MEETING REPORT

Let's talk about fertility awareness:

Implications for reproductive health

Institute for Reproductive Health, Georgetown University

July 2013

USAID FROM THE AMERICAN PEOPLE

FAM PROJECT IRH GEORGETOWN UNIVERSITY

This meeting report was prepared by the Institute for Reproductive Health at Georgetown University.

The Institute for Reproductive Health (IRH) is part of the Georgetown University Medical Center, an internationally recognized academic medical center with a three-part mission of research, teaching and patient care. IRH is a leading technical resource and learning center committed to developing and increasing the availability of effective, easy-to-use, fertility awareness-based methods (FAM) of family planning.

IRH was awarded the 5-year Fertility Awareness-Based Methods (FAM) Project by the United States Agency for International Development (USAID) in September 2007. This 5-year project aims to increase access and use of FAM within a broad range of service delivery programs using systems-oriented scaling up approaches.

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Acronyms

CPR	Contraceptive Prevalence Rate
CYP	Couple-years of Protection
FAM	Fertility Awareness-based Methods
IRH	Institute for Reproductive Health, Georgetown University
LAM	Lactational Amenorrhea Method
SDM	Standard Days Method®
SRH	Sexual and Reproductive Health
STI	Sexually Transmitted Infection
USAID	United States Agency for International Development

Acknowledgements

This report is the result of a half-day consultation organized by the Institute for Reproductive Health at Georgetown University (IRH) under the USAID-supported Fertility Awareness-based Methods (FAM) Project. The consultation was conducted in July 2013 at the International Center for Research on Women (ICRW), in Washington, DC.

The consultation was based on months of preparation by a team of IRH staff and consultants. Background preparations included a literature review of the available data related to fertility awareness and its effect on reproductive health attitudes and behaviors. This extensive review of the literature was conducted by Kimberly Aumack-Yee and Starr Hilliard to whom we express our appreciation for their outstanding work. Subsequently, they compiled the results into a white paper which provided the evidence-base for the consultation (Appendix B).

We are particularly grateful to all the participants in the consultation who offered their expert opinion and engaged with open minds regarding the role of fertility awareness in their work. We appreciate the contributions of the moderators and discussants who lead participants in rich conversation during the breakout group session. We also thank our colleagues at USAID for their participation in the meeting and their guidance and support under the FAM Project.

Introduction

While fertility is the physiological ability to become pregnant (or to cause a girl or woman to become pregnant), fertility awareness is much more. The Institute for Reproductive Health at Georgetown University (IRH), which focuses on fertility awareness interventions ranging from puberty education for very young adolescents to integration of fertility awareness-based methods (FAM) into family planning programs, proposes that:

> "Fertility awareness is actionable information about fertility throughout the life course and the ability to apply this knowledge to one's own circumstances and needs. Specifically, it includes basic information about the menstrual cycle, when and how pregnancy occurs, the likelihood of pregnancy from unprotected intercourse at different times during the cycle and at different life stages, and the role of male fertility. Fertility awareness also can include information on how specific family planning methods work, how they affect fertility, and how to use them; and it can create the basis for understanding, communication about and correctly using family planning."

Based on programmatic experiences, IRH has recognized the value of providing accurate information about fertility to women, men, girls, and boys. With this awareness, they are able to understand how sex, reproduction and family planning interconnect, which ultimately can improve sexual and reproductive health (SRH) outcomes and address unmet need for family planning. Fertility awareness can empower people to identify what is healthy and normal for them, and know when to seek reproductive health care. It can help youth understand their changing bodies and recognize their responsibilities to protect their SRH. It can also foster communication about SRH between future or current partners, parents and children, health care providers and patients, teachers and students. Fertility awareness can support reproductive rights, gender equality and social norms that help people develop the behaviors that have a positive effect on SRH for all.

With the potential for such positive outcomes, why has fertility awareness received so little attention within the SRH field? One reason may be the lack of documented evidence of the positive health outcomes directly related to fertility awareness. To begin the conversation, IRH conducted a comprehensive literature review, keeping a broad definition of fertility awareness in mind. We identified the literature on fertility awareness and analyzed findings and trends regarding how fertility awareness knowledge, or lack thereof, appears to influence SRH attitudes and behaviors across the life course. With this initial evidence base, IRH assembled a group of experts to discuss how to achieve a better understanding of the role of fertility awareness in improving the health and well-being of women, men, girls, and boys across the life course.

Purpose and Objectives

The overall goal of the Fertility Awareness-based Methods (FAM) Project is to expand access to and use of the Standard Days Method® (SDM), TwoDay Method®, and Lactational Amenorrhea Method (LAM) within the framework of informed choice. Inherent in this goal is improved fertility awareness. Numerous experiences under the FAM Project pointed toward the importance of fertility awareness as a

foundation for positive SRH outcomes and overall well-being. IRH convened colleagues and experts in the field to assess the evidence identified through a systematic review of all literature published on fertility awareness since 1990.

The key objectives of the Fertility Awareness Technical Consultation were to:

1) Define fertility awareness,
2) Assess the evidence of the effect of fertility awareness on SRH attitudes and behaviors across the life course,
3) Explore how fertility awareness could contribute to SRH program goals, and
4) Identify the knowledge gaps that could be addressed by future research.

Fertility Awareness 101

The consultation began with an attempt to develop a common definition of fertility awareness. How fertility awareness is defined—what it includes and what it does not—is important because of potentially different influences on SRH behaviors and outcomes, including family planning use. A comprehensive definition of fertility awareness encompasses the factors throughout the life course that shape behavior: cognitive, social, environmental and developmental factors. Four fundamental components of a common definition evolved.

Fertility awareness:

1. Includes basic knowledge of the fertile time in a women's menstrual cycle and when a woman can get pregnant, including the associated symptoms or physiologic changes in her body.
2. Increases self-efficacy allowing the individual to use his/her knowledge of fertility to make healthy decisions.
3. Empowers women and girls while engendering support for SRH from men and boys.
4. Can serve as the foundation of holistic reproductive health programs.

Participants also recognized that in order to better understand the effect of fertility awareness on SRH outcomes, it should be intentionally integrated into programs and its effects clearly defined and measured in terms of intended outcomes (e.g., increasing family planning use, delaying sexual debut and first birth).

Participants agreed that the definition of fertility awareness proposed by IRH (see page 1) met these criteria but that further work is needed to identify strategies to implement it in programs and measure its effect.

Literature Review Synopsis

In preparation for the consultation, a literature review was conducted and shared with participants (see Appendix B). The review was guided by the following research questions:

- What do people know, or believe they know, about fertility?
- How does fertility awareness (or lack thereof) affect SRH attitudes or behaviors (including family planning) across the life course?
- What interventions/programs have been implemented that have incorporated fertility awareness, and what is their effect on attitudes, behaviors, and SRH outcomes (including use of family planning)?

This review found that there is a dearth of accurate information—and a significant amount of misinformation—among the general population about fertility and how our bodies work. In regard to family planning, the most salient is concerns about side effects, along with other more nuanced perceptions that contribute to non-use of family planning. For example, inaccurate assessment of pregnancy risk reduces family planning use at critical points across the life course. Many believe pregnancy requires frequent sex, or that having had sex without becoming pregnant indicates they may be infertile. Some assume any breastfeeding prevents pregnancy. Others believe hormonal contraception impedes their future fertility, or using it during breastfeeding affects the infant's future fertility. Other researchers have found that negative perceptions of family planning, including lack of self-efficacy to control fertility and use contraception, result in failure to discuss and seek methods. In some settings, family planning use is stigmatized, or people believe it is not within human power to control fertility. Furthermore, gender inequities in reproductive decision-making may mean that even when women have accurate information, they may be constrained by the beliefs and choices of their partners and others who influence them. While several small-scale studies, conducted primarily with adolescents, have shown an individual-level increase in knowledge about fertility and self-efficacy following educational interventions, virtually no studies have addressed how increased fertility awareness could contribute to family planning uptake and use. And serious efforts to increase fertility awareness at a population level – not only increasing individual knowledge and skills in a large demographic group, but also creating a supportive environment in which to apply them – have not yet been attempted.

Working Group Discussions

During the consultation, participants joined small groups to discuss and achieve a common understanding of the potential effects that fertility awareness could have on attitudes and behavior. They also began the work of crafting an agenda for the SRH community related to fertility awareness research, programming, and communication.

Potential Effects of Fertility Awareness

Participants discussed the potential effects that improving fertility awareness could have at the individual and community level.

Individual effects could include:

- Better preparation for menses
- Fewer days of school missed/decreased absenteeism for girls
- Delayed sexual debut
- Improved self-care, hygiene, body care
- Fewer unintended pregnancies
- Improved ability to communicate with adults, youth, partners, health providers about SRH issues
- Better understanding of normal vs. abnormal signs and symptoms
- Increased ability to space pregnancies
- Increased condom use
- Increased correct/continued use of family planning methods
- Equal decision-making in family size, use of contraception, initiation of sex

At the community level, effects could include:

- Decreased rates of abortions
- Increased CYP
- Decreased rates of STIs
- Reduced stigma around puberty changes and menstruation
- Improved gender norms, improved respect between girls and boys/men and women
- Changed social norms around fertility, respect for men and women regardless of their chosen family size, changed social norms about masculinity

Participants recognized the complexity of developing and implementing interventions that could achieve these effects as well as the need to carry out research required to measure their effects. These were the topics of the small group discussions that followed.

Programs Discussion

How do we achieve widespread fertility awareness?

Participants in this group agreed that only by improving fertility awareness at the community level (creating a "tipping point", supportive environment, etc.) can sustainable change be achieved. But this is not likely to be achieved in the context of reproductive health programs per se. Fertility awareness can be supported through one-on-one counseling, but it is important to use a variety of platforms including schools, women's groups, workplaces, sports clubs, churches, health clinics, savings and loans groups, nutrition groups, WASH groups, youth clubs, mass media, vocational training programs, etc., to reach large numbers of people.

The content of the messages is important. Content must be tailored to different stages across the life course. For example, young adolescents need to receive different information than sexually active adults. People need a sufficient level of "body literacy" in order to internalize and act on the information they receive. This is particularly important when past experience is a more likely predictor of behavior than knowledge alone. Messages also need to include links to health services.

Communications Discussion

What approaches could be implemented to increase fertility awareness? What channels could be used to spread fertility awareness information?

These are not isolated interventions: they need to be reinforced through multiple approaches. Depending on the channel and budget, fertility awareness could be a single message or a whole package of messages/information to be shared. Message content should be consistent with needs over the life course and can be communicated through a variety of platforms:

Mass media platforms: TV, radio spots/novellas/dramas, posters, social media outreach, mhealth (SMS), smartphone apps (through pre-existing messaging apps)

Social media platforms: social media should be considered an important tool, responsive to adolescents through sustained dialogue via tweeting, texting, and helplines.

Community-based/interpersonal platforms: community-based groups like women's groups, men's groups, discussion groups, and other peer groups can be important channels for reaching large numbers of people.

Print/distributed materials: comic books, revised counseling materials that include these messages, magazine tear outs, USAID Facts for Family Planning booklet, and online courses may be appropriate for particular target groups.

How could this be done at a scale that will achieve broad community-level behavior change?

- Collaborate with a variety of other interventions to integrate fertility awareness messaging. Share relevant knowledge with HIV prevention programs, women in postpartum programs, etc. Integrate fertility awareness into other messages that are already taking place, using channels that already exist to make it successful.
- Professional organizations/institutions, along with public systems for free in-service training can be important channels for reaching service providers, teachers, and other influential people so they can communicate and support fertility awareness.

Who are the communicators about fertility awareness?

- Parents, teachers, providers/health professionals, opinion-leaders, and members of community based organizations can learn to communicate/educate with their children contextually from a young age
- Celebrities, sports stars, and other role models can help expand the messaging by being champions and speaking out about fertility awareness

Research Discussion

What are some appropriate indicators to measure the potential behavioral outcomes?

Participants in this group reviewed the points raised in the previous discussion about the potential effects of fertility awareness at the individual and community levels. It was agreed that some of these would be more difficult than others to measure and that prioritization was needed.

What research design and methods should be used to address these questions?

While it was agreed that the design and methods would need to fit the effects (and their indicators), a number of possibilities include:

- "Layer-in" fertility awareness to an intervention including several phases and measure indicators incrementally
- To build a robust evidence base, it is preferable to develop and use a generic set of indicators for fertility awareness research
- Quantitative studies are needed, particularly to assess changes at the community level and to garner evidence that can result in policy change and broad support for fertility awareness programming, but qualitative studies will be equally important to gain an understanding of the actual effects of fertility awareness on a number of factors (e.g., communication, self-efficacy).
- Community-based organizations can be important research partners – not just "platforms" – as delivering high-quality fertility awareness programming is essential to understanding its effects.

What research questions need to be answered?

Possible priority questions for fertility awareness research include:

- Is fertility awareness a catalyst for improved outcomes of existing programs?
- What are the negative outcomes for those who lack fertility awareness?
- Does fertility awareness improve CPR?
- Does fertility awareness improve uptake, use, and continuation of family planning methods?
- Does fertility awareness improve service quality (e.g. counseling)?
- What are the most effective/efficient strategies for imparting fertility awareness messages?
- What is the effect/success of communicating fertility awareness messages through mass media?
- Which fertility awareness messages are best communicated through which channels?

Panel of Experts: Next Steps

The consultation concluded with a panel of experts who summarized the small group discussions, offered their perspectives on fertility awareness in their own work, and recommended next steps for the reproductive health field.

Vanessa Cullins, Planned Parenthood Federation of America

According to Dr. Cullins, fertility awareness affords an opportunity to support women to achieve or prevent pregnancy. She commended the group for raising important and rarely discussed issues within the reproductive health field. She encouraged each organization present to consider how they can integrate fertility awareness into their programs, particularly in a manner that demedicalizes this information. "We must shift the paradigm with which we see SRH so that access to this information is universal, not contained only within the walls of health clinics."

With regard to research, she reminded the group that this area tends to be primarily in the developing world, but we can also learn quite a bit from the US context as well, especially in relation to the Affordable Care Act, which is focused on clinical outcomes for the individual and the community. When asked how she would begin integrating fertility awareness into US-based Planned Parenthood clinics, Dr. Cullins suggested the focus be on educators who provide information to the community, particularly within the context of sex-education. She recommended all-site trainings on fertility awareness and how to incorporate it into a woman's base of knowledge. Dr. Cullins pointed out that "Medical office assistants can also play a role in discussing fertility awareness with women and educating them about it, while the clinician can ask clarifying questions about family size and contraception."

John Stanback, FHI 360

Based on Dr. Stanback's perspective as a seasoned researcher in the reproductive health field, there is an important role for fertility awareness in dispelling myths about family planning and its side effects. General counseling is often insufficient to reduce contraceptive discontinuation rates, but by incorporating key counseling messages to improve fertility awareness, providers may have a greater impact on uptake, use, and continuation.

Dr. Stanback is hopeful that better fertility awareness could also reduce abortions, suggesting that fertility awareness could be a cross cutting issue around which diverse groups could find common ground. Better fertility awareness, including knowledge of normal, healthy secretions, could decrease instances of behaviors with negative health impacts like dessicant use or dry sex and, instead, help women understand their bodies and refrain from trying to "cure" things that are perfectly normal. It could also help increase awareness of STIs, thus mitigating the health/fertility damage they cause. Further research is needed on how fertility awareness affects quality of life. As Dr. Stanback pointed out, "Men's understanding of women's menstrual cycles and variable fertility could have a huge impact on behaviors towards women and women's empowerment, especially related to sex of children."

Elaine Murphy, Visiting Scholar, Population Reference Bureau

Dr. Murphy provided conclusions from a communications perspective. She reminded the group that "communication is the heart of both fertility awareness and FAM." Mass media is an area that has been neglected in traditional fertility awareness and FAM messaging, yet could have a powerful impact. In order to transform community norms, we want fertility awareness to be a universal experience for all people. Therefore, it could be integrated into school programs, pre-marital counseling, and other existing social groups. Both fertility awareness and FAM can be a springboard to other family planning use, and they address a major concern about many methods—side effects. Dr. Murphy encouraged the group to engage colleagues in discussion around fertility awareness. "We need to talk about how fertility awareness empowers women and youth, and we must document these cases."

Suzanne Petroni, International Center for Research on Women

Dr. Petroni, a gender expert, emphasized the importance of addressing the stigma that girls and women face related to puberty and menstruation and, instead, turning that into empowerment. Stigma is also an issue for boys, but this is especially true for adolescent girls. She pointed out that "If you look particularly at adolescence as a period during which girls and boys are becoming more aware of their bodies, changes that are happening to them, the importance of their peers over the life course, discussions that they are or aren't having on puberty and on sexual pleasure, etc., you can see this as a critical period in which we can contribute to changing traditional and often harmful sexual norms and roles. Adolescence is a time to inform decisions, norms, and beliefs that have the potential to create lifelong change." Looking at fertility awareness as an integral component of sexual and reproductive health and well-being generally is an opportunity to integrate these issues into programming for family planning, female genital cutting prevention, maternal mortality prevention, child marriage prevention, education, women's empowerment and wellbeing.

Next Steps

In conclusion, panel moderator, Shefa Sikder of USAID, reminded the group of the task before it. In order to integrate fertility awareness into reproductive health programs on a wide scale, there must first be a strong evidence base. In addition, she offered the following next steps for participants:

- Seek out ways your organization can integrate fertility awareness into SRH programming.
- Be champions of fertility awareness and challenge bias with your colleagues.
- Consider fertility awareness as an area of common interest, and engage colleagues with differing perspectives (particularly with regard to reducing abortions).
- Elucidate the connection between fertility awareness and family planning uptake, correct use, and continuation (particularly with regard to fear of side effects).
- Consider mass media approaches to communicate fertility awareness messages for universal access.
- Give particular attention to improving fertility awareness among adolescents.

Appendices

LET'S TALK ABOUT FERTILITY AWARENESS

Agenda | July 9, 2013

9:00am – 1:00pm

International Center for Research on Women
1120 20th St NW # 500N
Washington, DC 20036

Technical Consultation

Institute for Reproductive Health, Georgetown University

9:00 – 9:45 AM	**Fertility Awareness 101** *Introduce participants, develop a shared definition of fertility awareness.*
9:45 –10:25 AM	**Fertility Awareness through the Lifecycle: What difference does it make?** *Present results from a comprehensive review of studies integrating a fertility awareness component, followed by a facilitated discussion.*
10:25 – 10:40 AM	**Break**
10:40 – 10:50 AM	**Defining Fertility Awareness** *Discuss and prioritize the elements of fertility awareness, for both adolescents and sexually active men/women.*
10:50 – 11:50 PM	**Breakout Discussions: Implications for Research, Program and Communications** *Small group discussions to talk about the fertility awareness implications for communication, programming, and research.*
11:50 – 12:20 PM	**Panel Discussion & Next Steps** *Panel participants synthesize feedback and lead conversation on next steps.*
12:20 – 1:00 PM	**Closing & Lunch**

A COMPREHENSIVE LITERATURE REVIEW

Fertility Awareness across the Life Course

What people know, what they *don't* know, and how it influences their attitudes and behaviors related to sexual and reproductive health

Washington, DC

Institute for Reproductive Health, Georgetown University

7 July 2013

USAID FROM THE AMERICAN PEOPLE

FAM PROJECT IRH GEORGETOWN UNIVERSITY

This literature review was prepared by the Institute for Reproductive Health at Georgetown University.

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IRH was awarded the 5-year Fertility Awareness-Based Methods (FAM) Project by the United States Agency for International Development (USAID) in September 2007. This 5-year project aims to increase access and use of FAM within a broad range of service delivery programs using systems-oriented scaling up approaches.

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Acknowledgments:

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Introduction

The term *fertility awareness* appears frequently in the literature, but definitions and terminology vary across studies and programmatic approaches. Some literature considers fertility awareness as very basic knowledge of a woman's ability to conceive during several days mid-cycle. For example, the Demographic and Health Surveys (DHS) ask women if there are certain days when pregnancy is more likely (see box). Women who respond "halfway between two periods" are considered to have fertility awareness, although this response does not indicate that they actually know which days they are potentially fertile. Other studies also ask about knowledge of the fertile days of the menstrual cycle, using slightly different questions (Bloom 2000; Singh 1998), but the correct answers do not reflect accurate knowledge of the fertile window, which spans from the beginning to the end of the fertile days.

Fertility Awareness in the Demographic and Health Surveys

Question 1: From one menstrual period to the next, are there certain days when a woman is more likely to become pregnant?

Question 2: Is this time just before her period begins, during her period, right after her period has ended, or halfway between two periods?

In the literature many studies address multiple aspects of knowledge and beliefs about fertility throughout the life course and during different life circumstances, as well as some associated attitudes and behaviors (often without a precise fertility awareness definition). Within this context, the term fertility awareness broadens to also include information about:

- body changes during puberty and on-set of fertility (for girls and boys);
- postpartum or post abortion/miscarriage return to fertility;
- pregnancy risk for both breastfeeding and non-breastfeeding women; variable fertility and fertility risk during the menstrual cycle;
- observable changes throughout the menstrual cycle including signs of a woman's fertility;
- male fertility;
- mechanisms by which family planning (FP) methods affect likelihood of pregnancy;
- possible side effects of FP methods; and
- circumstances associated with infertility/subfertility and aging.)

Among the various examples of studies addressing multiple and broader elements of fertility awareness, Polis (2012) included knowledge of the fertile period, pregnancy risk, and infertility risks when exploring perceived infertility among young adults in the United States, in addition to associations with attitudes and behaviors related to contraceptive use. Sommer (2009) captured knowledge of the fertile period, of menstruation, and of normal cervical secretions when exploring how the onset of menses and puberty may affect school participation among girls in Tanzania. In a Canadian study, undergraduate students' awareness of human reproduction and age-related fertility also reflect a broader definition of fertility awareness (Bretherick 2010). A study assessing fertility awareness among women seeking to conceive (Blake 1997) used a definition that included knowledge of fertility indicators, understanding what the symptoms meant, and ability to use this information to enhance conception.

According to more comprehensive definitions, fertility awareness also includes the ability to apply this information to one's life, requiring individual knowledge, personal experience and skills. A review in FHI Network pointed out that:

> "Fertility awareness is often narrowly defined as a basic understanding anatomy and physiology. But many experts emphasize that fertility awareness is more than the ability to detect physical changes related to the menstrual cycle. Fertility awareness also involves understanding how

> emotions, behaviors and cultural factors relate to fertility. Many experts have expanded the definition to include a couple's ability to use and apply this basic information in their everyday lives and the ability to discuss the information with sexual partners and with health providers."
>
> FHI Network, 17, 1996

The Institute for Reproductive Health (IRH), which focuses on fertility awareness interventions ranging from those aimed at very young adolescents to fertility awareness-based methods of FP (FAM) (e.g., Standard Days Method®, TwoDay Method®, Lactational Amenorrhea Method), proposes that:

> "Fertility awareness is actionable information about fertility throughout the life course and the ability to apply this knowledge to one's own circumstances and needs. Specifically, it includes basic information about the menstrual cycle, when and how pregnancy occurs, the likelihood of pregnancy from unprotected intercourse at different times during the cycle and at different life stages, and the role of male fertility. Fertility awareness also can include information on how specific FP methods work, how they affect fertility, and how to use them; and it can create the basis for understanding, communication about and correctly using FP."

How fertility awareness is defined—what it includes and what it does not—is important because of potentially different influences on sexual and reproductive health (SRH) behaviors and outcomes, including FP use. A comprehensive definition of fertility awareness encompasses the factors across the life course that shape behavior: cognitive, social, environmental and developmental factors (NIH 2009). Theories of behavior change including the social learning theory/ social cognitive theory describe how many of these factors affect one another and influence behavior change, along with the importance of self-efficacy which is strengthened by observational learning and practice (Bandura 1997). Viewing fertility awareness within this context, a girl or woman with fertility awareness not only gains knowledge about her fertile time, but can also see and feel changes in her own body or circumstances that confirm and elucidate this knowledge, linking knowledge to personal, observed experiences and meaningful/relevant action. The Health Belief Model (Rosenstock 1988) addresses perceived susceptibility to a health issue, the severity of potential consequences, and barriers as well as benefits of change. Relating this to fertility awareness, for example, increased awareness of susceptibility to unintended pregnancy, and the ability to use fertility awareness information to reduce this risk, is also influenced by social and environmental factors that may be facilitated and/or constricted. Additionally, empowerment theories address how perceptions of power affect behaviors, and how power can be generated in social interactions (Gutierrez 2000). This is particularly relevant to fertility awareness, especially when the resulting knowledge, attitudes and behaviors may increase individual and collective power regarding reproductive life planning, communication about this with others, and resulting action.

A comprehensive literature review was conducted with these conceptual theories and a broad definition of fertility awareness in mind. We identified the literature on fertility awareness and analyzed findings and trends regarding how fertility awareness knowledge, or *lack* thereof, appears to influence sexual and reproductive health attitudes and behaviors across the life course. Findings and lessons learned from interventions and programs that have incorporated a fertility awareness component were also documented.

By searching the literature for the evidence of fertility awareness knowledge across the life course and its possible influences on attitudes and behaviors, this paper aims to document the potential relevance, or value-added, of fertility awareness as an empowering intervention and foundation for good sexual and reproductive health.

This literature search was guided by the following research questions:

- What do people know, or believe they know, about fertility?
- How does fertility awareness (or lack thereof) affect sexual and reproductive health attitudes or behaviors (including FP) across the life course?
- What is the effect of interventions/programs that have incorporated fertility awareness on attitudes, behaviors, and sexual and reproductive health outcomes (including use of FP)?

Methodology

The search strategy and selection criteria were broad, including articles on puberty and adolescence, schooling of girls, reasons for not using FP, beliefs about postpartum and post miscarriage/abortion return to fertility, the role of aging on fertility, as well as additional male-focused articles on these and other related topics. Initially a literature search of all existing abstracts was conducted using data bases such as PubMed, JSTOR, Google Scholar. Two researchers independently conducted additional, extensive database and online searches. Key informant interviews were conducted with leading reproductive health researchers to solicit their recommendations for studies to review. Reference lists and key journals were also searched.

Inclusion Criteria

The following inclusion criteria were used during the review of the abstracts and subsequent review of promising articles and reports:

- published between 1990-2013;
- peer-reviewed journals and 'grey' (non-peer-reviewed) literature;
- unpublished reports as available; and
- findings included a component of fertility awareness or had any association with fertility awareness.

These were relative few studies whose findings demonstrated a change in knowledge, attitudes, or behaviors due to an intervention that included fertility awareness. Efforts were made to include studies conducted around the globe and to reflect varying life stages and circumstances of both women and men.

Data Collection, Quality Assessment and Analysis

Two researchers reviewed all the identified articles and collaborated on preparing a detailed description of each article. Article descriptions included documentation of evidence regarding fertility awareness knowledge or lack thereof, associated attitudes and possible linkages to behavior. Lessons learned from programmatic integration of fertility awareness messages, often in combination with other health-related messages and approaches for communicating these messages, also were documented. A summary section highlighted relevant evidence and/or case building findings regarding the research questions posed by this review. Key findings from the article descriptions were then summarized in the tables included as an appendix to this report.

A study strength score, on a scale of 1 to 8, was determined for each article. The criteria were different for qualitative and quantitative studies. For quantitative studies, the following criteria were applied: whether the study was part of an intervention, had intervention and control groups or control sites, had baseline

and end line data, documented an acceptable response rate, included multivariate analysis with regard to fertility awareness, demonstrated significance levels, had an appropriate sample size, and appeared in a peer-reviewed journal. Qualitative study score was based on: whether the study was part of an intervention, had acceptable sample size, had written transcripts, had inter-coder reliability, specifically explored fertility awareness, included an adequate description of the study participants, explained the analytical process and theoretical framework, and had appeared in a peer-reviewed journal. Studies with both qualitative and quantitative components relevant to fertility awareness received a separate score for each. A review or summary report based on more than one study was not assigned a study strength score.

The quality assessment of the study and resulting score was specifically designed to assess the strength of the fertility awareness evidence or case building aspects of the article. As a result, a study – even a very strong study – with a cross-sectional survey design would receive a lower score for our purposes, as it would not be an intervention and would not have control and intervention groups. Without multivariate analysis specific to a fertility awareness component of the study, the score would be even lower. A few of the studies were based on the analysis of the same data set, which is noted at the end of each table in Appendix A.

Data analysis included identification, coding, and content analysis to identify key themes, contrasts and relationships. Tables and matrices were used to facilitate analysis and presentation of results. In collaboration with co-authors, trends were identified, conclusions were confirmed, and quotes were selected as exemplars.

Study Characteristics

A total of 83 studies met the inclusion criteria, representing research in North America, Africa, Asia, Latin America, Europe and Australia as indicated in Figure 1. Half of the studies were surveys, 16% were qualitative studies, 19% interventions, and 14% other (non-peer-reviewed reports). One was a literature review on reasons for unprotected intercourse among adult women (Figure 2).

Figure #1: Geographic Regions Represented by the Included Studies

Note: Two studies use data from more than one region

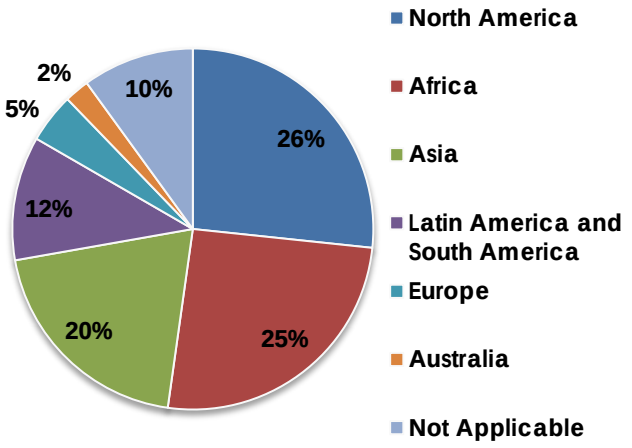
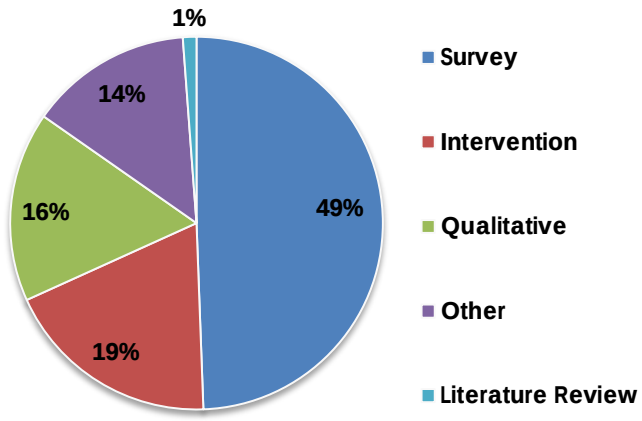


Figure #2: Methodologies of the Included Studies

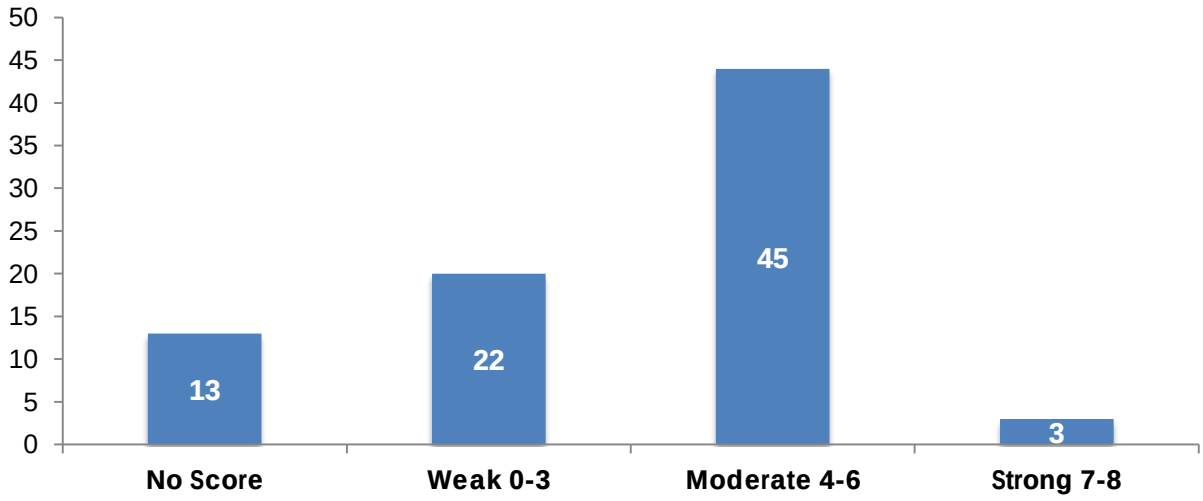
Note: Three studies combined qualitative and quantitative methodologies. These three studies were included in both the survey and qualitative studies categories in these calculations.



Although the authors actively searched for studies that included an intervention with a fertility awareness component, only 16 intervention studies were found. About half the total studies reviewed involved research on women only, 30 (36%) reported results for both women and men, and 7 (8%) included research on men only.

Regarding the study design rigor related to fertility awareness (see figure 3), 45 (54%) of the studies scored in the moderate range with a fertility awareness rigor score of 4-6 points out of a possible total score of 8 points. Only three of the studies (4%) had a strong study score of 7-8 points, which was partly due to the fact that so few of the studies had an identifiable fertility awareness component and were also interventions with experimental and control groups. Although 22 (26%) of the studies had a weak score of 2 or 3 points, the findings and conclusions of these 20 weaker studies confirmed findings and trends documented in the stronger studies.

Figure #3: Study design rigor in regard to fertility awareness



Results

We present our findings according to the research questions that guided our literature review:

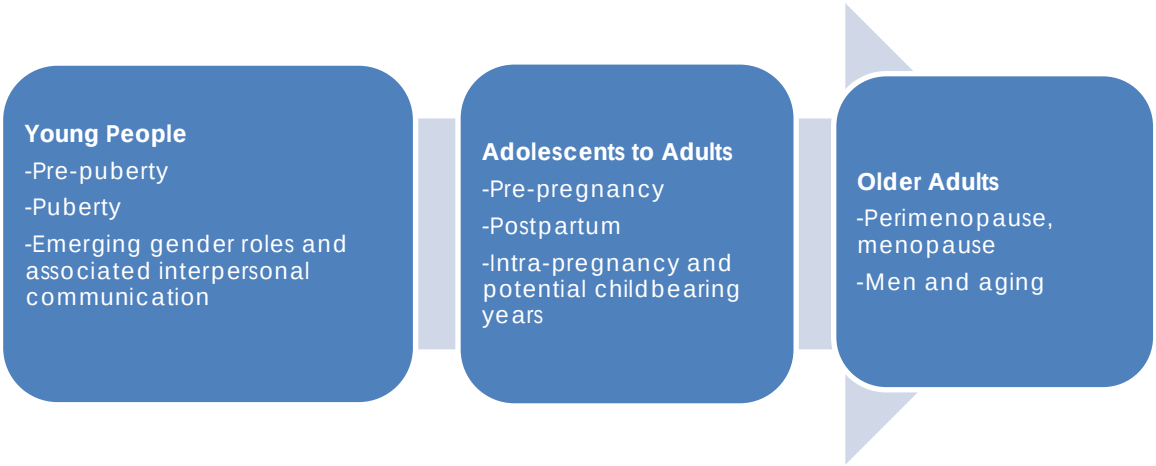
- What do people know, or believe they know, about fertility?
- How does fertility awareness (or lack thereof) influence sexual and reproductive health attitudes or behaviors (including FP) across the life course?
- What is the effect of interventions/programs that have incorporated fertility awareness on attitudes, behaviors, and sexual and reproductive health outcomes (including use of FP)?

We also considered the life course of the study participants, as fertility awareness has different components for people at different stages or circumstances.

CHART 1: What do people know, or believe they know about fertility? Key Results

- Lack of knowledge of puberty, menstruation and conception, menstrual cycle and fertile days, fertility indicators like cervical secretions, postpartum/post-abortion return of fertility, aging and fertility
- People know less than they think they do about fertility awareness
- Better fertility awareness among women, people with education, wealth, and previous knowledge of NFP/FAMs and some user-directed methods
- Widespread concerns about FP use reflect a lack of fertility awareness

Fertility Awareness: Life Course Perspectives



What do people know and believe about fertility?

Lack of knowledge about puberty, menstruation and conception

Studies from Bangladesh, India, Senegal, and Tanzania indicate that adolescents have low knowledge of puberty, menstruation, and the transition to being fertile (Agrawal 2007; Sommer 2010; Uddin 2008). Formative research conducted by the Institute for Reproductive Health to guide development of fertility awareness interventions for youth, as well as evaluations of these programs, also revealed limited fertility awareness among youth and their parents in Madagascar, Rwanda, Uganda, Brazil and Guatemala (IRH2011, IRH 2013b, IRH 2013g). Adolescent girls in a study in Pakistan were significantly less knowledgeable than adolescent boys about nocturnal emissions, and the boys were significantly less knowledgeable than girls about menstruation and menstrual hygiene (Shaikh 2006). In a survey of adolescent girls in Bangladesh, 23% had never heard about puberty, and only 24% knew that a girl who experienced menstruation might get pregnant if she only has sex once. Additionally, 18 of 20 married adolescent girls in this Bangladesh study who had given birth said that they did not understand why they became pregnant during their first pregnancies (Uddin 2008). A qualitative study with post-pubescent young women ages 16-19 in Tanzania indicated that girls often felt dismay over menstruation, attempted to keep menses a secret, and experienced harassment from boys and men related to menstruation (Sommer 2010).

On the other hand, in a survey of adolescent schoolgirls in India, 75% had awareness of the physical signs of puberty and over 80% knew that pregnancy was preventable (Agrawal 2007). In this study, over 80% had had sex education, with media listed over friends as a source of SRH education.

Lack of knowledge about menstruation and the fertile days

Multiple studies provide evidence that men and women lack specific knowledge of the beginning and end of the fertile days of the menstrual cycle or the “fertile window” (Ajayi 1991; Aneblom 2002; Berger 2012; Blake 1997; Bloom 2000; Byamugisha 2006; Dube 2006; Katz 2002; Kaye 2009; Makinwa-Adebusoye 1992; Ortayli 2005; Parasuraman 2009; Polis 2012; Sinai 2004 (unpublished); Singh 1998; Sommer 2009; Sommer 2010; Uddin 2008; Witt 2013; Witte 1997).

DHS conducted in countries around the world (IRH, 2013e) show considerable variation in responses to the question of when during a women's menstrual cycle she is fertile. While as many as 62% of married women of reproductive age in Congo-Brazzaville recognize that there is a fertile window half way between two periods, the proportion is significantly lower in all other African countries (less than 30% in 25 African countries). Rates in Asian countries in which DHS was conducted ranged 15%-57%, and rates in South America ranged 18%-39%.

In a study of 6549 married men ages 15-59 living in five districts in the northern state of Uttar Pradesh, India, men were asked to identify the period of the menstrual cycle when women are most likely to become pregnant. Between 14-20% of participants correctly identified the fertile period as approximately two weeks after the beginning of the menstrual cycle (Bloom 2000; Singh 1998).

In a study of 1824 adolescents and young men and women in Zimbabwe, of which the majority were orphans and vulnerable youth, 87-90% said that they did not know or gave inaccurate responses regarding the fertile period (Dube 2006). Among a random sample of adolescents and young men and women ages 15-24 in Senegal, 38% (n=1005) of young women and 32% (n=936) of young men had correct knowledge of the fertile period (Katz 2002).

Based on a nationally representative sample in the United States of 1800 unmarried men and women ages 18-29, only "34% knew there is a certain time in a woman's menstrual cycle when she is most likely to become pregnant and could identify that time as roughly halfway between her two periods" (Berger 2012).

In a recent study in India, in which the Standard Days Method, a fertility-awareness based method, was integrated into public health services in twelve districts (one half of districts) in the State of Jharkhand, community surveys showed that fertility awareness based method of FP (% who recognized that there is a fertile window half way between two periods) increased among all married women of reproductive age from 16.3% to 50.3% over the four-year study period (63.9% among women who had ever used the Standard Days Method) (IRH 2013d). In a similar study in three districts in Guatemala, fertility awareness increased from 8.3% to 16.1% (IRH 2013c).

Even women and men dealing with subfertility issues and actively seeking advice and support for infertility lacked knowledge of the fertile days in a women's menstrual cycle (Blake 1997; Dyer 2004; Hampton 2012; Zinaman 2012). Among 204 women seeking fertility assistance in Australia, less than 25% could identify cervical secretion changes indicative of fertility (Hampton 2012).

Lack of knowledge of fertility indicators like cervical secretions

A very few qualitative studies noted that women did observe cervical secretions but appeared to have little or no knowledge of secretions as a reliable indicator of fertility, and many worried that normal secretions were a sign of illness or infection (Bro 1993; IRH 2013h; Scorgie 2011; Sommer 2009). A young woman in a qualitative study conducted in Tanzania asked (Sommer 2009):

> *"Having vaginal discharge (white, watery, like milk, heavy, from the vagina)? Is it a disease?"* (IDI rural, in-school, Karina)

In an efficacy study of the TwoDay Method, a FAM that relies on the identification of the presence or absence of secretions, participants were asked about their sections before they were taught the method. The majority (88.4%) had noted secretions before, but they did not associate it with their fertility (IRH 2004). Some women interviewed during formative research for a community-based study of this method did associate secretions with fertility, but had had previous fertility awareness education (IRH 2013h). Another

qualitative study with rural and urban men and women in South Africa documented observation and concern about what appears to be normal cervical secretions (Scorgie 2011):

> *"By and large, the aim of hygiene practices was to remove unwanted vaginal fluids or 'discharge'. Focus-group discussions with young rural women revealed intense anxieties about 'white discharge' they believed signaled illness. Their descriptions suggested that what they were referring to, however, was normal, viscous fluid produced during ovulation. One woman, Thembi, explaining how she used a tampon to remove excess vaginal secretions, said:*
>
> > *There is some discharge that comes out with it when you remove the tampon. This indicates that you've removed the dirt and therefore by the time I arrive at my boyfriend's, I feel cleansed."(urban FGD, Thembi, 25-34 years)*

Women in some African countries also use drying agents that they insert into their vagina. In some settings this is because they perceive secretions to be dirty (Scorgie et al., 2009); in other communities it is because they believe excessive vaginal secretions are a sign of recent infidelity These women also do not recognize secretions as a natural symptom of their fertility (Aksel 2012). In the community-based TwoDay Method study, women who used vaginal drying agents indicated they were willing to modify this behavior to use the TwoDay Method (IRH 2013h).

Lack of knowledge about postpartum/post-abortion return to fertility

Misinformation about the return to fertility in the postpartum period has two possible effects. On the one hand, it is important to recognize that breastfeeding can delay the return to fertility. On the other hand, it is important to understand that breastfeeding alone is not sufficient to prevent pregnancy. Women and men generally viewed breastfeeding as a way to delay the return of fertility and often considered postpartum return of menses as a marker of fertility return, but usually without recognizing they could still become pregnant while breastfeeding.

In a nationally representative sample of 233,426 men and women in India, the percentage of men who believed (incorrectly) that a breastfeeding woman cannot get pregnant increased with age (28-56%). Similarly, only one third of women knew that they could get pregnant during breastfeeding (Parasuraman 2009). In another study in India (four Districts in the state of Jharkhand, n=1809, IRH 2013d), only about half of married women of reproductive age recognized that a woman can become pregnant when she is breastfeeding. In contrast, in a study in three districts in Guatemala (n=504), over two thirds of women knew that they can become pregnant while breastfeeding (IRH 2013c).

In a study in Mali in two villages in which all women of reproductive age and men married to women of reproductive age were surveyed to identify reasons for unmet need for FP, 16.7% of women in one village and 20.4% of women in the other were not using a method of FP, despite a desire to avoid pregnancy, because they were in postpartum amenorrhea, and/or breastfeeding, and believed they could not become pregnant (IRH 2013j)

In a survey conducted in Jordan, 3,183 post-partum women were interviewed at child health centers. Although 7.1% of participants were knowledgeable of the 3 criteria for the Lactational Amenorrhea Method (LAM) (transition to a complementary method of FP at 6 months postpartum, or before if menses returns or if the women is no longer fully breastfeeding), many LAM users appeared to wait past 6 months postpartum for return of menses, to begin using a complementary method (Bongiovani 2005).

Women are similarly unaware of the risk of pregnancy post-abortion. In a survey of post-abortion women at a hospital in Egypt, over 75% of the respondents either did not know how soon a woman could get pregnant following the procedure, or gave incorrect responses (Mahmoud 2013). In a survey conducted in four government hospitals in Ethiopia, only 26.7% of the 401 participants responded that fertility would

likely return soon, within two weeks post-abortion. Most participants in the Ethiopian study (81.8%) indicated they did not wish to become pregnant within the next three months (Melkamu 2003).

Lack of knowledge and lack of research on fertility awareness and aging

Few studies were found that addressed perceptions of fertility and aging. In an article by Sherman (2005), a Medline search examining women's knowledge of pregnancy risk during the peri-menopausal years found nothing. Studies that asked younger women and men about fertility and aging found lack of knowledge of the rapid decline of fertility for women, and lack of knowledge of the role of sexually transmitted infections (STIs) in reducing fertility potential (Bretherick 2010; Bunting 2008; Daniluk 2012; Daniluk 2013; Peterson 2012; Quach 2008).

In another study of men and women attending a four-year university in the United States, only 24% of women and 14% of men correctly identified that there is a considerable decrease in a woman's ability to become pregnant between the ages of 35 and 39. Sixty-seven percent of women and 81% of men overestimated this age range (Peterson 2012).

People know LESS than they think they do about fertility awareness.

Although women and men generally lacked knowledge of the fertile time of the menstrual cycle, they often perceived that they had more comprehensive and more accurate information than they actually did have (Ajayi 1991; Kaye 2009; Makinwa-Adebusoye 1992; Witt 2013). Among 465 low-income women in the United States attending a FP clinic, "only 40% of participants who believed they knew when the fertile time of their cycle was actually had the correct response to this question" (Witt 2013). In a study of unmarried youth in Kenya ages 12-19, while over 60% of participants stated that they had knowledge of the fertile period, less than 11% displayed accurate knowledge (Ajayi 1991).

In a study of sub-fertile women trying to conceive over 68% believed they had timed intercourse to match the fertile window. However, only 12.7% were able to do so with precision, and another 24% had accurate knowledge without demonstrated ability as evidenced by accurately completed fertility charts (Hampton 2012).

On another fertility awareness related topic, people also know very little about the effect of sexually transmitted infections on fertility. In a survey of 772 male and female high school students in Canada, more than 94% did not know that chlamydia and gonorrhea could increase the likelihood infertility (Quach 2008).

Better fertility awareness among women, people with education, wealth, and previous knowledge of NFP/FAMs and some user-directed methods

Although specific knowledge of the fertile days was very low in general, many studies showed slightly higher fertility knowledge among women when compared to men, with schooling, age and previous use of natural FP or FAM, condoms or withdrawal (Berger 2012). In a nationally representative study of 1800 unmarried young adults in the United States, there were significant differences in accurate knowledge of the fertile period by gender, race, education level, age of women, and previous use of withdrawal or natural FP. Some 42% of females, compared to 27% of males, could accurately identify a woman's fertile period ($p<0.05$) (Berger 2012). However in Zimbabwe, in a study of 1824 13 to 21 year old rural young people, while knowledge of the fertile days was consistently low, slightly more boys (13%) than girls (9.9%) responded that this was half-way between periods" (Dube 2006). In Senegal, men were more likely than

women to know that a girl or woman could get pregnant the first time she had sex while women were more likely to have knowledge of a fertile time of the menstrual cycle (Katz 2002).

Berger (2012) also found more education was significantly associated with an increased percentage of respondents ages 22-29 who had accurate knowledge of the fertile period. Some 25% of participants with high school or less, 40% of participants with some college, and 47% of participants with a college degree of more could accurately identity a woman's fertile days. Accurate knowledge of the fertile period increased with age for women between 18 and 29. Some 33% of females ages 18-19, 41% of females ages 20-24, and 50% of females ages 25-29 could accurately identify a woman's fertile days. (Berger 2012)

There was also a significant association between knowledge of the fertile days and previous use of withdrawal or FAM. Some 53% of sexually active males reported that they had ever used withdrawal, and 29% of those who had ever used withdrawal had more accurate knowledge. Eight percent of the sexually active females reported that they had ever used natural FP. Unsurprisingly, (given that fertility awareness education is typically included in method instruction for the FAMs), 58% of those had ever used natural FP had more accurate knowledge while 41 of those who had never used natural FP has less accurate knowledge (Berger, 2012).

A study of men in Uttar Pradesh, India found that older men had more knowledge of the fertile days than younger men (14% of men ages 15-24 compared to 22-24% in men ages 25-44). Additionally men in urban areas, rural men with more assets, and men with more education tended to have more knowledge of the fertile days (Bloom 2000).

An analysis of DHS data from six countries (Philippines, Democratic Republic of Congo, Morocco, Azerbaijan, and Cameroon and Bolivia) show that more educated women, and wealthier women, are more likely to respond "halfway between two periods" when asked when a woman is most likely to be fertile. While this association is not always statistically significant, the relationship is consistently in the same direction and holds true in the multivariate analysis in all countries except Azerbaijan, which might be explained by the highly educated sample of women in Azerbaijan (IRH 2013f). The multivariate analysis of fertility awareness indicates that as age increases fertility awareness also increases while controlling for other background characteristics, though this association was statistically significant only in the Philippines, Bolivia, and Cameroon. As the number of living children increases, fertility awareness decreases in Bolivia and Cameroon, suggesting that a previous birth experience does not necessarily influence fertility awareness. There appears to be linear increase in fertility awareness as wealth quintile increases in the Philippines, Morocco, Azerbaijan and Cameroon. Urban and rural residential differences are not a factor in fertility awareness except in Azerbaijan.

Widespread concerns about FP use reflect a lack of fertility awareness

Several studies noted that women and men overestimated the risk of side effects or possible negative health outcomes from the use of FP methods (Dyer 2004; Kaye 2009; Witt 2013; Witte 1997). Sedge et al. (2007) used DHS data to examine women with unmet need for FP in 53 countries. Women with unmet need are those who wish to avoid pregnancy, and are married and sexually active, yet are not using a method of FP. In most countries the most common reasons these women give for not using contraception are side effects and health concerns. Between 20%-50% of married women at risk of an unintended pregnancy cited these reasons in 26 of the 36 countries that had information on this question. Women who cite these concerns may base their responses on personal experience with contraception, on the experiences of women they know, or simply on their perceptions of FP. The authors concluded that where these reasons for non-use prevail, women likely have not obtained services of sufficient quality to help them understand contraception methods and use.

A small study in Mali that used qualitative methodologies to interview women and men with unmet need for FP also found many misconceptions about contraceptive methods (IRH 2013j). For example:

> "My close friends and family have the same opinions as me… During our chats, we talk about FP methods and their harmful side effects on women… and how that can prevent a person from having children…"

Another qualitative study with 21 teen mothers in the United States synthesized the young women's concerns about the side effects of long-acting reversible contraceptives:

> "For the most part, the teen mothers had dismal attitudes toward birth control, mostly due to the unpleasant side effects…(including)…weight gain…mood swings… and nausea." (Witte 1997)

In a nationally representative study of 1800 unmarried young adults in the United States, the perception of the negative side effects of FP methods was very common (Kaye 2009).

- "Among those who have relied on birth control pills, nearly half (44%) incorrectly believe that you should take a break from the pill every few years."
- "27% of unmarried young women believe that it is *extremely* or *quite likely* that using birth control pills or other hormonal methods of contraception for a long period of time will lead to a serious health problem like cancer."
- "Half of unmarried young women believe that cancer or other serious health risks due to the pill are at least *somewhat likely* and report that this concern reduces their likelihood of using birth control pills or other hormonal methods."
- "30% say it is extremely or quite likely that using an IUD will cause an infection."
- "36% say it is likely that the pill will cause them to gain weight and 40% say it will likely cause *severe* mood swings *and* that these concerns reduce the likelihood of their using the pill."

Concern that contraceptives might negatively affect fertility was also cited (Daniluk 2012; Quach 2008). In a study of mostly educated, white women in Canada, over 50% (n=3345) did not know that taking oral contraceptives for more than 5 years does not negatively affect a woman's fertility (Daniluk 2012).

This general lack of accurate, actionable knowledge about fertility and FP led us to the following question:

How does *LACK* of fertility awareness appear to influence sexual and reproductive health attitudes or behaviors (including FP) across the life course?

Although very few of the studies reviewed were designed to show a direct link between fertility awareness and associated attitudes or behaviors that support FP and other health outcomes, the following findings about attitudes and behaviors highlight possible trends and lessons learned that may be extrapolated when considering the

Chart 2: Is LACK of fertility awareness related to:

- Perceptions of low risk of pregnancy?
- Concern about method side effects?
- Misuse of user-directed methods when attempting to combine these with "safe days" without fertility awareness knowledge?
- Unprotected sexual intercourse?

potential influence of fertility awareness or lack thereof on attitudes and behavior. For example, it appears that "lack" of fertility awareness may contribute to non-use of FP, delayed method use postpartum or post abortion, method discontinuation and/or inaccurate attempts to use methods only during the fertile days. Lack of fertility awareness may also contribute to behaviors such as increased days of missed school for girls without puberty and fertility awareness education and support, poor vaginal health, such as douching to remove normal, healthy secretions, or lack of fertility awareness regarding the male role in sex determination of a child, leading to unjust blame and even gender-based violence against women.

Perceptions of low risk of pregnancy (including perceived low fertility) and resulting non-use of FP

An often cited reason for non-use of FP is low perceived risk of pregnancy. Among US women who had recently given birth after an unintended pregnancy (n= 7856), 41% reported that they had not used a method of FP because they either believed they would not get pregnant at the time they had had intercourse, or they considered themselves or their partners to be infertile (Nettleman 2007). Similarly, in a review of 16 studies of reasons for unprotected intercourse among adult women, perception of low risk of pregnancy was a commonly reported reason as specifically noted in seven of the studies reviewed by Ayoola (2007). In these seven studies, US women reported that they had had unprotected intercourse—perceiving that they had a low risk of pregnancy – because they thought that they or their partners were "infertile" (Coggins 2003; Foster 2004; Jones 2002; Killion 1998, Moos 1997; and Woodsong 2004), they considered themselves to be on a day of the menstrual cycle with low pregnancy risk (Moos 1997) and/or they believed that older age, breastfeeding status or infrequent sex (Foster 2004, Sable 1997) meant that they were at low risk of pregnancy.

Perceptions of subfertility or infertility also resonate through many of the studies in this review. Polis (2012) analyzed survey data from US unmarried women and men ages 18-29 (n=1699, and noted that 90% overestimated the risk of pregnancy from one act of intercourse, and 67% incorrectly estimated the chance of pregnancy during a year of unprotected sex. Regarding personal concerns about infertility, 19% of women and 13% of the men surveyed perceived themselves to be "very likely" infertile. Among women's reasons for perceived infertility, over 1/3 mentioned not getting pregnant after having had unprotected sex. In this study, perception of infertility was associated with women overestimating the chance of pregnancy from unprotected sex, and with men indicating that they would likely have sex without contraception in the next three months. In a Canadian survey of 772 high school students (Quach 2008), girls were significantly more in agreement than boys with statements regarding concern about possible infertility and desire to protect their fertility.

Among single and married youth (male and female) in Senegal, less than 50% knew a woman could get pregnant the first time she had sex. Among the males who had had premarital sex, less than 80% used contraception, and 16% reported that they did not think pregnancy was possible (Katz 2002). Similarly, in a Nigerian study of 5599 adolescents, the belief that a woman could not become pregnant the first time she had sex was a top-rated reason for not using FP (Makinwa-Adebusoye 1992).

For 5677 women seeking abortions in China (ages 15-48), non-use of emergency contraception was correlated with less knowledge of fertility and a lower rate of contraceptive use. "The main reason for non-use (of EC) was lack of awareness of the risk of pregnancy and the subsequent need for protection" (Meng 2009).

Concern about method side effects/misinformation about FP and fertility and non-use or discontinuation of FP methods

An often-stated reason for *not* using a FP method and method discontinuation is concern about possible side effects and/or possible negative health effects – including effects on fertility -- associated with some methods (Ayoola 2007; Makinwa 1992; Sedgh 2007; Singh 2012). In over 50% of the US studies reviewed by Ayoola, side effects and health concerns such as "sterility, cancer, irregular bleeding, weight gain, headaches, nausea, vomiting, hair loss, dizziness, weight loss, breast enlargement, acne, leg pain, varicose veins, bloated feelings, low energy, depression, stress, and mood changes" were among reasons women did not use FP. In addition, a survey of 1800 unmarried men and women in the US ages 18-29, found that expecting negative side effects of hormonal/LARC methods was associated with a decreased use of these methods (Frost 2012). "Better knowledge of side effects is needed and could contribute to young adults' propensity to use hormonal and LARC methods" (Frost 2012). Among low-income women attending FP clinics in the United States, "39.6% [n=465] strongly agreed/agreed that no chemicals or hormones were important considerations in their contraception decision-making" (Witt 2013).

A vast body of literature about reasons for non-use or discontinuation of contraceptive use in developing countries shows similar findings. For example, a 2012 analysis of DHS data from 60 countries looked at reasons for contraceptive discontinuation. They found that about a quarter of pill and injection users who discontinue their method in the first 12 months do so because of side effects or health concerns. The authors conclude that high discontinuation due to perceived or real side-effects requires counseling services and informed choice to be strengthened and method mix expanded (Ali 2012).

A broad definition of fertility awareness includes understanding of the menstrual cycle and a woman's awareness and anticipation of her typical menstrual bleeding pattern. Given that the contraceptive injectable (DMPA) has a very common side effect of changing a woman's bleeding pattern (Hatcher 2011), It is not surprising that women site changes in their menstrual bleeding pattern as a reason for method discontinuation (Tolley 2005). However, a study of 350 intra-pregnancy and postpartum women conducted in Mexico found that anticipatory counseling and guidance regarding menstrual cycle changes associated with use of the injectable contraceptives resulted in significant increases in method continuation (Canto de Cetina 2001), suggesting that appropriate counseling about expected menstrual side effects can mitigate the effect of actual side effects on method continuation.

Menstrual changes are not the only side effects of hormonal contraceptives that may affect method use. A South African study of injectable contraception users (n=187) found a concern among users about increased vaginal wetness when using progestin injectable FP (Smitt 2002). Despite the fact that vaginal secretions are natural symptoms of fertility, a possible increase was observed as a negative side effect for this study population. This underscores the importance of appropriate counseling, and suggests the potential importance of anticipatory guidance and counseling around normal menstrual bleeding and healthy secretions, along with common method-related side effects, to address any concerns about these observable changes.

Inaccurate identification of fertile days, associated misuse of user-directed methods and unprotected intercourse

In studies about withdrawal use in Turkey (Orayli 2005) and Lebanon (Myntti 2002) the authors report that withdrawal users combined withdrawal with a variety of fertility awareness strategies, including using withdrawal during the woman's perceived fertile days and having unprotected sex on perceived infertile days. Another strategy was using condoms or abstaining from sexual intercourse on perceived fertile days

and then using withdrawal on "less risky" days. However, Orayli described men learning about withdrawal "in bits and pieces" until you "guess or figure it out" with increasingly successful use over time. Additionally, only 3% of the men in this study could accurately describe the fertile days. False perceptions regarding the ability to identify "safe and unsafe" days for sexual intercourse may increase the risk of unintended pregnancy for many withdrawal users who combine this method with inaccurate knowledge of the fertile days. Both studies also noted that concern about method side effects was a common reason for withdrawal use over other method options.

Unintended pregnancy

We turn again to the analysis of DHS data from six countries (IRH 2013f). In four countries (Philippines, Bolivia, Morocco and Azerbaijan) correctly responding "halfway between two periods" was negatively associated with having an unintended pregnancy. That is, these women were less likely to have an unintended pregnancy (controlling for demographic characteristics). However this relationship was statistically significant only in Cameroon, and the effect was reversed in Morocco and DRC. In explaining their findings, the authors acknowledge that the definition of fertility awareness drawn from the DHS is weak and does not adequately capture respondent's actual understanding of when in the cycle a woman can become pregnant. They further point out that even women who understand when (in general) in a cycle a woman is more likely to become pregnant may not necessarily know how to apply this information to their own bodies, and do not translate this knowledge into the actions required to use a FP method or to avoid unprotected sex on the days they are fertile.

A study by Wilcox (2004) documents that those *without* fertility awareness information, may experience increased prevalence of sexual intercourse during the fertile window (as occurred in his study among IUD users and women who have had a tubal ligation, n=69), suggesting that biological influences may increase sexual intercourse during the fertile days, without couples being aware of this. Fortunately, we know that those *with* fertility awareness can effectively use fertility awareness-based methods to successfully avoid unprotected intercourse on the fertile days without reducing monthly coital frequency (Sinai 2006). However, given the significant lack of fertility awareness knowledge in the general population, and with many people who think they have more fertility awareness than they actually do (and then use their own self-styled-version of fertility awareness strategies), the potential benefit of increased fertility awareness knowledge worldwide and related attitudes and behaviors is very promising.

In a poster *Fertility Awareness Method Use Among Young Adult Low-Income Minority Women (*Guzman 2013), the authors conclude: "The vast majority of women are abstaining or using another method of birth control during what they perceive to be their fertile period. These findings are encouraging because it suggests that the behavior components of accurate FAM use are already present. What is lacking is knowledge of their fertile period."

These very different studies just described do not specifically document the influence of fertility awareness on behaviors such as unprotected intercourse or other health outcomes. Still, they do exemplify how "lack" of fertility awareness may contribute to false perceptions of infertility and false perceptions of low risk of pregnancy on an individual and community level and subsequent unprotected sex, concern about method side effects and resulting non-use of methods, misuse of user-directed methods when combined with inaccurate fertility awareness and possible increase in unintended pregnancy. Exploring other health outcomes possibly influenced by fertility awareness was beyond the scope of this review, but there are indications that the effect of fertility awareness may have implications beyond FP to broader SRH issues and beyond.

What is the effect of interventions/programs that have incorporated fertility awareness on attitudes, behaviors, and sexual and reproductive health outcomes (including use of FP)?

While direct evidence of the effect of fertility awareness on behavior is limited, findings (cited in the previous section) suggest that lack of fertility awareness contributes to unintended pregnancy, non-use of FP and other negative health outcomes. With this in mind, we reviewed studies that examined – directly or indirectly – the effect of fertility awareness interventions on attitudes, behaviors and outcomes. Although we specifically looked for intervention studies with an identifiable fertility awareness component, only 16 such studies were found, 8 of which targeted adolescents.

Results of Interventions that Included an Element of Fertility Awareness

- Increased knowledge of fertility awareness (IRH 2013a; Brieger 2001, Danielson 1990; IRH 2013a; IRH 2013b; IRH 2013g; Lavoie 2009; Roth 1993)
- Ability of young girls to track their menstrual cycle and prepare for next menses as well as talk more openly with parents about SRH issues (IRH 2013a; IRH2012)
- Increased use of FP methods or abstinence, and reduced pregnancies (Brieger 2001; Cabezon 2005; Virgil 2005)
- Fewer days of missed school as a result of a hygiene and puberty education, with and without sanitary pad distribution (Scott 2009)
- Increased male belief in pill safety and increased partner pill use (Danielson 1990)
- Increased couple communication and women's empowerment (IRH 2008c; Léon 2013)
- Increased method continuation when FP is informed by fertility awareness.

For example, in a Rwanda study, six youth-serving organizations at 10 sites integrated the "CycleSmart Kit" into their programs to help girls and boys learn about menstruation, puberty, their fertility, and "staying safe." This Kit consists of Cycle Beads (color-coded beads used with the Standard Days Method of FP which can also be a visual and tactile way of teaching adolescents about menstruation and fertility), a calendar, a weekly diary, washable/reusable sanitary pads, and a brochure on puberty and fertility awareness. With the support of program guidelines and a brief orientation for implementers, the Kit was integrated into programs over a five week period, through a weekly session with adolescents (n=198). Statistically significant increases in knowledge were observed for 19 of 20 knowledge indicators. All questions showed an increase in the frequency of correct responses from baseline to endline. Focus group findings and program log reports further indicate that girls did use CycleBeads to learn about and keep track of their menstrual cycles, and were better prepared for their next menstruation. Adolescents and parents report that the CycleSmart Kit facilitated useful puberty discussions between adolescents and their parents, teachers, peers and friends. Interest among young boys was also generated, and CycleBeads were described as a useful tool for teaching boys about puberty and fertility (IRH 2013a).

Another fertility awareness intervention in Rwanda and Guatemala involved exposure to the My Changing Body curriculum (IRH 2012), which includes 5 educational sessions for adolescents (n=268) along with an educational session for parents (n=117). Key themes of the curriculum include: puberty, body image, fertility awareness, hygiene, gender roles, and communication with parents and peers. Pre and post intervention measures revealed significant increases in adolescent knowledge of puberty and

fertility awareness as well as self-reported confidence to act on this knowledge (discuss fertility awareness topics with parents, share information about puberty with peers, or intervene when peers are teased about puberty-related issues). Statistically significant shifts towards more gender equitable norms were also noted. Regarding the results for parents, there was a significant increase in parents' fertility awareness knowledge, and improved parental accessibility for discussing topics about fertility and romantic relationships with their children. (IRH 2013g)

For most of the other intervention studies in this review, however, fertility awareness was not analyzed separately from other SRH messages and strategies, and the potential value-added of the fertility awareness component (separate from other elements of the intervention) is unknown.

For example, in Ghana, Nigeria, Chile and the US, interventions that included fertility awareness elements resulted in increased use of FP, increased abstinence or return to abstinence, and reduced pregnancies. In Nigeria and Ghana, a peer-education intervention with 3585 girls and boys included educational messages on reproductive anatomy and function along with education on FP, STIs, and HIV/AIDS prevention and successfully increased perceived self-efficacy in FP use, willingness to buy condoms, awareness of local youth-serving programs and FP use in the intervention groups (Brieger 2001). However, attitudes regarding concerns about the effect of FP methods on fertility and overall health, and pressure to demonstrate fertility before marriage continued post intervention. This further suggests that additional fertility awareness information on broader topics, including observable fertility indicators, and anticipatory guidance on the effect of methods on fertility and overall health, may further increase method uptake and/or continuation.

In Chile, the TeenStar school-based, abstinence-focused curriculum included fertility awareness topics such as human anatomy and physiology, puberty, male and female fertility, and charting of fertility indicators along with various abstinence-focused topics. The Teenstar intervention studies show reduced rates of self-reported initiation of sexual intercourse, increased discontinuation of sex, (Vigil 2005) and reduced pregnancies in the intervention groups (Cabezon 2005). In Fremont, CA, while testing a community-based health center approach to incorporate FAMs and enhance male involvement in FP, counselors at the teen clinic and school-based educators described CycleBeads as a helpful visual and tactile tool for teaching adolescents about the menstrual cycle and as a segue into conversations about fertility awareness, partner communication and risk reduction behaviors (Lavoie 2009).

In Ghana, a puberty and hygiene educational intervention for in-school girls (with and without sanitary pad distribution) was compared to a control group. Although specific details regarding the puberty and hygiene education provided were not documented in the report, girls in the intervention groups (n=183) experienced fewer days of missed school and an increase in girls' well-being measures. "Across both pads and education sites, girls agreed that 'I am less ashamed about menstruation now than I was before being in this study' (64.6%)" (Scott 2010).

Additionally, an intervention study in Oregon and Washington targeting male adolescents included a 30-minute slide presentation and a 30-minute interaction with a clinician. Fertility awareness messages and visuals on reproductive anatomy and fertility were included along with other topics such as hernia, testicular self-exam (TSE), STIs/HIV/AIDS, FP and abstinence, couple communication and access to services. The results of this study indicate that increased knowledge was strong only among those not sexually active at baseline, and effects on knowledge were seen at one-year follow-up. There were also reduced sexual coercion and sexual impatience responses among those in the intervention group who had not been sexually active at baseline (Danielson 1990). (Other studies in this review also document the benefit of educating youth before sexual debut, Ancheta 2005). A greater proportion of boys in the intervention groups practiced TSE and knew the contraceptive pill was safe. There was also increased partner pill use for those not sexually active at baseline, but who were sexually active at follow-up (Danielson 1990).

There is limited information on the effects of a fertility awareness intervention on adults' behavior. The Canto de Cetina study on anticipatory counseling on menstrual cycle changes associated with DMPA injectable use was described earlier. A study of women attending a peri-menopausal workshop resulted in increased knowledge and self-reported changes in behavior including initiating dialogue with a provider about mid-life health issues, exercise and nutrition (Stenger 2007).

In additional to these intervention studies, several studies show evidence of the effect of a fertility awareness intervention on behavior of adults. These studies were conducted in the context of assessing the integration of FAM into services. In Guatemala (IRH 2008b), users were interviewed when they first started using the Standard Days Method, and six months later. Results show significant increases in scale values for couple communication and women's empowerment. In India and Peru (IRH 2008a; León 2013), the Standard Days Method was integrated on a large scale in an entire community. Community surveys showed improvements from baseline to endline in couple communication and women's empowerment at the community level, with largest improvements among women who had ever heard of or ever used the method. Focus groups in the DRC with Standard Days Method users (IRH 2008c) confirm that using FAM improves couple communication as well as male-involvement in FP use.

What may contribute to relating fertility awareness knowledge to one's own body or circumstance and subsequent behavior?

Some studies suggest that accurate information about fertility may not necessarily be equated to one's own body or circumstance. Within the theory of the Health Belief Model, perceived susceptibility to a health issue and relating to the severity of the consequences contributes to behavior change. In the social learning theory, behavior change is facilitated by observing and practicing the new behavior. In a few studies in this review personal perception of risk of pregnancy remained low, even within the context of accurate information. In a Swedish study, for example, although 81% (n=518), of teens/women seeking abortion actually knew the fertile days of the menstrual cycle were between two menstrual periods and had high awareness of emergency contraception 83%, few women had used emergency contraception as an attempt to prevent unintended pregnancy. When those who had used emergency contraception in the past were asked why they did not use it this time, the main reason reported was "unawareness of pregnancy risk" (Aneblom 2002). It appears that even with basic awareness regarding the fertile time and awareness of EC, the women did not recognize or internalize "risk of pregnancy" at an individual and personal level. In a study in Tanzania, Sommer (2009) noted that girls knew vaguely about mid-cycle fertility but lacked details to understand the risk of pregnancy or apply this information to their own bodies. In a US study that includes teaching fertility awareness and tracking of fertility indicators to adolescents, Roth (1993) suggests that, "Lack of fertility awareness and lack of association of this with a girls' own body contributes to contraceptive risk-taking."

In another example, breastfeeding women who had participated in a LAM intervention in Bangladesh were interviewed to ascertain their knowledge and use of the LAM criteria. Although women knew all three criteria, they often did not transition to another FP method by six months postpartum, but rather waited until menses returned or beyond before considering themselves at risk of pregnancy (Bongiovani 2005; Kouyate 2010). Postpartum women and the general population often considered breastfeeding to be protective much longer than it is. The "lived experience" of women who had previously breastfed and not conceived until after first postpartum menses may have contributed to common views of return of fertility after return of postpartum menses (Kouyate 2010).

> *"Knowledge of return to fertility does not equate to beliefs of personal susceptibility to pregnancy." (Kouyate, USAID meeting summary quote)*

The importance of personal, "lived experiences" is reported in a few additional studies. A qualitative study of 37 men in the US documented men's lived experiences as shaping their "procreative consciousness" This included: personal experiences during puberty; revelations through peer experiences; personal experiences with first sex, first pregnancy scare, partner's miscarriage or abortion; perceptions influenced by the relationship with a partner and her beliefs, issues and/or concerns as well as perceived fertility or infertility based on direct sexual experiences with women (including perceived infertility based on unprotected sex not resulting in pregnancy) (Marsiglio 2001). Interestingly, in a very different study on women's positive and negative experiences with menses (McPherson 2004), university women who rated their periods as negative (including debilitating periods or negative mood swings) were better able to predict onset of menses. Their "lived experience" with these preceding body changes appeared to heightened awareness of associated events, such as onset of menses.

It is possible that associating fertility awareness to one's own body is instrumental in enhancing one's personal perception of risk of pregnancy and in influencing SRH attitudes and behaviors, including FP. Pyper (1997) summarizes key elements of fertility awareness, including, "personal involvement…to observe changes that occur in [our] own bodies. This involves observing changes that are related to significant reproductive events, for example puberty, menstruation, pregnancy, breastfeeding or the menopause."

Conclusion

With the lack of fertility awareness knowledge worldwide, and the potential to build on what is known with accurate information and supportive attitudes, there appear to be untapped opportunities to contribute to sexual and reproductive health behaviors and outcomes through improved fertility awareness. Evidence-based research on empowerment interventions has demonstrated strengthened self and collective efficacy, increased autonomy and authority, reduction of gender inequities, adoption of healthy behaviors and use of services, and improved child and family health outcomes (Wallerstein 2006). Whether fertility awareness is a "gateway" empowerment intervention that creates pathways to broader health outcomes and gender transformation or provides a foundational pillar for overall sexual and reproductive health could not be verified with this literature review. More research is needed to test different approaches and determine whether a fertility awareness component, specific to different stages across the life course, provides significant value-added to basic sexual and reproductive health education in a personal and meaningful way, and whether there is a significant positive impact on health behaviors and outcomes.

We look forward to discussing these topics related to fertility awareness and how to integrate them into research and programs.

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