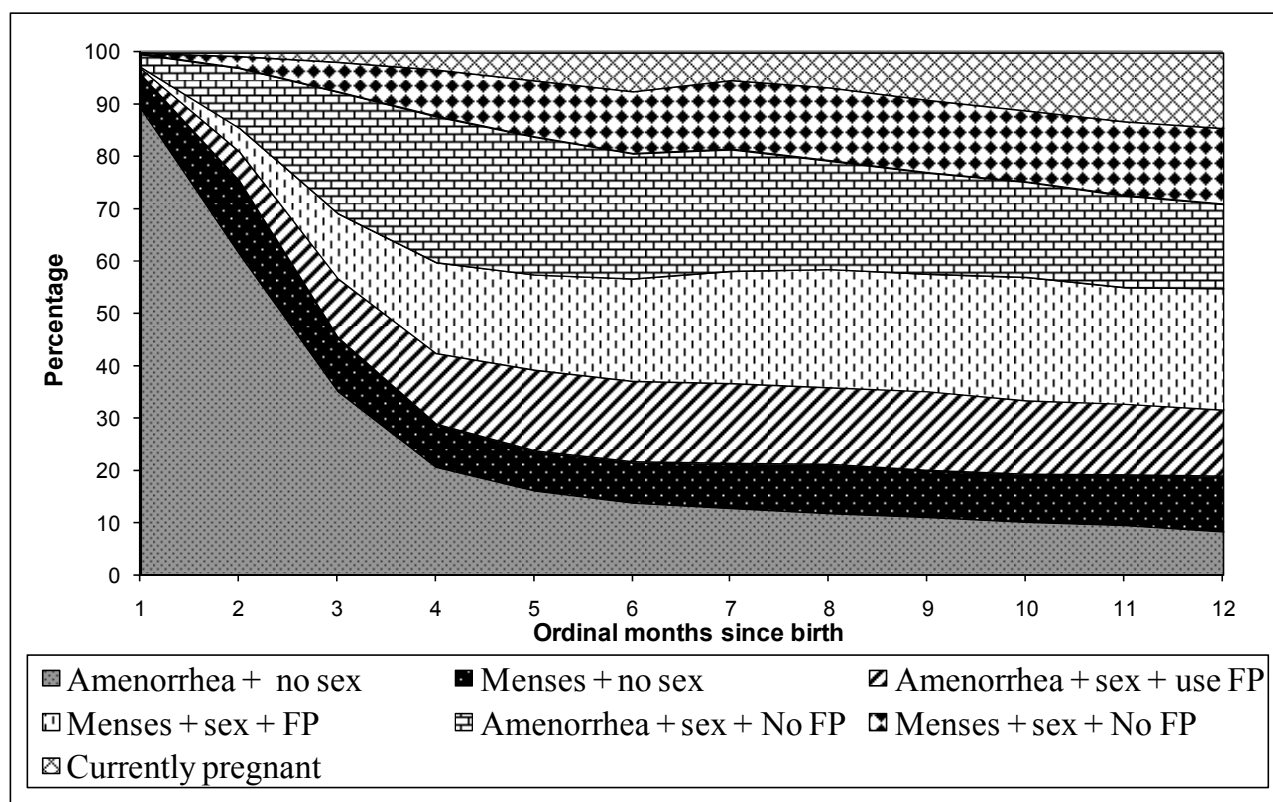
* Mostly methods women used before they became pregnant and others are condoms being used during pregnancy

A total of 25947 woman-months of postpartum were observed. For 63.3% of the months where women were fully exposed, use of a modern contraception was reported. In addition, 9.2% of the months were protected by a traditional method leaving 27.5% unprotected months. Among those months classified as low protection (i.e sexually active but amenorrheric), about 53% were unprotected with any family planning.

For some months, women were protected by having no menses and no sex or having menses but no sexual relations and yet many women (range 10-22%) still used a contraceptive method which may amount to wastage or signs of high precaution (Table 4). Similarly, some months when the women were pregnant, contraceptive use was reported especially modern methods like condoms. The distributions in the fourth column show that 60% of the postpartum women months fall into the last three categories where women are either exposed to pregnancy or are already pregnant (32% for amenorrhea plus sex; 27% for menses plus sex; and 1% for pregnant). Of this time, about 43% was not protected by any form of family planning.

A graphical illustration of the menses-sexual resumptions interactions and contraceptive use mix is presented in Figure 2. The figure presents the month by month shares of postpartum amenorrhea, contraceptive use, sexual activity and pregnancy status for the first 12 postpartum months.

Figure 2: Cumulated postpartum women-months of exposure and protection against pregnancy



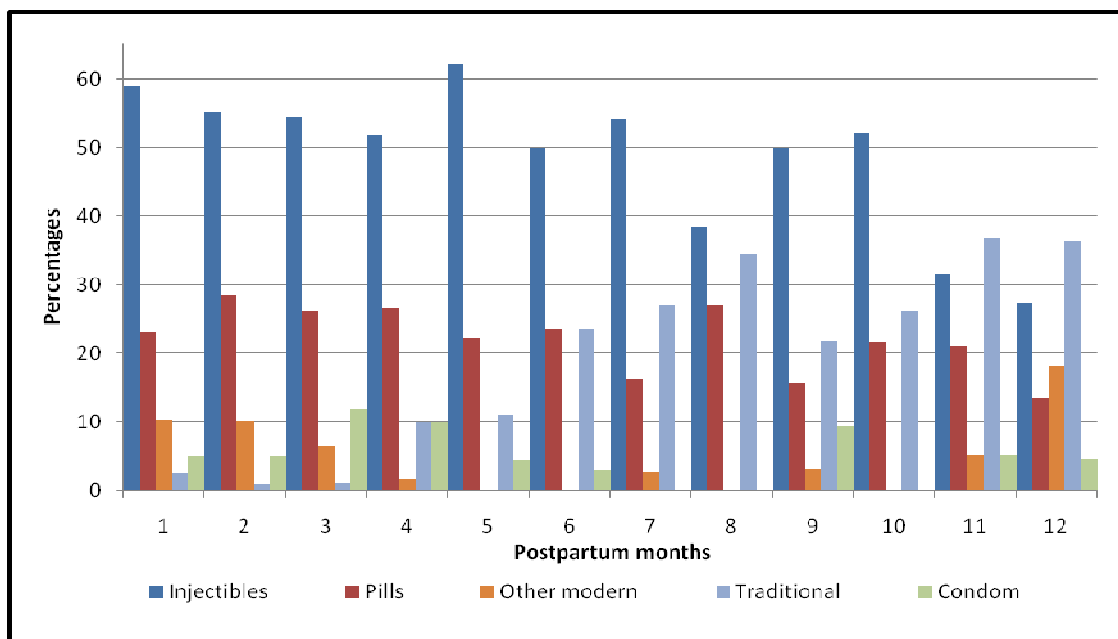
*FP=Family planning

Postpartum women whose menses have not returned may be unaware that they are pregnant for the first few months. Therefore, the probability of under-reporting pregnancies is likely to be high in this population. By focusing on each ordinal month, where each woman contributed one month and the woman-months were equal to the number of women, results showed that less than 5% of women reported being pregnant by the second postpartum month, although the percentages slowly increased with increasing postpartum months to about 12% by the twelfth postpartum month. In addition, by the twelfth month, about 23% of the women-months were sexually active, with menstruation resumed but protected by contraceptive use (Figure 2). During the same month, the proportion of women-months that were reported as amenorrheic, sexually active but no use of contraceptive method was about 16%, while the proportion of non-amenorrheic women-months where women were sexually active and used no contraceptive methods was about 15%. In about 12% of women-months in Nairobi slums where women reported being amenorrheic and sexually active during the twelfth month, a contraceptive method was reportedly used. Examination of the 71 women who were pregnant during the 12 months postpartum period, showed that 61% became pregnant after menses had resumed while the remaining women were amenorrheic during the month prior to getting pregnant. A majority (71%) of the pregnant women reported to have used no method during the previous month while others reported to have used injectables, pills and condoms in the month preceding the pregnancy.

Contraceptive uptake during Post-partum period

Information on contraceptive adoption by months of postpartum for women who reported use of a contraceptive method during the 12 month period after birth is summarized in Figure 3. Overall, injectables (12 monthly average of 48%) and pills (22%) remain the most common methods used during the 12 months postpartum period. It should be noted that no attempt was made to distinguish progesterone-only pills from combined pills. Traditional methods of contraception are more common among late adopters while early contraceptive adopters mostly prefer using injectables, followed by pills.

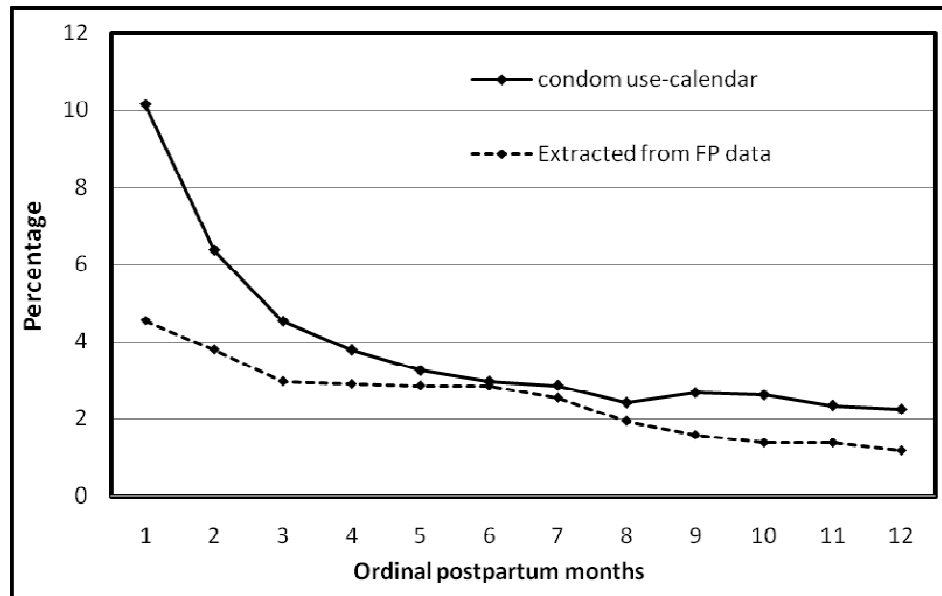
Figure 3. Choice of contraceptive by postpartum month of first adoption among women in Nairobi informal settlements.



Condom use in contrast to other contraceptive methods during the first 12 postpartum months among women in informal settlements was generally low. Condom use was on average below the 10% share of the entire contraceptive methods used. Other less preferred contraceptive methods included modern methods such as male and female sterilization, IUD, diaphragm, use of foams or jelly etc.

Additional condom use data were collected separately from the column of methods of contraception to take into account the possibility of use for HIV/STI prevention rather than pregnancy prevention. The calendar-based condom use data after excluding all months where no sexual activity was reported show that condoms are generally less used among postpartum women (Figure 4). Although, condom use in the first month is higher, it slowly falls to levels averaging about 2% by the twelfth month.

Figure 4. Percentage of women using condoms during sexually active months in the first 12 months of postpartum in Nairobi.



FP-Family planning/contraceptive use

More condom use was reported when women were asked about condom use only than when women were asked about contraceptive use methods that also included condom use. The difference in reported condom use levels was greatest during the first three postpartum months but appeared comparable thereafter (Figure 4). This difference suggests that respondents clearly distinguish use of condoms for contraceptive purposes versus use of condom for protection against sexually transmitted infections.

Early initiation of contraception following child birth is a good health decision for both the mother and child as it may help to prolong birth intervals. Specific factors might promote the early initiation of contraception and these include contacts with health personnel either during pregnancy or after birth, desire for another child, the sex of the child, wealth status etc. Table 5 presents associations of sex of child, place of delivery and desire for another child with timing for contraceptive initiation. Only about a tenth of the women in informal settlements initiate contraceptive use by the second

month. The corresponding figures for sixth, ninth and twelfth months are 41.3% 53.4% and 60.2%, respectively. No child gender differences were observed in the proportion of women initiating a contraceptive method by the second, sixth, ninth and twelfth month respectively. The proportion of women initiating a contraceptive method by month was slightly higher for women who gave birth in a health facility in contrast to those who delivered in a non-health facility setting but these differences were only significant for second and ninth months. Additionally, the results show that contraceptive initiations are much lower among women who report that they would want another child, and are highest among those who report being undecided about having another child. These differences were significantly different for all months as indicated by the small P-values (all less than 0.05).

Table 5. Percentage of women who initiated contraceptive use by 2nd, 6, 9 and 12th postpartum month.

Characteristics		N	Percentage initiating a contraceptive method by n-th month			
			2nd	6th	9th	12th
Child sex	Male	1547	10.1	40.4	56.7	60.1
	Female	1445	12.3	42.3	57.4	60.3
	P-value		<i>0.06</i>	<i>0.06</i>	<i>0.11</i>	<i>0.11</i>
Delivery facility	Not health facility	864	9.62	40.4	55.3	59.3
	Health facility	2128	12.4	42.2	59.3	61.1
	P-value		<i>0.04</i>	<i>0.06</i>	<i>0.01</i>	<i>0.05</i>
Want more children*	Want more	1641	8.8	38.7	51.7	58.2
	Want no more	842	11.2	42.3	53.9	59.4
	Undecided	123	13.0	43.0	54.7	63.1
	P-value		<i>0.01</i>	<i>0.02</i>	<i>0.02</i>	<i>0.01</i>
All		2992	11.0	41.3	53.4	60.2

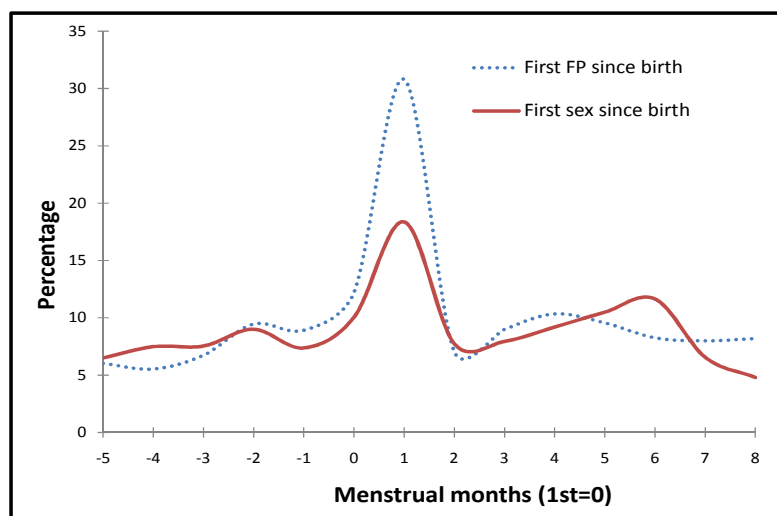
*Excludes women who are already sexually active

Menstrual resumption and timing of first contraceptive use during post-partum

The timing of contraceptive resumption is important for a woman who intends to avoid a pregnancy during the postpartum period. Similarly, the risk of unwanted pregnancies occurring shortly after birth even before the first menses appear in the absence of contraceptive use is well known (Hubacher et al. 2008; Sedgh et al. 2006). Therefore, the timing of first contraceptive use as well as the timing of first sexual intercourse in relation to the resumption of menses has key implications for reproductive health outcomes. Figure 5 shows the timing of initiation of modern contraceptive use in relation to the month of resumption of menses. In addition, the figure presents the percentage of women initiating sexual relations in relation to the month of menstrual resumption.

The results show that the majority of the postpartum women in the slum community initiate their contraceptive use during the months following their first menstrual cycle (Figure 5). Initiation of sexual activity also appears to be heaped round the time of menses resumption, although this peak does not match the pace of starting contraceptive use during the period immediately after menstrual resumption (Figure 5).

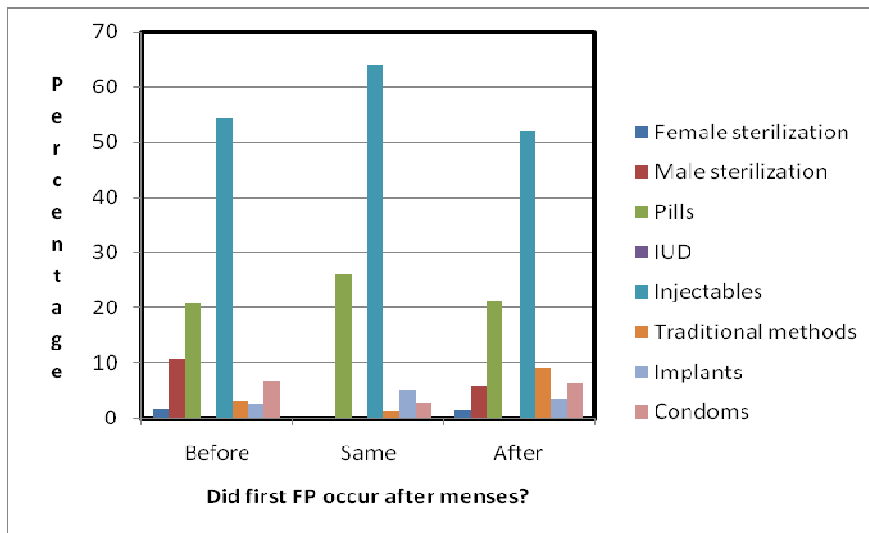
Figure 5. Resumption of Menses and timing of first modern contraceptive use (FP) and first sexual intercourse



*FP=Modern Family planning method

The overall choice of contraceptive method used for the period before menses resume and for the period after was generally the same i.e. injectables and pills were equally used during the amenorrhea and post-amenorrhea periods (Figure 6).

Figure 6. Choice of first contraceptives and timing of menstruating among women in informal settlements.



***FP=Family planning**

DISCUSSION

The study assessed patterns of contraceptive use, menstrual resumption, sexual resumption and breastfeeding patterns from women in urban informal settlements of Nairobi, Kenya. In particular, the calendar data was useful in manipulating the results into observing the month-by-month events with less overlap that is common with cross-sectional data.

The results show that slum women are somewhat exposed to early risks of pregnancies due to non-use contraceptives. While women in the urban slums communities resume menstruation as well as sexual relations quite early relative to other communities in Africa, relatively few initiate contraceptive use during the first six postpartum months. While this may not be an issue for women who are not sexually active or who are protected from pregnancy by postpartum infecundity, particular attention needs to be paid to the group of women who have experienced a return of menses, are sexually active and are not using any form of contraception. This group tends to peak between the third and sixth month of postpartum, where about 40% of all women are actually susceptible to pregnancy (or already pregnant) and not using any contraceptive methods. This group of women remains stable up to the twelfth month postpartum, but the component of those becoming pregnant increases steadily, with close to 15% becoming pregnant by the end of the first year after giving birth. It may be important to further understand the social context of such risks and whether being a resident in an informal settlement presents problems of access to reproductive health services for postpartum mothers.

One of the other major findings of this analysis is the observation that among postpartum women resumption of menses acts as a trigger or reminder to start using contraceptives. This observed relationship between the adoption of contraception and resumption of coitus has previously been observed in studies analyzing national reproductive health calendar data elsewhere (Becker and Ahmed 2001). Postpartum women in urban poor settings seem to be aware of the increased probability of having another pregnancy once the first menses have appeared. However, by associating the return of menses with the risk of another pregnancy, women may forget that ovulation precedes the appearance of menses with even higher likelihoods of ovulation occurring as the postpartum period gets longer (Becker and Ahmed 2001; Gray et al. 1990). Additionally, the quality and use of the contraceptive methods may be a major question here in leading to contraceptive failure especially if the suppliers of these contraceptives in the informal settlements

are mainly non-professional personnel (Fotso et al. 2008). Equally, the role of breastfeeding durations and intensities play a crucial role in how long it may take for the resumption of menses. Women who resume ovulation late tend to be part of a group that breast-fed for longest, suckle more intensively, and gradually introduce supplementary feeds (Bracher 1992; Howie and McNeilly 1982). Therefore, supplementing women's knowledge of postpartum breastfeeding and how it relates to the pattern of resumption of menses may be useful in delaying the return to natural fertility.

The cautious group of women who initiate contraception way before the menses appear acquire two defenses against pregnancy. However, this advantage only counts if the selected method is a permanent one or if consistent use of the method is achieved without discontinuation. In a study of Peru and Indonesian women, results showed that women who initiated the use of pills and intrauterine devices (IUD) within the first six months were more likely to be pregnant after two years of childbirth than women who initiated similar contraception after six months postpartum (Becker and Ahmed 2001). Therefore, early adoption of a contraceptive method may not necessarily translate into adequate birth spacing if continuation rates are low. This is a likely occurrence in settings such as informal settlements where education levels for women are low and constant supply or access to a given contraceptive method is not guaranteed. In subsequent analysis following additional data collection, it will be possible to investigate the associations between contraceptive initiation and continuation or discontinuation.

Condoms generally provide for dual protection against pregnancy and sexually transmitted infections (Cleland et al. 2006; Cleland et al. 1999). Unfortunately, only few postpartum women in Nairobi slums use this contraceptive method. The results from the 2003 Kenya Demographic and Health Survey show that approximately 5.3% of women reported having used a condom during their recent sexual encounter in the past 12 months (KDHS 2003). This percentage was 1.9% for women who were married or living together with a partner. Therefore, the observed rates in the current study are quite comparable to national rates. Given that about 80% of the women are married or living with a partner, perhaps their primary interest is not in preventing sexually transmitted infections but rather the control of birth spacing and avoiding unwanted pregnancies and hence the limited use of condoms. Other cultural taboos for sexual resumption during postpartum period could be explored in promoting condom use. For instance, in Ivory Coast, women who believed strongly in the cultural taboo that sexual relations during postpartum would harm the breastfeeding infant were more likely

to accept the use of condoms with their husbands to minimise the risk of extramarital sex, as long as the semen remained in the condoms without direct contact with the breastfeeding woman (Desgrees-du-Lou and Brou 2005; Williamson et al. 2006). Alternatively, postpartum mothers may be reluctant to use condoms that have higher failure rates as well as the difficulties in maintaining the consistent use of condoms due to gender power imbalances in sexual relationships (Maharaj and Cleland 2005). In contrast, hormonal contraceptive methods such as pills and injectibles provide a more convenient way to maintain consistent protection. Overall, condom use among married women and couples living together remains low in many parts of sub-Saharan Africa (Mark et al. 2007), and this has implications for HIV/AIDS transmission especially in communities where extramarital relations are common around the time of pregnancy and postpartum (Carpenter et al. 1999; Kamali et al. 2000). Other studies have shown the impact of the perceived risk of HIV infection as potential predictors of condom use (Maharaj and Cleland 2005). However, in the current study it was not feasible to convert reported sexual behavior into HIV/STD infection probabilities because no information was collected about the characteristics of men's extramarital relations that would be required to determine risk levels. Despite this limitation, the results demonstrate the increased need for pushing for the dual role of condoms as tools for HIV/STD and pregnancy prevention by HIV control and family planning programmes in Africa.

In Kenya, just like any other sub-Saharan African country, results show that contraceptive prevalence rates are low with large differences across educational and socio-economic groups (APHRC 2002b). Additionally, it has been documented that contraceptives are mostly needed for birth spacing and less likely for limiting. Therefore prioritizing the provision of methods by need may be a viable strategy in allocating the few resources available. For instance, interventions to promote methods for family size limitation may stress the promotion of sterilization and IUDs while interventions focussed on spacing may stress hormonal contraceptives. Overall, access and availability of modern contraceptive methods especially hormonal contraceptives which are good for spacing remains a key for meeting the unmet need especially for women from less privileged societies such as those in informal settlements in Nairobi.

In conclusion, postpartum contraception services present a valuable prospect to reach a large number of women with useful information on reproductive health services. Periods of antenatal or postpartum or routine child care visits need to be explored more since they present opportunities

when women may be particularly receptive to messages concerning their reproductive health and that of the child. Family planning services can coordinate well with maternal health services in providing information to postpartum women in need of family planning services during such periods. It may also be useful to include postpartum contraception in the training materials for traditional birth attendants since majority of the women especially in low resource settings such as those in informal settlements do not deliver at designated health centres, but report having delivered at home or home of a traditional birth attendant.

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