

# Postpartum Fertility and Contraception: An Analysis of Findings from 17 Countries



Maria Borda  
William Winfrey

March 2010



Family Planning Initiative  
Addressing unmet need for postpartum family planning



# Postpartum Fertility and Contraception: An Analysis of Findings from 17 Countries

Maria Borda  
William Winfrey

March 2010



ACCESS-FP, a five-year, global program sponsored by the United States Agency for International Development (USAID), is an associate award under the ACCESS Program. ACCESS-FP focuses on meeting the family planning and reproductive health needs of women in the postpartum period. Interventions are designed to complement those of the ACCESS Program in the promotion and scale-up of postpartum family planning through community and clinical interventions. ACCESS-FP works to reposition family planning through integration with maternal, newborn and child health programs, including the prevention of mother-to-child transmission of HIV. For more information about ACCESS-FP, please visit [www.accesstohealth.org/about/assoc\\_fp.htm](http://www.accesstohealth.org/about/assoc_fp.htm).

Published by:

Jhpiego

1615 Thames Street

Baltimore, Maryland 21231

USA

[www.jhpiego.org](http://www.jhpiego.org)

March 2010

## Table of Contents

---

ABBREVIATIONS AND ACRONYMS .....	vi
ACKNOWLEDGMENTS .....	vii
BACKGROUND.....	1
INTRODUCTION .....	1
LITERATURE REVIEW .....	2
METHODOLOGY .....	4
Data .....	4
Definitions .....	6
ANALYSIS OF FERTILITY-INFLUENCING BEHAVIORS.....	9
Breastfeeding.....	9
Return to menses .....	10
Return to sexual activity .....	13
UPTAKE OF FAMILY PLANNING DURING THE EXTENDED POSTPARTUM PERIOD .....	15
Family planning use and unmet need .....	15
Return of menses and family planning use.....	19
Use of maternal health services and family planning use .....	20
DISCUSSION.....	23
CONCLUSION .....	26
APPENDIX.....	27
REFERENCES .....	39

## Tables

<b>Table 1:</b> Surveys included in analysis and sample sizes.....	5
<b>Table 2:</b> Infant mortality disaggregated by preceding birth interval, Demographic and Health Surveys 2003–2007 .....	23
<b>Table A-1:</b> Use of family planning among married women aged 15–49, Demographic and Health Surveys 2003–2007.....	27
<b>Table A-2:</b> Unmet need for family planning, prospective and retrospective definition among postpartum women whose most recently born baby lives with them, Demographic and Health Surveys 2003–2007.....	28
<b>Table A-3:</b> Fully breastfeeding and use of the Lactational Amenorrhea Method among women in the postpartum period (disaggregated by trimester), Demographic and Health Surveys 2003–2007 .....	29
<b>Table A-4:</b> Percentage of postpartum women who are sexually active among women in the postpartum period (disaggregated by trimester), Demographic and Health Surveys 2003–2007 .....	30

<b>Table A-5:</b> Percentage of postpartum women whose menses has returned (disaggregated by trimester), Demographic and Health Surveys 2003–2007 .....	<b>31</b>
<b>Table A-6:</b> Percentage of women 3.0–5.9 months postpartum whose menses has not returned (disaggregated by breastfeeding status), Demographic and Health Surveys 2003–2007.....	<b>32</b>
<b>Table A-7:</b> Percentage of postpartum women using modern family planning services (disaggregated by trimester), Demographic and Health Surveys 2003–2007 .....	<b>33</b>
<b>Table A-8:</b> Percentage of postpartum women with unmet need for family planning services (disaggregated by trimester), Demographic and Health Surveys 2003–2007 .....	<b>34</b>
<b>Table A-9:</b> Percentage of women 6.0–8.9 and 9.0–11.9 months postpartum who are using modern family planning (disaggregated by whether menses has returned or not), Demographic and Health Surveys 2003–2007.....	<b>35</b>
<b>Table A-10:</b> Percentage of women 9.0–11.9 months postpartum using modern family planning services (disaggregated by use of antenatal care and facility-based delivery), Demographic and Health Surveys 2003–2007 .....	<b>36</b>
<b>Table A-11:</b> Percentage of women 0–11.9 months postpartum who used maternal health services, Demographic and Health Surveys 2003–2007.....	<b>37</b>

## Figures

<b>Figure 1:</b> Use of family planning among married women aged 15–49, all methods and modern methods, Demographic and Health Surveys 2003–2007.....	<b>6</b>
<b>Figure 2:</b> Unmet need among women 0.0–11.9 months postpartum, retrospective definition and prospective definition, Demographic and Health Surveys 2003–2007.....	<b>7</b>
<b>Figure 3:</b> Use of family planning among married women aged 15–49, modern methods and LAM, Demographic and Health Surveys 2003–2007.....	<b>8</b>
<b>Figure 4:</b> Percentage of women fully breastfeeding or using LAM at 3.0–5.9 months postpartum, Demographic and Health Surveys 2003–2007.....	<b>9</b>
<b>Figure 5:</b> Scatter plot of fully breastfeeding at 3.0–5.9 months postpartum versus percentage of births preceded by intervals of less than 18 months, Demographic and Health Surveys 2003–2007 .	<b>10</b>
<b>Figure 6:</b> Scatter plot of percentage of women whose menses has returned at 3.0–5.9 months postpartum versus percentage of births preceded by intervals of less than 18 months, Demographic and Health Surveys 2003–2007 .....	<b>11</b>
<b>Figure 7:</b> Scatter plot of percentage of women fully breastfeeding versus percentage of women who are amenorrheic at 3–5 months postpartum, Demographic and Health Surveys 2003–2007 .....	<b>12</b>
<b>Figure 8:</b> Percentage of women 3.0–5.9 months postpartum whose menses has not returned: Comparison of fully breastfeeding women with women who are not fully breastfeeding, Demographic and Health Surveys 2003–2007 .....	<b>13</b>
<b>Figure 9:</b> Percentage of women who have resumed sexual activity at 3.0–5.9 months postpartum, Demographic and Health Surveys 2003–2007.....	<b>14</b>
<b>Figure 10:</b> Scatter plot of sexual activity at 3.0–5.9 months postpartum versus percentage of births preceded by intervals of less than 18 months, Demographic and Health Surveys 2003–2007.....	<b>15</b>
<b>Figure 11:</b> Percentage of women using a modern method of family planning, all women and women at 3.0–5.9 months postpartum and 9.0–11.9 months postpartum, Demographic and Health Surveys 2003–2007 .....	<b>16</b>
<b>Figure 12:</b> Percentage of women 9.0–11.9 months postpartum using a method of modern family planning and those who need to use family planning (using family planning plus unmet need), Demographic and Health Surveys 2003–2007.....	<b>17</b>
<b>Figure 13:</b> Percentage of women 0.0–11.9 months postpartum with an unmet need to space or an unmet need to limit births (estimated prospectively), Demographic and Health Surveys 2003–2007 .....	<b>18</b>

<b>Figure 14:</b> Scatter plot of use of modern family planning at 9.0–11.9 months postpartum versus percentage of births preceded by intervals of more than 36 months, Demographic and Health Surveys 2003–2007 .....	<b>19</b>
<b>Figure 15:</b> Comparison of family planning use among women 6.0–8.9 months postpartum whose menses has returned and those whose menses has not returned, Demographic and Health Surveys 2003–2007 .....	<b>20</b>
<b>Figure 16:</b> Percentage of women using a modern method of family planning disaggregated by use of antenatal care (women 3.0–5.9 months postpartum), Demographic and Health Surveys 2003–2007 .....	<b>21</b>
<b>Figure 17:</b> Percentage of women using a modern method of family planning disaggregated by place of delivery (women 3.0–5.9 months postpartum), Demographic and Health Surveys 2003–2007 .....	<b>21</b>
<b>Figure 18:</b> Percentage of women with four or more antenatal care visits and percentage of women with facility-based deliveries (women 0–11.9 months postpartum), Demographic and Health Surveys 2003–2007 .....	<b>22</b>

## Abbreviations and Acronyms

---

ANC	Antenatal care
DHS	Demographic and Health Survey
DRC	Democratic Republic of Congo
FP	Family planning
LAM	Lactational Amenorrhea Method
MCH	Maternal and child health
PPFP	Postpartum family planning
USAID	United States Agency for International Development
WHO	World Health Organization



## Acknowledgments

---

This publication was made possible through support provided by the Service Delivery Improvement Division, Office of Population and Reproductive Health, Bureau for Global Health, U.S. Agency for International Development, under the terms of Associate Cooperative Agreement #GPO-A-00-05-00025-00, and Leader with Associates Cooperatives Agreement #GHS-A-00-04-00002-00. The opinions herein are those of the editors and do not necessarily reflect the views of the U.S. Agency for International Development.

Several people contributed to the preparation of this report. In particular, we gratefully acknowledge the following individuals and thank them for reviewing and providing critical feedback to this report:

Catharine McKaig, ACCESS-FP

Barbara Deller, ACCESS-FP

Virginia Lamprecht, U. S. Agency for International Development

We would also like to thank Dana Lewison and Renata Kepner from Jhpiego for editorial and graphic design assistance. Without them, this report would have not been possible.



## Background

---

Postpartum fertility and contraception are generally not well-understood by policymakers, health service providers or women themselves. Making use of existing Demographic and Health Survey (DHS) data for women in the first year postpartum, descriptive country profiles for the extended postpartum family planning (PPFP) period have been developed for 17 countries in which the ACCESS-FP program has worked since October 2005. Kenya was the first country for which a country profile was developed (Borda and Winfrey 2006). These postpartum family planning profiles highlighted unmet need, short birth-to-birth intervals, timing of key factors related to fertility return, and the relation of family planning use and maternal health care, as well as method mix. These profiles soon demonstrated their usefulness by succinctly describing key issues and findings that have been used both in the initiation of program activities among stakeholder and in the development of provider and community training materials. This paper aggregates some of the most compelling findings from the country profiles. The objective of this paper is to provide a synthesis of the country findings as well as identify key patterns of behavior related to postpartum family planning.

## Introduction

---

More than one-third of the 205 million pregnancies that occur worldwide annually are unintended. The majority of these unintended pregnancies occur in developing countries, where more than one-third of 182 million pregnancies are unintended (Guttmacher Institute 2008). Two-thirds of these unintended pregnancies occur among women who are not using a method of family planning. Family planning use during the first year postpartum has the potential to significantly reduce the number of unintended pregnancies. Research has demonstrated a large unmet need among women in the extended postpartum period (Ross and Winfrey 2001). Meeting these needs would substantially increase contraceptive prevalence as well as reduce maternal and child mortality (Cleland et al. 2006). Family planning use can benefit infant and maternal health through longer intervals between births. The ACCESS-FP Program, funded by the U.S. Agency for International Development (USAID), created several country-level analyses that describe postpartum return to fertility and family planning use among women in the first year postpartum. This paper brings together these analyses into a comparative report. The authors hope that the similarities across the analyses will provide policy and program managers with general lessons that can be applied anywhere. Where similarities do not exist, the authors hope that policy and program managers will look carefully at country-specific context to inform their decisions.

The general perspective of this report is that family planning or other behaviors to reduce fertility<sup>1</sup> in the extended postpartum period are intended to reduce the percentage of birth intervals that are dangerously short. The literature review, which follows immediately, will discuss the literature regarding fertility-reducing behaviors including family planning in the extended postpartum period. In the data and methods section that follows the literature review, there will be discussion of the data used, definitions of key variables and methodological issues.

---

<sup>1</sup> In many cases, this paper does not carefully distinguish between fecundity and fertility. The rationale for this is that reductions in fecundity will in most cases eventually be reflected in reduced fertility.

The first data analysis section presents graphs and charts describing levels of fully breastfeeding, return to menses, return to sexual activity and use of family planning services. Detailed tables from which the graphs are drawn are presented in an appendix. The fertility-influencing behaviors or outcomes will be related to the prevalence of dangerously short birth intervals in the hopes of identifying the country-level behaviors that are most associated with healthy birth intervals. In general, the working hypothesis of this paper is that greater use of family planning in the extended postpartum period, fully breastfeeding<sup>2</sup> and slower return to sexual activity will be associated with longer birth intervals. In 2005, a World Health Organization (WHO) technical consultation specified that after a live birth, the recommended interval before attempting the next pregnancy should be at least 24 months in order to reduce the risk of adverse maternal, perinatal and infant outcomes (WHO 2006).

The second analysis section of the paper presents data on the relationship between family planning and the use of maternal health services. The working hypothesis of this section is that women who use maternal health services are more likely to use family planning services in the extended postpartum period than women who do not use maternal health services. A corollary of this is that countries with greater use of maternal health services should have higher levels of family planning use in the extended postpartum period.

## Literature Review

---

The literature review focused on fertility-reducing behaviors including family planning during the extended postpartum period. These behaviors include return of menses, return to sexual activity, breastfeeding and use of maternal health services. Some of these behaviors biologically reduce fertility while some behaviors affect decisions to use family planning during the postpartum period. Fertility-reducing behaviors should affect the length of birth intervals. The delay of return of fertility should increase the time between birth intervals.

### **Breastfeeding and Lactational Amenorrhea Method (LAM)**

A study of fully breastfeeding women in Chile found that ovulation was experienced by 26% of subjects, and the cumulative probability of pregnancy was 9.4% by 180 days postpartum (Diaz et al. 1988). Of the women who became pregnant during the first 6 months while fully breastfeeding, 11.8% were also amenorrheic. Another study shows the significant influence of breastfeeding in extending the interval between two births (Jain and Bongaarts 1981). This study shows that in Bangladesh, Sri Lanka and Indonesia, the prevalence of breastfeeding added about 9–10 months to the average birth interval. Similarly, a study conducted by Smith shows that in countries with a total fertility rate of 5 or higher, each month of breastfeeding increases the birth interval by 0.6 months (Smith 1985). While these studies show that there is a correlation between breastfeeding and birth intervals, they do not describe how breastfeeding is measured. In other words, it is not known if “breastfeeding” refers to exclusive breastfeeding or fully breastfeeding.

---

<sup>2</sup> Fully breastfeeding is defined by the Demographic and Health Surveys as breastfeeding or giving an infant plain water only in the last 24 hours. This is differentiated from predominant breastfeeding, which includes juices and other water-based fluids, but not non-breast milk.

The Lactational Amenorrhea Method (LAM) and “exclusive breastfeeding” are two separate entities. LAM is a highly effective modern family planning method that relies on a woman’s natural infertility resulting from exclusive breastfeeding along with the absence of menses during the first 6 months after a baby is born. The three criteria that must be met to ensure LAM’s effectiveness as contraception are: 1) exclusive, fully or nearly fully breastfeeding; 2) menses has not returned since delivery; and 3) the baby is less than 6 months old. LAM is 99.5% effective when used correctly (i.e., when all three criteria are met).

While one of the three criteria of LAM is “exclusive” or “fully or nearly fully” breastfeeding, the definition and effectiveness of LAM as a contraceptive method is also dependent on the other two criteria: 1) amenorrhea; and 2) baby less than 6 months old.

### **Return of Menses**

Breastfeeding delays the resumption of ovulation and the return of menses. For individual postpartum women, the resumption of menstruation is not predictable. For non-breastfeeding women, most experience menses return within four to six weeks. The longer menses return is delayed, the more likely it is that ovulation will precede menses return (Kennedy and Trussell 2004). Individual studies appear to draw linkages between menses return and initiation of contraceptive use (Ross and Winfrey 2001). Becker and Ahmed found that family planning use is most likely in the month following menses return (Becker and Ahmed 2001).

### **Return to Sexual Activity**

Reported periods of abstinence from sexual activity after a birth vary greatly. Qualitative research has indicated that among those practicing postpartum abstinence, irregular sexual activity may happen early, progressing to regular activity later (Desgrees-du-lou and Brou 2005). Despite speculation about changes in postpartum abstinence patterns as a result of modernity and social change (Benefo 1995), a review found no change in the length of abstinence among West and Central African countries (Cleland, Mohamed and Capo-Chichi 1999).

There is some literature about the associations among breastfeeding, return to sexual activity and contraceptive use. A study that focused on Peru and Indonesia found that up to the third month postpartum, breastfeeding women in Peru, but not in Indonesia, were less likely than non-breastfeeding women to have resumed sexual intercourse (Becker and Ahmed 2001). This same study found that breastfeeding women are less likely to take up contraception in Peru but not in Indonesia during the same period. Another study that reviewed World Fertility Surveys in eight countries found that the average duration of breastfeeding among those who used contraception is generally lower than among those who did not use contraception (Jain and Bongaarts 1981).

### **Maternal Health Services and Contraception**

In a three-country study (Bolivia, Egypt and Thailand), in which the authors controlled for effects of living in high health service contact areas and other demographic factors, the results suggested that prior use of prenatal care had a strong influence on contraceptive use (Zerai and Tsui 2001). Similarly, a study using data from six countries (Thailand, Egypt, Tunisia, Zimbabwe, Guatemala

and Colombia) demonstrated the use of contraceptives and maternal and child health (MCH) services to be significantly associated, independent of intervening factors (Ahmed and Mosely 2002).

In Morocco, a study used household survey data and data on the supply environment for health and family planning services. A full information maximum likelihood estimator was used to control for possible endogenous factors. The authors concluded that findings indicate a substantial and apparently causal relationship between the intensity of MCH service use and subsequent contraceptive use (Hotchkiss et al. 1999).

In Guatemala, the intensity of MCH service use was positively associated with subsequent contraceptive use, after controlling for observed and unobserved individual, community and household factors (Seiber et al. 2005). In a study of five countries (Bolivia, Guatemala, Indonesia, Morocco and Tanzania), using similar methodology, the results in three of the five countries suggested that the intensity of MCH service use is positively associated with subsequent contraceptive use after controlling for the same factors. The authors concluded that for those three countries (Morocco, Guatemala and Indonesia), the intensity of MCH service use does have a causal impact on subsequent use after controlling for factors that predispose women to use health care services.

All of these studies concluded that MCH service use has a positive association with contraceptive use and two propose a causal relationship. It is noteworthy that the countries examined are limited to 10 countries, no doubt due to the availability of relevant data sets.

## Methodology

---

### Data

This paper uses the most recent Demographic and Health Surveys<sup>3</sup> in the following 17 countries: Bangladesh, the Democratic Republic of Congo, Ethiopia, Ghana, Guinea, Haiti, India, Kenya, Malawi, Mali, Madagascar, Nigeria, Pakistan, Rwanda, Tanzania, Uganda and Zambia. These are priority countries for the Office of Population and Health within USAID. For the purposes of this paper “postpartum women” are defined as women who gave birth in the 12 months preceding the interview. Table 1 presents the sample sizes of women interviewed and of these how many were postpartum.<sup>4</sup>

### Country Selection and Sample Size

This review includes information from 17 countries. Thirteen of these were selected due to their high-priority status for the Office of Population and Reproductive Health at USAID Washington. These are: Democratic Republic of Congo, Ethiopia, Kenya, Madagascar, Malawi, Nigeria, Rwanda, Tanzania, Uganda, Zambia, India, Pakistan and Haiti. These 13 countries were selected for priority status based on high levels of unmet need, contraceptive prevalence rates between 10–35%, and perceived potential for program success. Four additional countries where ACCESS-FP has had some

---

<sup>3</sup> The first draft of this paper was prepared in July of 2009.

<sup>4</sup> Problems with recall in this subsample will be reduced relative to the entire subsample of women with maternal health use information. Depending on the survey, the DHS asks women about use of maternal health services for births within either 36 or 60 months prior to the interview. The subsample of women in the extended postpartum period will be recalling events that can be at most 21 months prior to the interview (i.e., 9 months of pregnancy plus 12 months postpartum at most). For all women in the DHS sample, the recall period can be as long as 69 months (i.e., 9 months of pregnancy plus 60 months postpartum).

activities were added. These were: Bangladesh, Guinea, Mali and Ghana. All women with a living baby born in the 12 months preceding the survey and whose most recently born baby lives with them are included in the analysis.

**Table 1: Surveys included in analysis and sample sizes**

COUNTRY	YEAR OF SURVEY	TOTAL NUMBER OF WOMEN, AGED 15–49, INTERVIEWED	NUMBER OF POSTPARTUM WOMEN INTERVIEWED**
Bangladesh	2007	10,996*	1,106
Congo, Democratic Republic of	2007	9,995	1,754
Ethiopia	2005	14,070	1,900
Ghana	2003	5,691	734
Guinea	2005	7,954	1,313
Haiti	2005–2006	9,998	1,199
India	2005–2006	124,385*	9,493
Kenya	2003	8,195	1,205
Madagascar	2003–2004	7,949	1,052
Malawi	2004	11,698	2,281
Mali	2006	14,583	2,739
Nigeria	2003	7,620	1,229
Pakistan	2006–2007	10,023*	1,749
Rwanda	2005	11,321	1,689
Tanzania	2004–2005	10,329	1,694
Uganda	2006	8,531	1,574
Zambia	2007	7,146	1,250

\* Ever married women

\*\* Postpartum women interviewed include women who gave birth in the last 12 months and whose most recently born baby lives with them.

The extended postpartum period is divided into four trimesters: 0–2.9 months, 3.0–5.9 months, 6.0–8.9 months and 9.0–11.9 months. For the analysis of all women in the first year postpartum, sample sizes within each of the postpartum trimesters exceed 200 women, even in Ghana where the smallest postpartum sample size was encountered.<sup>5</sup> Although these are not large sample sizes, they are sufficient for interesting analysis.

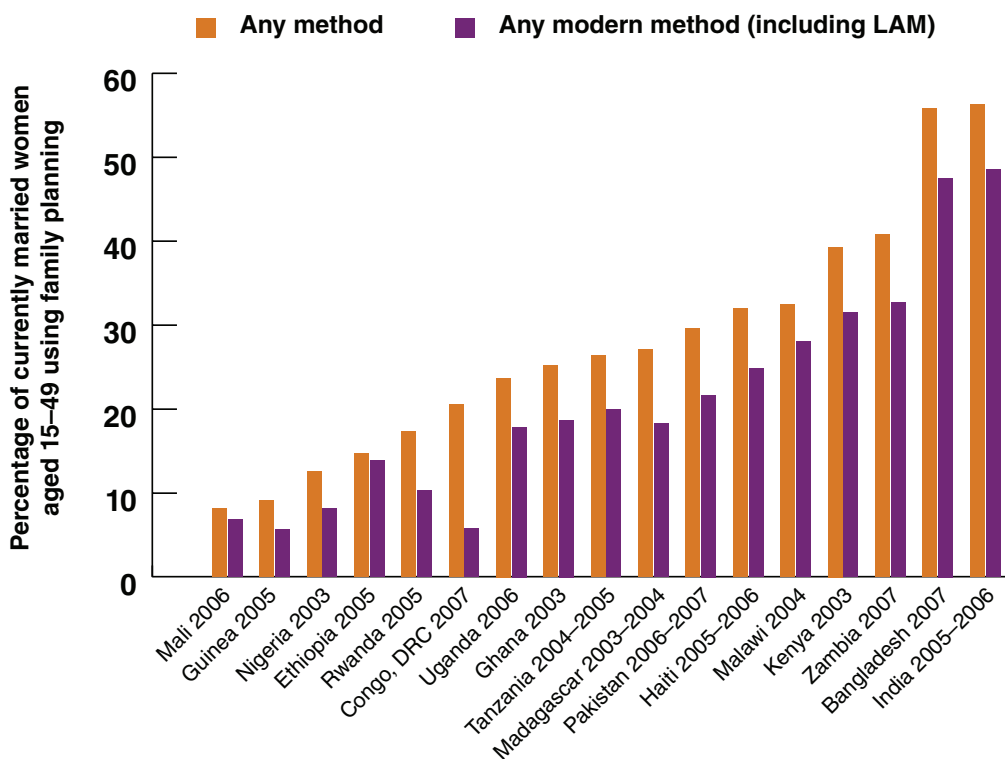
For other analyses, the behavior of specific groups of women in the first year postpartum within the trimesters is analyzed. For example, in one analysis the family planning behavior of women whose menses has returned is compared to the family planning behavior of women whose menses has not returned. Early in the extended postpartum period, menses has returned for very few women. In

<sup>5</sup> At the opposite end of the spectrum, India had sample sizes exceeding 1,500 women for each of the postpartum trimesters.

cases where sample sizes are between 25 and 49 observations, the reader is alerted to the small sample sizes. When sample sizes are less than 25, results are not reported.

These 17 countries cover a wide range of family planning usage. Figure 1<sup>6</sup> presents the percentage of married women who use family planning in each country. At the low end are Guinea, Nigeria and the Democratic Republic of Congo, where less than 10% of women use a modern method of family planning. At the other extreme are Bangladesh and India, where nearly 50% of married women use a modern method of family planning. In most countries there is a relatively modest percentage of traditional method users (the difference between total use and modern use). Exceptions to this general rule are the Democratic Republic of Congo and Madagascar, where targeted expansion of services or special efforts with traditional method users may yield quick increases in modern method family planning use.

**Figure 1: Use of family planning among married women aged 15–49, all methods and modern methods, Demographic and Health Surveys 2003–2007**



## Definitions

### Unmet need

Loosely defined, unmet need is the percentage of women who need family planning services but are not currently using family planning. The implementation of this definition has some sticky methodological issues, which have been described elsewhere (e.g., Westoff and Ochoa 1991). An issue important to the analysis of women in the first year postpartum is what to do with amenorrheic women. There are at least two possibilities. The first, most popular solution is to define their unmet need status based on their fertility preferences retrospectively at the time of their most recent

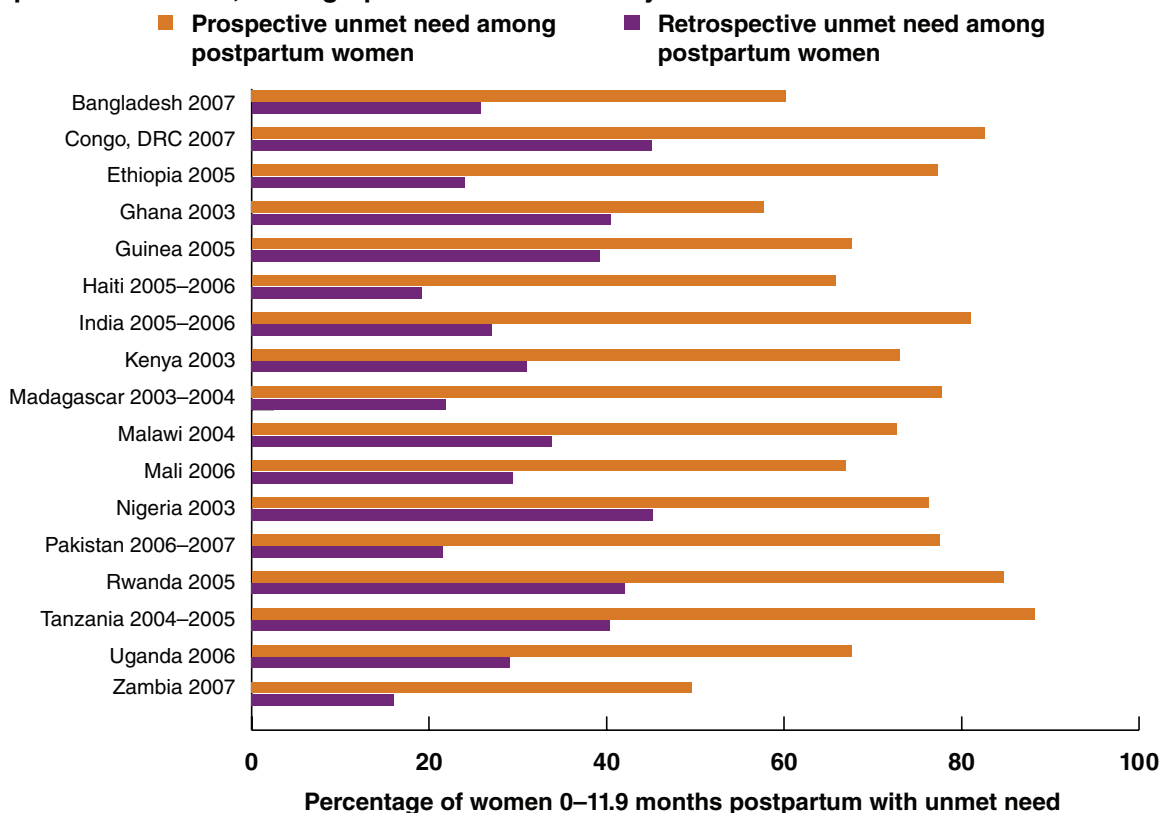
<sup>6</sup> The raw numbers for Figure 1 and subsequent charts and scatter plots are in the appendices.



pregnancy. A second possibility is to define their unmet need status based upon their fertility preferences at the time of the survey interview or prospectively (looking forward). Ross and Winfrey (2001) showed that alternative definitions of unmet need in the extended postpartum period can have serious impact on the estimated number of women with unmet need. This report defines unmet need based on fertility preferences looking forward or prospectively because it is most likely to correlate with their need for family planning in the extended postpartum period. Since women's return to fertility varies and it is difficult to predict that return, all women who are postpartum and not using a method could be considered to have an unmet need for family planning.

Figure 2 shows the percentage of women in the first year postpartum with unmet need, using the prospective and the retrospective definition. The prospective definition of unmet need produces a two- to three-fold increase relative to the usual unmet need definition. In Guinea, the percentage of women in the first year postpartum with unmet need using the prospective definition is 3.6 times larger, while in Haiti and Pakistan the difference is a more modest 1.7-fold increase.

**Figure 2: Unmet need among women 0.0–11.9 months postpartum, retrospective definition and prospective definition, Demographic and Health Surveys 2003–2007**



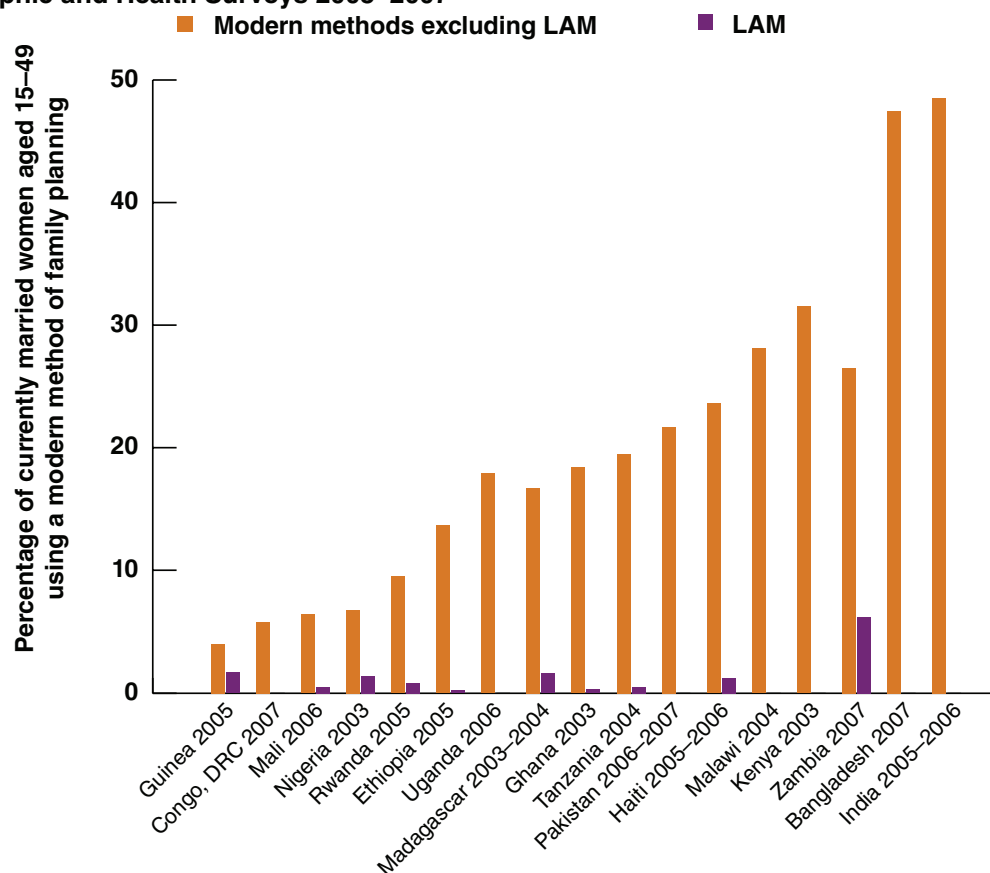
### LAM and Breastfeeding

The Lactational Amenorrhea Method (LAM) is a frequently recommended method for women who have just given birth. Unfortunately, respondents to the Demographic and Health Surveys do not consistently report the method, nor do the Demographic and Health Surveys make an attempt to verify that LAM is correctly adopted. Three requirements need to be met in order for LAM to be effective: 1) a woman must fully or nearly fully breastfeed, 2) the infant is 6 months or younger, and 3)

a woman's menses must not have returned. To partially correct for this shortcoming, this report concentrates on fully breastfeeding, which theoretically should have similar impacts on fertility in the first 6 months postpartum.

In spite of these limitations, this report includes LAM as a modern method of family planning. Reported LAM use is a small proportion of modern method use in most of the 17 countries in this analysis. Figure 3 shows LAM as a proportion of modern method use. The red portion of the bars represents LAM use. In all countries, the reported use of LAM is relatively low. In fact, with the exception of Madagascar, Nigeria and Zambia, one could argue that the reported use of LAM is programmatically insignificant. Later we will also see that the reported use of LAM often bears little relationship to levels of breastfeeding. For example, Rwanda has the highest reported use of breastfeeding at 3.0–5.9 months, yet we see here very little reported use of LAM.

**Figure 3: Use of family planning among married women aged 15–49, modern methods and LAM, Demographic and Health Surveys 2003–2007**



The appropriate definition of breastfeeding is not straightforward. We adopt the definition that most closely correlates with the return of menses in a cross-national setting. Among most recent Demographic and Health Surveys conducted between 2003 and 2009, the correlation between median months of exclusive breastfeeding and median months of amenorrhea was only 0.215 across countries. Fully breastfeeding is defined here as children being given breast milk or breast milk plus plain water. The same relationship between fully breastfeeding and amenorrhea was relatively high at 0.637. The correlation between median months of any breastfeeding and median months of

amenorrhea was 0.622. Since the correlation was highest for fully breastfeeding, we used that as our definition of breastfeeding throughout this report. We are aware, however, that the intensity of breastfeeding also affects fertility return, and that the addition of complementary food will decrease the intensity of breastfeeding and increase the risk of pregnancy.

## Analysis of Fertility-Influencing Behaviors

### Breastfeeding

Breastfeeding practice varies widely across the 17 countries. Figure 4 shows the percentage of women who are fully breastfeeding and the percentage using LAM for family planning at 3.0–5.9 months postpartum.<sup>7</sup> At the low end is Kenya, where less than 10% of women are fully breastfeeding. At the high is Mali, where almost 90% of women are fully breastfeeding at 3.0–5.9 months postpartum. Recall that Zambia and Madagascar had the highest reported use of LAM. Here we see that among the 17 countries, they are in the upper tier of fully breastfeeding. In most of the other countries, the prevalence of fully breastfeeding is several multiples larger than the use of LAM. In countries like Rwanda, Uganda, Ethiopia and India, the use of LAM could potentially be increased with relatively little behavior change. The major thrust of the program would probably need to be educational—encouraging the continuation of the healthy practice and linking the good practice with its fertility-inhibiting effect.

**Figure 4: Percentage of women fully breastfeeding or using LAM at 3.0–5.9 months postpartum, Demographic and Health Surveys 2003–2007**

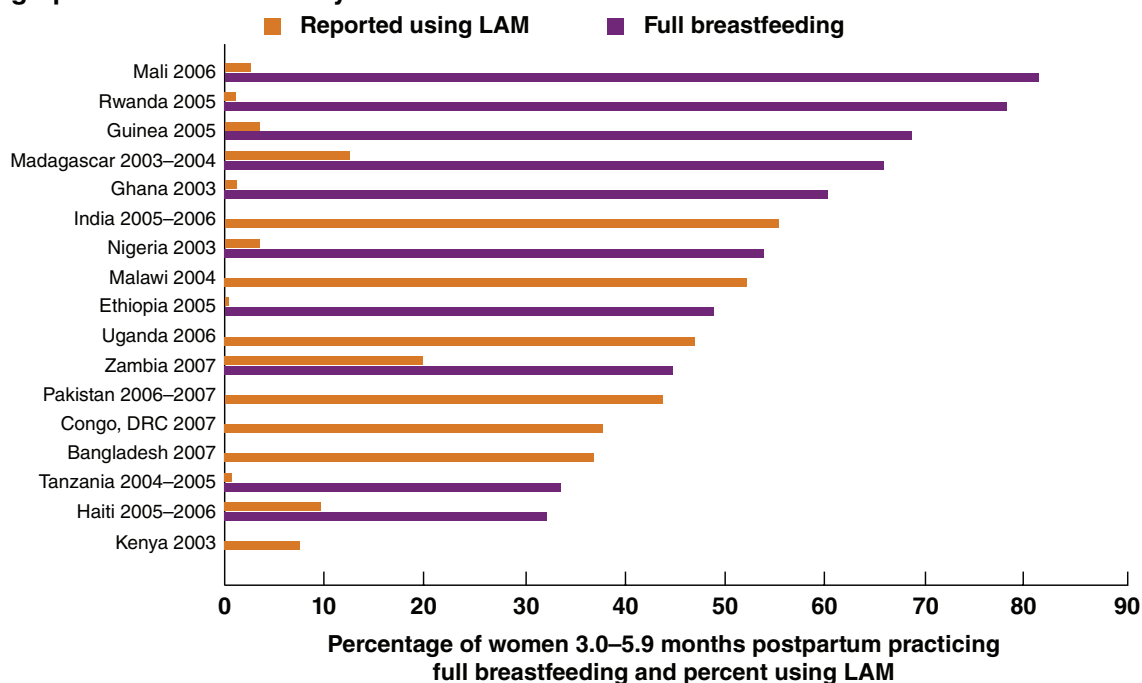
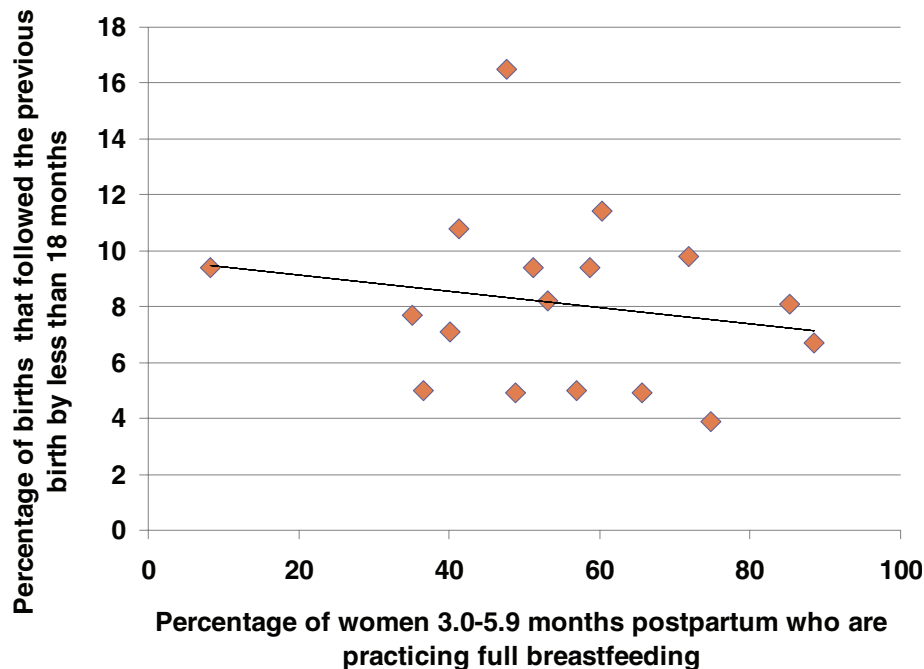


Figure 5 shows a scatter plot of full breastfeeding at 3.0–5.9 months postpartum versus percentage of short birth intervals. Via delayed menses, longer periods of breastfeeding should be negatively related to short birth intervals. In other words, longer periods of breastfeeding should be correlated with lower incidence of short birth intervals. For the purposes of this analysis, a short birth interval is defined as a

<sup>7</sup> This trimester was chosen for presentation because it might best correspond to the women who are using LAM or fully breastfeeding for the entire period of effectiveness in the case of LAM, or WHO recommendations in the case of exclusive breastfeeding.

birth that occurs less than 18 months after the previous birth. A birth interval of less than 18 months means that a woman became pregnant at 9 months or less than 9 months postpartum. The slope of the best fit line through the scatter plot with fully breastfeeding (Figure 5) is almost completely flat, and the scatter of the points is large. The correlation across the countries is only 0.184 and is not statistically significant. This is against expectations since breastfeeding is recommended as an important part of LAM for family planning. A couple of interpretations are possible. In countries where breastfeeding is not commonly practiced for a full 6 months, other methods of family planning are used (e.g., Bangladesh). Another possibility is that the indicator of fully breastfeeding measured by the Demographic and Health Surveys does not effectively capture the intent of the LAM definition. The Demographic and Health Surveys asks only about feeding patterns during the previous day. This may or may not be indicative of overall patterns of feeding. For example, it does not ask if the baby has ever been fed anything but breast milk or about the timings of feedings.

**Figure 5: Scatter plot of fully breastfeeding at 3.0–5.9 months postpartum versus percentage of births preceded by intervals of less than 18 months, Demographic and Health Surveys 2003–2007**



### Return to Menses

Figure 6 presents the relationship between the percentage of women whose menses has returned and the prevalence of short birth intervals. There is not much scatter of the points around the best fit line. The correlation between the two indicators is 0.724 and is statistically significant.

**Figure 6: Scatter plot of percentage of women whose menses has returned at 3.0–5.9 months postpartum versus percentage of births preceded by intervals of less than 18 months, Demographic and Health Surveys 2003–2007**

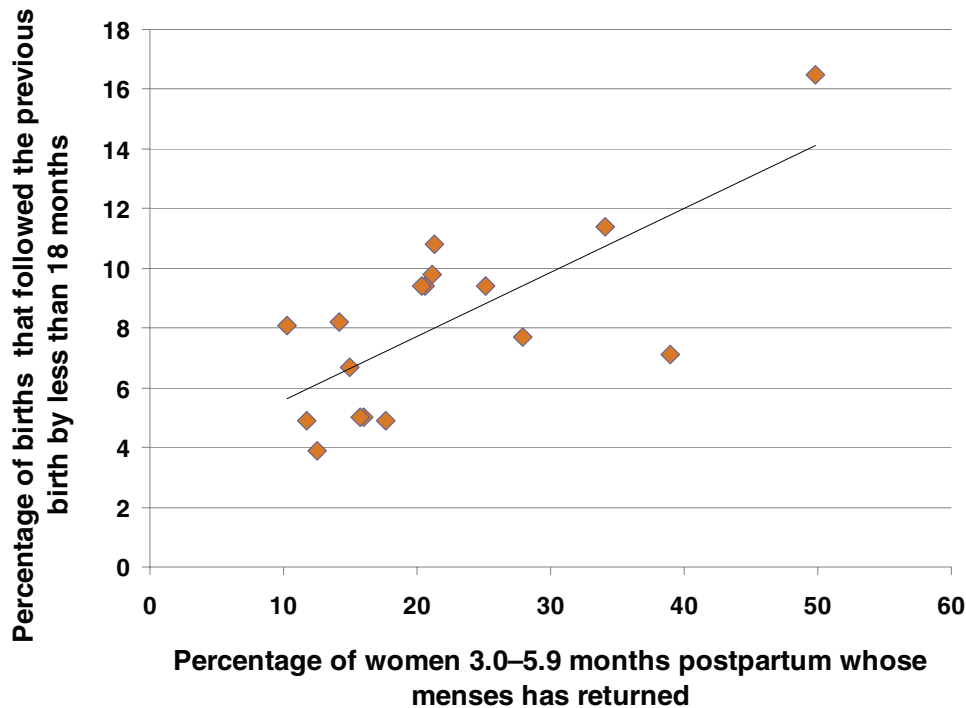
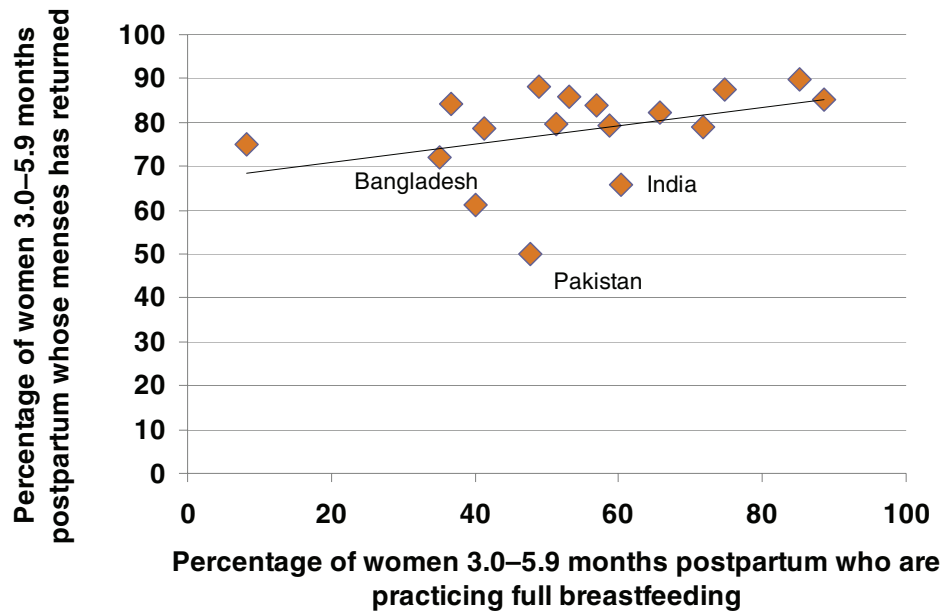


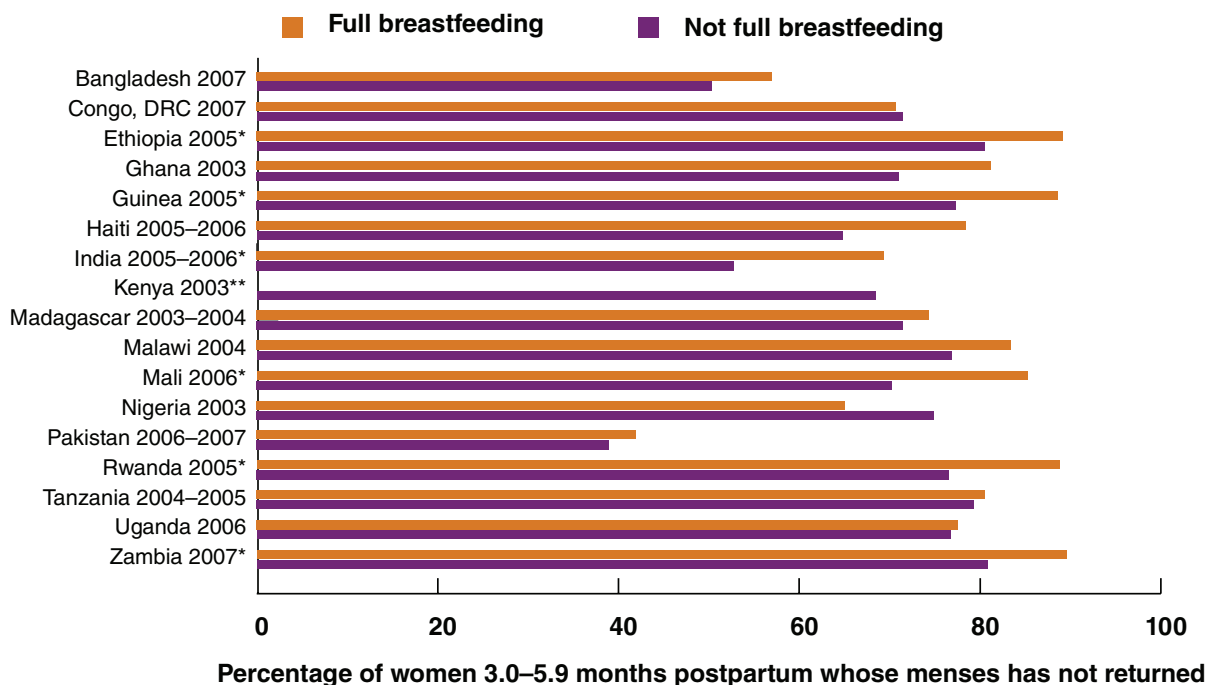
Figure 7 presents a scatter plot of the percentage of women who are amenorrheic versus the percentage of women who are fully breastfeeding at 3.0–5.9 months postpartum. Reinforcing the findings of the previous two graphs, this scatter plot shows that there is not a clear or exact linear relation between the two indicators. The best fit line among the points is positively sloping as expected; however, there is considerable scatter of the points around the line. The correlation between the percentage of women who are fully breastfeeding and the percentage of women whose menses has returned is 0.388 and is not statistically significant. The lack of a correlation further bolsters the assertion that factors other than fully breastfeeding affect the return of menses at the country level. On the other hand, the lack of significance in the relation may be the result of including relatively few countries in the analysis. In the previous section, we noted that the correlation between median months of amenorrhea and median months of fully breastfeeding was a robust 0.637 across 40 countries.

**Figure 7: Scatter plot of percentage of women fully breastfeeding versus percentage of women who are amenorrheic at 3–5 months postpartum, Demographic and Health Surveys 2003–2007**



The scatter plot of Figure 7 is not completely satisfactory and perhaps not convincing since it presents country-level aggregate indicators. Figure 8 partially corrects for this problem by showing the percentage of women whose menses has returned disaggregated by whether they are fully breastfeeding or not. In none of the 17 countries is there a large difference in the percentages. In only six countries are the differences significant at the  $p < .05$  level. It could also be argued that completely full breastfeeding is not the correct measure for the fertility-inhibiting effect. In Appendix Table A.6, the percentage of women for whom menses has not returned is disaggregated by full breastfeeding, receiving only liquids, and receiving solids or not breastfeeding. In this table, six countries—Ethiopia, Guinea, Haiti, India, Mali and Rwanda—show a statistically significant relationship. In India and Mali, the difference between women who are fully breastfeeding and those who are either not breastfeeding or feeding their child solid foods is more than 15 percentage points. However, in 11 countries there was not a statistically significant relationship.

**Figure 8: Percentage of women 3.0–5.9 months postpartum whose menses has not returned: Comparison of fully breastfeeding women with women who are not fully breastfeeding, Demographic and Health Surveys 2003–2007**



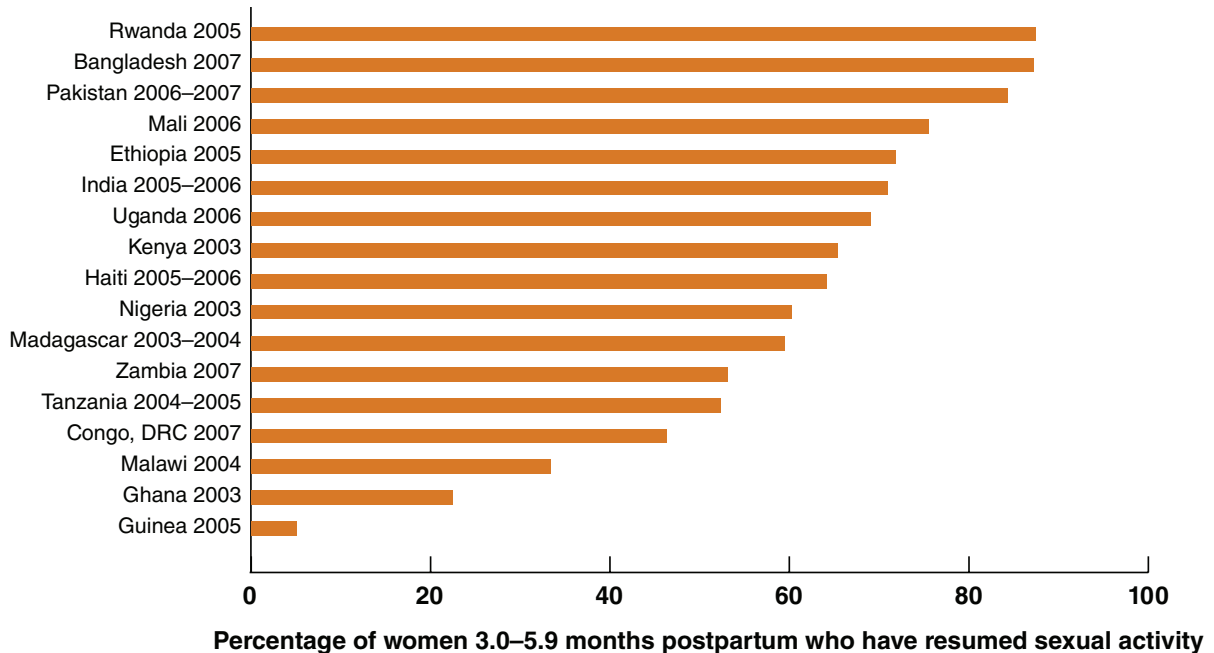
\* Difference between women fully breastfeeding and not fully breastfeeding is significant at  $p < .05$  in chi-squared test  
 \*\*  $N < 25$  for women who are fully breastfeeding at 3.0–5.9 months postpartum

The duration of fully breastfeeding and return to sexual activity vary greatly across countries and within regions. Across Africa, neighboring countries have vastly different rates of prevalence of fully breastfeeding at 3.0–5.9 months postpartum. In contrast, the three South Asian countries among the 17 analyzed here have approximately the same levels of fully breastfeeding, at 3.0–5.9 months postpartum. The number of countries analyzed here is relatively small and they may not be representative of global trends. In fact, in the Methodology section, the correlation between median months of fully breastfeeding and median month of amenorrhea were highly correlated. The return to sexual activity is similarly varied across countries.

### Return to Sexual Activity

Figure 9 shows the percentage of women who have resumed sexual activity at 3.0–5.9 months postpartum. At the low end is Guinea, where about 10% of women have resumed sexual activity at 3.0–5.9 months postpartum. At the high end are Bangladesh and Rwanda, where almost 90% of women have resumed sexual activity.

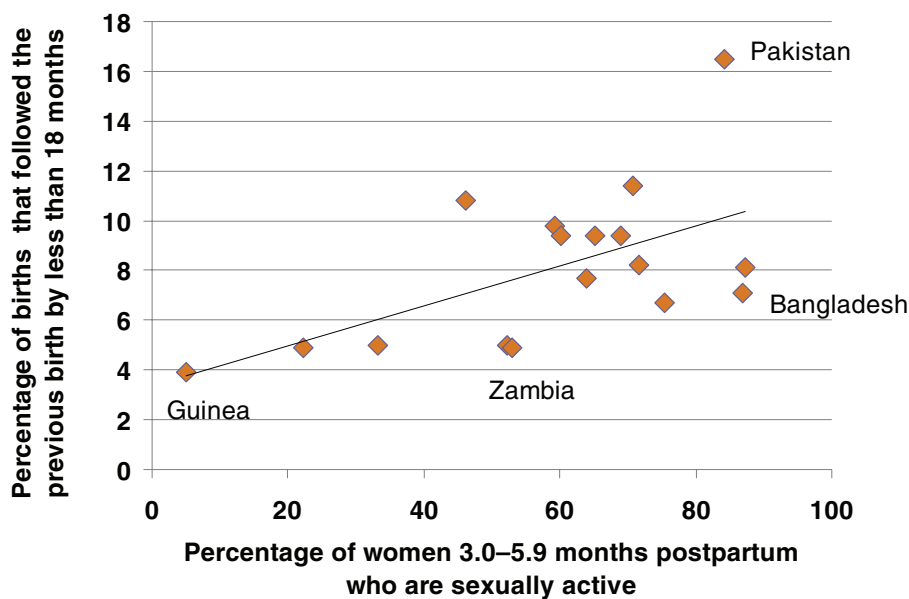
**Figure 9: Percentage of women who have resumed sexual activity at 3.0–5.9 months postpartum, Demographic and Health Surveys 2003–2007**



On average, across countries, quick return to sexual activity should be positively related to shorter birth intervals. In the scatter plot of sexual activity at 3.0–5.9 months versus percentage of short birth intervals (Figure 10), the best fit line has a relatively steep slope. In general, this means that in countries where sexual activity is delayed postpartum, short birth intervals are relatively rare. The correlation across countries is very strong—0.577—and is statistically significant. The data points for Pakistan, Bangladesh, Zambia and Guinea are indicated with labels. Pakistan has more short birth intervals than would be predicted by the best fit line. Bangladesh and Zambia have fewer short birth intervals than expected. Later we will see that Bangladesh and Zambia have high use of family planning services, perhaps helping to push the prevalence of short birth intervals down. The majority of pregnancies that occur within the first 9 months postpartum could be prevented through postpartum family planning.



**Figure 10: Scatter plot of sexual activity at 3.0–5.9 months postpartum versus percentage of births preceded by intervals of less than 18 months, Demographic and Health Surveys 2003–2007**

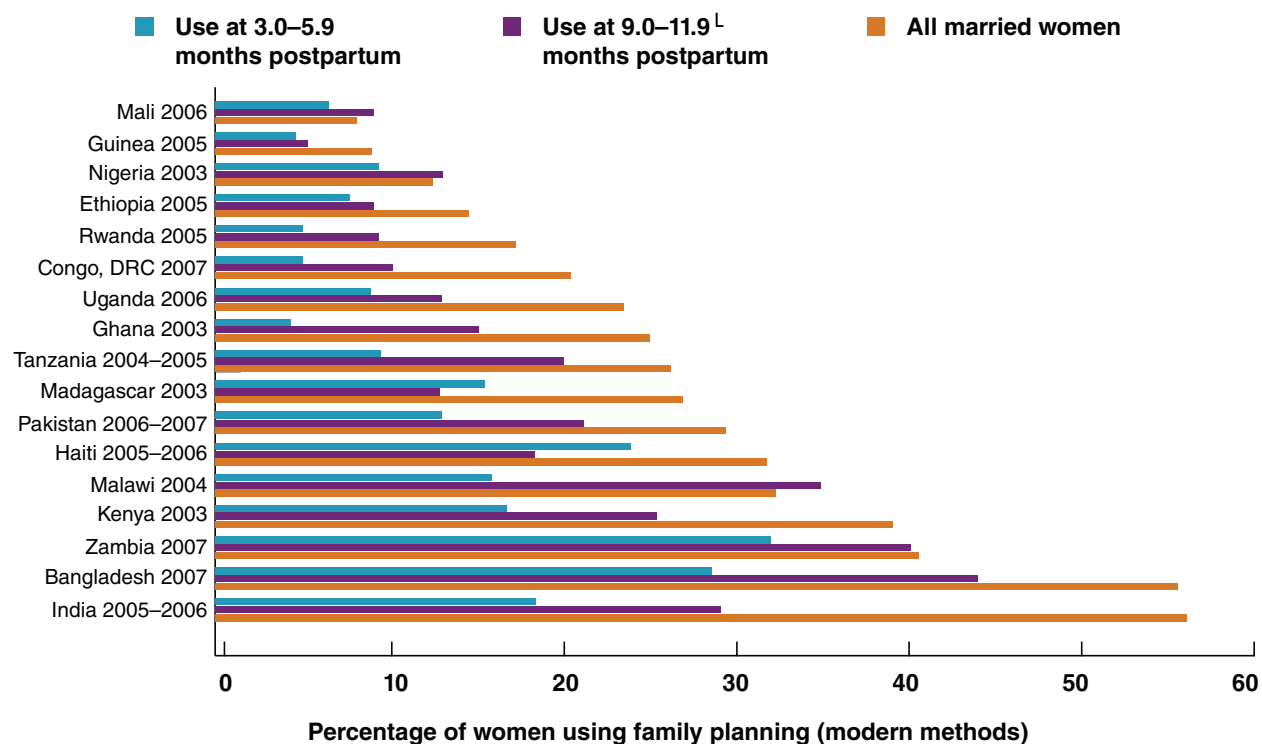


## **Uptake of Family Planning during the Extended Postpartum Period**

### **Family Planning Use and Unmet Need**

Figure 11 compares the use of modern family planning among women at 3.0–5.9 months postpartum and at 9.0–11.9 months postpartum to all currently married women for the 17 countries. The countries are sorted from lowest use of family planning to greatest use. In 15 of the 17 countries, women are more likely to be using modern family planning at the end of the postpartum period (9.0–11.9 months) than in the middle of the postpartum period (3.0–5.9 months). In most countries, the increase is quite large. In Bangladesh, India, Tanzania, Ghana and Malawi, the increase is more than 10 percentage points. In the Democratic Republic of Congo, Ethiopia, Haiti, Guinea, Madagascar, Mali, Nigeria, Rwanda and Uganda, the increase is less than 5%.

**Figure 11: Percentage of women using a modern method of family planning, all women and women at 3.0–5.9 months postpartum and 9.0–11.9 months postpartum, Demographic and Health Surveys 2003–2007**



In 14 of the 17 countries, women at the end of the extended postpartum period are less likely to be using family planning than married women in the general population. In India the difference is greater by 27 percentage points. Among the sample of countries, India has by far the largest use of female sterilization. The use of sterilization among currently married women exceeds 35%, while in all of the other 16 countries, less than 10% of all married women use sterilization.

The use of modern family planning is low among postpartum women compared to the unmet need for family planning. Figure 12 compares use of family planning to the total need for family planning (i.e., unmet need for family planning plus use of family planning) at the end of the extended postpartum period. The countries are sorted in ascending order of need for family planning. In all countries except Nigeria and Guinea, the percentage of women who need family planning services at 9.0–11.9 months postpartum exceeds 80%. In more than half of the countries, the percentage of women who need family planning services exceeds 90%. In all countries, the percentage of women needing family planning services greatly exceeds the percentage who are actually using family planning services. In fact, only in Bangladesh does the use of modern family planning as a percentage of total need exceed 50%.

**Figure 12: Percentage of women 9.0–11.9 months postpartum using a method of modern family planning and those who need to use family planning (using family planning plus unmet need), Demographic and Health Surveys 2003–2007**

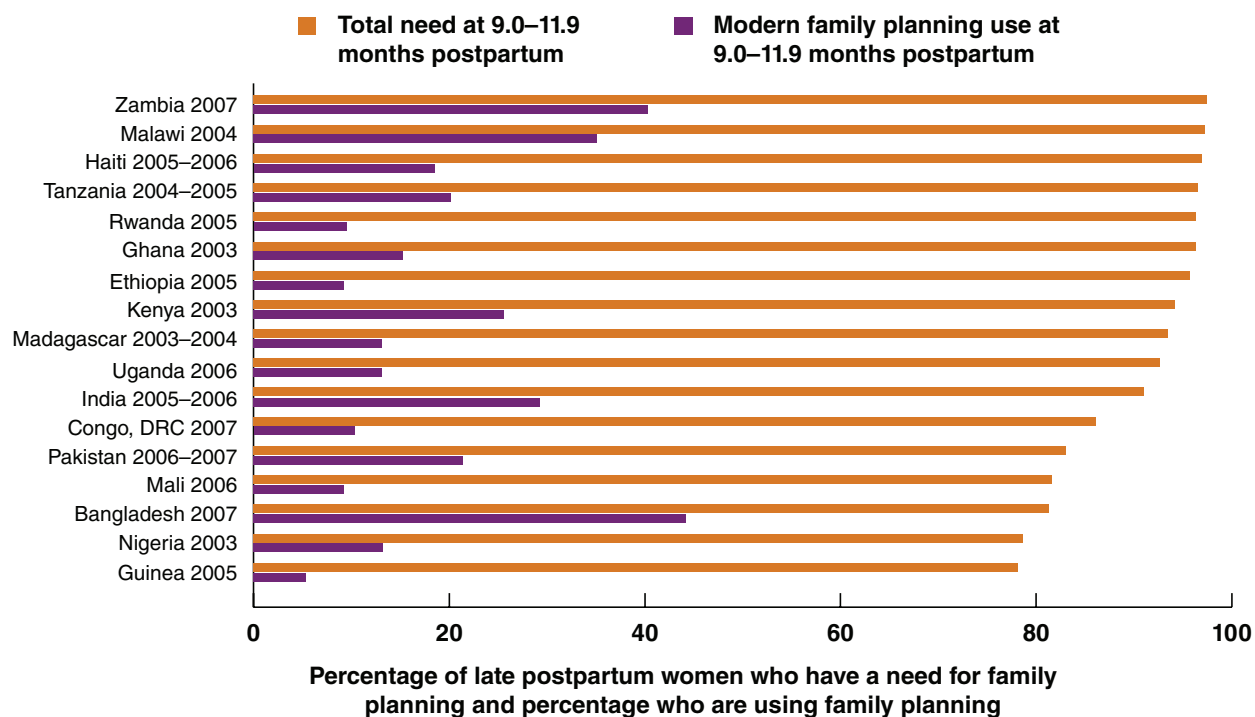
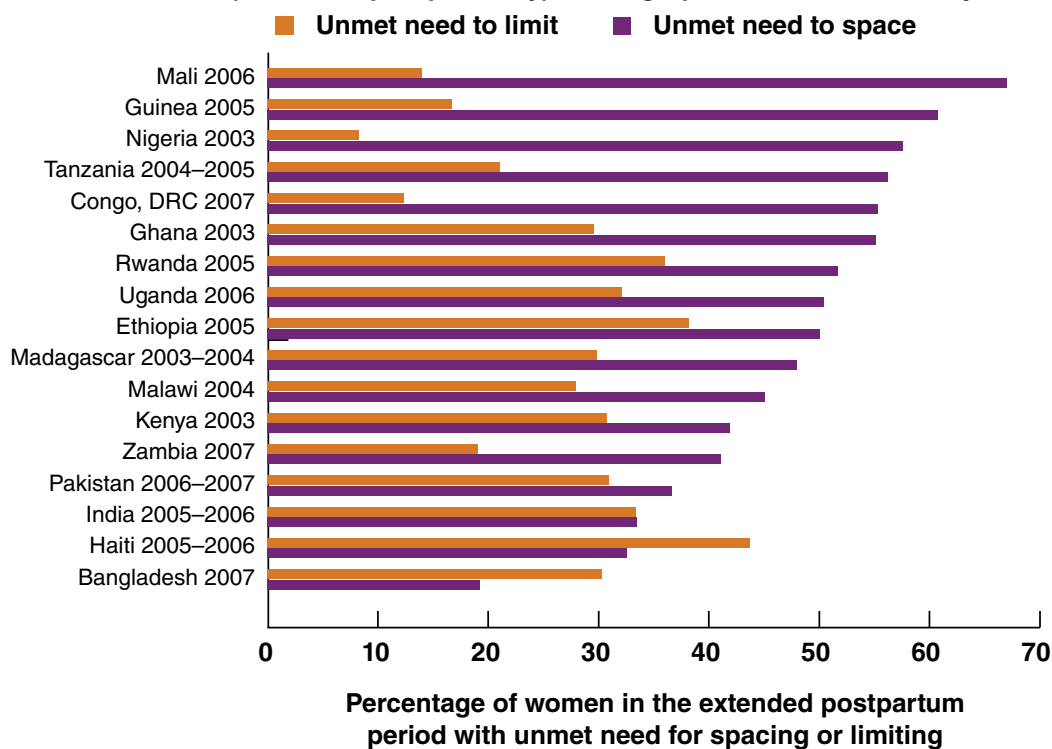


Figure 13 disaggregates unmet need by spacing and limiting. The countries are arranged by the level of unmet need for spacing. Interestingly, the unmet need for limiting does not follow the same pattern. Excepting Haiti, the countries at the bottom of the chart with the lowest levels of unmet need for spacing have relatively high levels of postpartum family planning use. On the other hand, excepting Zambia, the countries at the bottom of the chart have a relatively high level of unmet need for limiting. This may be evidence of the need for countries with relatively successful postpartum planning programs to increase emphasis on long-acting or permanent methods.

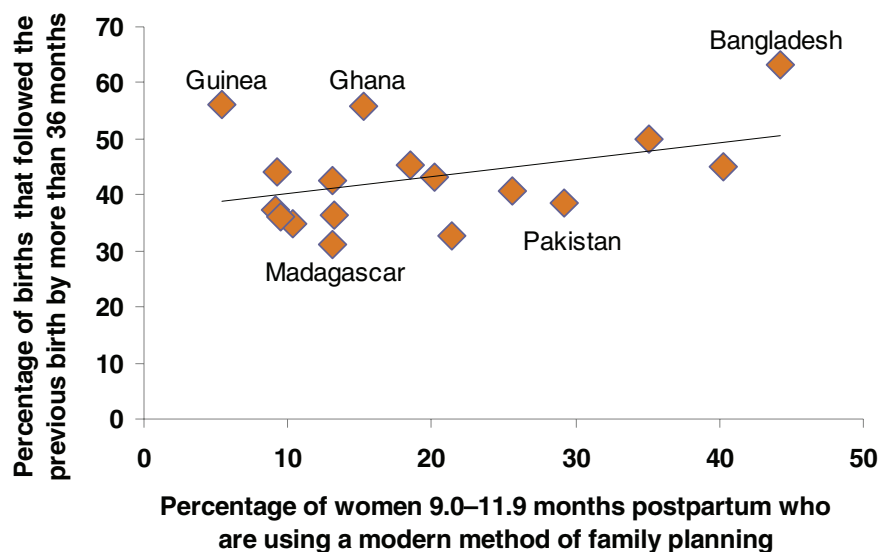
**Figure 13: Percentage of women 0.0–11.9 months postpartum with an unmet need to space or an unmet need to limit births (estimated prospectively), Demographic and Health Surveys 2003–2007**



In Figures 5 and 10, we saw that the correlation between postpartum abstinence and fully breastfeeding were not perfectly correlated with longer birth intervals in a cross-country comparison. Figure 14 presents a similar scatter plot for use of family planning services at 9.0–11.9 months versus the percentage of birth intervals that are more than 36 months.<sup>8</sup> The correlation is relatively strong at 0.390, but not statistically significant. A best fit line has also been drawn through the points to allow one to observe which countries perform better or worse than expectations. Guinea is far above the best fit line, indicating birth intervals longer than one would expect based on family planning use. This is probably explained by the long average period of abstinence during the extended postpartum period there. Pakistan is far below the line, indicating shorter birth intervals than expected based on family planning use. In the preceding bar chart, we showed that Pakistan had a relatively small total demand for family planning services, indicating that among the women who are not using family planning there is a relatively high desire to have a child soon.

<sup>8</sup> Analysis of the association of family planning use at 9.0–11.9 months will extend far beyond the less than 17.9-month interval analyzed earlier in the paper. Therefore, the longer interval was used.

**Figure 14: Scatter plot of use of modern family planning at 9.0–11.9 months postpartum versus percentage of births preceded by intervals of more than 36 months, Demographic and Health Surveys 2003–2007**



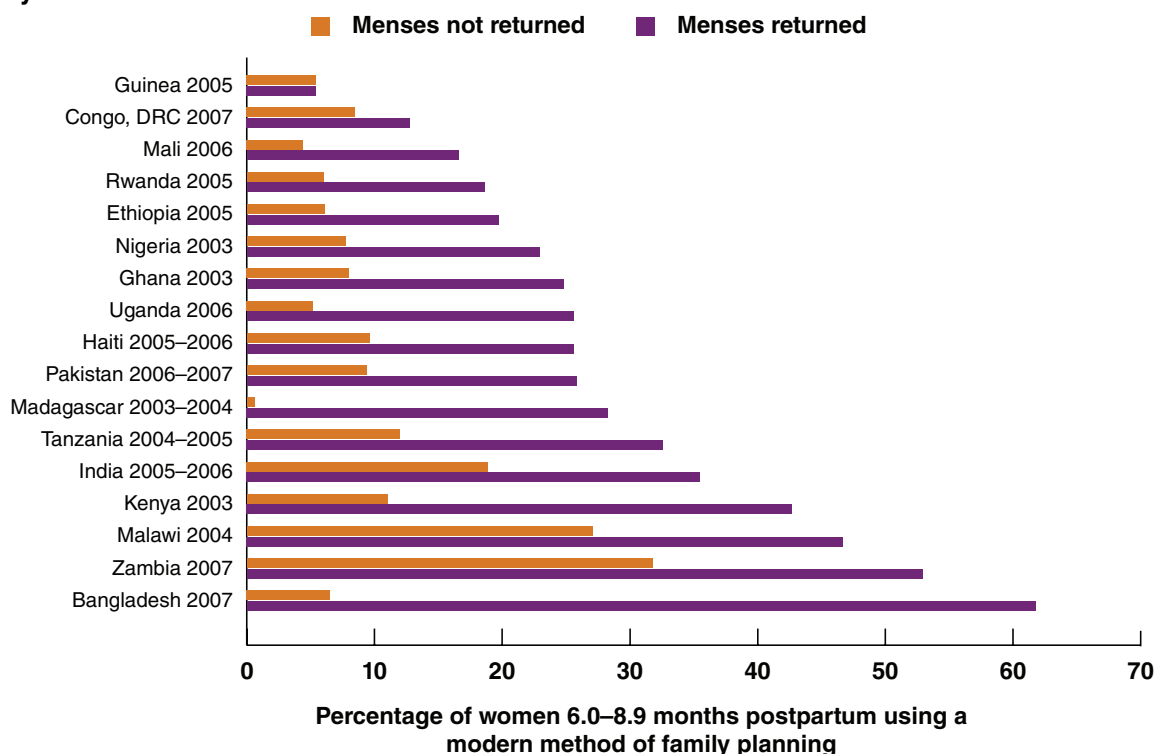
### Return of Menses and Family Planning Use

Women are frequently fertile postpartum before they realize it. Biologically a woman may ovulate before the first menstruation following a birth. The risk of ovulation preceding the first menstruation increases as the postpartum duration increases. In other words, the risk of pregnancy for women not using family planning increases as the postpartum period extends. Given that it is practically impossible to know when menses will return, women need to take measures to protect themselves immediately following birth if they want to delay their next pregnancy. Unfortunately many women do not initiate use of family planning until after menstruation has resumed. The extent of this problem varies widely by country. Figure 15 presents an analysis where the modern family planning use of women (6.0–8.9 months postpartum) whose menses has returned is compared to women whose menses has not returned.<sup>9</sup>

In all countries except Guinea, women whose menses has returned are more likely to be using modern family planning than women whose menses has not returned. In Madagascar and Bangladesh, women whose menses has returned are at least 10 times more likely to be using family planning than women whose menses has not returned. In both of these countries, the small percentage of amenorrheic women using family planning leaves little doubt that women and potentially service providers believe that they are not at risk of pregnancy before menses returns. In Tanzania, Kenya, Haiti, Uganda, Rwanda, Ghana, Nigeria, Ethiopia, Mali, the Democratic Republic of Congo and Pakistan, women whose menses has returned are twice as likely to be using family planning as those whose menses has not returned.

<sup>9</sup> The period 6.0–8.9 months postpartum was chosen to maximize the numbers of women whose menses has returned and whose menses has not returned respectively. In the period 0–6 months postpartum, there are relatively few women whose menses has returned. After 9 months, relatively few women have not had their menses return.

**Figure 15: Comparison of family planning use among women 6.0–8.9 months postpartum whose menses has returned and those whose menses has not returned, Demographic and Health Surveys 2003–2007**



### Use of Maternal Health Services and Family Planning Use

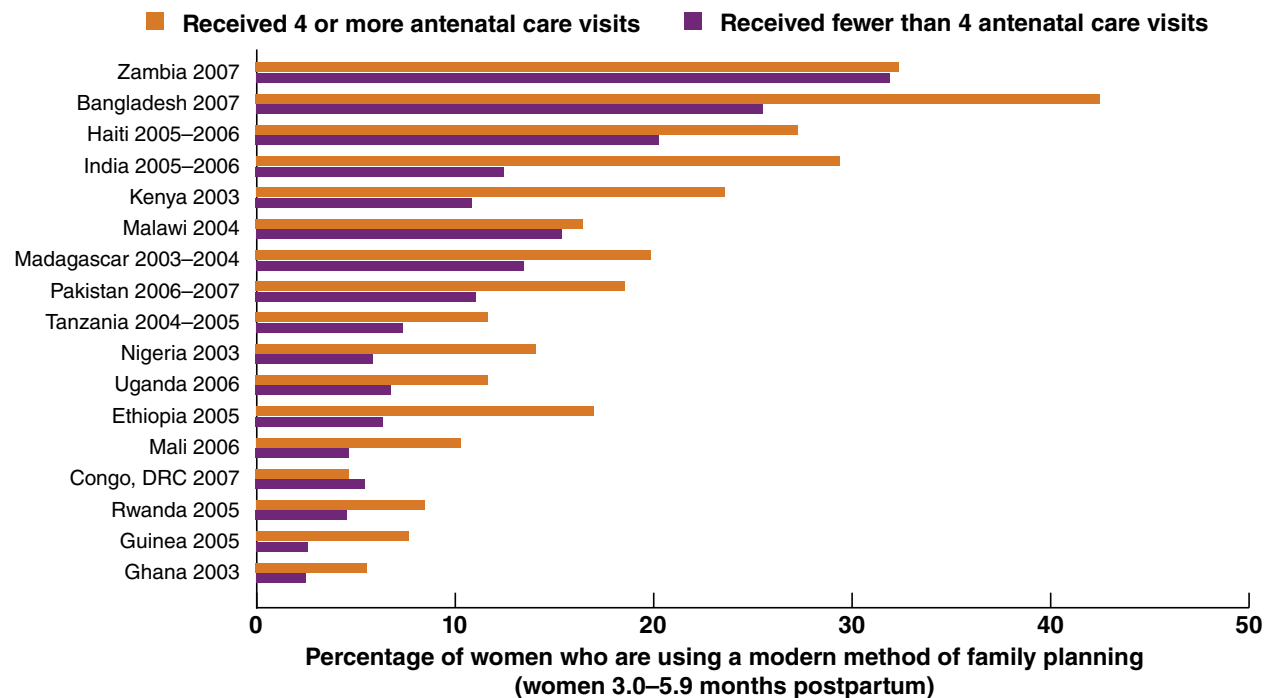
Recent data continue to show that meeting the need for family planning and maternal health services would have a dramatic effect on unintended pregnancies and maternal health. According to the Guttmacher Institute, unintended pregnancies would drop by two-thirds and 70% of maternal deaths would be averted (Singh et al. 2009). A potential avenue for meeting need in the extended postpartum period is by leveraging the contacts that women have with health personnel in the antenatal period and at the time of delivery. Conceptually, this avenue for increasing family planning use utilizes two approaches. First, the contacts that are already being made can be used to increase use. Second, the use of high-quality antenatal care and institutional deliveries can be increased. Postnatal care is not analyzed because of the inconsistent manner in which the Demographic and Health Surveys gather data on this service.

Figures 16 and 17 compare modern family planning use among women 3.0–5.9 months postpartum who have had adequate antenatal care (four or more visits)<sup>10</sup> versus those who have not; and women who delivered their babies in facilities versus those who did not. In all 15 countries, women who had adequate antenatal care or delivered in a facility were more likely to be using family planning in the extended postpartum period. In Ghana, Guinea, Mali, Nigeria, Kenya and India, women who had four or more antenatal care visits were more than twice as likely to use a modern method of family planning in the extended postpartum period. In Zambia and the Democratic Republic of Congo, the difference was relatively small.

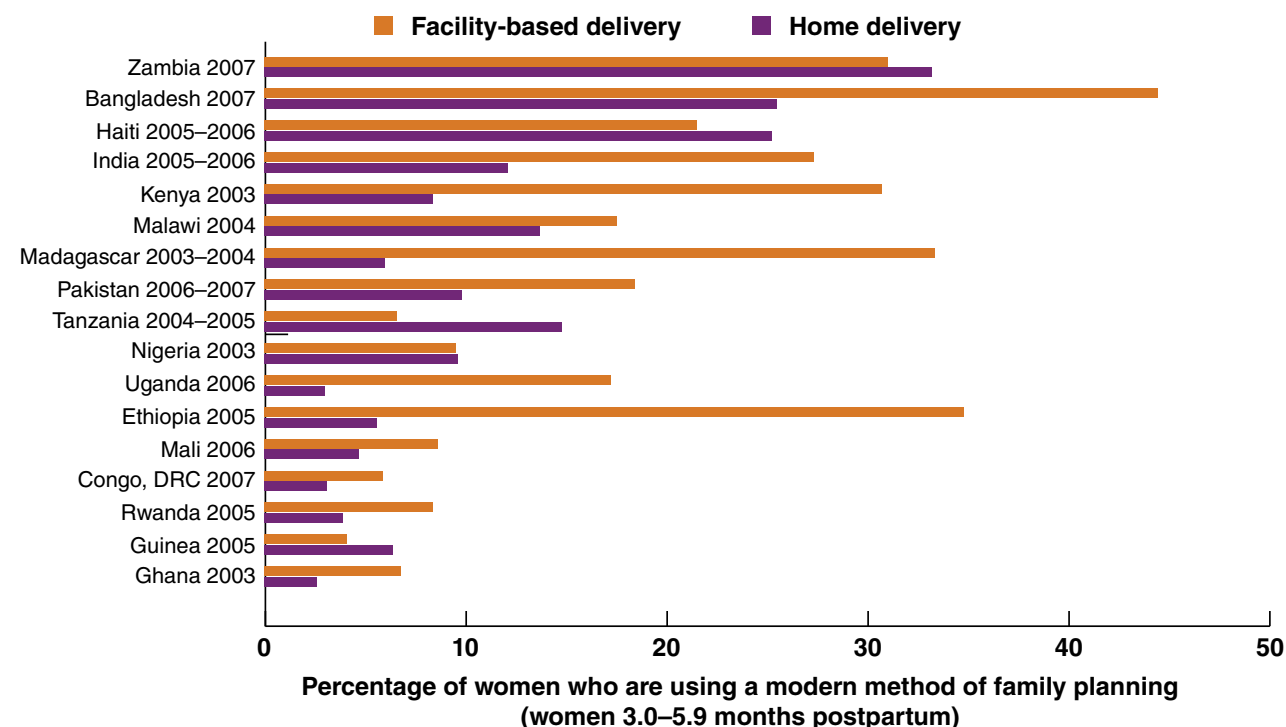
<sup>10</sup> WHO recommends a four-visit regime of antenatal care visits for women who do not pose risks. The structure of the DHS questionnaire does not allow a researcher to evaluate the content of the individual visits.

Figure 17 shows less of a consistent pattern. In 12 out of the 17 countries, women who delivered in a facility were more likely to be using a modern method of family planning at 3.0–5.9 months postpartum. In Bangladesh, India, Madagascar and Ethiopia, the differences were quite large.

**Figure 16: Percentage of women using a modern method of family planning disaggregated by use of antenatal care (women 3.0–5.9 months postpartum), Demographic and Health Surveys 2003–2007**



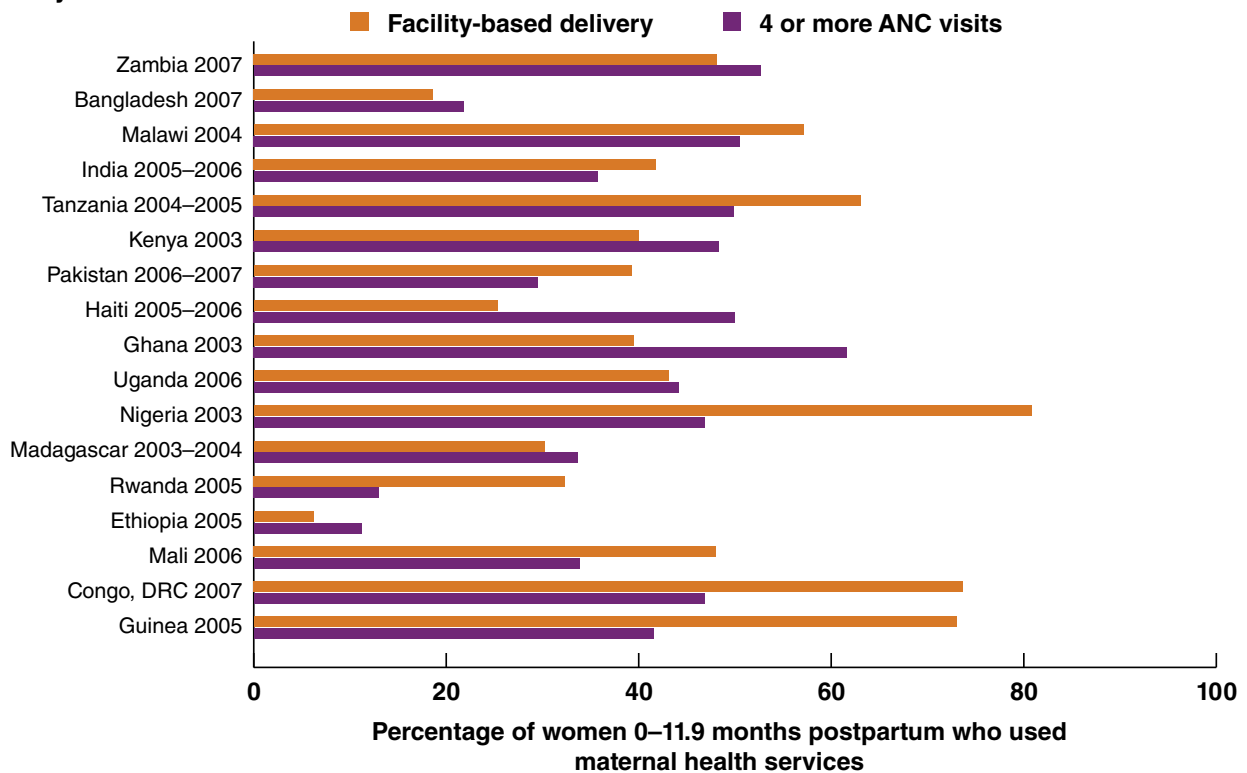
**Figure 17: Percentage of women using a modern method of family planning disaggregated by place of delivery (women 3.0–5.9 months postpartum), Demographic and Health Surveys 2003–2007**



The differences exposed above are meaningful only to the extent that women in a given country receive adequate antenatal care or deliver their babies in a facility. Figure 18 presents the percentages of all women in the first year postpartum who receive adequate antenatal care or deliver their babies in a facility. As was the case with the previous two figures, the countries are sorted from greatest to least use of family planning during the extended postpartum period. In spite of the apparent high use of maternal health services, very few women in Nigeria, the Democratic Republic of Congo and Guinea use family planning. At the other end of the spectrum, in Bangladesh few women use maternal health services but family planning use is relatively high in the extended postpartum period.

Logically, it would seem that if women who use antenatal care or deliver in facilities are more likely to use family planning, then the countries with highest use of these services would also have the greatest use of family planning during the extended postpartum period. This is not the case. In Figure 18, there does not appear to be any pattern to the levels of maternal health services among the countries (sorted by levels of family planning use during the extended postpartum period). Statistically, the country-by-country correlation between level of family planning use at 3.0–5.9 months postpartum and level of use of adequate antenatal care is small, at 0.086. For the level of use of delivery services, the correlation with family planning use during the extended postpartum period is actually negative, meaning that at the country level, greater use of facility-based deliveries is actually correlated with lower use of family planning services. This finding requires more investigation but a comparison of Guinea and Bangladesh is perhaps instructive. Use of family planning during the extended postpartum period in Bangladesh is relatively high, but use of delivery services is less than 20%. Guinea has the lowest level of family planning use during the extended postpartum period, but facility-based deliveries exceed 70%.

**Figure 18: Percentage of women with four or more antenatal care visits and percentage of women with facility-based deliveries (women 0–11.9 months postpartum), Demographic and Health Surveys 2003–2007**





## Discussion

The preceding analyses looked at behaviors in the extended postpartum period that may lead to longer birth intervals across 17 countries in the developing world. These countries are all poor, ranging in per capita income from a low of \$290 per capita in the Democratic Republic of Congo to \$2,740 in India.<sup>11</sup> The surveys analyzed include countries from Central Africa, East Africa, West Africa, South Asia and the Caribbean. The overall use of family planning ranges from a low of 9.1% in Guinea to a high of 56.3% in Bangladesh.

The analysis of the report concentrated on two main topics: country-level measures of behaviors in the extended postpartum period that are most likely to be correlated with longer birth intervals, and maternal health services that can be leveraged to increase the use of family planning services in the extended postpartum period. Implicit in these two approaches to analysis is the long-term goal of healthy mothers and babies. Longer birth intervals are correlated with lower infant and child mortality rates. Table 2 presents the levels of infant mortality for children where the preceding birth interval was less than 24 months, for children where the preceding birth interval was between 24 and 48 months, and for children where the preceding birth interval was greater than 48 months. In all 17 countries analyzed in this report, short birth intervals are associated with higher infant mortality rates.<sup>12</sup>

**Table 2: Infant mortality disaggregated by preceding birth interval, Demographic and Health Surveys 2003–2007**

INFANT MORTALITY RATE, 10 YEARS PRECEDING SURVEY			
Preceding Birth Interval			
	Less Than 24 Months	24.0–47.9 Months	48.0 Months or Greater
Bangladesh 2007	105.3	46.6	32.8
Congo, DRC 2007	144.9	75.0	61.8
Ethiopia 2005	133.8	58.0	37.6
Ghana 2003	131.3	48.9	55.3
Guinea 2005	171.6	105.4	47.4
Haiti 2005–2006	97.0	60.9	51.0
India 2005–2006	108.0	44.9	33.6
Kenya 2003	133.9	61.2	59.1
Madagascar 2003–2004	110.3	48.4	37.1
Malawi 2004	154.4	74.1	54.4
Mali 2006	157.8	85.2	54.5
Nigeria 2003	160.4	96.5	61.1
Pakistan 2006–2007	100.7	53.1	51.2
Rwanda 2005	149.1	82.1	77.7
Tanzania 2004–2005	143.4	66.2	61.9

<sup>11</sup> GNI per capita, PPP (current international \$). World Bank. 2009. World Development Indicators Online accessed September 1, 2009.

<sup>12</sup> Not all of the differences in lower infant mortality rates can be attributed to shorter birth intervals. Shorter birth intervals are also associated with greater use of infant health services, better maternal health care and better socio-economic status, which also contribute to better infant health outcomes.

INFANT MORTALITY RATE, 10 YEARS PRECEDING SURVEY			
Preceding Birth Interval			
	Less Than 24 Months	24.0–47.9 Months	48.0 Months or Greater
Uganda 2006	113.5	70.3	58.7
Zambia 2007	128.5	59.7	67.1

Macro International Inc, 2009. MEASURE DHS STATcompiler. <http://www.measuredhs.com>, September 1, 2009.

Greater use of maternal health services also has positive health benefits for both the mother and child. In other words, the analyses presented here can be viewed within the context of a virtuous circle where use of maternal health services leads to better birth outcomes, better use of family planning services in the extended postpartum period and better mortality outcomes for young children.

The relatively small number of countries analyzed in this report makes strong cross-national statements difficult. At several points in the report, scatter plots correlated a behavior in the extended postpartum period with an outcome. Only rarely were the indicators correlated with one another at a level that was statistically significant. The authors believe that the lack of correlation is in many cases a function of the relatively small number of countries in the sample rather than a true lack of association. Also, the lack of a correlation in a cross-country context does not mean that analysis at the level of the individual would not yield significant results.

Exclusive breastfeeding is recommended infants less than 6 months old. Exclusive breastfeeding contributes significantly to improved health outcomes for children, and breastfeeding is an important part of LAM for family planning. In the 17 countries analyzed here, levels of fully breastfeeding at 3.0–5.9 months postpartum ranged from almost 90% in Rwanda and Mali to less than 10% in Kenya. However, in our sample of countries, high levels of fully breastfeeding in a country do not automatically associate with longer birth intervals for that country. There was not a statistically significant correlation between longer birth intervals and levels of fully breastfeeding. The biological pathway for the fertility-reducing effect of breastfeeding is via delayed return of menses. The correlation between the return of menses and fully breastfeeding at 3.0–5.9 months postpartum is stronger than the correlation between fully breastfeeding and birth intervals. The stronger, but not significant, correlation could be indicative of either strong use of family planning in countries where the period of breastfeeding is short (e.g., Bangladesh) or the influence of countries where breastfeeding is not practiced as part of LAM (e.g., Rwanda).<sup>13</sup>

In this sample of countries, it appears that breastfeeding without the broader educational and behavioral context of LAM does not necessarily lead to shorter birth intervals. However, high levels of breastfeeding should provide an excellent base from which to launch efforts to expand use of a rigorous LAM program.

<sup>13</sup> A preliminary cross-country analysis not presented here found significant correlations between “any breastfeeding” and birth intervals; and “fully breastfeeding” and birth intervals. A future draft of this paper will investigate alternative definitions of breastfeeding.

In contrast to fully breastfeeding, abstinence in the extended postpartum period has a direct and unambiguous impact on fertility. Among the 17 countries analyzed, the percentage of women 3.0–5.9 months postpartum who have not returned to sexual activity ranges from almost 95% in Guinea to less than 15% in Bangladesh. The correlation between the percentage of women who are sexually active at 3.0–5.9 months postpartum and the percentage of births with short intervals is strong and statistically significant. However, the correlation between sexual activity at 3.0–5.9 months and the percentage of intervals shorter than 36 months is not as strong and not statistically significant, perhaps indicating that the women with long periods of abstinence after giving birth do not necessarily use a method of family planning after they resume sexual activity. In countries where the period of abstinence during the extended postpartum period is particularly long, family planning programs may want to include elements of education that discuss what can be done to space births after sexual activity resumes.

In general, women in the first year postpartum are less likely to be using family planning than married women in the general population. The largest gap between women in the first year postpartum and all survey women is in India, where a relatively high percentage of family planning users have accepted sterilization as their method of choice. In all 17 countries, the level of need for family planning significantly exceeds the use of family planning services. The level of use of a family planning method by the end of the extended postpartum period is relatively strong but not significantly correlated with the percentage of birth intervals that exceed 36 months.

Part of the reason for the lack of strong correlation between use of family planning and extended birth intervals may be the timing of family planning acceptance in the extended postpartum period. This paper presented circumstantial evidence that women in many countries wait for the return of menses to begin use of family planning. In Bangladesh, women 6.0–8.9 months postpartum whose menses has returned are more than 10 times more likely to use family planning than women whose menses has not returned. Salway and Sufia (1998) noted in Bangladesh that women's concern for their health and their children's health can militate against uptake of family planning before menses has returned. They recommend a strong program supporting LAM.

In 12 of the 17 countries, women who delivered in a facility were more likely to be using family planning in the extended postpartum period. This observation may be partially caused by the fact that, across countries, wealthier women are more likely to use family planning and wealthier women are much more likely to use birth delivery services (USAID | Health Policy Initiative 2007). The same set of motives that lead wealthy women to deliver their babies in a facility may lead them to use family planning services. Somewhat backing up this notion is the emphatic relationship between the use of antenatal services and use of family planning services. In the Health Policy Initiative report cited above, the use of antenatal care was more equitable than the use of facility-based deliveries.

In spite of this potential confusion of causality, all contacts with health personnel can be leveraged for greater use of family planning services in the extended postpartum period. Two sets of mutually reinforcing efforts can be pursued in this regard. First, existing maternal health services can be improved to promote family planning during the extended postpartum period and educate women on their options. In a country like the Democratic Republic of Congo with relatively high use of maternal health services and low use of family planning services, opportunities do exist for better

family planning counseling. Second, access to maternal health services can be expanded to more women. In a country like Bangladesh, there is a large difference in family planning use between women with access to maternal health services and those without, but the use of maternal health services is low. Improved access to health services could improve the situation.

## Conclusion

---

While this paper has contributed to our understanding of contraception use during the extended postpartum period at an aggregate level, it is worthwhile noting that actions taken or not during this critical period can affect maternal, infant and child health outcomes, which are most keenly felt at the individual level. Much more remains to be done to increase our understanding of the needs for contraception during the extended postpartum period as well as to address those needs more effectively through the provision of information and services. But the need for research does not imply a need to slow efforts, and several strong conclusions can be made.

**Unmet need for family planning in the postpartum period is best measured prospectively.** Unmet need, for better or worse, is the measure of need for family planning that is used in global and national advocacy. Postpartum family planning champions should be careful to present prospective unmet need in order to communicate the true extent of the need for family planning.

**LAM has potential to contribute to addressing unmet need.** In many countries with a very high unmet need for family planning, there is also a relatively high incidence of breastfeeding—a key element of LAM. Providers should capitalize on the dual benefit to mother and baby of exclusive breastfeeding for 6 months as the best nutrition for the baby and the contraceptive benefits of LAM for infant, child and maternal health.

**Health professionals and women must understand that fertility frequently precedes the return of menses.** Even in countries with relatively high rates of family planning use during the extended postpartum period, many women do not use family planning until their menses has returned. Health providers and promoters need to make sure that women know that pregnancy may occur before the return of menses.

**Contact with health professionals and the formal health system is important.** Women who receive adequate antenatal care are more likely to use family planning in the postpartum period. Efforts to increase use of antenatal care services that integrate family planning counseling will yield greater use of family planning in the post partum period.

## Appendix

**Table A-1: Use of family planning among married women aged 15–49, Demographic and Health Surveys 2003–2007**

	ANY METHOD	ANY MODERN METHOD (INCLUDING LAM)	LACTATIONAL AMENORRHEA METHOD	NUMBER OF OBSERVATIONS
Bangladesh 2007	55.8	47.5	0	10,192
Congo, DRC 2007	20.6	5.8	0	6,622
Ethiopia 2005	14.7	13.9	0.2	9,066
Ghana 2003	25.2	18.7	0.3	3,549
Guinea 2005	9.1	5.7	1.7	6,292
Haiti 2005–2006	32	24.8	1.2	6,323
India 2005–2006	56.3	48.5	0	93,089
Kenya 2003	39.3	31.5	0	4,919
Madagascar 2003–2004	27.1	18.3	1.6	5,140
Malawi 2004	32.5	28.1	0	8,312
Mali 2006	8.2	6.9	0.5	12,365
Nigeria 2003	12.6	8.2	1.4	5,336
Pakistan 2006–2007	29.6	21.7	0	9,556
Rwanda 2005	17.4	10.3	0.8	5,510
Tanzania 2004–2005	26.4	20	0.5	6,950
Uganda 2006	23.7	17.9	0	5,337
Zambia 2007	40.8	32.7	6.2	4,402

**Table A-2: Unmet need for family planning, prospective and retrospective definition among postpartum women whose most recently born baby lives with them, Demographic and Health Surveys 2003–2007**

	<b>RETROSPECTIVE UNMET NEED FOR FAMILY PLANNING</b>	<b>PROSPECTIVE UNMET NEED FOR FAMILY PLANNING</b>	<b>NUMBER OF OBSERVATIONS</b>
Bangladesh 2007	16.1	49.6	1,099
Congo, DRC 2007	29.1	67.6	1,727
Ethiopia 2005	40.4	88.2	2,198
Ghana 2003	42.1	84.7	676
Guinea 2005	21.5	77.5	1,342
Haiti 2005–2006	45.2	76.3	1,116
India 2005–2006	29.4	66.9	10,309
Kenya 2003	33.8	72.7	1,230
Madagascar 2003–2004	21.9	77.8	1,215
Malawi 2004	31.0	73.0	2,271
Mali 2006	27.1	81.0	2,758
Nigeria 2003	19.2	65.8	1,303
Pakistan 2006–2007	39.3	67.6	1,765
Rwanda 2005	40.5	87.7	1,705
Tanzania 2004–2005	24.1	77.3	1,739
Uganda 2006	45.1	82.6	1,556
Zambia 2007	25.8	60.2	1,269

**Table A-3: Fully breastfeeding and use of the Lactational Amenorrhea Method among women in the postpartum period (disaggregated by trimester), Demographic and Health Surveys 2003–2007**

	0–2.9 MONTHS POSTPARTUM			3.0–5.9 MONTHS POSTPARTUM			6.0–8.9 MONTHS POSTPARTUM			9.0–11.9 MONTHS POSTPARTUM		
	LAM	Full Breastfeeding	N	LAM	Full Breastfeeding	N	LAM	Full Breastfeeding	N	LAM	Full Breastfeeding	N
Bangladesh 2007	0.0	73.6	205	0.0	40.2	278	0.0	13.0	339	0.0	4.4	276
Congo, DRC 2007	0.0	77.0	457	0.0	41.2	470	0.0	7.9	421	0.0	11.1	379
Ethiopia 2005	0.0	74.9	555	0.4	53.2	587	0.7	23.4	598	0.2	11.0	459
Ghana 2003	0.0	92.2	138	1.3	65.7	168	1.3	35.1	200	1.1	12.8	169
Guinea 2005	3.3	85.8	391	3.8	74.8	359	3.6	46.3	322	5.2	26.1	270
Haiti 2005–2006	13.9	67.6	255	10.5	35.1	310	2.8	7.7	288	0.6	1.9	264
India 2005–2006	0.0	81.3	2,187	0.0	60.3	2,893	0.0	29.5	2,913	0.0	13.2	2,324
Kenya 2003	0.0	44.8	296	0.0	8.2	311	0.0	4.2	295	0.0	1.8	328
Madagascar 2003–2004	13.2	92.4	289	13.6	71.8	322	1.0	23.6	341	0.1	2.5	263
Malawi 2004	0.0	83.7	535	0.0	56.9	557	0.0	20.7	602	0.0	4.4	576
Mali 2006	0.6	94.1	698	2.8	88.6	760	1.8	66.7	674	1.9	36.3	626
Nigeria 2003	2.2	80.6	303	3.8	58.7	355	5.0	30.3	352	3.1	13.4	293
Pakistan 2006–2007	0.0	61.3	457	0.0	47.7	498	0.0	25.7	443	0.0	12.7	368
Rwanda 2005	1.2	97.4	436	1.2	85.2	446	1.8	25.0	408	1.3	5.8	415
Tanzania 2004–2005	1.1	81.2	431	0.8	36.6	406	1.8	5.5	458	2.1	1.7	445
Uganda 2006	0.0	87.5	394	0.0	51.2	394	0.0	16.9	396	0.0	6.0	371
Zambia 2007	8.8	90.1	309	21.6	48.8	324	17.8	4.2	315	13.9	2.7	322

**Table A-4: Percentage of postpartum women who are sexually active among women in the postpartum period (disaggregated by trimester), Demographic and Health Surveys 2003–2007**

	0-2.9 MONTHS POSTPARTUM		3.0-5.9 MONTHS POSTPARTUM		6.0-8.9 MONTHS POSTPARTUM		9.0-11.9 MONTHS POSTPARTUM	
	Sexually Active	N	Sexually Active	N	Sexually Active	N	Sexually Active	N
Bangladesh 2007	32.8	205	87.0	278	93.2	339	91.3	276
Congo, DRC 2007	16.3	457	46.2	470	62.6	421	67.7	379
Ethiopia 2005	25.6	555	71.7	587	84.9	598	89.5	459
Ghana 2003	3.0	138	22.4	168	36.8	200	56.5	169
Guinea 2005	2.3	391	5.0	359	11.1	322	10.0	270
Haiti 2005-2006	10.7	255	64.0	310	84.9	288	83.6	264
India 2005-2006	28.6	2,187	70.8	2,893	86.9	2,913	91.0	2,324
Kenya 2003	23.0	296	65.2	311	73.7	295	80.6	328
Madagascar 2003-2004	18.8	289	59.3	322	73.8	341	83.3	263
Malawi 2004	8.5	535	33.3	557	63.1	602	76.7	576
Mali 2006	28.3	698	75.4	760	80.1	674	85.8	626
Nigeria 2003	20.9	303	60.1	355	65.2	352	71.2	293
Pakistan 2006-2007	26.0	457	84.2	498	84.5	443	92.9	368
Rwanda 2005	67.1	436	87.3	446	88.5	408	89.4	415
Tanzania 2004-2005	20.4	431	52.2	406	68.0	458	74.0	445
Uganda 2006	29.0	394	69.0	394	81.6	396	89.3	371
Zambia 2007	11.6	309	53.0	324	73.2	315	76.5	322



**Table A-5: Percentage of postpartum women whose menses has returned (disaggregated by trimester), Demographic and Health Surveys 2003–2007**

	0–2.9 MONTHS POSTPARTUM		3.0–5.9 MONTHS POSTPARTUM		6.0–8.9 MONTHS POSTPARTUM		9.0–11.9 MONTHS POSTPARTUM	
	Menses Returned	N	Menses Returned	N	Menses Returned	N	Menses Returned	N
Bangladesh 2007	13.1	205	39.0	278	53.9	339	68.3	276
Congo, DRC 2007	7.8	457	21.3	470	29.2	421	42.3	379
Ethiopia 2005	5.1	555	14.2	587	16.3	598	22.8	459
Ghana 2003	1.4	138	17.7	168	31.0	200	43.3	169
Guinea 2005	3.5	391	12.5	359	21.6	322	33.1	270
Haiti 2005–2006	4.9	255	27.9	310	35.8	288	55.9	264
India 2005–2006	12.4	2,187	34.1	2,893	48.4	2,913	62.4	2,324
Kenya 2003	6.3	296	25.2	311	38.5	295	46.1	328
Madagascar 2003–2004	9.5	289	21.1	322	38.6	341	45.1	263
Malawi 2004	6.4	535	16.0	557	25.2	602	39.4	576
Mali 2006	5.0	698	15.0	760	23.4	674	40.4	626
Nigeria 2003	7.0	303	20.7	355	30.6	352	37.0	293
Pakistan 2006–2007	18.5	457	49.8	498	69.3	443	72.9	368
Rwanda 2005	4.4	436	10.2	446	21.1	408	27.6	415
Tanzania 2004–2005	5.7	431	15.7	406	27.8	458	39.5	445
Uganda 2006	5.2	394	20.4	394	29.4	396	38.7	371
Zambia 2007	3.5	309	11.7	324	29.6	315	40.5	322

**Table A-6: Percentage of women 3.0–5.9 months postpartum whose menses has not returned (disaggregated by breastfeeding status), Demographic and Health Surveys 2003–2007**

	NOT FULLY BREASTFEEDING	N	FULLY BREASTFEEDING	N	BREASTFEEDING AND LIQUIDS ONLY	N	BREASTFEEDING WITH COMPLEMENTARY FOODS OR NOT BREASTFEEDING	N
Bangladesh 2007	50.1	272	62.9	60	49.3	114	50.7	158
Congo, DRC 2007	70.5	383	75.7	60	65.3	119	72.9	263
Ethiopia 2005***	82.1	429	89.7	152	85.3	255	77.3	174
Ghana 2003	77.1	136	76.3	66	85.5	66	69.1	70
Guinea 2005***	83.9	306	89.0	57	86.5	219	77.6	87
Haiti 2005–2006	65.8	225	79.2	53	63.2	84	67.3	141
India 2005–2006****	58.2	2,209	70.3	683	62.8	1,449	49.2	759
Kenya 2003	67.8	290	*	8	70.3	77	66.9	214
Madagascar 2003–2004	74.3	182	71.5	132	81.1	54	71.3	127
Malawi 2004	79.3	447	81.1	106	83.4	168	76.9	279
Mali 2006***	82.5	574	84.0	168	84.8	496	67.4	78
Nigeria 2003	77.3	330	(65.0)	29	74.8	181	80.3	150
Pakistan 2006–2007	37.0	403	53.7	92	39.6	290	30.4	113
Rwanda 2005***	78.7	140	88.6	296	77.6	64	79.5	76
Tanzania 2004–2005	80.8	387	(80.6)	38	84.9	82	79.7	305
Uganda 2006	78.5	267	74.0	124	78.5	148	78.6	119
Zambia 2007*	81.6	247	89.6	84	(87.7)	25	80.9	222
( ) between 25 and 49 observations								

\* less than 25 observations

\*\* p<.05 in a chi-squared test on the implicit 2x2 table of fully breastfeeding versus not fully breastfeeding

\*\*\* p<.05 in a chi-squared test on the implicit 3x2 table of fully breastfeeding versus liquids only versus complementary feeding and not breastfeeding

**Table A-7: Percentage of postpartum women using modern family planning services (disaggregated by trimester), Demographic and Health Surveys 2003–2007**

	0–2.9 MONTHS	N	3.0–5.9 MONTHS	N	6.0–8.9 MONTHS	N	9.0–11.9 MONTHS	N
Bangladesh 2007	7.1	205	28.8	278	34.1	339	44.2	276
Congo, DRC 2007	2.6	457	5.1	470	5.3	421	10.3	379
Ethiopia 2005	1.2	555	7.8	587	7.7	598	9.2	459
Ghana 2003	0.6	138	4.4	168	15.3	200	15.3	169
Guinea 2005	3.7	391	4.7	359	4.4	322	5.4	270
Haiti 2005–2006	15.6	255	24.1	310	15.8	288	18.5	264
India 2005–2006	7.6	2,187	18.6	2,893	24.3	2,913	29.3	2,324
Kenya 2003	2.2	296	16.9	311	18.9	295	25.6	328
Madagascar 2003–2004	13.3	289	15.6	322	9.8	341	13.1	263
Malawi 2004	4.0	535	16.0	557	25.1	602	35.1	576
Mali 2006	1.8	698	6.6	760	7.2	674	9.2	626
Nigeria 2003	5.5	303	9.5	355	10.1	352	13.2	293
Pakistan 2006–2007	2.8	457	13.1	498	18.5	443	21.4	368
Rwanda 2005	1.7	436	5.1	446	8.5	408	9.5	415
Tanzania 2004–2005	4.7	431	9.6	406	20.0	458	20.2	445
Uganda 2006	2.4	394	9.0	394	14.3	396	13.1	371
Zambia 2007	10.4	309	32.2	324	39.0	315	40.3	322

**Table A-8: Percentage of postpartum women with unmet need for family planning services (disaggregated by trimester), Demographic and Health Surveys 2003–2007**

	0–2.9 MONTHS	N	3.0–5.9 MONTHS	N	6.0–8.9 MONTHS	N	9.0–11.9 MONTHS	N
Bangladesh 2007	84.8	205	52.7	278	42.7	339	28.8	276
Congo, DRC 2007	77.3	457	70.1	470	64.3	421	56.6	379
Ethiopia 2005	92.2	555	87.8	587	87.3	598	85.2	459
Ghana 2003	98.5	138	91.5	168	75.7	200	77.3	169
Guinea 2005	78.5	391	82.4	359	78.1	322	68.6	269
Haiti 2005–2006	83.3	255	74.1	310	77.9	288	70.4	264
India 2005–2006	85.1	2,187	70.2	2,892	60.7	2,907	53.5	2,323
Kenya 2003	91.7	296	74.1	311	68.8	295	57.5	328
Madagascar 2003–2004	82.3	289	76.8	322	76.9	341	75.3	263
Malawi 2004	92.9	535	76.8	557	67.7	602	56.2	626
Mali 2006	90.7	698	82.1	760	78.7	674	71.4	576
Nigeria 2003	79.8	303	64.0	355	61.5	352	58.9	293
Pakistan 2006–2007	87.5	457	68.5	497	59.9	442	50.8	368
Rwanda 2005	95.0	436	90.1	446	84.5	408	80.8	415
Tanzania 2004–2005	91.7	431	81.9	406	70.5	458	66.2	445
Uganda 2006	93.0	394	84.8	394	76.3	396	75.9	371
Zambia 2007	87.4	309	60.2	324	49.3	315	44.6	322

**Table A-9: Percentage of women 6.0–8.9 and 9.0–11.9 months postpartum who are using modern family planning (disaggregated by whether menses has returned or not), Demographic and Health Surveys 2003–2007**

	6.0–8.9 MONTHS				9.0–11.9 MONTHS			
	Menses not Returned	N	Menses Returned	N	Menses not Returned	N	Menses Returned	N
Bangladesh 2007	5.0	156	59.0	183	6.5	88	61.8	189
Congo, DRC 2007	4.1	299	8.3	122	8.5	220	12.8	159
Ethiopia 2005	4.4	500	24.8	98	6.1	355	19.7	105
Ghana 2003	8.3	139	30.8	62	8.0	96	24.8	73
Guinea 2005	3.6	252	7.0	69	5.4	181	5.4	89
Haiti 2005–2006	9.3	185	27.5	103	9.6	116	25.6	147
India 2005–2006	18.1	1,505	30.9	1,408	18.9	874	35.5	1,450
Kenya 2003	11.5	181	30.9	113	11.0	177	42.7	151
Madagascar 2003–2004	2.8	209	20.9	131	0.6	145	28.3	119
Malawi 2004	18.3	461	47.1	141	27.1	343	46.7	233
Mali 2006	4.8	504	14.0	170	4.4	380	16.6	246
Nigeria 2003	9.2	244	12.2	108	7.7	186	22.9	107
Pakistan 2006–2007	4.9	137	24.5	305	9.4	100	25.8	269
Rwanda 2005	3.9	322	25.8	86	6.0	301	18.6	114
Tanzania 2004–2005	11.4	330	42.2	127	12.0	269	32.6	176
Uganda 2006	3.2	279	41.0	116	5.2	228	25.6	143
Zambia 2007	33.2	222	52.6	93	31.8	192	52.9	130

**Table A-10: Percentage of women 9.0–11.9 months postpartum using modern family planning services (disaggregated by use of antenatal care and facility-based delivery), Demographic and Health Surveys 2003–2007**

	RECEIVED LESS THAN 4 ANTENATAL CARE VISITS	N	RECEIVED 4 OR MORE ANTENATAL CARE VISITS	N	DELIVERED AT HOME	N	DELIVERED IN A HEALTH FACILITY	N
Bangladesh 2007	25.5	223	42.5	55	25.5	229	44.4	49
Congo, DRC 2007	5.5	232	4.7	238	3.1	134	5.9	336
Ethiopia 2005	6.4	509	17.0	78	5.6	542	34.8	44
Ghana 2003	2.5	66	5.6	103	2.6	97	6.8	71
Guinea 2005	2.6	217	7.7	143	6.4	92	4.1	267
Haiti 2005–2006	20.3	141	27.3	169	25.2	220	21.5	90
India 2005–2006	12.5	1,846	29.4	1,047	12.1	1,659	27.3	1,234
Kenya 2003	10.9	164	23.6	147	8.4	193	30.7	118
Madagascar 2003–2004	13.5	219	19.9	103	6.0	209	33.3	113
Malawi 2004	15.4	252	16.5	305	13.7	221	17.5	336
Mali 2006	4.7	499	10.3	261	4.7	386	8.6	374
Nigeria 2003	5.9	197	14.1	157	9.6	50	9.5	304
Pakistan 2006–2007	11.1	362	18.6	136	9.8	303	18.4	195
Rwanda 2005	4.6	385	8.5	61	3.9	326	8.4	120
Tanzania 2004–2005	7.4	195	11.7	211	14.8	151	6.6	254
Uganda 2006	6.8	220	11.7	174	3.0	229	17.2	166
Zambia 2007	31.9	154	32.4	169	33.2	170	31.0	154

**Table A-11: Percentage of women 0–11.9 months postpartum who used maternal health services, Demographic and Health Surveys 2003–2007**

	RECEIVED LESS THAN 4 ANTENATAL CARE VISITS	RECEIVED 4 OR MORE ANTENATAL CARE VISITS	N	DELIVERED AT HOME	DELIVERED IN A HEALTH FACILITY	N
Bangladesh 2007	78.2	21.8	1,099	81.4	18.6	1,099
Congo, DRC 2007	53.2	46.8	1,718	74.1	25.9	1,727
Ethiopia 2005	88.8	11.2	2,198	6.2	93.8	2,198
Ghana 2003	38.4	61.6	676	39.4	60.6	676
Guinea 2005	58.5	41.5	1,343	71.6	28.4	1,343
Haiti 2005–2006	50.0	50.0	1,116	74.7	25.3	1,116
India 2005–2006	64.3	35.7	10,317	41.8	58.2	10,317
Kenya 2003	51.7	48.3	1,229	60.0	40.0	1,230
Madagascar 2003–2004	66.4	33.6	1,215	69.8	30.2	1,215
Malawi 2004	49.5	50.5	2,271	42.9	57.1	2,271
Mali 2006	66.2	33.8	2,758	48.0	52.0	2,758
Nigeria 2003	53.2	46.8	1,302	65.2	34.8	1,303
Pakistan 2006–2007	70.5	29.5	1,764	39.3	60.7	1,766
Rwanda 2005	87.0	13.0	1,705	32.3	67.7	1,705
Tanzania 2004–2005	50.2	49.9	1,739	53.2	46.8	1,739
Uganda 2006	55.9	44.1	1,556	44.0	56.0	1,556
Zambia 2007	47.5	52.6	1,269	48.1	51.9	1,269





## References

---

- Ahmed S and Mosley WH. 2002. Simultaneity in the use of maternal-child health care and contraceptives: Evidence from developing countries. *Demography*, 39: 75–93.
- Baschieri A and Hinde A. 2007. The proximate determinants of fertility and birth intervals in Egypt: An application of calendar data. *Demographic Research* 16: 59–96.
- Becker S and Ahmed S. 2001. Dynamics of contraceptive use and breastfeeding during the postpartum period in Peru and Indonesia. *Population Studies* 55: 165–179.
- Benefo KD. 1995. The determinants of the duration of post partum sexual abstinence I West Africa: A study of the Yoruba in Nigeria. *Demography* 32: 139–157.
- Borda M and Winfrey W. 2006. *Family Planning Needs during the Extended Postpartum Period in Kenya*. Futures/Constella for ACCESS-FP, Jhpiego: Baltimore, Maryland.
- Caldwell JC and Caldwell P. 1977. The role of marital sexual abstinence in determining fertility: A study of Yoruba in Nigeria. *Population Studies* 31: 193–217.
- Cleland J, Bernstein S, Ezeh A, Faundes A, Glasier A, Innis J. 2006. Family planning: The unfinished agenda. *Lancet Series, Sexual and Reproductive Health*: 368.
- Cleland JG, Ali M, Capo-Chichi V. 1999. Post-partum sexual abstinence in West Africa: Implications for AIDS-control and family planning programmes. *AIDS* 13(1): 125–131.
- Conde-Agudelo A, Rosas-Bermudez A, Kafury-Goeta A. 2006. Birth spacing and risk of adverse perinatal outcomes: A meta-analysis. *Journal of the American Medical Association* 295: 1809–1822.
- Desgrees-du-lou A and Brou H. 2005. Resumption of sexual relations following childbirth: Norms, practices and reproductive health issues in Abidjan, Côte d’Ivoire. *Reproductive Health Matters* 13: 155–163.
- Diaz S et al. 1988. Lactational amenorrhea and the recovery of ovulation and fertility in fully nursing Chilean women. *Contraception* 38: 53–67.
- Forste R. 1995. Effects of lactation and contraceptive use on birth-spacing in Bolivia. *Social Biology* 42: 108–123.
- Guttmacher Institute. 2008. “In Brief: Facts on Induced Abortion Worldwide.” Accessed on June 18, 2009. At: [http://www.guttmacher.org/pubs/fb\\_IAW.pdf](http://www.guttmacher.org/pubs/fb_IAW.pdf).
- Guttmacher Institute. 2008. *Sharing Responsibility: Women, Society and Abortion Worldwide*. New York.
- Hotchkiss D, Magnani J, Rous M, Azelmat T, Mroz JH. 1999. The effects of maternal-child health service utilization on subsequent contraceptive use in Morocco. *Journal of Bioscience*: 31: 145–165.

- Hotchkiss D, Rous J, Seiber E, Berruti A. 2005. Is maternal and child health service use a causal gateway to subsequent contraceptive use? A multi-country study. *Population Research and Policy Review* 24: 543–571.
- Jain A and Bongaarts J. 1981. Breastfeeding: Patterns, correlates, and fertility effects. *Studies in Family Planning* 12: 79–99.
- Kennedy K and Trussell J. 2004. Postpartum contraception and lactation, in *Contraceptive Technology*, 18th Edition. Hatcher R et al. (eds). Ardent Media, Inc.: New York.
- Labbok MH et al. Multicenter study of the lactational amenorrhea method (LAM): Efficacy, duration, and implication for clinical application. *Contraception* 89:327–36.
- Ross J and Winfrey W. 2001. Contraceptive use, intention to use and unmet need during the extended postpartum period. *International Family Planning Perspectives* 27: 20–27.
- Salway S and Sufia N. 1998. Uptake of contraception during postpartum amenorrhoea: Understandings and preferences of poor, urban women in Bangladesh. *Social Science and Medicine* 4: 899–909.
- Seiber E, Hotchkiss D, Rous J, Berruti A. 2005. Maternal and child health and family planning service utilization in Guatemala: Implications for service integration. *Social Science and Medicine* 61: 279–291.
- Setty-Venugopal V and Upadhyay UD. 2002. *Birth Spacing: Three to Five Saves Lives*. Population Reports, Series L, No. 13. Johns Hopkins Bloomberg School of Public Health, Population Information Program: Baltimore, Maryland.
- Singh S et al. 2009. *Adding It Up: The Costs and Benefits of Investing in Family Planning and Maternal and Newborn Health*. Guttmacher Institute and United Nations Population Fund: New York.
- Smith, D. 1985. Breastfeeding, contraception, and birth intervals in developing countries. *Studies in Family Planning* 16: 154–163.
- USAID | Health Policy Initiative. 2007. *Inequalities in the Use Family Planning and Reproductive Health Services: Implications for Policies and Programs*.
- Westoff C and Ochoa L. 1991. Unmet need and the demand for family planning. *Demographic and Health Survey Comparative Studies* 5.
- World Health Organization (WHO). 2006. *Report of a WHO Technical Consultation on Birth Spacing. Geneva Switzerland, 13–15 June 2004*. WHO: Geneva.
- Zerai A and Ong-Tsui A. 2001. The relationship between prenatal care and subsequent modern contraceptive use in Bolivia, Egypt and Thailand. *African Journal of Reproductive Health* 5: 68–82.