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*Culturally Perceived Risks of Pregnancy: Correlations between early disclosure of pregnancy,  
gender and social norms, and positive maternal health program outcomes  
in Bankass and Bandiagara, Mali*

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An abstract of  
A thesis submitted to the Faculty of the  
Rollins School of Public Health of Emory University  
in partial fulfillment of the requirements for the degree of  
Master of Public Health  
in the Hubert Department of Global Health  
2014

## Abstract

### **Culturally Perceived Risks of Pregnancy: Correlations between early disclosure of pregnancy, social and gender norms, and positive maternal health program outcomes in Bankass and Bandiagara, Mali**

By Meighan Tarnagada

**Background.** Over 20 years after ICPD, uptake of essential reproductive and maternal health services remains slow in Sub-Saharan Africa. Frequently, social norms, cultural traditions, and gender roles are blamed for impeding access to crucial health care. Although current anthropological research highlights the need to address culturally perceived risks of pregnancy in current maternal health programming, no evidence addresses the impact of early disclosure of pregnancy on maternal health program outcomes.

**Objective.** This study investigates the intersections of culturally perceived risks of pregnancy disclosure, social and gender norms, and maternal health program outcomes within the context of a community-based maternal health initiative in Mali, West Africa.

**Methods.** In two rural districts of the Mopti region of central Mali, survey data were collected from women that gave birth within the past six months. Differences in socio-demographic characteristics, gender empowerment constructs, and health service utilization were analyzed between intervention and control districts and timing of pregnancy disclosure. The predictive value of early disclosure of pregnancy, the primary covariate of interest, on main maternal health program outcomes was assessed using multivariate modeling. Binomial logistic regression was performed to fit associative models with each of four maternal health program outcome variables including: current family planning use, complete package of WHO recommended antenatal care services, institutional delivery, and skilled postnatal care.

**Results.** Unadjusted bivariate associations between positive maternal health program outcomes and the intervention district were significant. Women in the intervention district also reported statistically higher scores of gender empowerment than those in the control district. After adjusting for socio-demographic characteristics, gender empowerment indices, and exposure to the intervention, early disclosure of pregnancy remained a strong predictor of the receipt of the WHO recommended package of antenatal care services, institutional delivery, and skilled postnatal care.

**Discussion.** This analysis substantiates the valor of community-based initiatives that catalyze dialogue about pregnancy at the community and household level and confront social and gender norms that impede women from accessing health services. The results from this analysis contribute to existing research by emphasizing the benefit of addressing culturally perceived risks of pregnancy to improve maternal health service utilization in Mali.

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## **ACKNOWLEDGEMENTS**

I would like to thank Dr. Roger Rochat for his unwavering support throughout not only my culminating thesis project but the past two years. His mentorship continues to motivate and inspire me to push boundaries, ask questions, and dedicate my professional career to improving global reproductive health. I am also eternally grateful to Paul Weiss for his indefatigable guidance and analytical advice. Finally, thanks to Marcie Rubardt and Jennifer Kuzara of CARE USA for their continual encouragement, assistance, and authorization to use PEMN data for my thesis project.

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## I. Introduction

The 1994 International Conference on Population Development (ICPD) in Cairo marked a monumental shift in prioritizing reproductive health in the global arena. Focusing on gender equity and emphasizing reproductive health as a human right, the final ICPD document set an international agenda that aimed to bolster women's health worldwide while recognizing the need to address and involve men in the process (Keleher & Franklin, 2008). These priorities were further materialized at the Millennium Summit in 2000 upon the establishment of the Millennium Development Goals (MDGs), and specifically Goal 5 which aims to improve maternal health by reducing maternal mortality and achieving universal access to reproductive health services (UN, 2011). As a result, in the past decade programmatic efforts have largely concentrated on preventative services to impact high maternal mortality ratios including improving family planning services, safe abortion, antenatal care, skilled assistance at delivery, emergency obstetric services, and postpartum care (WHO, 2009). However, despite these efforts, uptake in reproductive and maternal health services has been slow, and reproductive health indicators have shown little improvement in many developing countries (M. C. Hogan et al., 2010; WHO, 2009).

Although global maternal mortality has declined from 400 maternal deaths per 100,000 live births in 1990 to 210 in 2010, it falls short of the MDG 5 target (a 75% reduction by 2015). This holds especially true for Sub-Saharan Africa which as a whole has the world's highest maternal mortality ratio – 500 maternal deaths per 100,000 live births in 2010 (UN, 2013). In fact, in 2008 maternal mortality in Sub-Saharan Africa accounted for 52 percent (95% CI: 45, 59) of the estimated 342,900 (95% CI: 302,100, 394,300) maternal deaths worldwide (M. C. Hogan et al., 2010).

Across the region, significant health disparities and limited access to reproductive and obstetric care services yield low contraceptive prevalence, insufficient antenatal and postnatal care, low levels of skilled attendance at birth, and overall poor maternal health indicators (Gribble, 2008; M. C. Hogan et al., 2010; Khan, 2007).

To reduce maternal mortality, interventions have primarily operated on one or more of the steps to maternal death as described by McCarthy and Maine (McCarthy, 1997; McCarthy & Maine, 1992). They describe the 3 steps as follows: recognition of a pregnancy, development of complications, and lack of effective treatment. By definition, a maternal death is directly or indirectly related to pregnancy. Complications may arise from pre-existing conditions intensified by pregnancy, from the pregnancy itself, or from the pregnancy's management or termination. In situations where treatment is non-existent, ineffective or insufficient, these complications may worsen and result in mortality. Thus, successful intervention points are based on prevention: preventing pregnancy, preventing the occurrence of complications of pregnancy, or preventing complications during delivery.

Comprehensive antenatal care (Gage, 2007), skilled assistance at delivery (Singh, 2009; van den Broek et al., 2003; WHO, 2004), institutional delivery (Thaddeus & Maine, 1994; Tsu, 1994), postnatal care (WHO, 2010), and birth spacing have been consistently found to be associated with maternal health service outcomes. WHO recommends a minimum of four antenatal care visits with the first taking place ideally during the first trimester. Comprehensive care should include consultations to identify and manage risky conditions (e.g., high blood pressure and sexually transmitted infections), to administer tetanus toxoid and supplements of folic acid and iron, and to inform women and their families about danger signs in pregnancy, emergency referral services,

and the value of making a birth plan and delivering in an institution (WHO, 2009). Although the comprehensive antenatal care's impact on maternal mortality has been disputed (AbouZahr, 2003), evidence in Mali, West Africa has found receipt of antenatal care to be associated with increased skilled delivery care (Gage, 2007). In Sub-Saharan Africa, evidence has found delivery in a medical institution attended by trained medical staff to be associated with lower rates of maternal and neonatal mortality and morbidity compared to home births (Moyer & Mustafa, 2013). In addition, postnatal care is also vital for the maternal and neonatal health as the immediate postpartum period accounts for the majority of maternal and child deaths (WHO, 2010).

While these delivery points significantly impact maternal mortality, consistent and affordable access is limited, and even where available, coverage and uptake of maternal health services is intermittent (Beegle, Frankenberg, & Thomas, 2001; Konate, 1998). To understand the gaps in service provision, contextual influences on health service use has been studied extensively. Demographic and socioeconomic factors have been shown to greatly impact health service use, especially reproductive health services. Low parities (Magadi, Madise, & Rodrigues, 2000) younger maternal age, (Haque, Rahman, Mostofa, & Zahan, 2012), woman's level of education, women's employment (Addai, 1998; Magadi et al., 2000; Nuwaha & Amooti-Kaguna, 1999), and high levels of husbands' education (Nuwaha & Amooti-Kaguna, 1999) have been found to be determinants of utilization of reproductive health services. Additional predictors of a woman's likelihood of using health services include urban residence (Addai, 1998) and household living conditions (Bloom, Wypij, & Das Gupta, 2001).

More recently, studies have shifted focus to understand the nuanced social norms and cultural contexts that influence these determinants. An individual's behavior is influenced by how a person

thinks the community views his or her actions and these social norms are reflected in women's health seeking behaviors (Rutenberg & Watkins, 1997). Studies have begun to investigate community influences (D. P. Hogan & Biratu, 2004; Maticka-Tyndale & Tenkorang, 2010; Stephenson, Beke, & Tshibangu, 2008), household power dynamics (Bankole, 1998; Beegle et al., 2001; Blanc, 2001; Pulerwitz, Michaelis, Verma, & Weiss, 2010), and gender roles (White, Greene, & Murphy, 2003) on reproductive health services. Yet, research to date has taken a somewhat narrow view and cultural aspects of pregnancy have been neglected (Ngomane & Mulaudzi, 2012).

This study will address this knowledge gap by further investigating the intersections of culturally perceived risks of pregnancy disclosure, social and gender norms, and maternal health program outcomes in Mali, West Africa. By evaluating the impact of early disclosure of pregnancy, a socially undesirable construct, on maternal health program outcomes we will contribute evidence to the literature about the value of programmatic interventions focused on intra-familial discussions about women's health.

### Research Objectives:

Specifically, this thesis hopes to address the following research objectives:

- Describe the current state of literature pertaining to social and gender norms, culturally perceived risks of pregnancy and maternal health service utilization and identify areas for further investigation
- Detail the methodology of a randomized household survey in rural Mali for a final evaluation of a community-based action research project on maternal health (PEMN)

- Evaluate the differences in demographic characteristics, measurements of gender empowerment, and use of maternal health services between PEMN’s intervention and control districts
- Investigate whether early disclosure of pregnancy is a strong predictor of maternal health program outcomes
- Provide evidence-based recommendations for community-based maternal health interventions focused on social change

## II. Literature Review

Pregnancy represents a highly constructed social world by which women must adhere (Papen, 2008). Cultural taboos of pregnancy greatly impact access and use of maternal health care and are embedded in established social and gender normative behaviors. Effective programming must take into account each of these aspects in a complex social network in order to successfully change behavior and improve population health.

### Diffusion of Innovation and Social Network Theory

Complex social underpinnings of individual behavior play a significant role in facilitating or constraining use of health services (Andersen, 1973; Berkanovic, 1982; Berkman, 2000; Pescosolido, 1992). This network of positive and negative influences on health service uptake is grounded in two psycho-social theories: diffusion of innovation theory and social network theory.

The diffusion of innovation theory presents the adoption of new behavior or innovation in a 5-stage process (Rogers & Kincaid, 1981). The innovation-decision process develops from knowledge to persuasion, decision, implementation, and confirmation. Initial knowledge may be obtained through various communication avenues and is thus persuaded through interpersonal

communication primarily based on the compatibility of the innovation's attributes with one's values, beliefs and needs. This persuasion impacts decision making and further implementation of the ideation. The social network theory (Montgomery & Casterline, 1996; Rogers & Kincaid, 1981) is used as an extension of the diffusion of innovation theory. In response to criticism about the diffusion on innovation theory's individual, psychological approach, the social network theory suggests that individuals who are more highly interconnected and centralized within social networks are more likely to hear about innovations earlier and to have more opportunity for social comparison (Kincaid, 2004) and influence (Nowak, Szamrej, & Latane, 1990). A social network approach thus catalyzes the individual 5-stage process by changing the interaction process in social networks to accelerate the diffusion of innovations.

Measurement of approaches founded in the diffusion of innovation and social network theories are derived from units of ideation. Ideation is often culturally defined as "the cumulative conjunction of variables used to measure progress on the stages of the innovation-decision process prior to behavior change (Kincaid, 2000)." Some variables include measures of knowledge and beliefs about the positive and negative elements of the innovation, discussion about the innovation with one's family, friends, and change agents, and social endorsement. Examples in maternal health programs would include knowledge of pregnancy danger signs, attitudes about institutional delivery, discussion of birth planning with the extended family, and approval of post-partum family planning use by one's spouse.

## Social Norms, Culture, Gender Roles, and Reproductive Health

Within social networks, norms are preserved by traditions that dictate and restrict behaviors of both women and men. Often social norms are defined as “individuals’ perceptions about which attitudes and behaviors are typical or desirable in their community (Cialdini et al., 2006; Paluck, Ball, Poynton, & Sieloff, 2010). Perceived social norms may affect behavior more dramatically when the norms are related to a community that the individual decision-maker values (i.e., his/her village, ethnic group, or religious group); when an individual esteems his or her membership in a specific social group, the group’s social norms can affect behavior so powerfully as the individual desires to conform to the group (Cialdini et al., 2006; Cialdini & Trost, 1998). Paluck (2009) demonstrates that behavior change is generated most effectively through changing social norms. In fact, other research furthers this finding suggesting that modification of pro-social descriptive norms (emphasizing the regularity of desired behavior or the non-uniformity of undesired behavior) and proscriptive injunctive norms (emphasizing that which ought not to be done in the eyes of the community) are most influential in bring about change (Cialdini et al., 2006; Croy, Gerrans, & Speelman, 2010).

Social normative behavior is deeply rooted in cultural traits that are passed from one generation to the next. This expression of cultural and social values are embedded in society and become part of one’s lifestyle. As such, they are innate and often difficult to change. Social norms and cultural belief systems thus significantly impact individuals’ health care-seeking behavior, especially reproductive and maternal health (Shaikh, 2005). Williams’ study on cultural practices and social support for women in New Mexico (Williams, 2001) indicated that cultural practices

and beliefs influence and prescribes women's behavior during pregnancy and childbirth. Similar results were found in South Africa; indigenous practices influenced and delayed attendance at antenatal care clinics (Ngomane & Mulaudzi, 2012).

Gender roles deeply entrenched in cultural practices and social norms further affect health behavior and access to reproductive health services. The World Health Organization (WHO, 2001) defines gender as socially constructed roles, behaviors, and attributes that a given society considers appropriate for men and women. Inequality in gendered roles and norms result in power imbalances that influence decisions regarding maternal health and family planning (Kalichman et al., 2008; Paek, Lee, Salmon, & Witte, 2008; Varga, 2003). A woman's limited decision-making power and value in her household affects her access and utilization of essential health care services (Jansen, 2006).

In traditional Pakistani society, power dynamics and decision-making are out of a woman's grasp; decisions regarding family planning and pregnancy are controlled by the husband and the mother-in-law (Casterline J.B., 2001; Mumtaz & Salway, 2009). Multiple studies in Sub-Saharan Africa also found that imbalanced gender norms that emphasize male dominance influence women's family planning behavior (Beekle, 2006; DeRose & Ezeh, 2010; Dynes, Stephenson, Rubardt, & Bartel, 2012; Hertrich & Andro, 2002; Paek et al., 2008; Smith, 2010). Specifically, negotiation about contraceptive use is intimately linked with the power dynamics between partners (Hertrich & Andro, 2002; Kaggwa, Diop, & Storey, 2008; Kulczycki, 2008; Tolley, Loza, Kafafi, & Cummings, 2005) and the superiority of male sexual pleasure, a manifestation of these power relations (Bajos et al., 2013). Other research has discerned significant associations



between inequitable gender norms and rates of HIV/STI transmission, physical violence, and youth sexual behaviors (G. Barker & Ricardo, 2005; Marsiglio, 1988; Marston & King, 2006).

Nonetheless, differential gender roles, the resulting power dynamics within a household and how they influence decisions on maternal health are not fully understood (Bankole, 1998; Beegle et al., 2001; Blanc, 2001; Pulerwitz et al., 2010). Not only is gendered influence on pregnancy and childbirth poorly understood, few studies measure the role of men and their influence on maternal health care throughout pregnancy and obstetrical outcomes (Dudgeon & Inhorn, 2004).

### **Addressing the Gatekeepers of Maternal Health: Male Involvement**

The reallocation of international attention to reproductive and maternal health brought about advancement in women's health services throughout Sub-Saharan Africa. However, while health systems strengthening has aimed to improve quality and availability of reproductive health services, acceptance and use of these services have lagged behind. By the time of the ICPD, substantial evidence had been accumulated on the detrimental effects on reproductive health from negative or absent male involvement (G. Barker, & Das, A., 2004; Odimegwu et al., 2005). Increasing understanding of social, gender, and cultural influences on a woman's autonomy and agency in making health care decisions had led to reassessments of programmatic scope to include men in reproductive health services.

Research on gender relations within the household have discovered that some women's access and utilization of reproductive and maternal health services depend upon their spouses (Dudgeon & Inhorn, 2004). Men are often the primary decision makers about maternal health issues (Mohammad-Alizadeh, Wahlström, Vahidi, & Johansson, 2009; Speizer, Whittle, & Carter,

2005), family size, and contraceptive use (Nzioka, 2002; Oyediran, 2002; Soldan, 2004). A study in Bangladesh found that almost 70% of women surveyed needed spousal or familial approval to seek health services (Hossain & Ross, 2006). In 2000, Haider discovered that the selection of a birth attendant remained primarily the husband's decision (Haider, 2000). Numerous studies have highlighted the importance of men's influence as gate-keepers to reproductive and maternal health services and have called for increased male involvement (Dudgeon & Inhorn, 2004).

Overall, previous literature reviews have found mixed but generally positive assessments of programs involving men (Elwy, Hart, Hawkes, & Petticrew, 2002; P. Sternberg & Hubley, 2004), though published impact evaluation studies on male involvement in maternal health are uncommon. Some studies have demonstrated that maternal health education interventions targeting both men and women have proved to increase the couple's knowledge (Kunene et al., 2004; Mullany, Lakhey, Shrestha, Hindin, & Becker, 2008; Toubia & Delano, 1995), male participation during antenatal clinics, health seeking behavior among pregnant women, awareness and use of family planning in postpartum period, and also awareness of dual protection for STIs. Evidence also indicates that male involvement can lead to contraceptive uptake, improved spousal relationships, and women's participation in contraceptive decision-making (Bawah, 2002; Kim, 2001; Nzioka, 2002; Sharan, 2002; P. Sternberg & Hubley, 2004).

Male involvement in communication interventions has been found to improve reproductive health outcomes (Cohen 2000; Cohen, 2003; Mufune, 2009; Obionu 2001; Peacock & Levack, 2004; P. Sternberg & Hubley, 2004; USAID, 2000, 2003, 2006). A plethora of studies have found

evidence that indicates that spousal communication can lead to contraceptive uptake (Azimi Y.N., 2003; Bawah, 2002; Casterline J.B., 2001; Kim, 2001; Nzioka, 2002; Sharan, 2002; P. Sternberg & Hubley, 2004). For example, among women residing in six countries of Sub-Saharan Africa, those who reported frequent communication with their partners about contraception had greater odds of using a family planning method than those who reported never discussing the topic (Stephenson, Baschieri, Clements, Hennink, & Madise, 2007). However, documented and evaluated use of communication interventions as a means to increase male involvement before, during, and after pregnancy is limited and inconsistent.

Moreover, these studies lack substantial measures to evaluate how male involvement impacts gender equity, women's empowerment, or whether men were able to confront gendered social norms (P. Sternberg & Hubley, 2004; Verma et al., 2006; White et al., 2003). Some argue that programs that focus on male involvement suffer from inadequate methodology grounded weak theory (P. Sternberg & Hubley, 2013). These programs have focused on evaluating their impact with indicators such as men's knowledge, attitudes, and behaviors with regard to family planning and contraceptive use, safe sex, gender roles and relations. However, while most studies demonstrate some change in male knowledge and understanding of gender relations, most are short term, and few have been evaluated systematically (Barker 2007).

### **Culturally Perceived Risks of Pregnancy**

Frequently, social norms, cultural traditions, and gender roles are blamed for impeding access to crucial modern health care. Culturally construed health behaviors and perceptions of health risks are more often than not based on political, social, and cultural contexts rather than biological

medical principles (Nelkin, 2003) and the importance of local understanding over these perceptions has been emphasized in research on childbirth (AsowaOmorodion, 1997; Liamputtong, Yimyam, Parisunyakul, Baosoung, & Sansiriphun, 2005). Several studies in central Mozambique found that women's comprehension about biological and medical reproductive risks were often intimately related to, ensconced with, or completely replaced by concerns with social threats (Adetunji, 1992; AsowaOmorodion, 1997; Eggleston, 2000; Etuk, Itam, & Asuquo, 1999; Nichter, 2002, 2003). Perceived reproductive threats corresponded to their fears about reproductive loss, their daily experiences of social and economic insecurity and, their engagement in risky social relationships (R. R. Chapman, 2006). Allen (2002) and Chapman (2003, 2010), have built upon these studies to demonstrate that for women in Tanzania and Mozambique respectively, social threats to pregnancy matter more than the biomedical risks of reproduction, the foci of global safe motherhood initiatives. These studies found that women prefer to resort to traditional healers, medicines, and use cultural coping mechanisms instead of participating in "modern" health care services (van der Sijpt, 2013).

In Mali, West Africa and across Sub-Saharan Africa, culturally perceived risks of pregnancy and a woman's vulnerability to negative maternal health outcomes is handled with concealment. In these contexts, high fertility is prized and childlessness is stigmatized (Inhorn, 2003; Kielmann, 1998); women may even be condemned for poor reproductive outcomes (Savage, 1996; Stewart, 1993). To protect women from social risks such as gossip, sorcery, and spirit possession, pregnancies are not disclosed (V. Adams et al., 2005; R. Chapman, 2005; Mathole, Lindmark, Majoko, & Ahlberg, 2004; Savage, 1996; Stokes, Dumbaya, Owens, & Brabin, 2008). Discussion

about pregnancy is considered taboo: it is kept secret from friends, outsiders, and is only discussed in the household when the pregnancy becomes physically evident (Ngomane & Mulaudzi, 2012). Gossip and sorcery are affiliated with and are cultural explanations for negative maternal health outcomes. In Zimbabwe, for example, the cultural taboo is built around protecting the fetus from evil spirits. It is believed that the first three months of pregnancy are the most critical and discussion about pregnancy during this time will bewitch the pregnant mother resulting in malformations or a miscarriage (Mathole et al., 2004). In West Africa, concealment of pregnancy and secrecy of childbirth is an established social norm. Secrecy about pregnancy and lack of disclosure is found to result in the underutilization of antenatal care services, delay in emergency care, and often women giving birth alone (Okafor, 2000).

Although current anthropological research highlights the need to address culturally perceived risks of pregnancy in current maternal health programming, no evidence addresses the impact of disclosure of pregnancy on maternal health program outcomes. While initiatives have been built to address male involvement and encourage dialogue about pregnancy at the household and community level, programs that target culturally perceived risks and taboos related to disclosure are rare. More research is needed to determine the association between early pregnancy disclosure and positive health outcomes and its consideration in maternal health programming.

### III. Methodology

This study is a part of the final evaluation of *Projet Espoir de la Mère et du Nouveau-Né (PEMN)* in Mali. A collaborative effort between CARE USA and CARE Mali, PEMN is an action-research initiative that aims to document the benefits of integrating community-level interventions that address social barriers that impede pregnant women's access to essential maternal health services with technical medical interventions. PEMN implemented a quasi-experimental intervention-control methodology in the Bandiagara and Bankass districts from June 2011 through September 2013. Each district received health systems strengthening and capacity building to address gaps in critical maternal and newborn health services. Over the course of the project a social change intervention package including couples counseling, extended family discussions, male friendly services, and community dialogue was implemented in Bankass (the intervention district) to address social norms related to gender, power, intra-familial decision-making and social exclusion. Overall, PEMN hypothesized that addressing social norms around gender and decision making will positively influence maternal health behaviors.

The PEMN final evaluation uses mixed methodology to document the impact of community-based social interventions on positive maternal health program outcomes. A quantitative household survey was conducted at baseline and endline in each of the intervention and control districts. Quantitative questionnaires were also collected at endline to authenticate changes in the community health workers' knowledge and attitudes. In addition, health facility assessments were undertaken at baseline and endline in all health facilities in each district (Bankass and Bandiagara). Qualitative data was collected to explore the change process of 6 triads (women, their husbands, and their mothers-in-law) that adhered to the social change package. Focus groups and structured

in-depth interviews were also conducted with implementers and stakeholders to provide further evidence of the project's implementation process.

## Population and Study Setting

The PEMN endline survey was conducted in the Bankass and Bandiagara districts in the Mopti region of central Mali. The Mopti region is marked as rural and predominantly agricultural with some of the highest socio-economic disparities in the country. In 2007, residents in the Mopti region had the lowest levels of education in Mali: 81 percent of the population reported no education (CPS/MS, 2007). Employment outside the household varied significantly between gender, only 43 percent of women were currently employed compared to over two-thirds (67%) of men (CPS/MS, 2007). Similar to much of rural Mali, women in Mopti are also characterized with early marriage and childbirth. The mean age at marriage among women is 17 and on average women give birth to their first child at age 19 (CPS/MS, 2007).

Low indicators of reproductive and maternal health are predominant in the region. High desired family size (women desire an average of 7.8 children and men desire a slightly higher average of 8.3) reflected in a total fertility rate of over 6 children, results in the lowest contraceptive prevalence rate in the country (CPS/MS, 2007). According to the 2006 Mali Demographic and Health Survey, 30 percent of women in the whole country received an antenatal care visit within the first trimester while 35 percent obtained four or more antenatal care visits. Data is not available for the WHO recommended package of antenatal care at the nationwide nor the regional level. However, it can be concluded that the proportion of women who received the complete package in Mopti is very low. Institutional delivery and receipt of postnatal care is also rare in the Mopti

region. Less than one third of women in the region (30%) delivered in a local health facility and less than a fifth (15%) received postnatal care within 48 hours postpartum (CPS/MS, 2007).

### Research design and sample

This study is a secondary analysis using data collected from endline quantitative household surveys. To obtain a representative sample, 500 households were randomly selected from the intervention and control districts (Bankass and Bandiagara respectively), for a total of 1000 households. A random sample of 50 villages in each district were sampled using the probability proportional to size technique; 10 households from each village were selected. Within each selected village, 3 data collectors started at a locally defined center and visited each household until they reached a total of 10 eligible households. The household surveys were conducted with women, their husbands, and their mothers-in-law. However, this study uses data collected from women's surveys. To be eligible for the women's survey participants must have freely consented to the interview process, be at least 15 years of age, and have had given birth within the past six months. If multiple women were eligible in one household, the woman that most recently delivered was interviewed. Conversely, if these criteria were not met, the next household was approached.

Before data collection, field supervisors and interviewers participated in extensive training. All data collection staff participated in a four day training to become familiar with the survey tools, skip patterns, interview strategies, and address ethical conduct during the interview process. The surveys were piloted twice in villages outside the sample – once with the field supervisors and again with the interviewers on the last day of training – to culturally adapt and finalize the tools. In total, five survey teams were trained and hired for data collection. Each team consisted of a



supervisor, three female interviewers and one male interviewer. All interviews were conducted in local languages (Peuhl, Dogon, or Bambara) and were completed in 30 days.

Data collection throughout the study adhered to ethical principles. Before each interview, investigators addressed the following topics in the introduction with respondents: the purpose of the study, the procedure, the target of the study, the risks, benefits, compensation, confidentiality, participation and withdrawal time of the interview and contacts responsible for the study. Respondent's anonymity was ensured throughout the data collection process – personal identifiers were not recorded on questionnaires and village's names were replaced with numerical codes.

Quality control for data collection was ensured at two levels: in the field by team supervisors and by the data collection coordinator. Each team supervisor was responsible for:

- ensuring that household selection followed protocol in each village,
- ensuring that ethical consent was obtained,
- filling out monitoring forms (quota, use of translation, etc.),
- ensuring each survey was properly completed,
- informing and communicating regularly with the survey management team in case of issues or changes with the survey protocol in the field
- ensuring completeness of questionnaires before leaving a village
- properly coding each questionnaire and village

The data collection coordinator was responsible for supervising team supervisors. He was in charge of:

- debriefing the five data collection teams after the first day of data collection
- supervising field supervisors to ensure proper conduct during data collection

- ensuring ethical data collection and protocol compliance by the field supervisors
- ensuring that household selection each village complied to the study protocol
- calling field supervisors daily to ensure compliance to the data collection schedule
- maintaining and updating monitoring forms of each team's progress in the field

Completed questionnaires were sent to Bamako for input. CSPRO software was used for data entry. Double entry was used to compare and verify the quality of entered data and eliminate data entry errors. Once verified for quality and cleaned, the data was converted into SPSS formatting for analysis.

This analysis was determined to be IRB-exempt because it is an analysis of secondary data and all data were de-identified prior to analysis. Prior to data collection, all portions of the study were reviewed by Emory University's Institutional Review Board (IRB73365) and determined to meet the criteria for exemption.

## Measurements

The woman's questionnaire included sections on background information and socio-demographic characteristics, health service use, as well as, fourteen sets of indices items regarding a woman's agency, interfamilial power, and social capital.

The objective of this analysis is to explore the relationships between early disclosure of pregnancy with positive maternal health program outcomes. The specific outcomes that will be investigated include: family planning, antenatal care, institutional delivery, and postnatal care. For the sake of this analysis, the four maternal health program outcomes are translated into dichotomous variables defined as follows:

1. Family planning: currently using a modern method to avoid pregnancy (injections, pills and male condoms)
2. Antenatal care: receipt of WHO recommended package of antenatal services: at least four antenatal service visits with first visit taking place during the first trimester
3. Institutional delivery: woman delivered last pregnancy in a public or private health facility
4. Postnatal care: within 24 hours after last pregnancy, woman received care from a midwife, nurse, physician, or other health officer

The primary covariate of interest is early disclosure of pregnancy, a dichotomous variable defined as discussing pregnancy with someone in the household when the respondent (woman) thought (1) she might be pregnant, but didn't know for sure or (2) when she knew she was pregnant, but before she started to show. Other variables detailed the woman's communication and disclosure of pregnancy. These include with whom she discussed her pregnancy, why she didn't discuss or disclose pregnancy with someone in the household, and similar series of questions for discussion of pregnancy concerns, sex during and after pregnancy, and future use of family planning.

### Demographics

Standard information of population level background information and characteristics was collected for all respondents. This included information about age, age at first marriage, education, religion, relationship constructs, parity, and employment.

### Women's Empowerment Indices

The women's survey questionnaire included a set of quantitative gender scales from the WE-MEASR (Women's Empowerment –Multidimensional Evaluation of Agency, Social Capital, and Relations) tool developed by CARE USA. They are divided into three primary domains of change

in women's empowerment: agency, relations, and social capital. The thematic area of agency focuses on the internalization of beliefs of roles, responsibilities, and obligations of women and men, the value of and rights of women and men, and perceived community norms of these constructs. Agency is also addressed through woman's self-efficacy or confidence to perform behaviors under variety of conditions. Indices measuring relations concentrate on communication with partners and spouses, decision-making in households, and power, control and domination in intimate relationships. Aspects of social support are acquired through items addressing cognitive social capital (trust in others, social harmony, perceived fairness, and sense of belonging) and structural social capital (membership in groups, involvement in citizens activities, and social support from the community).

The following gender indices were introduced at endline to permit a robust analysis of associations between key dimensions of gender/women's empowerment and maternal health program outcomes of interest: (See Appendix 1 for further detail)

*Agency: Attitudes and Beliefs about Gender*

A series of four sub-indices were developed to account for personal attitudes and beliefs about gender. ***Intolerance of intimate partner violence index*** is a set of five question items with response options yes and no indicating if a husband is justified in hitting his wife. DHS recommended scoring was used; a respondent was scored with a "1" when demonstrating complete intolerance of intimate partner violence ("no" for all of the questions) while any other combination of tolerance/intolerance for index items were scored as "0." Thus the index is measured as a dichotomous variable with the high score (1) indicating an equitable attitude (intolerance of intimate partner violence) and the low score (0) indicating an inequitable attitude (tolerance of

intimate partner violence). The *right to refuse sex index* is based on a set of eight yes or no questions and is built using an additive scale (zero being the lowest possible score and eight being the highest possible score). The highest score (8) indicates highly equitable beliefs about a woman's right to refuse sex and a low score (0) indicates inequitable beliefs. The *male dominance index* is a composite of seven questions using a five-point Likert scale. An average score is calculated with a higher score (5) representing highly equitable beliefs about male dominance (or lack of a strong presence of male dominance within the household). The *women's health rights index* consists of two questionnaire items with response options using a five-point Likert scale from strongly disagree to strongly agree. Scoring was calculated based on the average of scores with a high score (5) representing more equitable beliefs about women's health rights.

The same series of questions were posed to respondents to also ask about perceived norms in the community. Sub-indices were calculated in a similar manner.

#### *Agency: Self-efficacy*

Self-efficacy was measured using a series of 35 question items. Thematic issues included self-efficacy to use family planning, to refuse sex, to go to a health facility, to attend community meetings, to ask for help with child care, and to ask one's spouse to participate in household duties. Response options for all items were on five-point Likert scale ranging from completely unsure to completely sure. The index was scored by averaging the responses to measure a woman's self-efficacy. A high score (5) represented high self-efficacy. It should be noted that in previous studies, sub-indices were calculated based on thematic groupings of questions. However, for the purpose of this analysis, factor analysis and scale reliability techniques were employed to determine the most appropriate construction of indices (see Validation of Indices section for further detail).

### *Social Capital: Community Support in Times of Crisis*

Community support in times of crisis index was developed as a measure of cognitive social capital or perceived social support in specific situations. A series of nine items were posed based on two crisis situations (if the woman was pregnant and bleeding and if the woman's husband severely were to beat her severely). A five-point Likert scale was implemented with responses ranging from completely sure to not at all sure. Responses were averaged to calculate the scale with a higher score (5) representing more perceived social support.

### *Relations: Decision-Making Power*

The decision-making power index is comprised of a series of questions regarding a woman's participation in household decision-making. Each item is coded in a two-tier system: 1 = woman made decision herself or with her husband; 0 = the woman's husband or another family member made the decision without consulting the woman. The index was thus calculated a mean index ranging from zero to one where higher scores represented more decision-making power within the family.

### *Relations: Inter-spousal Communication*

The inter-spousal communication index is also based on five-point Likert-type responses ranged from always to never. The index averages nine question items and is scored with one being the lowest level of communication to five being the highest or most frequent level of communication.

### *Other Indices*

A composite index was constructed reflecting the respondent's attitudes and views toward her local health facility. The index score represents an average of seven Likert-based items with one indicating low perceived quality of services to five indicating high perceived quality of services.

## Validation of Indices

To reduce the data from the set of questions posed on each of the women's empowerment constructs (agency, relations, and social support) to a single index and verify predetermined indices from the WE-MEASR tool, factor analysis and scale reliability tests were performed. Using SPSS, factor analysis with orthogonal variance maximizing rotation was conducted on each construct's set of questions to verify and finalize composite indices. Sub-indices were built based on factor loadings and were deemed suitable for analysis when the Cronbach's alpha reliability coefficients were greater than 0.7. Each item's influence on Cronbach's alpha was also considered in finalizing each index; items were eliminated from an index if the Cronbach's alpha increased more than 5% upon its removal. The factor loadings and Cronbach's alphas for the items in each index are outlined in Appendix 1.

As a result of the verification process some indices were reconstructed or determined to be unsuitable for analysis. Under the agency construct of women's empowerment, both the male dominance and women's health rights indices for individual and perceived community attitudes and beliefs about gender (four sub-indices in total) were excluded from analysis based on low Cronbach's alpha measures. In addition, measures of self-efficacy were reconstructed into four sub-indices based on maximization of variance rather than six sub-indices based on pre-determined thematic areas. One item was also dropped in the service quality index to improve the Cronbach's alpha by more than 5%.

## Analysis

Analysis was performed with SPSS. Using binary logistic regression, bivariate unadjusted associations were calculated between the primary covariate of interest, early disclosure of

pregnancy, and each of the four dependent variables. Other covariates of interest were loaded into a multivariable logistic regression model to assess their impact on the relationship between early disclosure of pregnancy and each maternal health program outcome. Covariates with an alpha of 0.05 were entered into the final model. However, regardless of significance, if an adjusted beta coefficient for early disclosure of pregnancy changed by approximately 10 percent or more, the covariate was entered into the final model to control for confounding. This process was repeated for each maternal health program outcome to determine the most parsimonious model.



**Table 1 : Final Indices**

<u>Domain</u>	<u>Sub-Domains</u>	<u>Indices</u>	<u># of Items</u>	<u>Alpha</u>	<u>Mean</u>	<u>SD</u>	<u>Range</u>
Agency	Internalized attitudes and beliefs about gender	Gender Attitude and Belief 1: <i>Tolerance of Intimate Partner Violence</i>	5	$\alpha$ .778	-	-	0-1
		Gender Attitude and Belief 2: <i>Right to Refuse Sex</i>	8	$\alpha$ .804	2.87	2.18	1-8
	Perceived community attitudes and beliefs about gender	Gender Attitude and Belief 1: <i>Tolerance of Intimate Partner Violence</i>	5	$\alpha$ .816	-	-	0-1
		Gender Attitude and Belief 2: <i>Right to Refuse Sex</i>	8	$\alpha$ .852	2.74	2.38	1-8
	Self-efficacy	Self-efficacy to discuss family planning	4	$\alpha$ .924	2.9	1.44	1-5
		Self-efficacy with husband	13	$\alpha$ .976	2.35	0.92	1-5
		Self-efficacy in the community	11	$\alpha$ .949	3.43	0.96	1-5
		Self-efficacy with children	7	$\alpha$ .958	4.51	0.81	1-5
Social Capital	Community support	Community Support in Times of Crisis	7	$\alpha$ .875	4.68	0.58	1-5
Relations	Decision- making power	Participation in Household Decision-making	19	$\alpha$ .726	0.22	0.16	0-1
	Inter-spousal communication	Inter-spousal Communication	5	$\alpha$ .726	2.72	0.83	1-5
Other	Service quality	Perceived quality of services at health center	8	$\alpha$ .842	4.46	0.58	1-5

## IV. Results

### Descriptive Statistics

#### Demographic variables

Of the 500 women surveyed in each district, the mean age was 27 years. At the time of the survey, ages ranged from 15 to 47 years old. Respondents were primarily of 5 main ethnic groups – the most common being Dogon (52% of women in Bankass and 92.6% of women in Bandiagara) and Peulh (21.8% and 5.8% respectively). Most of the respondents indicated their religion as Muslim. However, Christianity was practiced - 1.6% of women in Bankass and 5.8% in Bandiagara. Educational attainment of respondents in both districts is relatively low. In Bankass 83.3% of women never had formal education with only 1.2% making it to secondary school. Similarly in Bandiagara, the majority of respondents reported no formal education (77.6%). Over half of the women surveyed worked outside the home for liquid or in-kind payment (70.2% in Bankass and 50.6% in Bandiagara). However, household expenses are rarely met with their contributions. In both Bankass and Bandiagara less than 15% of women stated that their earnings contribute to at least of half of the household expenses.

Slightly under half of the households surveyed had polygamous unions (41.3%). Within each district approximately 17% of the women surveyed were the first wives in these unions. However, regardless of the marital arrangement, women married young and had little say in the process. The mean age of marriage was 17 years in each district ranging from 9 to 28 years of age. Less than 30% of women surveyed in Bankass and Bandiagara (29.9% and 25.7% respectively) chose their husbands. Among those who didn't choose their husband, only 45.1% in Bankass and 32.4% in Bandiagara had a say in who she was going to marry. Having a choice in her husband is statistically

significant with age at first marriage ( $p=.001$ ) and whether the woman was the only, first, or other co-wife ( $p=.001$ ).

Respondents had on average 4 live births in their lifetime – a mean of 4.25 live births in Bankass and 3.8 in Bandiagara. In Bankass, 40% of women reported having had a child who died in the first year of life and 32.2% of women in Bandiagara reported a child death. Having a child die in his/her first year of life was not statistically associated with age of marriage ( $p=.07$ ). However, there is a statistically significant relationship with whether the woman was the only, first, or other co-wife ( $p<.001$ ); a woman is more likely to not have a child die in his/her first year of life if she's the only wife.

### Discussion of Pregnancy

Over 50% of women discussed their pregnancy with someone in the household (62.6% in Bankass and 53.4% in Bandaigara). This relationship between discussion of pregnancy and intervention district is statistically significant ( $\text{Chi}^2= 8.68, p=.003$ ) - women in Bankass are 1.2 times more likely to have had discussed their pregnancy with someone in their household than women in Bandiagara. The majority of women discussed their pregnancy with their husbands, mothers-in-law, mothers, or sisters/sisters-in-law. Although there was no significant association between district and whether the woman discussed with her husband or mother-in-law, women in Bandiagara were more likely to discuss their pregnancy with their mothers than women in Bankass( $\text{Chi}^2=16.08; p<.001$ ). Conversely women in Bankass were more likely to discuss their pregnancy with their sisters or sisters-in-law than those in Bandiagara ( $\text{Chi}^2=9.23; p=.02$ ).

While slightly less frequent, women in both districts also reported discussing their fears and concerns related to pregnancy with someone in the household (49.2% in Bankass and 38.6% in

Bandiagara). Women in Bankass were 1.2 times more likely to discuss their concerns about pregnancy with someone in the household than women in Bandiagara ( $p=.001$ ). In both districts most women discussed their concerns with their husbands (64.6% and 63.2%). However, while women in Bandiagara were more likely to discuss concerns with their mothers ( $\text{Chi}^2=20.8$ ;  $p<.001$ ), women in Bankass were more likely to discuss concerns with their mothers-in-law ( $\text{Chi}^2=6.1$ ;  $p=.014$ ).

Discussion about sex and future family planning use also differed by district ( $p=.002$ ;  $p<.001$ ). Women in Bankass were 1.3 times as likely to discuss sex during pregnancy and 1.4 times more likely to discuss future family planning use during pregnancy than women in Bandiagara. Women primarily discussed both of these subjects with their husbands. There was no statistically significant association between district and with whom in their household they discussed sex and future family planning use.

Among the women who did not discuss their pregnancy with anyone in their households (37.4% in Bankass and 46.6% in Bandiagara), issues of social taboo were cited as the primary reasons to not disclose. In each district, the majority of women (43.9% and 50.6%) stated that they did not discuss their pregnancy with anyone because “we don’t talk about these things.” Expression of the personal repercussions of social taboo was also cited through responses such as “I was embarrassed” and “I was afraid” which accounted for over 30% in each district. Among the women who did not discuss future use of family planning during their pregnancies, the most popular responses were “we don’t talk about these things” or “I didn’t want to use family planning.”

## Gender Empowerment Constructs and Indices

Indices were developed based on subsets of questions around key gender empowerment constructs. Differences were examined between intervention districts to determine the impact of the project's activities on sub-domains including: internalized attitudes and beliefs about gender, perceived community attitudes and beliefs about gender, self-efficacy, community support, decision-making power, and inter-spousal communication. Health service quality was also analyzed. Further investigation was undertaken to better understand relationships between different gender constructs and maternal health program outcomes.

Scores for self-efficacy in regards to family planning indicate that women in Bankass, the intervention district, have a significantly higher mean score for self-efficacy with family planning (3.17) than women in the control district (2.6), Bandiagara ( $p < .001$ ). This holds true for the self-efficacy index scores for community participation and children as well ( $p < .001$  for both scores). Inter-spousal communication scores were also statistically significant between districts ( $p < .001$ ). Women in Bankass have significantly higher mean gender equitable communication scores (2.89) compared to women in Bandiagara (2.54). Along with measures of self-efficacy and equitable communication, women in Bankass have higher mean scores for perceived community support during crisis ( $p < .001$ ). The average mean score for perceived community support in Bankass is 4.76 compared to a mean score in Bandiagara of 4.6. While perceived quality of health care services was high in both districts (4.53 in Bankass and 4.4 in Bandiagara), the mean scores for perceived quality of health services are significantly higher in the intervention district ( $p < .001$ ).

Interestingly, indices representing intolerance for intimate partner violence were significantly higher in the control district ( $p < .001$ ). Women in Bandiagara are 1.33 times more likely to express

personal intolerance for intimate partner violence than women in Bankass (CI: 1.14, 1.55). Likewise, women in the control district are more 1.43 times more likely to perceive people in their community to be intolerant of intimate partner violence (CI: 1.25, 1.65). However, it should be noted that less than 10 percent of women in each district were scored as “intolerant of intimate partner violence.”

**Table 2 : Gender Empowerment Indices Associated with Intervention District**

<b>Gender Empowerment Indices</b>	<b>Bankass Mean (std)</b>	<b>Bandiagara Mean (std)</b>	<b>pvalue</b>
Quality of Services	4.53 (.54)	4.4 (.61)	<.001
Right to refuse sex	2.88 (2.03)	2.87 (2.32)	0.942
Right to refuse sex - Community	2.68 (2.19)	2.81 (2.56)	0.374
Household decision-making	.22 (.15)	.22 (.17)	0.573
Self-efficacy: Family planning	3.17 (1.4)	2.6 (1.4)	<.001
Self-efficacy: Husbands	2.33 (.91)	2.36 (.93)	0.497
Self-efficacy: Community	3.65 (.86)	3.21 (.99)	<.001
Self-efficacy: Children	4.64 (.69)	4.39 (.9)	<.001
Inter-spousal communication	2.89 (.82)	2.54 (.81)	<.001
Community Support in Crisis	4.76 (.52)	4.6 (.63)	<.001

**Table 3 : Gender Empowerment Indices Associated with Intervention District**

<b>Gender Empowerment Indices</b>	<b>Bankass N (%)</b>	<b>Bandiagara N (%)</b>	<b>pvalue</b>
Intolerance for IPV	41 (8.2%)	73 (14.6%)	.001
Intolerance for IPV: Community	39 (7.8%)	83 (16.6%)	<.001

High scores of self-efficacy with family planning, community participation, and children are significantly associated with positive maternal health program outcomes ( $p < .001$ ). Each maternal health outcome was also associated with frequent communication between spouses and positive community support in crisis (see Table 4). Current use of family planning was associated with every gender construct index except those representing intolerance for IPV ( $p < 0.05$ ). In fact, the

indices indicating personal and perceived community intolerance for intimate partner violence were not associated with any positive maternal health outcome. While mean scores for perceived quality of services were generally high (at least 4.6 out of 5), a woman's perception of the services she will receive at the local health center is associated with current use of family planning method, receipt of the complete package of antenatal care, and skilled postnatal care ( $p < .001$ ). Conversely, mean scores for equitable decision-making at the household were overall low for each maternal health outcome ranging from 0.19 to 0.22 on a scale from zero to one. However, more equitable decision-making is significantly related to current use of family planning, institutional delivery, and skilled postnatal care.

### Early Disclosure of Pregnancy

Early disclosure of pregnancy, the discussion of pregnancy when a woman thought she was pregnant but was unsure or when she knew was pregnant but before she started to show, is the primary covariate of interest in this study. Early disclosure of pregnancy is statistically significant with intervention district ( $p = .002$ ). In Bankass women are 1.2 times more likely to disclose their pregnancy early than women in Bandiagara.

Investigation of relationships between early disclosure of pregnancy and other covariates and index constructs led to the discovery of confounding variables among the population surveyed. A woman's ethnicity was found to be statistically significant with early disclosure ( $\text{Chi}^2 = 14.463$ ;  $p = .013$ ). In addition, working outside the household for liquid or in-kind payment was statistically associated with early disclosure of pregnancy ( $\text{Chi}^2 = 13.198$ ;  $p < .001$ ). Women who disclosed their pregnancy early were 1.3 times more likely to work outside the home. Early disclosure of pregnancy was also associated with formal educational attainment ( $\text{Chi}^2 = 7.277$ ;  $p = .007$ ). Women

who disclosed their pregnancy early were 1.2 times more likely to have had formal education compared to those who didn't disclose or did so late in her pregnancy.

*Table 4 : Associations with Early Disclosure of Pregnancy – Demographic Characteristics*

Variable	Chi2	pvalue
Age	8.377	0.137
Ethnicity	14.463	0.013
Work	13.198	<.001
Education	7.277	0.007
Religion	2.684	0.101
Wife type (only, 1 <sup>st</sup> , or other)	0.08	0.961
Chose husband	1.275	0.259
Age at first marriage	20.772	0.291
Parity	3.752	0.289

Among the gender empowerment constructs, several indices were statistically significant with early disclosure of pregnancy. The household decision-making index, self-efficacy with family planning, community participation, and children sub-indices, inter-spousal communication index, and the community support in crisis index were all associated with early disclosure of pregnancy ( $p < .001$ ). In addition, higher perceived quality of services at the local health center was associated with early disclosure of pregnancy ( $p < .001$ ). Neither the personal or perceived community intolerance for IPV indices were associated with early disclosure of pregnancy.



**Table 5: Gender Empowerment Indices Associated with Maternal Health Program Outcomes**

Gender Empowerment Indices	Complete ANC		Current FP use		Institutional Delivery		Postnatal Care	
	Mean	Std	Mean	Std	Mean	Std	Mean	Std
Quality of Services	4.62*	.422	4.80*	0.35	4.67	0.38	4.68*	0.37
Right to refuse sex	2.96	2.08	3.47**	2.59	3.02*	2.03	2.94	2.04
Right to refuse sex - Community	2.78	2.34	3.28***	2.81	2.9	2.30	2.83	2.31
Household decision-making	.22	0.17	0.19***	0.14	0.20**	0.16	0.21***	0.16
Self-efficacy: Family planning	3.31*	1.35	3.91*	0.96	3.46*	1.29	3.43*	1.29
Self-efficacy: Husbands	2.33	0.89	2.93*	1.01	2.38	0.92	3.37	0.89
Self-efficacy: Community	3.69*	0.90	3.96*	0.90	3.74*	0.88	3.74*	0.88
Self-efficacy: Children	4.66*	0.59	4.87*	0.38	4.65*	0.67	4.68*	0.61
Inter-spousal communication	2.96*	0.76	3.32*	0.77	2.97*	0.81	2.98*	0.78
Community Support in Crisis	4.76**	0.45	4.84**	0.47	4.84*	0.33	4.83*	0.37
<b>*p&lt;.001 **p&lt;.01 ***p&lt;.05</b>								

**Table 6 : Gender Empowerment Indices Associated with Maternal Health Program Outcomes – Dichotomous Indices**

Gender Empowerment Indices	Complete ANC		Current FP use		Institutional Delivery		Postnatal Care	
	po	%	N	%	N	%	N	%
Intolerance for IPV	33	12.7%	12	13.3%	34	9.7%	34	9.4%
Intolerance for IPV : Community	33	12.7%	12	13.3%	33	9.4%	36	9.9%

**Table 7 : Gender Empowerment Indices Associated with Early Disclosure of Pregnancy**

<b>Gender Empowerment Indices</b>	<b>Mean (Std)</b>	<b>Range</b>	<b>pvalue</b>
Quality of Services	4.52 (.53)	1-5	<.001
Intolerance for IPV	.33 (.34)	0-1	0.01
Right to refuse sex	2.94 (2.18)	1-5	0.195
Intolerance for IPV - Community	.11 (.31)	0-1	0.175
Right to refuse sex - Community	2.76 (2.44)	1-5	0.669
Household decision-making	1.35 (.28)	1-3	<.001
Self-efficacy: Family planning	3.18 (1.39)	1-5	<.001
Self-efficacy: Husbands	2.38 (.94)	1-5	0.103
Self-efficacy: Community	3.62 (.93)	1-5	<.001
Self-efficacy: Children	4.63 (.77)	1-5	<.001
Inter-spousal communication	2.93 (.79)	1-5	<.001
Community Support in Crisis	4.69 (.51)	1-5	<.001

**Table 8 : Gender Empowerment Indices Associated with Early Disclosure of Pregnancy - Dichotomous Indices**

<b>Gender Empowerment Indices</b>	<b>N</b>	<b>(%)</b>	<b>pvalue</b>
Intolerance for IPV	54	10.5%	0.33
Intolerance for IPV: Community	56	10.9%	0.175

## Maternal Health Program Outcomes

Four primary maternal health program outcomes were analyzed in this study. Complete antenatal care, current family planning use, institutional delivery, and postnatal care, as defined above, were investigated for relationships with characteristic variables, gender empowerment constructs, and the key covariate of interest, early disclosure of pregnancy.

*Table 9 : Associations between Positive Maternal Health Program Outcomes by District*

Health Outcomes by Health district	Pvalue	OR	CI	
FP (current use)	0.004	1.33	1.22	3.006
ANC	<.001	1.34	1.182	1.515
Inst. Delivery	<.001	1.44	1.279	1.628
Postnatal Care	<.001	1.40	1.238	1.579

Overall, 26% of the surveyed population (n=1000) received the complete package of antenatal care services in their last pregnancy. Receipt of the complete package of antenatal care services was statistically significant with district ( $p<.001$ ). Women in Bankass were 1.3 times more likely to receive the full package of antenatal care services than women in Bandiagara. Receipt of ANC services varied across age groups with 35% of women over 40 years of age to 27.5% of women aged 15-19 at the time of survey receiving the complete package of ANC services during their last pregnancy. Christian women were more likely to receive complete ANC services (32.4%) than Muslim women (26.1%). Receipt of ANC services also varied from 20-40% in the participating ethnic groups. Over 38% of Samogo women received the complete package of ANC services. While the greatest percentage of receipt of services, only 21 women identified with the Samogo ethnic group. Educational attainment and employment outside the home are statistically associated with the receipt of the complete package of ANC services ( $p=.001$  and  $p=.015$ ); women with a

higher educational attainment and women who work outside the home are more likely to receive the complete package of ANC services.

About a quarter of married women received complete ANC services (26.6%). Age at marriage had little impact on receipt of ANC services; 23-27% of women within each age group received the complete package. Receiving the complete package of ANC services also varied little between women who chose her husband and those who didn't, women with different parity, and those who have had a child die within the first year of life. However, whether the woman was the only, 1<sup>st</sup> or other wife was statistically significantly associated with the receipt of complete ANC services during their last pregnancy ( $p=.038$ ). See Tables 10-12.

*Table 10 : Population Characteristics of Women with Positive Maternal Health Program Outcomes*

(N=1000)	Complete ANC		Current FP use		Institutional Delivery		Postnatal Care	
	N	%	N	%	N	%	N	%
<b>District</b>								
Bankass	160	32.5%*	58	11.6%**	220	44.7%*	222	45.2%*
Bandiagara	100	20.4%*	32	6.4%**	132	27%*	141	29%*
<b>Age at time of survey</b>								
15-19	30	27.5%	5	4.4%	51	45.5%	44	39.6%
20-24	58	25.3%	22	9.5%	88	39.1%	89	39.7%
25-29	85	29.6%	24	8.3%	101	35.3%	100	35%
30-34	57	26.5%	25	11.4%	67	31.3%	82	38.3%
35-39	16	15.4%	8	7.5%	35	33.7%	37	35.6%
40+	14	35%	6	15%	10	25.6%	11	28.2%
<b>Religion</b>								
Muslim	247	26.10%	84	8.8%	335	35.6%	345	36.7%
Christian	12	32.4%	5	13.5%	16	43.2%	17	45.9%
<b>Ethnicity</b>								
Dogon	191	26.9%	63	8.7%	250	35.3%***	259	36.7%***
Peulh	28	20.6%	5	3.6%	41	30.4%***	42	31.1%***
Dafing	25	30.1%	14	16.9%	44	53.7%***	45	54.9%***
Bambara	5	31.3%	0	0.00%	4	25%***	4	25%***
Samogo	8	38.1%	7	31.8%	7	31.8%***	7	31.8%***
Other	3	17.6%	1	5.6%	6	35.3%***	6	35.3%***
<b>Attended school</b>								
None	202	25.8%**	55	6.9%*	245	31.4%*	258	33.1%*
Fundamental 1	32	25%**	22	16.8%*	63	49.2%*	64	50.8%*
Fundamental 2	15	30.6%**	10	20.4%*	30	61.2%*	29	59.2%*
Secondary	9	64.3%**	2	14.3%*	11	78.6%*	10	71.4%*
<b>Employment outside home</b>								
Yes	174	29.2%***	63	10.4%	245	41.3%*	247	41.7%*
No	86	22.2%***	27	6.8%	107	27.6%*	116	30.1%*
<b>Total</b>								
	260	26.00%	90	9.00%	352	35.2%	362	36.2%

\*p<.001 \*\*p<.01 \*\*\*p<.05

From the population surveyed, only 90 women were currently using a family planning method (9%). Current family planning use was statistically significantly associated with district ( $p=.004$ ). Women in Bankass were 1.3 times more likely to be currently using a family planning method than women in Bandiagara. Similar to other contexts, women in their twenties and early thirties were more likely to be currently using a contraceptive method (8-12%). Differences in use between Muslim and Christian women varied only slightly – 8.8% of Muslim women were currently using a family planning method and 13.5% of Christians were currently using a method. Educational attainment was the only demographic factor that was significantly associated with current family planning use ( $p<.001$ ). Women who received an education were more likely to be currently using a family planning method than those who never attended formal schooling. Among the marital and child health characteristics of the women surveyed, only one attribute was statistically associated with current family planning use. Choice of husband was significantly associated with current family planning use ( $p=.004$ ). Women were more likely to be currently using a contraceptive method if she chose her husband herself (13.5%) than if someone else chose her husband for her (7.4%).

**Table 11 : Marital Characteristics of Women with Positive Maternal Health Program Outcomes**

<b>(N=1000)</b>	<b>Complete ANC</b>		<b>Current FP use</b>		<b>Institutional Delivery</b>		<b>Postnatal Care</b>	
	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
<b>Marital status</b>								
Single/never married	2	20%	0	0.00%	6	54.5%	5	45.5%
Married	258	26.6%	90	9.2%	346	35.9%	358	37.2%
<b>Age at first marriage</b>								
<15	22	25.9%	9	10.6%	26	32.1%	26	32.1%
15-19	196	27.1%	67	9.1%	265	36.7%	270	37.5%
20-24	35	26.5%	10	7.5%	49	37.4%	54	41.2%
25-29	3	23.1%	2	15.4%	2	15.4%	5	38.5%
<b>Choice in husband</b>								
Herself	78	27.8%	37	13.5%**	108	39.9%	115	42.6%***
Someone else	182	26%	53	7.4%**	238	34.1%	243	34.9%***
<b>Wife status</b>								
Only wife	152	26.4%***	51	8.7%	208	36.2%	206	36%**
First wife	35	20.6%***	16	9.4%	50	29.9%	54	32.3%**
Other wife	70	32.1%***	23	10.5%	88	40.6%	98	45.2%**
<b>Total Population</b>	260	26.00%	90	9.00%	352	35.2%	362	36.2%
<b>*p&lt;.001 **p&lt;.01 ***p&lt;.05</b>								

Approximately 35% of respondents recently delivered in a health facility. This health outcome was statistically significant with district ( $p<.001$ ). Women in the intervention district, Bankass, were 1.4 times (CI: 1.3, 1.6) more likely to deliver in a health facility than women in the control district (Bandiagara). Although women who had an institutional delivery or home birth did not differ by age group, or religion, they differed by a woman’s ethnic group, educational attainment, and employment outside the home. Institutional deliveries were significantly associated with ethnic group ( $p=.015$ ) with over 50% of women in the Dafing ethnic group delivering in a health center. Women were also more likely to deliver their last baby in a health facility if they worked outside the home ( $p<.001$ ) or attended formal schooling ( $p<.001$ ). Over 70% of women who

received a secondary school education delivered in a health facility compared to less than 32% of women who had never attended formal schooling.

Institutional deliveries were not statistically associated with any marriage characteristics of the women surveyed. Whether a woman had a child that died within the first year of life also was not associated with institutional delivery. However, the relationship between a woman's parity and delivery in a health facility was statistically significant ( $p=.014$ ).

**Table 12 : Child Health Characteristics of Women with Positive Maternal Health Program Outcomes**

<b>(N=1000)</b>	<b>Complete ANC</b>		<b>Current FP use</b>		<b>Institutional Delivery</b>		<b>Postnatal Care</b>	
	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>	<b>N</b>	<b>%</b>
<b>Parity</b>								
1 birth	43	26.1%	11	6.4%	78	45.9%***	73	43.5%
2-3 births	72	24.2%	26	8.6%	103	34.8%***	108	36.5%
4-5 births	81	29.7%	27	9.9%	96	35.8%***	104	38.8%
6+ births	64	25.7%	26	10.3%	75	30.5%***	78	31.7%
<b>Child death in the first year of life</b>								
Yes	95	26.5%	37	10.2%	115	33.4%	123	35.8%
No	165	26.4%	53	8.3%	237	37.3%	240	37.9%
<b>Total Population</b>								
	260	26.00%	90	9.00%	352	35.2%	362	36.2%
<b>*p&lt;.001 **p&lt;.01 ***p&lt;.05</b>								

Receipt of postnatal care from a skilled provider was also measured within the population surveyed – over 36% of women received skilled postnatal care after their most recent delivery. As with the other primary maternal health program outcomes, postnatal care was associated with district ( $p<.001$ ). In Bankass women were 1.4 times more likely to have received postnatal care from a skilled provider than women in Bandiagara. Also similar to the outcomes, receipt of postnatal care was statistically significantly associated with ethnic group ( $p=.013$ ), educational attainment ( $p<.001$ ), and employment outside the household ( $p<.001$ ). Although directionality of association



cannot be determined with ethnic group, 55% of women affiliated with the Dafing group received postnatal care compared to 25-35% of women in each of the other participating ethnic groups.

Among the marital constructs, postnatal care was significantly associated with choice of husband ( $p=.031$ ) and whether the woman was the only, 1<sup>st</sup>, or other wife ( $p=.019$ ). Women who chose their husband (40%) were more likely to have received postnatal care after their last delivery than when someone else chose their husbands (31%). None of the child health indicators were significantly associated with receipt of skilled postnatal care.

### Early Disclosure and Maternal Health Program Outcomes

In-depth analysis was undertaken to understand the pathway between early disclosure of pregnancy and positive health outcomes. Unadjusted associations between early disclosure of pregnancy and current family planning use, receipt of the complete package of antenatal care services, institutional delivery, and skilled postnatal care were compared to adjustments with the population characteristics and gender construct indices.

#### Family Planning Use

The unadjusted odds of currently using a family planning method was significantly higher among women who disclosed her pregnancy early [OR 2.1 (95% CI: 1.33, 3.34)]. However, this relationship changes when adjusting for population characteristics and the various gender constructs and indices. While the association between current use of family planning and early disclosure remained significant with each of the population variables, the education coefficient changed by greater than 10% suggesting confounding. Among all of the population characteristics, the relationship between current use of family planning and early disclosure remained strongest when adjusting for a woman's parity. However, no matter which population characteristic was

adjusted for, women who disclosed their pregnancy early were at least 1.9 times more likely to be currently using a family planning method than those who disclosed late or not at all.

When adjusting the relationship between early disclosure of pregnancy and current use of family planning with the various gender constructs and other indices, confounding was also present. Index scores of perceived quality of services, self-efficacy with family planning, community participation, and children, inter-spousal communication, and community support in crisis were all confounders changing the crude beta coefficient by greater than 10%. While most of the adjusted odds remained strong, some gender constructs indices impacted the significance of the relationship between early disclosure of pregnancy and current use of family planning. When adjusting for strong self-efficacy with family planning, the adjusted odds decreased to 1.5 (CI: 0.95, 2.47). Similarly, the relationship of interest became insignificant when adjusting for the inter-spousal communication index [OR 1.4 (95% CI: 0.89, 2.33)]. Regardless of the significance of these two constructs, both remained in the full model to account for confounding.

The full model adjusts for all of the population characteristic and gender construct variables. When adjusting for all of the variables (20), women who disclose their pregnancy early are 1.27 times more likely to be currently using a family planning method than those who either disclosed late or not at all (CI: 0.75, 2.17). The full model is not statistically significant and suggested that early disclosure of pregnancy is not associated with current family planning use.

**Table 13 : Crude and Adjusted Associations between Early Disclosure of Pregnancy and Current Use of Family Planning**

Effect	B1	%ΔB1	p-value	OR	95% CI	
<b>Crude</b>	0.744		0.002	2.103	1.327	3.335
<b>Adjustments: Population Characteristics</b>						
District	0.691	7.12%	0.003	1.997	1.256	3.174
Education	0.642	13.71%	0.007	1.9	1.188	3.039
Ethnicity	0.737	0.94%	0.002	2.089	1.302	3.352
Parity	0.764	2.69%	0.001	2.147	1.352	3.41
Age	0.744	0.00%	0.002	2.104	1.323	3.345
Age at marriage	0.733	1.48%	0.002	2.082	1.304	3.325
Chose husband	0.726	2.42%	0.002	2.067	1.301	3.284
Employment	0.703	5.51%	0.003	2.02	1.271	3.212
<b>Adjustments: Gender Constructs and Indices</b>						
Quality of Services	0.615	17.34%	0.01	1.85	1.156	2.96
Intolerance for IPV	0.749	-0.67%	0.001	2.114	1.333	3.354
Right to refuse sex	0.725	2.55%	0.002	2.064	1.3	3.278
Intolerance for IPV - Community	0.748	0.54%	0.001	2.113	1.332	3.353
Right to refuse sex - Community	0.764	2.69%	0.001	2.148	1.346	3.426
Household decision-making	0.705	5.53%	0.003	2.024	1.274	3.217
Self-efficacy: Family planning	0.429	42.34%	0.078	1.535	0.953	2.473
Self-efficacy: Husbands	0.680	8.60%	0.005	1.975	1.234	3.160
Self-efficacy: Community	0.489	34.27%	0.044	1.63	1.013	2.623
Self-efficacy: Children	0.525	29.44%	0.029	1.691	1.056	2.708
Inter-spousal communication	0.364	51.08%	0.138	1.439	0.889	2.329
Community Support in Crisis	0.657	11.69%	0.006	1.928	1.212	3.068
<b>Full Model</b>						
	0.241	68.7%	0.376	1.273	0.746	2.17

### Antenatal Care

Women who disclose their pregnancies early are 2.2 times more likely to have received the complete recommended package of antenatal services during their last pregnancy than those who disclosed late or not at all (CI: 1.67, 3.01). When adjusting this relationship with population characteristics, the odds ratio remains strong – over 2.0 for each variable. All adjusted odd ratios

remained significant when adjusting for the various gender constructs and indices. However, the adjusted beta coefficient for early disclosure changed considerably when accounting for the self-efficacy with family planning (16%), self-efficacy with community participation (15%), and inter-spousal communication (19%) indices. As a result these variables were forced into the final model to adjust for confounding.

The full model included all 20 variables of interest. Adjustment of all of these variables produced a 1.7 odds that a women that disclosed her pregnancy early had received the complete package of antenatal care services during her last pregnancy (CI: 1.26, 2.4). To arrive at a more parsimonious model, variables were eliminated one at a time based on their significance and impact on the covariate of interest. Variables that were insignificant but had confounding relationships with the primary covariate or its association with the receipt of complete ANC services were forced into the final model. See Table 15 for the details of the variables in the final model. Overall, early disclosure of pregnancy is statistically significantly associated with the receipt of complete ANC services. Women who disclose their pregnancy early are 1.7 times more likely to have received complete antenatal care services than women who disclosed late or not at all (CI: 1.26, 2.37).

**Table 14 : Crude and Adjusted Associations between Early Disclosure of Pregnancy and Antenatal Care**

<b>Effect</b>	<b>B1</b>	<b>%ΔB1</b>	<b>p-value</b>	<b>OR</b>	<b>95% CI</b>	
<b>Crude</b>	0.806		<.001	2.24	1.666	3.01
<b>Adjustments: Population Characteristics</b>						
District	0.764	5.21%	<.001	2.147	1.593	2.893
Education	0.803	0.37%	<.001	2.233	1.654	3.015
Ethnicity	0.799	0.87%	<.001	2.223	1.649	2.996
Parity	0.811	0.62%	<.001	2.251	1.674	3.028
Age	0.818	1.49%	<.001	2.266	1.683	3.05
Age at marriage	0.789	2.11%	<.001	2.02	1.632	2.97
Chose husband	0.792	1.74%	<.001	2.207	1.64	2.969
Employment	0.788	2.23%	<.001	2.177	1.617	2.931
<b>Adjustments: Gender Constructs and other Indices</b>						
Quality of Services	0.730	9.43%	<.001	2.075	1.538	2.800
Intolerance for IPV	0.811	-0.62%	<.001	2.251	1.674	3.027
Right to refuse sex	0.803	0.37%	<.001	2.233	1.661	3.002
Intolerance for IPV - Community	0.81	0.50%	<.001	2.248	1.672	3.022
Right to refuse sex - Community	0.806	0.00%	<.001	2.238	1.666	3.009
Household decision-making	0.807	-.08%	<.001	2.241	1.666	3.015
Self-efficacy: Family planning	0.675	10.56%	<.001	1.964	1.450	2.659
Self-efficacy: Husbands	0.811	-0.62%	<.001	2.249	1.673	3.025
Self-efficacy: Community	0.686	14.89%	<.001	1.985	1.466	2.687
Self-efficacy: Children	0.747	7.32%	<.001	2.111	1.565	2.848
Inter-spousal communication	0.653	18.98%	<.001	1.921	1.415	2.609
Community Support in Crisis	0.758	5.96%	<.001	2.135	1.584	2.877
<b>Full Model</b>						
	0.552	31.51%	0.001	1.737	1.257	2.401

**Table 15 : Final Model: Early Disclosure of Pregnancy and Antenatal Care**

	<b>B</b>	<b>S.E.</b>	<b>Pvalue</b>	<b>OR</b>	<b>95% CI</b>	
<b>Early disclosure</b>	<b>0.547</b>	<b>0.162</b>	<b>0.001</b>	<b>1.728</b>	<b>1.258</b>	<b>2.373</b>
<b>Adjustments:</b>						
District	0.446	0.175	0.011	1.562	1.109	2.201
Education	0.055	0.19	0.77	1.057	0.729	1.533
Employment	.011	0.166	0.945	1.011	0.73	1.401
Ethnicity	0.105	0.082	0.201	1.11	0.946	1.303
Quality of services	-0.627	0.183	0.001	0.534	0.373	0.765
Household decision-making	-0.452	0.492	0.358	0.636	0.243	1.668
Self-efficacy: FP	-0.114	0.063	0.069	0.892	0.789	1.009
Self-efficacy: Husband	0.182	0.09	0.043	1.2	1.006	1.432
Self-efficacy: Community	-0.111	0.102	0.275	0.895	0.733	1.092
Self-efficacy: Children	-0.130	0.117	0.269	0.878	0.698	1.106
Inter-spousal Communication	-0.157	0.111	0.157	0.854	0.687	1.062
Community support in Crisis	0.108	0.176	0.539	1.114	0.789	1.572
Constant	3.727	1.017	<.001			

### Institutional Delivery

The crude relationship between early disclosure of pregnancy and institutional delivery is statistically significant ( $p < .001$ ). Women who disclose their pregnancies early are 2.25 times more likely to deliver in a health facility than women who disclose late or not at all (CI: 1.72, 2.95). When adjusting for various population characteristics, this relationship remained strong and significant with little impact on the coefficient of interest, early disclosure of pregnancy. The relationship between early disclosure of pregnancy and institutional delivery is also significant when adjusting for gender constructs and other indices. Nonetheless, adjustments with the quality of services, self-efficacy with family planning, self-efficacy in the community, inter-spousal communication, and community support in crisis indices result in substantial change in the early disclosure of pregnancy coefficient and suggest confounding in the relationship. The full model, adjusting for all variables, revealed a significant relationship between early disclosure of

pregnancy and institutional delivery. When accounting for all of the population characteristics and gender constructs, women who disclose their pregnancy early are 1.5 times more likely to have an institutional delivery than women who disclose late or not at all.

**Table 16 : Crude and Adjusted Associations between Early Disclosure of Pregnancy and Institutional Delivery**

Effect	B1	%ΔB1	p-value	OR	95% CI	
<b>Crude</b>	0.812		<.001	2.252	1.72	2.948
<b>Adjustments: Population Characteristics</b>						
District	0.758	6.65%	<.001	2.135	1.624	2.806
Education	0.774	4.68%	<.001	2.168	1.644	2.859
Ethnicity	0.781	3.82%	<.001	2.184	1.664	2.867
Parity	0.804	0.99%	<.001	2.235	1.705	2.93
Age	0.792	2.46%	<.001	2.207	1.684	2.893
Age at marriage	0.798	1.72%	<.001	2.22	1.689	2.923
Chose husband	0.799	1.60%	<.001	2.224	1.695	2.918
Employment	0.763	6.03%	<.001	2.144	1.634	2.815
<b>Adjustments: Gender Constructs and Other Indices</b>						
Quality of Services	0.727	10.47%	<.001	2.069	1.564	2.738
Intolerance for IPV	0.809	0.37%	<.001	2.245	1.715	2.94
Right to refuse sex	0.8	1.48%	<.001	2.225	1.697	2.918
Intolerance for IPV - Community	0.805	0.86%	<.001	2.237	1.708	2.929
Right to refuse sex - Community	0.809	0.37%	<.001	2.246	1.714	2.944
Household decision-making	0.788	2.96%	<.001	2.2	1.678	2.883
Self-efficacy: Family planning	0.600	26.11%	<.001	1.822	1.374	2.417
Self-efficacy: Husbands	0.805	0.86%	<.001	2.238	1.709	2.931
Self-efficacy: Community	0.632	22.17%	<.001	1.882	1.424	2.488
Self-efficacy: Children	0.745	8.25%	<.001	2.107	1.603	2.77
Inter-spousal communication	0.614	24.38%	<.001	1.847	1.395	2.445
Community Support in Crisis	0.708	12.81%	<.001	2.03	1.542	2.672
<b>Full Model</b>						
	0.41	45.20%	0.011	1.507	1.097	2.071

The final relationship was determined using backward elimination techniques for a more parsimonious model. As a result, 16 variables were adjusted for (see Table 17). The adjusted odds determined that women who disclosed their pregnancy early were 1.5 times more likely to deliver in a health facility than women who disclosed late or not at all (1.12, 2.1).

**Table 17 : Final Model - Early Disclosure of Pregnancy and Institutional Delivery**

	<b>B</b>	<b>S.E.</b>	<b>Pvalue</b>	<b>OR</b>	<b>95% CI</b>	
<b>Early disclosure</b>	<b>0.413</b>	<b>0.158</b>	<b>0.009</b>	<b>1.511</b>	<b>1.108</b>	<b>2.06</b>
<b>Adjustments:</b>						
District	0.593	0.174	.001	1.81	1.287	2.545
Education	-0.68	0.186	<.001	0.507	0.352	0.73
Employment	-0.122	0.164	0.459	0.885	0.641	1.222
Ethnicity	0.098	.079	0.213	1.103	0.945	1.286
Parity	.233	.075	.002	1.263	1.091	1.462
Inter-spousal Communication	-0.077	0.11	0.484	0.926	0.747	1.148
Self-efficacy: FP	-0.265	0.061	<.001	0.767	0.681	0.864
Quality of services	-0.928	0.187	<.001	0.396	0.274	0.571
Intolerance of IPV: Community	0.419	0.254	0.099	1.52	0.924	2.5
Household decision-making	0.247	0.498	0.62	1.28	0.483	3.396
Self-efficacy: Husband	0.217	0.089	0.015	1.242	1.043	1.479
Self-efficacy: Community	-0.143	0.1	0.154	0.867	0.713	1.055
Self-efficacy: Children	0.177	0.113	0.12	1.193	0.955	1.49
Community support in crisis	-0.425	0.192	0.027	0.654	0.449	0.952
Constant	5.301	1.078	<.001			

### Postnatal Care

The unadjusted association between early disclosure of pregnancy and receipt of skilled postnatal care is statistically significant ( $p < .001$ ). Women who disclose their pregnancy early are more than twice as likely to receive skilled postnatal care after delivery (CI: 1.65, 2.82). When adjusting for population characteristics, the association between early disclosure and receipt of postnatal care continues to be significant with consistent adjusted odds ratios at approximately 2.1.



Adjustments with the gender constructs and other indices also do not greatly impact the crude odds ratio between early disclosure and postnatal care. However, many variables notably changed the coefficient of interest. The following gender constructs and indices were deemed to be confounders of the relationship:

- Self-efficacy with family planning
- Self-efficacy with community participation
- Self-efficacy with children
- Inter-spousal communication
- Community support in times of crisis

The fully adjusted model results in a statistically significant association between early disclosure and postnatal care (OR: 1.47, CI: 1.07, 2.0). However, model reduction techniques were employed to reduce the full model into a more parsimonious model. In the final model early disclosure of pregnancy is significantly associated with receipt of postnatal care. Women who disclose their pregnancy early are 1.5 times more likely to receive skilled postnatal care than women who disclose their pregnancy late in term or not at all (CI: 1.08, 2.0).

**Table 18 : Crude and Adjusted Associations between Early Disclosure of Pregnancy and Postnatal Care**

Effect	B1	%ΔB1	p-value	OR	95% CI	
<b>Crude</b>	0.77		<.001	2.159	1.653	2.819
<b>Adjustments: Population Characteristics</b>						
District	0.72	6.49%	<.001	2.054	1.568	2.691
Education	0.724	5.97%	<.001	2.063	1.571	2.709
Ethnicity	0.736	4.42%	<.001	2.087	1.594	2.733
Parity	0.76	1.30%	<.001	2.137	1.636	2.793
Age	0.769	0.13%	<.001	2.157	1.651	2.82
Age in marriage	0.748	2.86%	<.001	2.113	1.611	2.773
Chose husband	0.745	3.25%	<.001	2.106	1.61	2.755
Employment	0.728	5.45%	<.001	2.071	1.583	2.710
<b>Adjustments: Gender Constructs and Other Indices</b>						
Quality of Services	0.681	8.9%	<.001	1.977	1.495	2.613
Intolerance for IPV	0.767	0.39%	<.001	2.153	1.648	2.812
Right to refuse sex	0.761	1.17%	<.001	2.14	1.637	2.798
Tolerance for IPV - Community	0.763	0.91%	<.001	2.145	1.643	2.802
Right to refuse sex - Community	0.756	1.82%	<.001	2.129	1.63	2.782
Household decision-making	0.752	2.34%	<.001	2.122	1.624	2.773
Self-efficacy: Family planning	0.564	26.75%	<.001	1.758	1.33	2.324
Self-efficacy: Husbands	0.763	0.91%	<.001	2.146	1.643	2.803
Self-efficacy: Community	0.588	14.01%	<.001	1.8	1.365	2.374
Self-efficacy: Children	0.684	11.17%	<.001	1.981	1.51	2.6
Inter-spousal communication	0.559	27.4%	<.001	1.749	1.324	2.311
Community Support in Crisis	0.668	13.25%	<.001	1.95	1.485	2.559
<b>Full Model</b>	0.383	48.31%	0.016	1.467	1.073	2.006

**Table 19 : Final Model - Early Disclosure of Pregnancy and Postnatal Care**

	<b>B</b>	<b>S.E.</b>	<b>Pvalue</b>	<b>OR</b>	<b>95% CI</b>	
<b>Early disclosure</b>	<b>0.383</b>	<b>0.158</b>	<b>0.015</b>	<b>1.466</b>	<b>1.076</b>	<b>1.998</b>
<b>Adjustments:</b>						
District	0.549	0.173	0.002	1.731	1.233	2.432
Education	-0.531	0.184	0.004	0.588	0.41	0.844
Employment	0.043	0.165	0.796	1.043	0.755	1.442
Ethnicity	0.144	0.079	0.069	1.155	0.989	1.348
Choice of husband	.243	.169	.15	1.275	.916	1.775
Age at first marriage	-0.024	.031	.447	.977	.919	1.038
Inter-spousal communication	-0.061	0.111	0.585	0.941	0.757	1.170
Self-efficacy: FP	-0.233	0.061	<.001	0.792	0.703	0.893
Quality of services	-1.081	0.192	<.001	0.339	0.233	0.494
Household decision-making	-0.211	0.501	0.674	0.810	0.304	2.161
Self-efficacy: Husband	0.209	0.09	0.02	1.233	1.034	1.47
Self-efficacy: Community	-0.158	0.101	0.118	0.854	0.701	1.041
Self-efficacy: Children	0.066	0.115	0.566	1.068	0.853	1.337
Community support in crisis	-0.331	0.188	0.079	0.718	0.497	1.039
Constant	6.524	1.245	<.001			

### Overview of Final Models

See Table 20 for an overview of the final relationships between early disclosure of pregnancy and the four maternal health program outcomes. Each positive maternal health outcome was statistically significant with early disclosure when adjusted for other population characteristics and gender constructs, except current use of family planning.

**Table 20 : Final Models: Adjusted Associations between Early Disclosure of Pregnancy and Positive Maternal Health Program Outcomes**

	<b>B</b>	<b>OR</b>	<b>95% CI</b>	
<b>Family Planning Use</b>	0.241	1.273	0.746	2.17
<b>Antenatal Care</b>	0.547	1.728	1.258	2.373
<b>Institutional Delivery</b>	0.413	1.511	1.108	2.06
<b>Postnatal Care</b>	0.383	1.466	1.076	1.998
B=coefficient for early disclosure of pregnancy				

## V. Discussion

The aim of this analysis was to investigate the relationships between the culturally perceived risk of discussing pregnancy, social and gender norms, and maternal health program outcomes within the context of a community-based maternal health initiative. Results indicate that women exposed to PEMN, a community-based maternal health initiative focused on igniting household and community-level dialogue about pregnancy, are more likely to disclose their pregnancy early, exhibit higher gender equitable scores in agency, social support and relations, and have positive uptake in maternal health services. This finding is reinforced with evidence that early disclosure of pregnancy is a strong predictor of positive maternal health program outcomes in West African communities.

The PEMN initiative was built upon findings from an in-depth situational analysis of key social factors that influence maternal health behaviors in Mali. Key findings of the baseline analysis found that positive maternal health program outcomes are largely impacted by inter-spousal communication, a woman's value, and her power within the household. Specifically in the Malian context it was found that:

- Dialogue about pregnancy was sporadic and rare by which neither the husband nor the extended family talks openly about a woman's pregnancy due to cultural taboos affiliated with the subject;
- A woman's value in society and within her extended family is conditioned upon by how many children (more specifically sons) she has given birth to;
- A woman's power and ability to make decisions within her household are influenced by whether she is part of a monogamous or polygamous marriage, the distance from and level

of paternal family support, access to independent financial resources, and her relationship with in-laws.

While the PEMN initiative addressed all three of these points, the results of this analysis confirms the impact the project had on the first point by increasing dialogue and more specifically early disclosure of pregnancy within a household. Women in Bankass were 1.2 times more likely to discuss pregnancy and pregnancy concerns with someone in the household (CI: 1.06, 1.38; CI: 1.09, 1.4) than women in Bandiagara, the control district. Statistically significant differences in discussion about sex and future family planning use during pregnancy was also found between Bankass and Bandiagara (OR:1.31; OR: 1.43). While these odds ratios are not strong (1.5 and higher), they are based on exposure to PEMN defined broadly as being in the district where the social change package was implemented (Bankass). This suggests that the project's impact on household discussion may be greater than indicated here. Further impact evaluation analyses are planned to clearly define the projects true coverage and delineate whether the utilization of district as a measure of exposure dilutes the project's true impact.

Unadjusted bivariate associations between positive maternal health program outcomes and the exposure to PEMN were also significant. Women in Bankass were 1.3 times more likely to be currently using a family planning method or have received the complete package of antenatal care services than women in Bandigara (CI: 1.22, 3.01; CI: 1.18, 1.52). In addition, women in Bankass were more likely to deliver in a health facility (OR: 1.4) and receive postnatal care (OR: 1.4). These relationships suggest project success in improving maternal health program outcomes in the intervention district. However, further analysis was undertaken to validate if there is a legitimate pathway between early disclosure of pregnancy and positive maternal health behaviors.

To do so, we first investigated intermediary or mediating factors that may be associated with early disclosure of pregnancy or its relationship with each maternal health behavior. Inclusion of the population characteristic variables were largely based on previous research. Measures of age, educational attainment, and employment are suggested to influence reproductive health behaviors and related power dynamics (Haque et al., 2012; M. C. Hogan et al., 2010; Kaggwa et al., 2008; Magadi et al., 2000). A woman's marriage history and fertility also influence maternal health program outcomes (Agha & Carton, 2011; Blanc, 2001; M. C. Hogan et al., 2010; Kaggwa et al., 2008); data on women's parity, age at marriage, and ability to decide whom they married were included for this reason. In addition, in polygamous contexts, research has shown that a woman's wife ranking influences her status and health (Al-Krenawi, 1999). Taking this into account, a variable reflecting the woman's rank in the household was included in analysis.

Age and age at first marriage were not statistically associated with maternal health program outcomes, early disclosure, nor found to be confounders of the relationship between the two. This suggests that other constructs representing power and gender dynamics may be more important in the relationship between pregnancy disclosure and positive maternal health program outcomes. Nonetheless, our data does substantiate the influence of a woman's employment and educational attainment with maternal health program outcomes. Employment outside the home was statistically significant with receipt of the complete package of antenatal care services ( $p=.015$ ), institutional delivery ( $p<.001$ ), and skilled postnatal care ( $p<.001$ ). This supports research indicating that control over independent financial resources is an important predictor of reproductive health behaviors ((Beegle et al., 2001; Blanc, 2001). It was also significantly associated with early disclosure of pregnancy which may be evidence that women who work outside the home have more power and self-efficacy within a household to discuss her pregnancy.

Across all positive maternal health program outcomes and early disclosure of pregnancy, we found statistically significant relationships with higher educational attainment.

Marriage union and fertility-related variables were not consistently associated with all of the outcomes or the covariate of interest. A woman's parity was only significantly associated with institutional delivery ( $p=.014$ ). It was not related to early disclosure of pregnancy nor did it confound the relationship between early disclosure and each of the maternal health program outcomes. Similarly, a wife's rank within the household (only, 1<sup>st</sup>, or other wife) was only associated with receipt of antenatal care ( $p=.038$ ) and postnatal care ( $p=.019$ ) while her ability to choose her husband was related to current use of family planning ( $p=.004$ ) and receipt of postnatal care ( $p=.031$ ). None of these variables were deemed confounders of the relationship between early disclosure and each maternal health outcome (antenatal care, family planning use, institutional delivery, and postnatal care).

The three fundamental domains for the gender construct indices are evidenced to be contextual mediating factors in reproductive health. Agency, social capital, and familial relation dynamics greatly influence a woman's access to maternal health services (A. M. Adams, Madhavan, & Simon, 2002; Haddad, Hoddinott, & Alderman, 1997; Madhavan, 2002; Madhavan, Adams, & Simon, 2003; Pick & Obermeyer, 1996; Simon, Adams, & Madhavan, 2002). In this analysis, each index was analyzed in relationship with early disclosure and its relationship to each maternal health outcome to determine confounding associations. All but five of the twelve (Intolerance for IPV, Right to refuse sex, Perceived Community Intolerance for IPV, Perceived Community Right to Refuse Sex, and Self-efficacy with husband) indices were significant with early disclosure of pregnancy and deemed confounders. While all of the indices were assumed to have mitigating

effects on household discussion of pregnancy, it is interesting that four indices were not associated with early disclosure of pregnancy.

The right to refuse sex index aims to score equitable gender beliefs regarding whether a woman is justified in refusing sex under certain conditions. The assumption is made that a woman who expresses equitable beliefs of her ability to refuse sex is also able to possess agency in other aspects of her life, and more specifically agency to obtain maternal health services. While a high Cronbach's alpha of 0.8 suggests strong reliability in the index's grouping of items, further investigation is needed to determine if the individual items within the scale are culturally applicable to the Malian context.

Re-evaluation of the personal and perceived community intolerance of IPV indices also needs to be considered to determine if measurement bias is present. While discussion about intimate partner violence was not a primary focus of PEMN activities, we would assume that both districts would have similar scores if no impact was made by the intervention. Contrary to this hypothesis, our findings suggest that both indices were significantly higher in the control district and neither were associated with any positive maternal health program outcomes.

While our findings demonstrate significant differences in current family planning use, receipt of antenatal and postnatal care, and institutional delivery between those who were exposed to PEMN (in Bankass) and those who weren't (Bandiagara), it is essential to understand the pathways by which women are changing behavior and achieving positive reproductive health outcomes. Current family planning users are more likely to have higher scores in all the gender empowerment indices. Women who are currently using family planning methods are associated with positive perceptions of the quality of services at their health center, high scores of agency, gender equitable relations



within their household, and a sense of positive community support. These findings suggest that a woman must be completely empowered in order to break strong social and cultural norms against family planning use. Unlike other reproductive health services, access and availability to family planning services is not enough. As our results demonstrate, interventions like PEMN which focus on transforming gender and social norms through household communication are crucial in changing behaviors and increasing family planning use.

Women who receive the complete package of antenatal care services are more likely to have positive perceptions of the quality of services provided at their local health facility, higher scores of self-efficacy, more frequent communication, and community support. This suggests that client satisfaction, communication, and a woman's agency catalyze a woman's ability to receive early and consistent antenatal care services. Women who have more trust in the services provided at their local health facility are more likely to use them. In addition, those whom are more confident in their ability to seek the services or discuss their need for services are more likely to obtain them. Frequent communication with one's spouse may also improve inter-spousal relations and increase husbands' knowledge of his wife's maternal health needs – ultimately increasing acceptability and accessibility of antenatal services.

Unlike women who receive the complete package of antenatal services, women who deliver in a health facility are statistically associated with gender equitable decision-making at the household. Equitable decision-making by which a woman herself or with her husband makes decisions about her health and daily activities may be considered a longer-term outcome of frequent spousal communication – as evidenced by the short term nature of antenatal care visits compared to the long-term goal of institutional delivery. Frequent communication make contribute to shifts of

power dynamics within a household giving women more leverage and say in decisions about her health, especially the location of her delivery. This relationship also holds true for those who received skilled postnatal care. Frequent inter-spousal communication and equitable decision-making scores are associated with the receipt of skilled care within 24 hours after delivery.

To validate the pathway from early disclosure to positive maternal health program outcomes outside of the PEMN initiative we adjusted for the district in all models along with previously discussed confounding variables. This gives an unbiased relationship between early disclosure of pregnancy and maternal health program outcomes which may be applied afterwards to programming such as PEMN.

Although the crude relationship with current use of family planning alludes to early disclosure of pregnancy being a strong predictor, adjusting for confounding demographic and gender construct variables results in an insignificant association. In other words, disclosing a pregnancy early bears no influence on current family planning use when accounting for a woman's education, age, ethnicity, employment, district, perception of service quality, and measures of self-efficacy (in all four domains), inter-spousal communication, household decision-making power, community support in crisis, and intolerance for intimate partner violence. In fact based on the results, instead of early disclosure of pregnancy, strong predictors may be measures of self-efficacy related to family planning and husbands.

The final model between early disclosure of pregnancy and receipt of complete antenatal care services reveals a statistically significant relationship when controlling for demographic and gender construct indices ( $p=.001$ ). Women who disclose their pregnancy early are 1.7 times more likely to receive the full package of ANC services than women who disclose late or not at all.

Although as a function of the definition of complete antenatal care services a woman must receive her first antenatal care visit within the first trimester often before she starts to show, it is not obliged that early receipt of the first visit equates to a minimum of four visits, the second condition of the complete package. Receipt of her first antenatal care visit within the first trimester also does not equate to early disclosure of pregnancy to someone in the household – a woman may seek ANC services in secret before it is socially desirable to disclose her pregnancy. While the model controls for differences in self-efficacy, household dynamics, and community support, the results may simply indicate that early disclosure of pregnancy leads to more time to receive the complete package. However, evaluation of the other predictors in the model suggest that perceived quality of services may impact use of antenatal care services ( $p=.001$ ), and high measures of self-efficacy with her husband ( $p=.04$ ) may impact a woman's ability to consistently go to the health facility throughout her pregnancy for at least four antenatal care visits.

When adjusting for population characteristics and other gender construct indices, women who disclose their pregnancy early are 1.5 times more likely to have an institutional delivery than those who disclose late or not at all (CI: 1.13, 2.1). Unlike the other maternal health program outcomes, perceived community gender beliefs were confounders and forced into the model. High scores of perceived community intolerance for IPV may be a proxy for underlining accepting social support and equitable gender norms which reinforce agency to seek skilled health services and specifically deliver at a health facility. The association between early disclosure of pregnancy and institutional delivery emphasizes the need for birth planning. Ultimately, early discussion at the household level may lead to longer preparation time to adequately plan logistics and arrange financial resources needed for an institutional delivery.

Receipt of skilled postnatal care is also significantly associated with early disclosure when controlling for demographic and gender empowerment measures [OR: 1.47 (CI: 1.08, 2.0)]. While it cannot be assumed that all women who receive skilled postnatal care delivered in a health facility, it can be assumed that a majority have – in fact, 90.4% of women in the sample population that received postnatal care also delivered in a health facility. This suggests that the relationship between early disclosure and postnatal care is similar to that of early disclosure and institutional delivery. Like with institutional deliveries, women who disclose their pregnancies early may benefit from extended preparation time for the delivery and postnatal care.

### Program Implications

The results of this analysis leads to several noteworthy implications for future programming in maternal health. Women who disclose their pregnancy early in Mali are breaking social norms. Our evidence shows that these positive deviants are more likely to have positive maternal health program outcomes. In conservative contexts like Mali, interventions need to be designed to address underlining social constructs and gender beliefs. The strong influences of self-efficacy, inter-spousal communication, and community support across all maternal health indicators call for comprehensive programming that augments the value of women, promotes women’s self-confidence, and fosters strong dialogue at the household and the community level. An empowered woman will be more likely to access essential maternal health services during her pregnancy.

Community-based maternal health programs should focus on early identification of pregnancy. Interventions targeted towards early dialogue about pregnancy at the household level, like PEMN, will increase the likelihood of a woman receiving antenatal services, having an institutional delivery, and receiving skilled postnatal care. Cultivating dialogue about pregnancy, pregnancy

concerns, sex and future use of family planning early in pregnancy is associated with high self-efficacy, inter-spousal communication, and equitable decision-making – underpinnings of women’s empowerment that effect maternal health in Mali.

While access is essential, it is not enough. Higher perceived quality of services of the local health facility was consistently associated with use of services (antenatal, delivery, postnatal, and family planning). Women, their husbands, and their extended families will be more willing to use or encourage the use of maternal health services when the perception of their quality is high. This reinforces the overall programmatic implication that provision of maternal health services does not equate to utilization. To be the most effective in increasing positive maternal health program outcomes, programs must confront embedded social norms in the community, focus on influencing fundamental gender empowerment constructs, and improve quality of service provision at the local level.

### Data limitations

The results of this analysis have several limitations. First of all, household survey respondents were randomly selected within two rural districts in the Mopti region of Mali to substantiate PEMN, a maternal health action-research initiative. While the initial selection of the two districts for the maternal health project were based on representational criteria for the region, the results presented in this analysis are not representative of Mali nor the Mopti region.

In addition, the PEMN initiative underwent project activities amidst the Taureg Rebellion in Northern Mali in 2012 and 2013. While consultants in the field suggest that it did not impact Bankass or Bandiagara districts, population movement was extensive at the time. This analysis is not capable for accounting for internal or external migration in each community which may have

biased measurements, exposure to the intervention, and influenced the underlying assumptions that the two districts are statistically similar in demographic composition.

A third limitation is that this study did not control for household power dynamics between the woman and her husband or mother-in-law. Previous research in the Mopti region concluded that the preferences and opinions of mothers-in-law are associated with their daughter-in-law's maternal health behaviors (White et al., 2013). While this analysis accounts for household decision-making as a measure of household power dynamics, it is limited in focus on early disclosure of pregnancy rather than the inner workings and power play between individuals of a household. Community-level variables that have been found to be significantly associated with reproductive health indicators in other studies such as accessibility of health facilities (van den Broek et al., 2003; Overbosch et al., 2004; Gage, 2007) and exposure to mass media (Kaggwa et al., 2008; Agha and Carton, 2011; Haque et al., 2012) were also not collected. Future research should consider the modifying effects of these intra-familial and community-level attributes while assessing positive maternal health program outcomes in Mali.

## VI. Conclusions

Over 20 years after the International Conference on Population and Development which resulted in a historical shift in the global agenda to promote reproductive rights and gender equality, progress towards reducing maternal mortality and increasing utilization of maternal health services is still slow. Research in Sub-Saharan Africa has shown that service provision is not sufficient in changing maternal health behaviors. A woman must navigate through complex social, cultural, political, and economic barriers to access crucial health care services. This analysis supports previous findings by validating the need for maternal health programming that focuses on underlying social and gender empowerment constructs. Our results substantiate the value of community-based initiatives like PEMN that catalyze dialogue about pregnancy at the community and household level and confront social and gender norms that impede women from accessing health services.

Overall, the results from this analysis contribute to existing research by emphasizing the benefit of addressing culturally perceived risks of pregnancy in Mali. Women who deviate from established norms that socially prohibit them from discussing their pregnancy with household members significantly benefit from essential maternal health services. By confronting culturally perceived risks with early disclosure of pregnancy, women are more likely to receive the recommended WHO package of antenatal care, have an institutional delivery, and receive skilled postnatal care – vital services that can contribute to the reduction maternal and neonatal mortality in Mali.

## VII. Appendix I: Construction of Indices

*Table 21: Index Components and Characteristics – Tolerance of Intimate Partner Violence*

Questions	Factor Loadings	Alpha	Alpha if removed
Is he justified in hitting his wife, if she goes out without telling him?	NA*	0.778	0.746
Is he justified in hitting his wife if she neglects their children?	NA*	0.778	0.702
Is he justified in hitting his wife if she argues with him?	NA*	0.778	0.732
Is he justified in hitting his wife if she refuses to have sex with him?	NA*	0.778	0.761
Is he justified in hitting his wife if she did not cook the food properly?	NA*	0.778	0.74
*Items are dichotomous (yes/no); Factor analysis was not performed			

*Table 22: Index Components and Characteristics – Right to Refuse Sex*

Questions	Factor Loadings	Alpha	Alpha if removed
Is a woman justified in refusing to have sex with her husband if she knows he has a sexually transmitted disease?	NA*	0.804	0.806
Is a woman justified in refusing to have sex with her husband if she knows he has sex with other women?	NA*	0.804	0.785
Is a woman justified in refusing to have sex with her husband if she has recently given birth?	NA*	0.804	0.802
Is a woman justified in refusing to have sex with her husband if she is tired?	NA*	0.804	0.764
Is a woman justified in refusing to have sex with her husband if she does not want to have sex?	NA*	0.804	0.788
Is a woman justified in refusing to have sex with her husband if she is unhappy with him?	NA*	0.804	0.753
Is a woman justified in refusing to have sex with her husband if she is not in the mood?	NA*	0.804	0.752
Is a woman justified in refusing to have sex with her husband if she does not want to become pregnant?	NA*	0.804	0.764
*Items are dichotomous (yes/no); Factor analysis was not performed			



**Table 23 : Index Components and Characteristics – Male Dominance**

Questions	Factor Loadings	Alpha	Alpha if removed
It is solely the mother’s responsibility to take care of the children.	-0.752	0.321*	0.35
A man should have the final say about decisions in his home	0.702	0.321*	0.253
A man is the one who decides when to have sex with his wife.	0.849	0.321*	0.305
A woman should tolerate being beaten by her husband to keep her family together.	0.768	0.321*	0.306
A woman is a real woman only when she has had a child.	0.653	0.321*	0.16
If a woman wants to avoid being pregnant it is her responsibility alone.	0.945	0.321*	0.345
It’s better to have more sons than daughters in a family.	0.81	0.321*	0.282
*Cronbach’s alpha <.7 – index is removed from analysis			

**Table 24 : Index Components and Characteristics – Women’s Health Rights**

Questions	Factor Loadings	Alpha	Alpha if removed
A woman can go to the health facility without her husband’s permission.	0.858	0.631*	-
A woman can use family planning without her husband’s permission.	0.858	0.631*	-
*Cronbach’s alpha <.7 – index is removed from analysis			

**Table 25 : Index Components and Characteristics – Community Perceptions of Tolerance of Intimate Partner Violence**

Questions	Factor Loadings	Alpha	Alpha if removed
Do most people in your community think he is justified in hitting his wife, if she goes out without telling him?	NA*	0.816	0.793
Do most people in your community think he is justified in hitting his wife if she neglects their children?	NA*	0.816	0.752
Do most people in your community think he is justified in hitting his wife if she argues with him?	NA*	0.816	0.777
Do most people in your community think he is justified in hitting his wife if she refuses to have sex with him?	NA*	0.816	0.799
Do most people in your community think he is justified in hitting his wife if she did not cook the food properly?	NA*	0.816	0.777
<b>*Items are dichotomous (yes/no); factor analysis was not performed</b>			

**Table 26 : Index Components and Characteristics – Community Perceptions of Right to Refuse Sex**

Questions	Factor Loadings	Alpha	Alpha if removed
Do most people in your community think that a woman is justified in refusing to have sex with her husband if she knows he has a sexually transmitted disease?	NA*	0.852	0.875
Do most people in your community think that a woman is justified in refusing to have sex with her husband if she knows he has sex with other women?	NA*	0.852	0.836
Do most people in your community think that a woman is justified in refusing to have sex with her husband if she has recently given birth?	NA*	0.852	0.857
Do most people in your community think that a woman is justified in refusing to have sex with her husband if she is tired?	NA*	0.852	0.824
Do most people in your community think that a woman is justified in refusing to have sex with her husband if she does not want to have sex?	NA*	0.852	0.815
Do most people in your community think that a woman is justified in refusing to have sex with her husband if she is unhappy with him?	NA*	0.852	0.821
Do most people in your community think that a woman is justified in refusing to have sex with her husband if she is not in the mood?	NA*	0.852	0.816
Do most people in your community think that a woman is justified in refusing to have sex with her husband if she does not want to become pregnant?	NA*	0.852	0.823
<b>*Items are dichotomous (yes/no); factor analysis was not performed</b>			

**Table 27 : Index Components and Characteristics – Community Perceptions of Male Dominance**

Questions	Factor Loadings	Alpha	Alpha if removed
Do most people in your community think that it is solely the mother’s responsibility to take care of the children.	0.961	0.372*	0.382
Do most people in your community think that a man should have the final say about decisions in his home	0.954	0.372*	0.316
Do most people in your community think that a man is the one who decides when to have sex with his wife.	0.814	0.372*	0.329
Do most people in your community think that a woman should tolerate being beaten by her husband to keep her family together.	0.826	0.372*	0.388
Do most people in your community think that a woman is a real woman only when she has had a child.	0.821	0.372*	0.252
Do most people in your community think that if a woman wants to avoid being pregnant it is her responsibility alone.	0.811	0.372*	0.363
Do most people in your community think that it’s better to have more sons than daughters in a family.	0.809	0.372*	0.36
<b>*Cronbach’s alpha &lt;.7 – index is removed from analysis</b>			

**Table 28 : Index Components and Characteristics – Community Perceptions of Women’s Health Rights**

Questions	Factor Loadings	Alpha	Alpha if removed
Do most people in your community think that a woman can go to the health facility without her husband’s permission	0.874	0.678*	-
Do most people in your community think that a woman can use family planning without her husband’s permission	0.874	0.678*	-
<b>*Cronbach’s alpha &lt;.7 - index is removed from analysis</b>			

**Table 29 : Index Components and Characteristics – Husbands**

<b>Questions</b>	<b>Factor Loadings</b>	<b>Alpha</b>	<b>Alpha if removed</b>
How sure are you, that you could refuse to have sex with your husband when you don't want to have sex but he does?	0.84	0.976	0.974
How sure you that you could refuse to have sex with your husband if you were feeling tired?	0.851	0.976	0.974
How sure you that you could refuse to have sex with your husband if you were feeling sick?	0.693	0.976	0.977
How sure you that you could refuse to have sex with your husband if he gets angry with you if you don't have sex?	0.89	0.976	0.973
How sure you that you could refuse to have sex with your husband if he threatens to hurt you if you won't have sex?	0.766	0.976	0.976
How sure you that you could refuse to have sex with your husband if he threatens to have sex with other women if you don't have sex with him?	0.78	0.976	0.975
How sure are you, that you could refuse to have sex with your husband if he threatens to end the marriage if you don't have sex with him?	0.823	0.976	0.974
How sure are you, that you could refuse to have sex with your husband if he threatens to take on another wife?	0.771	0.976	0.975
How sure are you that you could ask your husband to do some of the household duties?	0.826	0.976	0.974
How sure are you that you could ask your husband to do some of the household duties if you want his help and he isn't doing anything else at the time?	0.832	0.976	0.974
How sure are you that you could ask your husband to do some of the household duties if you want to go to an important community meeting?	0.752	0.976	0.976
How sure are you that you could ask your husband to do some of the household duties if you want to go visit a friend or family member?	0.943	0.976	0.974
How sure are you that you could ask your husband to do some of the household duties when you are pregnant?	0.941	0.976	0.974
How sure are you that you could ask your husband to do some of the household duties when you are not feeling well?	0.94	0.976	0.974
How sure are you that you could go to the health facility if your husband objected to your going?	0.859	0.976	0.974

**Table 30 : Index Components and Characteristics – Family Planning**

Questions	Factor Loadings	Alpha	Alpha if removed
How sure are you that you could bring up the topic of family planning with your husband?	0.547	0.924	0.895
How sure are you that you could tell your husband that you wanted to use family planning?	0.594	0.924	0.875
How sure are you that you could use family planning?	0.771	0.924	0.95
How sure are you that you could use family planning, even if your husband did not want to?	0.581	0.924	0.866

**Table 31 : Index Components and Characteristics – In the Community**

Questions	Factor Loadings	Alpha	Alpha if removed
How sure are you that you could go to the health facility if you wanted to go?	0.715	0.949	0.944
How sure are you that you could go to the health facility if you were worried that the staff would treat you badly?	0.612	0.949	0.948
How sure are you that you could go to the health facility even if you feel you have some work to do at home?	0.922	0.949	0.939
How sure are you that you could go to the health facility if your family thought you were neglecting your household duties?	0.768	0.949	0.945
How sure are you that you could attend a community meeting?	0.771	0.949	0.945
How sure are you that you could attend a community meeting if your family did not encourage you to go?	0.932	0.949	0.938
How sure are you that you could attend a community meeting if your family did not want you to go?	0.679	0.949	0.952
How sure are you that you could attend a community meeting if your family would not help with your household duties so that you could attend?	0.928	0.949	0.938
How sure are you that you could express your opinion at a community meeting?	0.773	0.949	0.945
How sure are you that you could express your opinion at a community meeting if some people did not agree with that opinion?	0.928	0.949	0.938
How sure are you that you could express your opinion at a community meeting if most people did not agree with that opinion?	0.7	0.949	0.949

**Table 32 : Index Components and Characteristics – Children**

<b>Questions</b>	<b>Factor Loadings</b>	<b>Alpha</b>	<b>Alpha if removed</b>
How sure are you that you could ask an adult in your household to watch the children?	0.863	0.958	0.946
How sure are you that you could ask an adult in your household to watch the children when you want to rest because you are sick?	0.807	0.958	0.952
How sure are you that you could ask an adult in your household to watch the children when you need to go to the health facility?	0.847	0.958	0.948
How sure are you that you could ask an adult in your household to watch the children when you want to go visit a family member?	0.806	0.958	0.955
How sure are you that you could ask an adult in your household to watch the children when you want to go visit a friend?	0.797	0.958	0.955
How sure are you that you could ask an adult in your household to watch the children so you can attend to other responsibilities?	0.803	0.958	0.955
How sure are you that you could ask an adult in your household to watch the children so you can earn income?	0.799	0.958	0.952

**Table 33: Index components and characteristics – Social Support**

<b>Questions</b>	<b>Factor Loadings</b>	<b>Alpha</b>	<b>Alpha if removed</b>
How sure are you that there is someone in your village who you could go to for advice?	0.814	0.875	0.855
How sure are you that there is someone in your village who could take you to the hospital?	0.636	0.875	0.857
How sure are you that there is someone in your village who would help care for your children or household while you are away?	0.619	0.875	0.860
So, if your husband has beaten you severely, how sure are you that there is someone in your village who you could talk to about your problem?	0.757	0.875	0.857
How sure are you that there is someone in your village who you could go to for advice?	0.828	0.875	0.852
How sure are you that there is someone in your village who would shelter you if you needed it?	0.678	0.875	0.859
How sure are you that there is someone in your village who would take you to the hospital?	0.583	0.875	0.858

**Table 34: Index components and characteristics – Decision-making Power**

<b>Questions</b>	<b>Factor Loadings</b>	<b>Alpha</b>	<b>Alpha if removed</b>
Which member of your household usually makes decisions about your health care	NA	0.726	0.718
Which member of your household usually makes decisions about making large household purchases	NA	0.726	0.719
Which member of your household usually makes decisions about making household purchases for daily needs	NA	0.726	0.718
Which member of your household usually makes decisions about when you will visit family/relatives/friends	NA	0.726	0.703
Which member of your household usually makes decisions about when your whole household will visit family/friends	NA	0.726	0.709
Which member of your household usually makes decisions about how to use the money you bring into the household	NA	0.726	0.713
Which member of your household usually makes decisions about how to use the money your husband brings home	NA	0.726	0.729
Which member of your household usually makes decisions about when your family will sell a large asset (like a cow)	NA	0.726	0.724
Which member of your household usually makes decisions about when your family will sell a small asset (like a chicken)	NA	0.726	0.713
Which member of your household usually makes decisions about what you can wear	NA	0.726	0.727
Which member of your household usually makes decisions about who you can spend time with	NA	0.726	0.702
Which member of your household usually makes decisions about how you spend your time	NA	0.726	0.700
Which member of your household usually makes decisions about whether you can work to earn money	NA	0.726	0.700
Which member of your household usually makes decisions about when you and your husband have sex	NA	0.726	0.716
Which member of your household usually makes decisions about whether you and your husband use family planning	NA	0.726	0.717
Which member of your household usually makes decisions about how many children to have	NA	0.726	0.721
Which member of your household usually makes decisions about whether to circumcise a girl	NA	0.726	0.719
Which member of your household usually makes decisions about where a woman should give birth	NA	0.726	0.717
Which member of your household usually makes the decision to seek modern health care during pregnancy	NA	0.726	0.719



**Table 35: Index components and characteristics – Inter-spousal Communication**

Questions	Factor Loadings	Alpha	Alpha if removed
How often do you and your husband discuss things that happened during the day?	0.956	0.726	0.658
How often do you and your husband discuss your worries or feelings?	0.955	0.726	0.644
How often do you and your husband discuss what to spend household money on?	0.915	0.726	0.69
How often do you and your husband discuss when to have children?	0.899	0.726	0.667
How often do you and your husband discuss family planning?	0.894	0.726	0.731

**Table 36: Index components and characteristics - Perceived Quality of Services**

Questions	Factor Loadings	Alpha	Alpha if removed
The health facility provides high quality services	0.204	0.794	0.757
The staff at the health center are friendly and respect me	0.213	0.794	0.753
The staff at the health center give me better service if my husband comes with me	0.195	0.794	0.763
The staff at the health center give me all the information I need for my well-being	0.208	0.794	0.754
The health center has the equipment needed to provide good care for me in childbirth	0.190	0.794	0.762
The health center is the safest place to deliver my baby	0.189	0.794	0.765
I am able to get to the health center for delivery if I needed to	0.18	0.794	0.767
The cost of services at the health center is acceptable in relation to the benefits	0.07	0.794	0.842*
<b>* Question removed from index due to an increase of Cronbach's alpha of greater than 5%</b>			

## VIII. References

- AbouZahr, C., & Wardlaw, T. (2003). *Antenatal Care in Developing Countries: Promises, achievements and missed opportunities: an analysis of trends, levels and differentials, 1990-2001*. Geneva.
- Adams, A. M., Madhavan, S., & Simon, D. (2002). Women's social networks and child survival in Mali. *Social Science & Medicine*, 54(2), 165-178. doi: [http://dx.doi.org/10.1016/S0277-9536\(01\)00017-X](http://dx.doi.org/10.1016/S0277-9536(01)00017-X)
- Adams, V., Miller, S., Chertow, J., Craig, S., Samen, A., & Varner, M. (2005). Having a “safe delivery”: Conflicting views from Tibet. *Health Care for Women International*, 26(9), 821-851.
- Addai, I. (1998). Demographic and sociocultural factors influencing use of maternal health services in Ghana. *African Journal of Reproductive Health*, 2(1), 73-80.
- Adetunji, J. A. (1992). Church-Based Care in a Yoruba Community, Nigeria. *Social Science & Medicine*, 35(9), 1171-1178.
- Agha, S., & Carton, T. W. (2011). Determinants of institutional delivery in rural Jhang, Pakistan. *International Journal for Equity in Health*, 10. doi: 10.1186/1475-9276-10-31
- Al-Krenawi, A. (1999). Women of polygamous marriages in primary health care centers. *Contemporary Family Therapy*, 21(3), 417-430. doi: 10.1023/a:1021920601391
- Andersen, R. N., J. (1973). Societal and individual determinants of medical care utilization in the United States. *Milbank Memorial Fund Quarterly Health*(51), 95-124.
- AsowaOmorodion, F. I. (1997). Women's perceptions of the complications of pregnancy and childbirth in two Esan communities, Edo state, Nigeria. *Social Science & Medicine*, 44(12), 1817-1824. doi: 10.1016/s0277-9536(96)00291-2
- Azimi Y.N., A. A. S. (2003). Husband-wife communication and family planning practices among Malay married couples in Mukim Rusila, Terengganu. *Med J Malaysia*(58).
- Bajos, N., Teixeira, M., Adjamagbo, A., Ferrand, M., Guillaume, A., Rossier, C., & Equipe, E. (2013). NORMATIVE TENSIONS AND WOMEN'S CONTRACEPTIVE ATTITUDES AND PRACTICES IN FOUR AFRICAN COUNTRIES. *Population*, 68(1), 17-39.
- Bankole, A., & Singh, S. (1998). Couples' fertility and contraceptive decision-making in developing countries: Hearing the man's voice. *International Family Planning Perspectives*, 1(24), 15-24.
- Barker, G., & Das, A. (2004). *Men and sexual and reproductive health: The social revolution*.
- Barker, G., & Ricardo, C. (2005). *Young men and the construction of masculinity in sub-Saharan Africa: implications for HIV/AIDS, conflict, and violence*: World Bank Washington, DC.
- Bawah, A. A. (2002). Spousal communication and family planning behavior in Navrongo: A longitudinal assessment. *Studies in Family Planning*, 33(2), 185-194. doi: 10.1111/j.1728-4465.2002.00185.x
- Beegle, K., Frankenberg, E., & Thomas, D. (2001). Bargaining power within couples and use of prenatal and delivery care in Indonesia. *Studies in Family Planning*, 32(2), 130-146. doi: 10.1111/j.1728-4465.2001.00130.x
- Beekle, A. T., McCabe, C., (2006). Awareness and determinants of family planning practice in Jimma, Ethiopia. *International Nursing Review*(53), 269-276.
- Berkanovic, R. T., C. (1982). Social networks, beliefs, and the decision to seek medical care: an analysis of congruent and incongruent patterns. *Medical Care*(20), 1018-1026.

- Berkman, L., Glass, T., Brissette, I., & Seeman, T. (2000). From social integration to health: Durkheim in the new millennium. *Soc Sci Med*(51), 843-857.
- Blanc, A. K. (2001). The effect of power in sexual relationships on sexual and reproductive health: An examination of the evidence. *Studies in Family Planning*, 32(3), 189-213. doi: 10.1111/j.1728-4465.2001.00189.x
- Bloom, S. S., Wypij, D., & Das Gupta, M. (2001). Dimensions of women's autonomy and the influence on maternal health care utilization in a North Indian city. *Demography*, 38(1), 67-78. doi: 10.2307/3088289
- Casterline J.B., S. Z. A., Haque M. (2001). Obstacles to contraceptive use in Pakistan: a study in Punjab. *Studies in Family Planning*(32), 95-110.
- Chapman, R. (2005). *Embodying risk, defining danger in safe motherhood*. Paper presented at the 104th Annual Meeting of the American Anthropological Association, Washington, DC.
- Chapman, R. R. (2006). Chikotsa - Secrets, silence, and hiding: Social risk and reproductive vulnerability in central Mozambique. *Medical Anthropology Quarterly*, 20(4), 487-515. doi: 10.1525/maq.2006.20.4.487
- Cialdini, R. B., Demaine, L. J., Sagarin, B. J., Barrett, D. W., Rhoads, K., & Winter, P. L. (2006). Managing social norms for persuasive impact. *Social influence*, 1(1), 3-15.
- Cialdini, R. B., & Trost, M. R. (1998). Social influence: Social norms, conformity and compliance.
- Cohen, S. I., & Burger, M. (2000). Partnering: A new approach to sexual and reproductive health (Technical Paper No. 3). In U. N. P. Fund (Ed.). New York.
- Cohen, S. I. B. M. U. N. P. F. (2003). It takes 2 partnering with men in reproductive & sexual health. from <http://www.unfpa.org/public/home/publications/pid/2474>
- CPS/MS, C. d. P. e. d. S. (2007). du Ministère de la Santé (CPS/MS), Direction Nationale de la Statistique et de l'Informatique du Ministère de l'Économie, de l'Industrie et du Commerce (DNSI/MEIC) et Macro International Inc. 2007. *Enquête Démographique et de Santé du Mali*.
- Croy, G., Gerrans, P., & Speelman, C. (2010). Injunctive social norms primacy over descriptive social norms in retirement savings decisions. *The International Journal of Aging and Human Development*, 71(4), 259-282.
- DeRose, L. F., & Ezeh, A. C. (2010). Decision-Making Patterns and Contraceptive Use: Evidence from Uganda. *Population Research and Policy Review*, 29(3), 423-439. doi: 10.1007/s11113-009-9151-8
- Dudgeon, M. R., & Inhorn, M. C. (2004). Men's influences on women's reproductive health: medical anthropological perspectives. *Social Science & Medicine*, 59(7), 1379-1395. doi: 10.1016/j.socscimed.2003.11.035
- Dynes, M., Stephenson, R., Rubardt, M., & Bartel, D. (2012). The influence of perceptions of community norms on current contraceptive use among men and women in Ethiopia and Kenya. *Health & Place*, 18(4), 766-773. doi: 10.1016/j.healthplace.2012.04.006
- Eggleston, E. (2000). Unintended pregnancy and women's use of prenatal care in Ecuador. *Social Science & Medicine*, 51(7), 1011-1018. doi: 10.1016/s0277-9536(00)00010-1
- Elwy, A. R., Hart, G. J., Hawkes, S., & Petticrew, M. (2002). Effectiveness of interventions to prevent sexually transmitted infections and human immunodeficiency virus in heterosexual men - A systematic review. *Archives of Internal Medicine*, 162(16), 1818-1830. doi: 10.1001/archinte.162.16.1818

- Etuk, S. J., Itam, I. H., & Asuquo, E. E. J. (1999). Role of the spiritual churches in antenatal clinic default in Calabar, Nigeria. *East African Medical Journal*, 76(11), 639-643.
- Gage, A. J. (2007). Barriers to the utilization of maternal health care in rural Mali. *Social Science & Medicine*, 65(8), 1666-1682. doi: 10.1016/j.socscimed.2007.06.001
- Gribble, J., & Haffey, J. (2008). Reproductive Health in Sub-Saharan Africa. Washington, D.C.
- Haddad, L., Hoddinott, J., & Alderman, H. (1997). *Intrahousehold resource allocation in developing countries: models, methods, and policy*: Johns Hopkins University Press.
- Haider, S. (2000). *Baseline survey of communication program for reducing maternal mortality and violence against women*. Dhaka, Bangladesh: Research and Evaluation Associates for Development.
- Haque, S. E., Rahman, M., Mostofa, M. G., & Zahan, M. S. (2012). Reproductive Health Care Utilization among Young Mothers in Bangladesh: Does Autonomy Matter? *Women's health issues : official publication of the Jacobs Institute of Women's Health*, 22(2), e171-e180.
- Hertrich, V., & Andro, A. (2002). Demand for Contraception in Sahelian Countries: Are Men's and Women's Expectations Converging? Burkina Faso and Mali, Compared to Ghana. *Population*, 929-957.
- Hogan, D. P., & Biratu, B. (2004). Social identity and community effects on contraceptive use and intentions in southern Ethiopia. *Studies in Family Planning*, 35(2), 79-90. doi: 10.1111/j.1728-4465.2004.00010.x
- Hogan, M. C., Foreman, K. J., Naghavi, M., Ahn, S. Y., Wang, M. R., Makela, S. M., . . . Murray, C. J. L. (2010). Maternal mortality for 181 countries, 1980-2008: a systematic analysis of progress towards Millennium Development Goal 5. *Lancet*, 375(9726), 1609-1623. doi: 10.1016/s0140-6736(10)60518-1
- Hossain, J., & Ross, S. R. (2006). The effect of addressing demand for as well as supply of emergency obstetric care in Dinajpur, Bangladesh. *International Journal of Gynecology & Obstetrics*, 92(3), 320-328. doi: 10.1016/j.ijgo.2005.09.029
- Inhorn, M., & van Balen, F. (2003). *Infertility around the globe: New thinking on childlessness, gender, and reproductive technologies*. Berkeley: University of California Press.
- Jansen, I. (2006). Decision making in childbirth: the influence of traditional structures in a Ghanaian village. *International Nursing Review*, 53(1), 41-46. doi: 10.1111/j.1466-7657.2006.00448.x
- Kaggwa, E. B., Diop, N., & Storey, J. D. (2008). The role of individual and community normative factors: A multilevel analysis of contraceptive use among women in union in Mali. *International Family Planning Perspectives*, 34(2), 79-88. doi: 10.1363/3407908
- Kalichman, S. C., Simbayi, L. C., Cloete, A., Cherry, C., Strebler, A., Kalichman, M. O., . . . Henda, N. (2008). HIV/AIDS risk reduction and domestic violence prevention intervention for South African men. *International Journal of Men's Health*, 7(3), 255-273.
- Keleher, H., & Franklin, L. (2008). Changing gendered norms about women and girls at the level of household and community: a review of the evidence. *Glob Public Health*, 3 Suppl 1, 42-57. doi: 10.1080/17441690801892307
- Khan, S., Mishra, V., Arnold, F., & Abderrahim, N. (2007). Contraceptive Trends in Developing Countries *DHS Comparative Reports No. 16*. Calverton, Maryland.

- Kielmann, K. (1998). Barren ground: contesting identities of infertile women in Pemba. In M. K. Lock, P. (Ed.), *Pragmatic women and body politics*. Cambridge: Cambridge University Press.
- Kim, Y., & Kols, A. (2001). Counselling and communicating with men to promote family planning in Kenya and Zimbabwe: Findings, lessons learned, and programme suggestions *Programming for male involvement in reproductive health*. Geneva: WHO.
- Kincaid, D. L. (2000). Social networks, ideation, and contraceptive behavior in Bangladesh: a longitudinal analysis. *Social Science & Medicine*, 50(2), 215-231. doi: 10.1016/s0277-9536(99)00276-2
- Kincaid, D. L. (2004). From innovation to social norm: Bounded normative influence. *Journal of Health Communication*, 9, 37-57. doi: 10.1080/10810730490271511
- Konate, M., Djibo, A., & Djire, M. (1998). Mali: The Impact of Family Planning on the Lives of New Contraceptive Users in Bamako.
- Kulczycki, A. (2008). Husband-Wife Agreement, Power Relations And Contraceptive Use in Turkey. *International Family Planning Perspectives*, 34(3), 127-137. doi: 10.1363/3412708
- Kunene, B., Beksinska, M., Zondi, S., Mthembu, N., Mullick, S., Ottolenghi, E., . . . Cuthbertson, C. (2004). INVOLVING MEN IN MATERNITY CARE South Africa.
- Liamputtong, P., Yimyam, S., Parisunyakul, S., Baosong, C., & Sansiriphun, N. (2005). Traditional beliefs about pregnancy and child birth among women from Chiang Mai, Northern Thailand. *Midwifery*, 21(2), 139-153. doi: 10.1016/j.midw.2004.05.002
- Madhavan, S. (2002). Best of friends and worst of enemies: competition and collaboration in polygyny. *Ethnology*, 41(1), 69-84.
- Madhavan, S., Adams, A., & Simon, D. (2003). Women's networks and the social world of fertility behavior. *International Family Planning Perspectives*, 29(2).
- Magadi, M. A., Madise, N. J., & Rodrigues, R. N. (2000). Frequency and timing of antenatal care in Kenya: explaining the variations between women of different communities. *Social Science & Medicine*, 51(4), 551-561. doi: 10.1016/s0277-9536(99)00495-5
- Marsiglio, W. (1988). Adolescent male sexuality and heterosexual masculinity: A conceptual model and review. *Journal of Adolescent Research*, 3(3-4), 285-303.
- Marston, C., & King, E. (2006). Factors that shape young people's sexual behaviour: a systematic review. *Lancet*, 368(9547), 1581-1586. doi: 10.1016/s0140-6736(06)69662-1
- Mathole, T., Lindmark, G., Majoko, F., & Ahlberg, B. M. (2004). A qualitative study of women's perspectives of antenatal care in a rural area of Zimbabwe. *Midwifery*, 20(2), 122-132. doi: 10.1016/j.midw.2003.10.003
- Maticka-Tyndale, E., & Tenkorang, E. Y. (2010). A multi-level model of condom use among male and female upper primary school students in Nyanza, Kenya. *Social Science & Medicine*, 71(3), 616-625. doi: 10.1016/j.socscimed.2010.03.049
- McCarthy, J. (1997). The conceptual framework of the PMM Network. *International Journal of Gynecology & Obstetrics*, 59, S15-S21. doi: 10.1016/s0020-7292(97)00143-4
- McCarthy, J., & Maine, D. (1992). A FRAMEWORK FOR ANALYZING THE DETERMINANTS OF MATERNAL MORTALITY. *Studies in Family Planning*, 23(1), 23-33. doi: 10.2307/1966825

- Mohammad-Alizadeh, S., Wahlström, R., Vahidi, R., & Johansson, A. (2009). Women's perceptions of quality of family planning services in Tabriz, Iran. *Reproductive Health Matters*, 17(33), 171-180.
- Montgomery, M. R., & Casterline, J. B. (1996). Social learning social influence and new models of fertility. *Population and Development Review*, 22, 151-175.
- Moyer, C. A., & Mustafa, A. (2013). Drivers and deterrents of facility delivery in sub-Saharan Africa: a systematic review. *Reproductive Health*, 10, 14. doi: 10.1186/1742-4755-10-40
- Mufune, P. (2009). The Male Involvement Programme and Men's Sexual and Reproductive Health in Northern Namibia. *Current Sociology*, 57(2), 231-248. doi: 10.1177/0011392108099164
- Mullany, B., Lakhey, B., Shrestha, D., Hindin, M., & Becker, S. (2008). Impact of husbands' participation in antenatal health education services on maternal health knowledge. *JNMA; journal of the Nepal Medical Association*, 48(173), 28-34.
- Mumtaz, Z., & Salway, S. (2009). Understanding gendered influences on women's reproductive health in Pakistan: Moving beyond the autonomy paradigm. *Social Science & Medicine*, 68(7), 1349-1356. doi: 10.1016/j.socscimed.2009.01.025
- Nelkin, D. (2003). Foreword: The Social Meaning of Risk. In B. H. Harthorn, Oaks, L. (Ed.), *Risk, Culture, and Health Inequality: Shifting Perceptions of Danger and Blame*. Westport, CT: Praeger.
- Ngomane, S., & Mulaudzi, F. M. (2012). Indigenous beliefs and practices that influence the delayed attendance of antenatal clinics by women in the Bohlabele district in Limpopo, South Africa. *Midwifery*, 28(1), 30-38. doi: 10.1016/j.midw.2010.11.002
- Nichter, M. (2002). Social Relations of Therapy Management. In M. a. L. Nichter, M. (Ed.), *Medical Anthropology* (pp. 81-110). New York: Routledge.
- Nichter, M. (2003). Harm Reduction: A Core Concern for Medical Anthropology. In B. H. Harthorn, Oaks, L. (Ed.), *Risk, Culture, and Health Inequality: Shifting Perceptions of Danger and Blame* (pp. 13-33). Westport, CT: Praeger.
- Nowak, A., Szamrej, J., & Latane, B. (1990). FROM PRIVATE ATTITUDE TO PUBLIC-OPINION - A DYNAMIC THEORY OF SOCIAL IMPACT. *Psychological Review*, 97(3), 362-376. doi: 10.1037/0033-295x.97.3.362
- Nuwaha, F., & Amooti-Kaguna, B. (1999). Predictors of home deliveries in Rakai District, Uganda. *African Journal of Reproductive Health*, 3(2), 79-86.
- Nzioka, C. (2002). The implications of research on men on policy and programme development in reproductive health *Programming for male involvement in reproductive health*. Geneva: WHO.
- Obionu, C. N. (2001). *Primary health care for developing countries*. Enugu, Nigeria: Delta.
- Odimegwu, C., Adewuyi, A., Odebiyi, T., Aina, B., Adesina, Y., Olatubara, O., & Eniola, F. (2005). Men's role in emergency obstetric care in Osun State of Nigeria. *African Journal of Reproductive Health*, 59-71.
- Okafor, C. B. (2000). Folklore linked to pregnancy and birth in Nigeria. *Western Journal of Nursing Research*, 22(2), 189-202.
- Oyediran, K., & Isiugo-Abanihe, U. (2002). Husband wife communication and couple's fertility desires among the Yoruba of Nigeria. *African Population Studies*(17), 61-80.
- Paek, H. J., Lee, B., Salmon, C. T., & Witte, K. (2008). The contextual effects of gender norms, communication, and social capital on family planning behaviors in Uganda: A multilevel

- approach. *Health Education & Behavior*, 35(4), 461-477. doi: 10.1177/1090198106296769
- Paluck, E., Ball, L., Poynton, C., & Sieloff, S. (2010). Social norms marketing aimed at gender based violence: A literature review and critical assessment. *New York: International Rescue Committee*.
- Papen, U. (2008). Pregnancy starts with a literacy event: pregnancy and antenatal care as textually mediated experiences. *Ethnography*(9), 377-402.
- Peacock, D., & Levack, A. (2004). The men as partners program in South Africa: Reaching men to end gender-based violence and promote sexual and reproductive health. *International Journal of Men's Health*, 3(3), 173-188.
- Pescosolido, B. (1992). Beyond rational choice: the social dynamics of how people seek help. *American Journal of Sociology*(97), 1096-1138.
- Pick, W. M., & Obermeyer, C. M. (1996). Urbanisation, household composition and the reproductive health of women in a South African city. *Social Science & Medicine*, 43(10), 1431-1441.
- Pulerwitz, J., Michaelis, A., Verma, R., & Weiss, E. (2010). Addressing Gender Dynamics and Engaging Men in HIV Programs: Lessons Learned from Horizons Research. *Public Health Reports*, 125(2), 282-292.
- Rogers, E. M., & Kincaid, D. L. (1981). Communication networks: Toward a new paradigm for research.
- Rutenberg, N., & Watkins, S. C. (1997). The buzz outside the clinics: conversations and contraception in Nyanza Province, Kenya. *Studies in Family Planning*, 290-307.
- Savage, O. (1996). Children of the rope and other aspects of pregnancy loss in Cameroon. In R. Cecil (Ed.), *The anthropology of pregnancy loss: Comparative studies in miscarriage, stillbirth, and neonatal death*. Oxford, UK: Berg.
- Shaikh, B. T., Hatcher, J. (2005). Health seeking behaviour and health service utilization in Pakistan: challenging the policy makers. *Journal of Public Health Policy*, 1(27), 49-54.
- Sharan, M., & Valente, T. (2002). Spousal communication and family planning adoption: effects of a radio drama serial in Nepal. *International Family Planning Perspectives*, 1(28), 16-25.
- Simon, D., Adams, A. M., & Madhavan, S. (2002). Women's social power, child nutrition and poverty in Mali. *Journal of Biosocial Science*, 34(2), 193-214.
- Singh, S., Darroch, J. E., Ashford, L. S., & Vlassoff, M. (2009). Adding It Up: The Costs and Benefits of Investing in Family Planning and Maternal and Newborn Health. New York, NY.
- Smith, D. J. (2010). Promiscuous Girls, Good Wives, and Cheating Husbands: Gender Inequality, Transitions to Marriage, and Infidelity in Southeastern Nigeria. *Anthropol Q*, 83(1). doi: 10.1353/anq.0.0118
- Soldan, V. (2004). How family planning ideas are spread within social groups in rural Malawi. *Studies in Family Planning*(35), 275-290.
- Speizer, I. S., Whittle, L., & Carter, M. (2005). Gender relations and reproductive decision making in Honduras. *International Family Planning Perspectives*, 131-139.
- Stephenson, R., Baschieri, A., Clements, S., Hennink, M., & Madise, N. (2007). Contextual influences on modern contraceptive use in sub-saharan Africa. *American Journal of Public Health*, 97(7), 1233-1240. doi: 10.2105/ajph.2005.071522

- Stephenson, R., Beke, A., & Tshibangu, D. (2008). Contextual influences on contraceptive use in the Eastern Cape, South Africa. *Health & Place, 14*(4), 841-852. doi: 10.1016/j.healthplace.2008.01.005
- Sternberg, P., & Hubley, J. (2004). Evaluating men's involvement as a strategy in sexual and reproductive health promotion. *Health Promotion International, 19*(3), 389-396. doi: 10.1093/heapro/dah312
- Sternberg, P., & Hubley, J. (2013). Does mens involvement work? Evidence from evaluated interventions. *Sexual Health Exchange*(2), 5.
- Stewart, D., & Stotland, N. (Eds.). (1993). *Psychological aspects of women's health care: The interface between psychiatry and obstetrics and gynecology*. Washington, DC: American Psychiatric Press.
- Stokes, E., Dumbaya, I., Owens, S., & Brabin, L. (2008). The right to remain silent: a qualitative study of the medical and social ramifications of pregnancy disclosure for Gambian women. *Bjog-an International Journal of Obstetrics and Gynaecology, 115*(13), 1641-1647. doi: 10.1111/j.1471-0528.2008.01950.x
- Thaddeus, S., & Maine, D. (1994). TOO FAR TO WALK - MATERNAL MORTALITY IN CONTEXT. *Social Science & Medicine, 38*(8), 1091-1110. doi: 10.1016/0277-9536(94)90226-7
- Tolley, E., Loza, S., Kafafi, L., & Cummings, S. (2005). The impact of menstrual side effects on contraceptive discontinuation: Findings from a longitudinal study in Cairo, Egypt. *International Family Planning Perspectives, 31*(1), 15-23. doi: 10.1363/3101505
- Toubia, N., & Delano, G. E. (1995). *Doing more with less: The Marie Stopes clinics in Sierra leone*: Population Council.
- Tsu, V. D. (1994). ANTENATAL SCREENING - ITS USE IN ASSESSING OBSTETRIC RISK-FACTORS IN ZIMBABWE. *Journal of Epidemiology and Community Health, 48*(3), 297-305. doi: 10.1136/jech.48.3.297
- UN, U. N. (2011). The Millennium Development Goals Report: 2011. New York, NY.
- UN, U. N. (2013). The Millennium Development Goals Report 2013. New York.
- USAID. (2000). Involving men in sexual and reproductive health: An orientation guide In U. I. G. W. Group (Ed.). Washington , DC.
- USAID. (2003). Reaching men to improve reproductive health for all implementation guide. In I. G. W. Group (Ed.). Washington , DC.
- USAID. (2006). SysteMALEtizing: Resources for engaging men in sexual and reproductive health In U. I. G. W. Group (Ed.). Washington , DC.
- van den Broek, N. R., White, S. A., Ntonya, C., Ngwale, M., Cullinan, T. R., Molyneux, M. E., & Neilson, J. P. (2003). Reproductive health in rural Malawi: a population-based survey. *Bjog-an International Journal of Obstetrics and Gynaecology, 110*(10), 902-908. doi: 10.1016/s1470-0328(03)02902-1
- van der Sijpt, E. (2013). Hiding or hospitalising? On dilemmas of pregnancy management in East Cameroon. *Anthropology & medicine, 20*(3), 288-298.
- Varga, C. A. (2003). How gender roles influence sexual and reproductive health among South African adolescents. *Studies in Family Planning, 34*(3), 160-172. doi: 10.1111/j.1728-4465.2003.00160.x



- Verma, R. K., Pulerwitz, J., Mahendra, V., Khandekar, S., Barker, G., Fulpagare, P., & Singh, S. K. (2006). Challenging and changing gender attitudes among young men in Mumbai, India. *Reprod Health Matters, 14*(28), 135-143. doi: 10.1016/s0968-8080(06)28261-2
- White, V., Greene, M., & Murphy, E. (2003). Men and reproductive health programs: Influencing gender norms. *Washington, DC: The Synergy Project. Available at [www. synergyaids.com/SynergyPublications/Gender\\_Norms. pdf](http://www.synergyaids.com/SynergyPublications/Gender_Norms.pdf), sitio visitado el, 5.*
- WHO, W. H. O. (2004). Making pregnancy safer: the critical role of the skilled attendant: a joint statement by WHO, ICM and FIGO. Geneva.
- WHO, W. H. O. (2009). *Achieving Millennium Development Goal 5: target 5A and 5B on reducing maternal mortality and achieving universal access to reproductive health*. Retrieved from [http://www.who.int/reproductivehealth/publications/monitoring/rhr\\_09\\_06/en/index.html](http://www.who.int/reproductivehealth/publications/monitoring/rhr_09_06/en/index.html).
- WHO, W. H. O. (2010). WHO Technical Consultation on Postpartum and Postnatal Care. Geneva.
- Williams, J. (2001). The clinical work book: using portfolios to enhance clinical teaching. *Journal of Nursing Education*(40), 135-136.