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The Influence of Interfamilial Power on Family Planning and Maternal Health Care in Mali: Perspectives of Women, Men, and Mothers-in-Law

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Rob Stephenson, PhD

Committee Chair

The Influence of Interfamilial Power on Family Planning and Maternal Health Care in Mali: Perspectives of Women, Men, and Mothers-in-Law

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Bachelor of Arts

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An abstract of

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Abstract

The Influence of Interfamilial Power on Family Planning and Maternal Health Care in Mali: Perspectives of Women, Men, and Mothers-in-Law

By Darcy White

Background. Despite decades of policies and programs designed to improve reproductive health in the developing world, indicators of family planning and maternal health remain poor, particularly in Sub-Saharan Africa. The typical approach to addressing these gaps has focused exclusively on women, however evidence suggests that women often have limited control over their own reproductive health.

Objective. This study explores interfamilial power dynamics and the relative influence of women, their husbands, and their mothers-in-law on family planning and maternal health care practices.

Methods. In two rural districts of the Mopti region of central Mali, survey data were collected from women, their husbands, and their mothers-in-law. In addition to socio-demographic questions, respondents were presented with eight sets of scale items assessing agreement with various constructs of gender, power, and health. Based on these items, the primary covariates for analysis comprised a series of indices constructed using principal components analysis. Logistic regression was performed to fit associative models for each of five outcome variables representing the index women's: current use of family planning, antenatal care frequency, antenatal care timing, institutional delivery, and postnatal care.

Results. Although the relevant constructs and the degree of influence of each respondent group varied across the five outcomes, some overarching patterns emerged. After adjusting for socio-demographic characteristics and other significant covariates, husbands' preferences and opinions were not significantly associated with any of the outcomes. In contrast, the preferences and opinions of mothers-in-law had strong effects on the reproductive health behaviors of their daughters-in-law. From the perspective of the index women, constructs related to self-efficacy, perceptions of the value of women, and attitudes towards health services were independently associated with preventative and health-seeking practices.

Discussion. These results indicate that interventions focusing only on women or at the level of the couple are insufficient to advance women's reproductive health in patriarchal societies such as Mali. Future research and programmatic efforts need to address gender norms and consider the influence of mothers-in-law.

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Definition of key terms

Antenatal care: Also referred to as prenatal care, antenatal care refers to health services provided to a woman during pregnancy to promote her health and that of the developing fetus.

Delivery care: In this paper, the term "delivery care" is used interchangeably with institutional delivery, referring to labor and delivery in a community health center, public hospital, or a private hospital or clinic.

Family planning: Family planning, in the context of this analysis, is used synonymously with contraceptive use, referring specifically to the current use of modern methods of contraception. Modern methods include hormonal contraceptives such as the pill, injectables, and implants; intrauterine devices (IUDs)—both hormonal and copper-based; male and female condoms; and male and female sterilization.

Gender: This analysis discusses gender as a social construct that influences norms and prescribes expected characteristics and behaviors for the different sexes (Riley, 1997; Blanc, 2001).

Maternal health care: Maternal health care refers generally to the provision of adequate antenatal, delivery, and postnatal care.

Postnatal care: Postnatal care entails a health assessment of both the mother and newborn within 48 hours of delivery. This service is alternatively described as postpartum care, and some reports use the two terms separately to indicate care for the mother (postpartum) and for the infant (postnatal). In this paper, however, the term postnatal care is used to refer to both.

Skilled provider: A skilled provider or attendant is a health professional with the necessary competencies to provide care during pregnancy, childbirth, and the immediate postpartum period. These competencies include the ability to identify complications, manage them, and refer to specialized care where needed (WHO, 2004).

Polygamy: Polygamy is the practice of having multiple concurrent spouses. In this paper, polygamy will refer exclusively to the practice of one man having multiple wives, also known as polygyny.

Power: Power encompasses both "power to" and "power over." The former describes the ability of an individual to complete an action or behavior, and the latter describes the ability to influence or control another person or to complete an act in the face of opposition (Riley, 1997; Wingood and DiClemente, 2000). Power dynamics in the context of reproductive and maternal health are alternatively discussed in the literature using the terms gender inequity, gender inequality, and relative status, and autonomy.

I. INTRODUCTION

In the past few decades, governments, international organizations, and investors have placed increasing emphasis on the value reproductive health. This recognition has resulted in the worldwide implementation of policies and programs designed to improve family planning and maternal health services. Although global trends in maternal mortality, contraceptive prevalence, and unintended pregnancy point to significant advances, progress has been limited in sub-Saharan Africa. Aiming to address these shortcomings, research and interventions have traditionally focused exclusively on women. While educating and increasing access for women is undoubtedly important, this approach assumes that women have complete control over their fertility and health decisions. In contrast, evidence from diverse settings indicates that women often have only partial if any autonomy over their reproductive and sexual health.

In order to understand reproductive health behaviors and outcomes, it is important to consider the perspectives and influence of other key stakeholders—particularly husbands and mothers-in-law. However, interpersonal power has proven difficult to measure, and previous studies that have attempted to account for it have significant limitations. In light of this gap, this study aims to explore the link between household power dynamics and the family planning and maternal health behaviors of married women in rural Mali. Specifically, it assesses the relative influence of the preferences and beliefs of women, their husbands, and their mothers-in-law on the women's family planning behavior, antenatal care frequency, antenatal care timing, delivery care, and postnatal care. The key objectives of the study are as follows:

1. Identify core constructs and beliefs related to power and gender that drive patterns of family planning and maternal health care in rural Mali.
2. Identify which of these constructs and beliefs act as barriers to and which facilitate preventative and health-seeking behaviors among women.
3. Assess the relative power of women, their husbands, and mothers-in-law in determining reproductive and maternal health practices, while controlling for other known socio-economic and demographic predictors.

Background

The event credited with bringing reproductive health and gender equality into the global spotlight was the International Conference on Population and Development [ICPD], held in Cairo in 1994. Tasked with setting the agenda for the next two decades of population health policies and programs, the delegates at the ICPD asserted that reproductive health is a human right that "implies that people are able to have a satisfying and safe sex life and that they have the capability to reproduce and the freedom to decide if, when and how to do so" (United Nations [UN], 1994, p. 40). This emphasis on comprehensive reproductive health and the promotion of sexual health marked a significant break from the previous, narrow focus on family planning as a means of population control (Cohen and Richards, 1994). The ICPD set an additional important precedent by calling for "the empowerment and autonomy of women" (UN, 1994, p. 22)

and for efforts to involve men and acknowledge their responsibility in reproductive health behaviors and decisions (UN, 1994).

These commitments were reinforced at the Millennium Summit in 2000 with the definition of the Millennium Development Goals [MDGs], which set measurable targets for improvements in reproductive health and gender equality by 2015 (UN, 2011). Yet, over a decade after these goals were first adopted, family planning and maternal health indicators continue to lag behind MDG targets in much of the developing world (World Health Organization [WHO] Department of Reproductive Health and Research [RHR], 2009; Hogan et al., 2010). Although recent decades have witnessed marked improvements in contraceptive use, substantial unmet need and high levels of unintended pregnancy persist in many developing countries (Kahn et al., 2007; Singh, Sedgh, and Hussain, 2010). Similarly, reductions in maternal mortality have been slow and uneven across regions (WHO RHR, 2009). In a systematic review of maternal mortality data from 1980 to 2008, Hogan et al. (2010) found that, in 2008, more than half of all maternal deaths occurred in just six countries.

Sub-Saharan Africa is characterized by particularly poor family planning and maternal health indicators (Khan et al., 2007; Gribble and Haffey, 2008; Hogan et al, 2010). The region has the lowest levels of contraceptive use worldwide, with eight countries reporting contraceptive prevalence below 20 percent (Khan et al., 2007). Although this low prevalence is driven in part by high desired fertility, unmet need for contraception ranges from 17 to 35 percent for much of the region, according to Demographic and Health Survey [DHS] estimates from 2000 to 2005 (Khan et al., 2007). Consequently, 39 percent of the 49.1 million pregnancies that occurred in Africa in 2008

are estimated to have been unintended (Singh et al., 2010). Unintended pregnancies have been linked to unsafe abortion as well as delayed and less frequent antenatal care seeking (Magadi, Madise, and Rodrigues, 2000; Gipson, Koenig, and Hindin, 2008). Related to these indicators and additionally reflecting limited access to obstetric care services, maternal mortality is high in sub-Saharan Africa; the region accounted for 52 percent (95% CI: 45, 59) of the estimated 342,900 (95% CI: 302,100, 394,300) maternal deaths worldwide in 2008 (Hogan et al., 2010).

Maternal morbidity and mortality are largely preventable through provision of contraceptive services, safe abortion, quality antenatal care, skilled assistance at delivery, emergency obstetric services, and postpartum care (WHO RHR, 2009). A recent report by Singh et al. (2009) suggests that meeting the global need for family planning as well as maternal and newborn health care would prevent 70 percent of maternal deaths and 44 percent of newborn deaths. Contributing to these declines, over two thirds of unplanned pregnancies would be prevented if all women with a desire to limit or space childbearing had access to effective methods of contraception (Singh et al., 2009). Spacing births contributes to both maternal and child health, and in a systematic review, Hogan et al. (2010) found that high fertility was the strongest predictor of maternal mortality.

For women who do become pregnant and carry the pregnancy to term, the WHO recommends a minimum of four antenatal care visits, the first taking place early as possible in the pregnancy—ideally during the first trimester (WHO RHR, 2002). Though the value of antenatal care has been disputed and evidence is inconclusive as to its effect on maternal mortality, antenatal care is considered beneficial to the extent that it promotes health, provides critical information, and connects women with the health

system (AbouZahr and Wardlaw, 2003). Quality antenatal care includes health screenings to identify and manage risky conditions such as high blood pressure and sexually transmitted infections, as well as administration of tetanus toxoid and supplements of folic acid and iron (WHO RHR, 2002). Antenatal care also presents an opportunity to inform women and their families about danger signs in pregnancy, where to go in case of an emergency, and the value of making a birth plan and delivering in an institution. In her analysis of 2001 Mali DHS data, Gage (2007) found that receipt of prenatal care was associated with increased delivery care, presumably because women knew where to go and had gained trust and familiarity with the system.

The components of maternal health care with the most direct impact on mortality are skilled assistance at delivery (van den Broek, 2003; WHO, 2004, Singh et al., 2009) and postnatal care (WHO, 2010). In sub-Saharan Africa, many women deliver at home (Adamu and Salihu, 2002; Save the Children, 2008) and although skilled attendants can make home visits, delivery in an institution facilitates referral in case of complications or emergencies (Singh et al., 2009). Postnatal care is also critical for the health of both the mother and infant, as the immediate postpartum period accounts for the majority of maternal and child deaths (WHO, 2010). Although the precise timeframe during which care is most critical has not been agreed upon, the majority of guidelines suggest a regimen in which postnatal care is provided within 48 hours after delivery (WHO, 2010).

In spite of the recognized value and effectiveness of these preventative services, the prevalence of family planning, antenatal care, institutional delivery, and postnatal care remains inadequate in sub-Saharan Africa (Khan et al., 2007; Singh et al., 2009; WHO, 2010). Contributing to this low coverage, limited access to health information and

services in underdeveloped settings has been recognized as a formidable barrier. However, even where care is accessible and affordable, substantial gaps in coverage remain (Konaté, Djibo, and Djiré, 1998; Beegle, Frankenberg, and Thomas, 2001). Accordingly, researchers and program planners have begun to appreciate the complexity of and contextual influences on reproductive health. There has been a gradual movement away from the assumption that promoting awareness and expanding access is sufficient to improve outcomes, towards an approach that recognizes that individual attitudes and behaviors are products of their social and cultural environments (Stephenson et al., 2007; Kaggwa, Diop, and Storey, 2008).

Still, most studies have focused exclusively on women as the target population, aiming to understand and influence barriers and facilitators from their perspective. This focus ignores the reality that fertility and pregnancy-related decisions are often household matters wherein women do not act independently (Konaté et al., 1998; Castle et al., 1999; Pulerwitz, Gortmaker, and Dejong, 2000; Adamu and Salihu, 2002; Gage, 2007). In much of the world, the low status of women prevents them from freely accessing family planning and maternal health services. Not only do husbands have significant influence on the behavior and actions of their wives, studies have found that other household members, particularly mothers-in-law, may also exert control over women (Castle et al., 1999; Blanc, 2001; UNFPA and EngenderHealth, 2003).

However, the power dynamics within a household and how they influence decisions on reproductive health are not fully understood (Bankole and Singh, 1998; Pulerwitz et al., 2000; Beegle et al., 2001; Blanc, 2001). Although there is no single pattern of interfamilial power that can be described to characterize all households or even

all households within a region, there is a need for further research to investigate how to measure relative power, identify the cultural and normative constructs that influence it, and assess the implications for women's health.

By addressing this knowledge gap, this study will contribute to understanding of the interpersonal and societal factors that influence family planning and maternal health behaviors, thereby informing the design of strategic programs and policies to improve the health and rights of women. Depending on the relative influence of each household member and the constructs and factors identified as central to power dynamics, interventions can be designed to achieve a more favorable balance that promotes equity and optimizes health. Although the results of this analysis are limited in their applicability to other settings, the findings will inform the design of other studies aiming to measure and address household power dynamics.

II. LITERATURE REVIEW

Inequitable power relations at the interpersonal and the institutional levels are pervasive across all societies and cultures. Both "power to" and "power over" are influenced by gender, as social and normative prescriptions define hierarchies in which one sex has more resources, privileges, and control over the other (Riley, 1997). Research from a variety of settings indicates that gender-based inequities in power are inextricably linked to family planning and maternal health. However, the association between power and reproductive health is not straightforward, suggesting that interpersonal power is multi-dimensional and highly contextual. A number of measures of power have been developed, but the relevant indicators and constructs driving patterns of reproductive health behavior remain unclear.

Gender, power, and health

To explain the phenomenon of gender inequity, Australian sociologist Robert Connell drew from existing theories to publish a unifying Theory of Gender and Power in 1987. He posits that three interdependent, overlapping structures define gender relations and create inequity (Wingood and DiClemente, 2000). The first of these structures describes economic factors stemming from the sexual division of labor, which assigns women to more domestic and often unpaid work, such that they are financially dependent upon men. The second structure relates to institutional and social forces that establish male dominance and enforce the subordination of women. Finally, the structure of "cathexis" is characterized by social norms and expectations of women's sexual behavior, which reinforce and overlap with the other two structures.

Relating this theory to health, behavioral scientists Wingood and DiClemente (2000) applied the three social structures to the study of HIV transmission among women. For each, they explored a range of exposures and risk factors that could affect a woman's risk of acquiring HIV, illustrating how the theory can help explain patterns of vulnerability and inform interventions. Related to the sexual division of labor, they highlight the influence of low education, un- or underemployment, financial dependence, and young age. Risk factors attributed to the sexual division of power include limited access to services and information, a partner who disapproves of safer practices, and low self-efficacy. The structure of cathexis calls attention to the significance of having an older partner, family members unsupportive of preventative measures, social norms that value high fertility, lack of trust in the medical system, and strong traditional beliefs and practices.

These structures and associated risk factors can similarly be extended to family planning and maternal health, given the overlapping social and behavioral contexts with HIV transmission. A lack of autonomy due to young age, poor education, financial dependence, and conservative social norms is likely to limit women's ability to practice family planning or to obtain timely and sufficient maternal health services. In particular, the need for approval and support from one's husband presents a significant barrier, as men have been found to possess inaccurate or incomplete knowledge regarding the reproductive health risks and needs of women (Blanc, 2001). In contexts of high valued fertility in which a woman's status is largely dependent on her ability to bear children, women's options and self-efficacy are especially curtailed (Ezeh, 1997; Riley, 1997).

Power and reproductive health: Evidence of association

A growing body of research on the role of power and gender in reproductive health suggests a number of associations. At the most basic level, studies have approached the issue by considering whose preferences and values carry more weight when couples disagree. Survey data suggest that, particularly with respect to fertility and family planning, women and men often have discordant views and ideals (Becker, 1996; Bankole and Singh, 1998; Blanc, 2001). Although there is some regional variation, research in developing countries indicates that men are generally more likely to express higher desired fertility levels than women (Becker, 1996; Yoder, Guèye, and Konaté, 2011). Additionally, men have been found to commonly object to family planning for fear that it will make women promiscuous, signify a loss of husbands' control over their wives' fertility and sexuality, or lead to side-effects such as sterility (Konaté et al., 1998; Castle et al., 1999; Blanc, 2001; Yoder et al., 2011).

In a study among couples in five south and southeast Asian countries, Mason and Smith (2000) found that husbands' fertility preferences had a stronger association with current contraceptive use than did women's preferences in settings with high gender disparities. Supporting this finding, survey data from married women in rural Pakistan indicate that having a husband's approval is a strong predictor of family planning use (Agha and Carton, 2011). Evidence from studies in Africa similarly suggests that opposition or disapproval from husbands serves as a barrier to family planning as well as antenatal care (Adamu and Salihu, 2002; Gage, 2007; Yoder et al., 2011).

In addition to husbands, other household members have been reported to express strong preferences regarding women's fertility and reproductive health behavior.

Mothers-in-law in particular have been cited for asserting their fertility values and attitudes towards contraception on their daughters-in-law in order to control the reproductive health practices of the younger women (Castle et al., 1999; UNFPA and EngenderHealth, 2003). Although the influence of in-laws and other household members has received far less attention than that of husbands, the few studies that have considered them suggest that they play an important role, especially in patrilineal societies (Bloom, Wypij, and Gupta, 2001; Char, Saavala, and Kulmala, 2010; Simkhada, Porter, and van Teijlingen, 2010). A qualitative study in Madhya Pradesh in Northern India, for instance, captured the influence of mothers-in-law, who expressed a desire for high fertility and skepticism and distrust of contraception (Char et al., 2010).

In contrast to these studies that indicate that the preferences of husbands, mothers-in-law, and other high status family members determine women's fertility and reproductive health, other studies have reported inconsistent results (Bankole, 1995; Bankole and Singh, 1998; Konaté et al., 1998). These incongruous findings suggest that power is multidimensional and the effects are highly dependent on the context. For example, from an analysis of DHS data from 18 developing countries, Bankole and Singh (1998) reported variable patterns in the relative weight of each partners' fertility preferences. They found that, in six countries, women's preferences seemed to exert more influence on contraceptive use than did their husband's preferences (Bankole and Singh, 1998). Additionally, data from a study in Nigeria revealed that husbands' fertility preferences dominated among couples with low parity, but women had more influence on further childbearing when the number of living children was high (Bankole, 1995).

These inconsistencies might reflect interesting patterns in power dynamics, however the type of analysis employed in these studies is too simplistic to explain the underlying mechanisms. It assumes that the association of a behavior or practice with one partner's preferences is indicative of a power differential, which ignores the potential influence of other, confounding factors. Additionally, relying on reported fertility preferences can introduce bias, as women may express certain values and preferences to conform to the dominant views of husbands or in-laws (Mason and Smith, 2000). In light of these limitations, Blanc (2001) calls for more nuanced studies designed to explicitly measure power as opposed to assuming its influence.

Measuring power

A significant challenge to research on power dynamics is the lack of an established definition of power (Pulerwitz et al., 2000; Blanc, 2001). In an attempt to capture different indicators and dimensions of interpersonal power, researchers have developed a variety of measures and techniques. Although the specific variables and their relative effects are dependent on the context, common approaches build upon a core set of constructs that are believed to drive or reflect power dynamics.

One approach is to collect data on proxy measures of power, analyzing the influence of characteristics that have been associated with spousal inequity such as discordance in age, education, or wealth (Blanc, 2001). As an illustration of this approach, Beegle et al. (2001) used relative asset ownership, education, and family status as indicators of relationship power in their study of maternal health in Indonesia. The results of their analysis revealed that women's ownership of even a small proportion of the household assets, providing them with some degree of economic independence,

increased the likelihood of frequent and early antenatal care as well as institutional delivery. Additionally, women with more education than their husbands were significantly more likely obtain antenatal care. Beegle et al. (2001) also found that the social status of the woman's natal family, which was correlated with asset ownership and education, emerged as a significant predictor of both antenatal and delivery care. The authors posit that, in Indonesia, relative family status influences relationship dynamics from the start and determines whether a woman is dependent on the marriage or could be supported in the case of marital dissolution (Beegle et al., 2001).

Another indicator that has been used as a proxy measure of power is spousal communication. Based on the finding that couples are more likely to discuss topics such as family planning where there is greater equality between men and women, the degree of communication has been suggested to reflect relationship power (Blanc, 2001). Studies have revealed that communication between husbands and wives regarding family planning is often low in developing countries, as few women report having discussed the topic with their husbands or knowing their spouse's attitude towards it (Becker, 1996; Khan et al., 2007). These low levels of communication, in turn, have been associated with lower odds of family planning use (Blanc, 2001; Kaggwa et al., 2008; Yoder et al., 2011)

Increasingly, studies have taken more direct approaches to measuring power dynamics, concluding that proxy measures are insufficient to fully capture the nature and effects of power. The most widely used method of quantifying power in the context of reproductive health is to assess which partner has more control over common decisions (Konaté et al., 1998; DeRose and Ezeh, 2009; Agha and Catron, 2011; Hindin and

Muntifering, 2011). Respondents are typically asked to indicate whether specific decisions are primarily made by women, their husbands, or by both partners jointly. When combined in an index, these responses are taken to represent the degree of women's autonomy and influence in the household.

Exemplifying this approach, Agha and Carton (2011) used factor analysis to construct an index based on a series of questions addressing who makes decisions about household expenditures, children's health care and education, the health care of the woman, the woman's employment, and visits to relatives. In the adjusted analyses, greater decision-making autonomy emerged as a significant predictor of antenatal care, institutional delivery, and family planning use. The association with family planning, however, was negative, which conflicts with findings from other studies (Mason and Smith, 2000; DeRose and Ezeh, 2009; Bogale et al., 2011). This incongruous association could be explained by Agha and Carton's reliance on a single index to capture complex power dynamics, the presence of unmeasured confounding factors, or the fact that they combined joint decisions with those attributed to women alone. Research on contraceptive use in Uganda found that merging joint and woman-only decisions led to significantly different results than when analyzing them separately (DeRose and Ezeh, 2009)

Focusing more specifically on the influence of gender in shaping interpersonal power, several studies have measured perceptions of gender equity in the context of reproductive health. In rural China, Cui et al. (2010) measured women's beliefs regarding gender equity through an index based on seven items addressing marital obedience, sexual conduct, the women's responsibilities, and the value of women. A

related study, also in rural China, assessed men's gender equity beliefs using the same index (Ying, Li, and Hui, 2011). Both studies found that more equitable beliefs—from women's as well as from men's perspectives—were associated with receipt of antenatal care and institutional delivery (Cui et al., 2010, Ying et al., 2011). In further recognition of the importance of men's gender equity beliefs, Pulerwitz and Barker (2008) developed and validated a scale, known as the Gender-Equitable Men (GEM) Scale, in Rio de Janeiro. They found that, among a sample of young men, more equitable gender norms were associated with greater use of condoms and contraceptives (Pulerwitz and Barker, 2008).

Another construct related to power that has been used to understand reproductive health behavior is self-efficacy. Self-efficacy is indicated as a key factor in several behavior change theories (Murphy, 2005); an individual's confidence and conviction in his or her ability to carry out an action is thought to be an important prerequisite for any sort of personal change (Bandura, 1990). Exploring this construct, Boer and Mashamba (2007) assessed the applicability of the Theory of Planned Behavior (TPB) and the Protection Motivation Theory (PMT) to the study of condom use in South Africa. Both theories suggest that self-efficacy, along with factors such as subjective norms and attitudes towards the target behavior (in the case of TPB), and the perceived risks associated with not adopting the behavior and the effectiveness of that behavior at reducing those risks (PMT) are predictors of behavioral change (Boer and Mashamba, 2007). In their analysis of data collected from male and female college students in South Africa, the authors found that self-efficacy was a significant predictor of condom use. They reason that, particularly in the context of high gender-based inequality, self-efficacy

is necessary for women to negotiate or adopt a personally beneficial behavior (Boer and Mashamba, 2007).

Other researchers argue that power is too complex to be captured through single indices, calling instead for studies that incorporate multiple dimensions (Beegle et al., 2001; Blanc, 2001). Power relations are shaped by constructs at the individual, interpersonal, and societal levels, the effects of which cannot be fully understood in isolation. For example, self-efficacy alone will not necessarily result in adoption of favorable behaviors or outcomes; characteristics of the social and cultural environment must also be addressed (Bandura, 1990).

Adopting this multi-dimensional approach, studies have measured power through various combinations of constructs and indices including decision-making power, control over financial resources, freedom of movement, relationship control, and attitudes towards or experience of intimate partner violence, as well as perceived self-efficacy (Mason and Smith, 2000; Bloom et al., 2001; Kadir et al., 2003; Pettifor et al., 2004; Haque et al., 2012). Although these studies have been conducted in diverse settings, they have consistently demonstrated an association of the various measures of power with antenatal care and skilled attendance at delivery (Bloom et al., 2001; Haque et al., 2012), as well as condom and contraceptive use (Mason and Smith, 2000; Pettifor et al., 2004). However, the relative influence the each dimension has not been equal or consistent across studies, suggesting that power is dynamic and context-specific.

Taking the development of measures of power one step further, Pulerwitz et al. (2000) constructed a validated, multi-dimensional scale. They drafted a series of items based on Connell's Theory of Gender and Power as well as Emerson's Social Exchange

Theory, which posits that interpersonal power is influenced by dependence on the other person, the relative share of assets, and feasible alternatives to the relationship (as cited in Pulerwitz et al., 2000). The authors conducted focus groups to revise and evaluate the items, which they then validated using factor analysis to assess internal reliability and construct validity. Two subscales were retained in the resulting Sexual Relationship Power Scale—one relating to relationship control and the second addressing decision-making power. From a pilot study with a sample of women attending a community health clinic in the United States, the authors found that higher power as indicated by the final scale was significantly associated with consistent condom use.

Together, these studies suggest that gender-based power dynamics have significant implications for reproductive health. However, the previous approaches to measuring power have been limited in their ability to explain patterns in health behaviors and outcomes. Studies that have relied on proxy measures or focused on only one construct have been unable to capture the full effects of power imbalances or clarify the underlying social, cultural, and personal factors that drive them. Other studies have oversimplified the spectrum of relative power, for example by measuring decision-making with only three discrete categories of husband, wife, or jointly controlled decisions. Some have even further reduced decision-making processes by merging joint and woman only decisions to represent female autonomy (Agha and Carton, 2011; Haque et al., 2012). The category of joint decision-making encompasses a wide range from husband-dominated, to equally weighted, to wife-dominated decisions, each of which represents significantly different power relations.

A further notable gap in previous research is that few studies have systematically assessed power from the perspectives of men or other household members. Women's perceptions of their own autonomy and relative influence are important, however, particularly in settings where a woman's childbearing is viewed as a household matter, it is critical to consider the perceptions of other family members as well. Ignoring these different perspectives risks overlooking important contextual details and associations that could modify or reinforce the effects of women's perceptions and beliefs.

Although a handful of studies have included men, they have been limited in their measures of power relations. Some have assessed only the influence of men's fertility preferences and attitudes towards family planning (Bankole, 1994; Bankole and Singh, 1998; Mason and Smith, 2000; Yoder et al., 2011), while others have focused on proxy indicators of power (Beegle et al., 2001) or measured only one construct (Boer and Mashamba, 2007; Pulerwitz and Barker, 2008; Bogale et al., 2011; Ying et al., 2011). Another limitation of several previous studies is that data from male respondents was linked to data from their female partners, (Boer and Mashamba, 2007; Bogale et al., 2011; Yoder et al., 2011), which is important in order to understand the power dynamics of the relationship and the effects at the household level.

The very few studies that have considered mothers-in-law have also been limited in scope. Simkhada et al. (2010) conducted semi-structured-interviews with women, husbands, and mothers-in-law to explore the influence of the older women on their daughters-in-law's use of antenatal care in Nepal, but they were only able to interview a small sample of husbands and mothers-in-law. Another study designed to understand the role of mothers-in-law in Pakistan surveyed 717 triads of women, their husbands, and

their mothers-in-law, however the study was primarily descriptive and did not analyze the association between relative power and reproductive health outcomes (Kadir et al., 2003).

A final consideration is that measures need to be context-specific, as the relevant constructs and their effects vary across settings. Although certain constructs appear to be central to shaping power in a wide range of settings, the specific items and their relative importance may differ from place to place; a valid, complete set of indicators developed in one setting will not necessarily transfer to another. For example, the Sexual Relationship Power Scale (Pulerwitz et al., 2000), having been designed for use in the United States, is unlikely to be applicable in patriarchal, pronatalist communities in Africa. Consequently, more research is needed to further explore locally relevant dimensions of power from the perspectives of all stakeholders and assess their influence on reproductive health.

Power and reproductive health in Mali

Mali is characterized by a combination of exceptionally low gender equity and poor family planning and maternal health indicators, making it a valuable setting in which to study the association between interfamilial power and reproductive health. The Human Development Index [HDI], a composite measure of income, education, and health, ranks Mali 175th out of the 187 countries and territories for which an HDI was calculated in 2011 (UNDP, 2011). Additionally, of the 145 countries included in the UN's Gender Inequality Index, Mali ranks at number 143 (UNDP, 2011). Though the country has experienced moderate economic growth and development in recent years,

The World Bank still considers it to have some of the worst social indicators worldwide (World Bank, 2011).

Women in Mali are disadvantaged from a young age. Educational opportunities for girls are limited (World Bank, 2011) and arranged marriage is common (Boye et al., 1991). Additionally, traditional practices and Islamic law (Sharia) have a strong influence in society, and these customs generally do not favor women (OECD Development Centre, 2004). According to the 2010 Human Rights Report, issued by the United States Department of State (2011), harmful practices such as female genital cutting affect over 90 percent of girls and women and gender-based violence is alarmingly common. Although spousal abuse is a crime, few women file reports due to stigma and financial dependence on their husbands (US Department of State, 2011).

At marriage, women go to live with their husbands' family, where men, as well as older women, have authority (Konaté et al., 1998). Mali's Civil Code affirms men's dominance as the heads of the household, calling for women to obey their husbands (Boye et al., 1991; OECD Development Centre, 2004). The Civil Code does outline some protections for women, including the right to choose who they marry and a minimum age at marriage of 15 (Boye et al., 1991; US Department of State, 2011). However, these stipulations are rarely enforced, especially in rural areas (Boye et al., 1991; US Department of State, 2011).

Polygamy is a legally recognized form of marriage and is accepted by Islam (Boye et al., 1991), accounting for 39 percent of marriages in Mali as of 2006 (CPS/MS, 2006). The prevalence of polygamy has been suggested to shape gender relations and fertility values in a society (Ezeh, 1997). From his analysis of 1991 Kenya DHS data,

Ezeh (1997) found that where polygamy was more prevalent, desired fertility and contraceptive use were lower among all women, regardless of their marriage type. Additionally, polygamy was found to be associated with a lower age at marriage for women, which in many societies signifies a lower age at first intercourse and, hence, a lower age at first pregnancy (Ezeh, 1997). Pregnancy and delivery at a young age carry both biological and social risks. Complications are more common (UNFPA and EngenderHealth, 2003; Population Council, 2004), and younger women tend to have lower status such that they may not receive adequate care and attention (Population Council, 2004).

Although the influence of polygamy has not been measured in Mali, the country has one of the world's highest fertility rates and a correspondingly low contraceptive prevalence rate. According to the 2006 Mali DHS, the total fertility rate in the country is 6.6, reaching 7.2 in rural areas (Cellule de Planification et de Statistique du Ministère de la Santé [CPS/MS], 2007). The vast majority of both men and women (74% and 90%, respectively) are aware of at least on modern method of contraception, yet only 7 percent of currently married women report current use of one (CPS/MS, 2007). This low contraceptive prevalence is partially attributable to high desired fertility, however nearly a third of women are estimated to have an unmet need: 21 percent have an unmet need for spacing and 10 percent have an unmet need for limiting future childbearing (CPS/MS, 2007).

Most women (70%) obtained at least one antenatal care visit during their most recent pregnancy, but only 35 percent received the recommended four or more visits and only 30 percent received their first visit within three months gestation (CPS/MS, 2007).

Fewer than half of the women (45%) who gave birth in the five years preceding the 2006 DHS delivered in a health facility, and only 22 percent received postnatal care within 48 hours postpartum (CPS/MS, 2007). As a result of inadequate levels of preventative care, coupled with limited access to treatment for complications, the most recent DHS reported a maternal mortality ratio of 464 deaths per 100,000 live births for the period from 2000 to 2006, down from 582 deaths per 100,000 births for 1995 to 2001 (CPS/MS, 2007). Highlighting the uncertainty of maternal mortality data, the United Nations estimate for Mali is much higher at 830 deaths per 100,000 live births as of 2008 (World Bank, 2011), and a systematic review of maternal mortality data calculated a ratio of 670 deaths per 100,000 live births in 2008, with a confidence interval of 422 to 1017 (Hogan et al., 2010).

Framing these reproductive health indicators in light of the socio-cultural context, several studies have assessed the influence of interpersonal power on Malian women's health behaviors and outcomes (Konaté et al., 1998; Castle et al., 1999; Gage, 2007). These studies suggest that women have low decision-making power, resulting in a lack of autonomy to practice family planning (Konaté et al., 1998; Castle et al., 1999) or obtain antenatal and delivery care without permission (Gage, 2007).

However, more research is needed to further elucidate these associations and identify relevant constructs and the underlying values and beliefs that shape power relations. Given the patriarchal structure of Malian society, it is particularly important to consider the perceptions of husbands and mothers-in-law, as described above. This study addresses these gaps and contributes to existing literature by exploring multiple dimensions of power from the perspectives of women, their husbands, and their mothers-

in-law, sampling from both polygamous and monogamous households. The analysis measures the relative influence each construct and family member on contraceptive use as well as antenatal, delivery, and postnatal care, suggesting targeted points for intervention and further research.

III. METHODOLOGY

This analysis uses data collected in Mali for the Projet Espoir (Project Hope) Baseline Survey (PEBS) through the collaborative efforts of CARE International, CARE Mali, and Emory University. Collected in June and July 2011, the data will inform the design of Projet Espoir, which aims to advance maternal health by improving local service delivery and catalyzing social change to overcome cultural and structural barriers to care. Ethical approval for the study was obtained from the Emory University IRB and the Malian Ministry of Health IRB.

Population and study setting

The PEBS was conducted in Bandiagara and Bankasse, two districts in the Mopti region of central Mali. The Mopti region is rural and predominantly agricultural, with the lowest levels of education in the country: 81 percent of the population reports no education (CPS/MS 2007). Although men and women have roughly equal educational profiles overall, recent data show that educational attainment is improving at a higher rate for men than for women among younger generations (CPS/MS, 2007). Gender disparities are also evident in levels of employment, as only 43 percent of women are currently employed while over two-thirds (67%) of men are employed (CPS/MS, 2007). Additionally, the mean age at marriage among women is 17, much lower than the mean age of 27 among men (CPS/MS, 2007). On average, women give birth to their first child at age 19 (CPS/MS, 2007).

Family planning and reproductive health indicators in the Mopti region highlight a substantial need for improvements in service delivery as well as efforts to overcome

barriers to health seeking and behavior change. The total fertility rate in the region is 6.3 and only two percent of married women report current use of a modern method of contraception, giving the region the lowest contraceptive prevalence rate in the country (CPS/MS, 2007). Additionally, both women and men in the region express high desired fertility; women desire an average of 7.8 children and men desire a slightly higher average of 8.3, compared to the national figures of 6.3 and 7.7, respectively (CPS/MS, 2007).

According to the 2006 Mali Demographic and Health Survey, two-thirds of women (66%) in the Mopti region received at least one antenatal care visit in their most recent pregnancy (CPS/MS, 2007). However, the proportion who received the WHO recommended minimum level of care is far lower, given that only 35 percent of women in the country overall obtained four or more visits and 30 percent had the first visit within three months gestation (CPS/MS, 2007). The prevalence of delivery and postnatal care is similarly low. Fewer than one third of women in the region (30%) delivered in a health facility and 15 percent received postnatal care within 48 hours postpartum, compared to levels of 45 percent and 22 percent, respectively, at the national level (CPS/MS, 2007).

Sample and research design

To generate a representative sample, the Projet Espoir Baseline Survey was designed to collect data from 300 randomly selected households in each district, for a total of 600 households. The sampling frame comprised the catchment areas of the 21 health facilities (CS-COMs) in Bandiagara and the 23 in Bankasse. A probability sample of 30 villages was randomly selected from each district, distributed in proportion to the

size of the catchment areas. Within each selected village, data collectors started at a locally defined center and selected every third house until they reached a total of 10 households per village. The criteria for inclusion in the study were that a household contained a woman who had given birth in the past twelve months whose husband was also present to be interviewed. If these criteria were not met, the next house was approached.

Prior to collecting data, the survey staff participated in a four-day training to familiarize them with the question guide and teach them about ethical conduct and interviewing strategies. The questionnaire was then pilot-tested in a village that did not form part of the sample. In total, 28 data collectors were trained to work in teams of eight. Interviews were conducted in the local language (Dogon, Peulh or Bambara), and all 60 villages in both districts were surveyed in twenty days.

In order to capture the range of opinions and perspectives within a household, the data collectors planned to interview the "index woman" (the woman who had given birth in the past 12 months), her husband, her mother-in-law, and a co-wife, if applicable. Mothers-in-law and co-wives were not present in every household, however. In the case of multiple co-wives, one co-wife was randomly selected to be interviewed. In total, 544 households were surveyed—275 in Bandiagara and 269 in Bankasse. From these households, 544 women, 527 husbands, 356 mothers-in-law, and 250 co-wives completed the questionnaire.

For this analysis, the data were cleaned to yield a restricted sample size that included only households in which the primary woman, her husband, and her mother-in-law completed the survey. This yielded a final sample of 317 households. Given that not

all households were polygamous, inclusion of responses from co-wives would have limited the sample to 114 households, which would have insufficient power to detect associations. As such, data from co-wives were excluded from the present analysis.

Measurements

The questionnaires administered to each household member were comparable, including sections on background information and socio-demographic characteristics, as well as eight sets of scale items regarding maternal health, gender, and interfamilial power. Additionally, the questionnaire administered to the index woman covered current contraceptive use, birth history, maternal health practices, and care-seeking behavior during the most recent pregnancy. The contents of the questionnaires administered to each respondent group—index women, their husbands, and their mothers-in-law—are outlined below in Table 1.

Table 1: Components of the questionnaires administered to each respondent group

Component	Index women	Husbands	Mothers-in-law
Background and socio-demographic characteristics	X	X	X
Birth history	X		
Contraceptive use	X		
Prenatal, labor/delivery, and postnatal care	X		
Practices during pregnancy and childbirth*	X	X	X
Scales:			
Traditional and cultural practices	X	X	X
Value of women	X	X	X
Marital conduct and responsibilities	X	X	X
Attitudes towards the health center (CS-COM)	X	X	X
Perceived efficacy of the index woman	X	X	X
Decision-making power	X	X	X
Trust and respect	X		
Overall power	X	X	X

**Index women were asked about knowledge of practices as well as adherence to these recommended practices during their most recent pregnancy. Husbands and mothers-in-law were asked only about their knowledge of recommended practices.*

The objective of this analysis is to quantify the influence of interfamilial power dynamics on family planning behavior and the receipt of antenatal, delivery, and postnatal care. The five dichotomous outcomes are defined as the primary woman's: [1] family planning use (current use of a modern contraceptive), [2] antenatal care frequency (receipt of four or more antenatal care visits), [3] antenatal care timing (receipt of the first antenatal care visit within four months gestation), [4] delivery care (delivery at an institution), and [5] postnatal care (receipt of postnatal care from a skilled provider within 48 hours postpartum). Skilled providers are operationally defined as health extension workers, nurses, midwives, physicians, and health or clinical officers.

The primary covariates for the analyses are a series of indices based on the scale items. They address agreement with traditional practices in pregnancy and childbirth, the value of women, marital conduct and responsibilities, attitudes towards health services (CS-COM), perceptions of the index woman's ability to act on her reproductive health preferences (efficacy[*]), trust and respect, overall household power, and decision-making power. Each index is comprised of a set of three to eight items, for which respondents were read a statement and shown an illustration of a ladder. Respondents were told to imagine that the top of the ladder represents total agreement or total influence and the bottom represents total disagreement or no influence. Responses were recorded on a scale from one to 10 based on which rung of the ladder the respondent pointed to.

As depicted in Table 1, responses to these scale items were collected from each member of the household with the exception of the items concerning trust and respect, which were asked only of the index women. To quantify spousal decision-making patterns, new variables were generated for each respondent to represent his or her perception of the difference in decision-making power between the husband and the index woman. Due to missing data from husbands and mothers-in-law regarding the overall household power of the index women[†], however, a single scale was created for overall power based on index women's perceptions of their husbands' power minus their perceptions of their own power. The construction of these difference variables is illustrated below in Table 2.

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[*] From the perspective of the index woman, this is a measure of her self-efficacy with regards to her fertility and health-seeking behaviors. Responses were collected from husbands and mothers-in-law as well to determine their perceptions of the behavioral efficacy of the index woman.

[†] Husbands and mothers-in-law were asked to rank the overall power of their wives and daughters-in-laws, however it was not possible to identify which responses corresponded to the index women in polygamous households. In contrast, the questions regarding decision-making power elicited more specific data, allowing for identification of the perceived influence of the index women.

Table 2: Construction of variables representing differences in overall power and decision-making power		
Indicator	Respondent	Response
Spousal discordance in power	Index woman 	Perceived power of husband  - Perceived power of index woman 
Decision-making power	Index woman 	Perceived decision-making power of husband  - Perceived decision-making power of index woman 
	Husband 	Perceived decision-making power of husband  - Perceived decision-making power of index woman 
	Mother-in-law 	Perceived decision-making power of husband  - Perceived decision-making power of index woman 

To reduce the data from each set of scale items to a single index representing the central construct, a principal components analysis was performed. Prior to analyses, scale items with inverse directionality to the rest of the items were reverse coded, such that a "10" represented highly negative (or highly positive) attitudes for all items relating to a given construct. Using STATA version 12.0 (StataCorp LP, 2011), principal

components analysis was conducted separately on data from index women, husbands, and mothers-in-law. To ensure comparability in the resulting indices across the three respondents, any item that was negatively correlated with the remainder of the items for any of the three respondents was dropped from all analyses.

The final indices were built using the first factors (principal components) identified through orthogonal variance maximizing rotation. Items were assigned weights relative to their contribution to the variance of the first factor, and final composite indices were generated for each of women, husbands, and mothers-in-law to represent their responses to the different constructs. Since only women's responses were used to measure trust and respect as well as the spousal power differential, a single index was created for each of these constructs. The regression coefficients for the items in each index, along with the proportion of total variance accounted for by the index and the Cronbach's alpha reliability coefficients are presented in Tables 3-9, below.

Table 3: Index components and characteristics – Agreement with traditional and cultural practices			
	Regression coefficients*		
	Women	Husbands	Mothers-in-law
For a week after she has given birth, a woman should be given hot food only	-0.105	0.048	-0.110
A woman can use traditional herbs as an enema during pregnancy to relieve constipation	0.478	0.558	0.522
The baby should not be breastfed until all of the colostrum has been removed	0.418	0.553	0.724
A woman must obey her husband during pregnancy to make sure she has an easy delivery	0.185	-0.209	-0.134
A woman should not bathe after sunset	0.560	0.319	0.133
Proportion of variance explained	0.266	0.261	0.241
Cronbach's alpha reliability coefficient	0.352	0.245	0.323
*Coefficients generated with regression, based on PCA with varimax rotation			

Table 4: Index components and characteristics – Value of women			
	Regression coefficients*		
	Women	Husbands	Mothers-in-law
Women have the least say in household decisions	0.387	0.461	0.390
Women cannot make household decisions alone	0.370	0.417	0.410
It is more important to have sons than daughters	-0.087	-0.131	-0.137
If a woman dies in childbirth, she can be replaced by the family with another woman	0.143	-0.049	0.047
Women should not be allowed to decide who they marry	0.257	0.353	0.286
A woman should not start her own economic activities without the consent of her in-laws	0.295	0.205	0.271
Proportion of variance explained	0.362	0.298	0.346
Cronbach's alpha reliability coefficient	0.608	0.524	0.597
*Coefficients generated with regression, based on PCA with varimax rotation			

Table 5: Index components and characteristics – Marital conduct and responsibility			
	Regression coefficients*		
	Women	Husbands	Mothers-in-law
It's a woman's responsibility to avoid getting pregnant	0.267	0.208	-0.253
A man can hit his wife if she refuses to have sex with him	0.581	0.581	0.328
A man can hit his wife if she refuses to have sex with him during pregnancy	0.534	0.550	-0.082
A man should have the final word about decisions in his home	0.047	0.056	0.541
A man needs other women even if things with his wife are fine	0.155	0.114	0.530
Proportion of variance explained	0.278	0.286	0.267
Cronbach's alpha reliability coefficient	0.294	0.301	0.335

*Coefficients generated with regression, based on PCA with varimax rotation

Table 6: Index components and characteristics – Attitudes towards the health facility (CS-COM)

	Regression coefficients*		
	Women	Husbands	Mothers-in-law
The CS-COM provides high quality services	0.346	0.410	0.376
The staff at the CS-COM are friendly and respect women†	0.422	0.462	0.463
The staff at the CS-COM give women† all the information they need for their wellbeing	0.253	0.196	0.297
The CS-COM has the equipment needed to provide good care for women† in childbirth	0.214	0.043	0.157
The CS-COM is the safest place for a woman† to deliver her baby	-0.011	0.006	-0.076
Women† are able to get to the CS-COM for delivery if they need to	-0.208	-0.263	-0.207
The cost of services at the CS-COM is acceptable in relation to the benefits	0.227	0.261	0.137
Proportion of variance explained	0.317	0.299	0.313
Cronbach's alpha reliability coefficient	0.672	0.681	0.706

*Coefficients generated with regression, based on PCA with varimax rotation

†These questions were framed in reference to the index women for all respondents

Table 7: Index components and characteristics – Perceived efficacy of the index women

	Regression coefficients*		
	Women	Husbands	Mothers-in-law
If she wanted to, the index woman† could decide to have only two children	0.315	0.287	0.347
If she wanted to, the index woman could deliver her baby in a CS-COM	0.501	0.580	0.520
If she wanted to, the index woman could go to a health center alone	0.508	0.566	0.523
Proportion of variance explained	0.548	0.451	0.501
Cronbach's alpha reliability coefficient	0.582	0.373	0.501

*Coefficients generated with regression, based on PCA with varimax rotation
†For the index women, these questions asked about their own self-efficacy

Table 8: Index components and characteristics – Difference in perceived decision-making power between husband and wife*

	Regression coefficients†		
	Women	Husbands	Mothers-in-law
Decision on how many children to have	0.508	0.420	0.441
Decision on whether to circumcise a girl	0.288	0.128	0.499
Decision on where a woman should give birth	0.479	0.481	0.458
Decision to seek modern healthcare during pregnancy	0.228	0.419	0.111
Decision on whether to sell the family's animals	0.105	0.227	-0.098
Proportion of variance explained	0.318	0.307	0.301
Cronbach's alpha reliability coefficient	0.397	0.358	0.425

*Perceived decision-making power of wife subtracted from perceived decision-making power of the husband from the perspective of each respondent (see Table 2).
†Coefficients generated with regression, based on PCA with varimax rotation

Table 9: Index components and characteristics – Perceptions of household trust and respect	
	Regression coefficients*
	Women
I feel my husband trusts me	0.263
I feel my mother-in-law respects me	0.261
I feel I am an important member of this family	0.260
I trust my husband to help me if I need help	0.303
I trust my mother-in-law to help me if I need help	0.303
Proportion of variance explained	0.515
Cronbach's alpha reliability coefficient	0.762
*Coefficients generated with regression, based on PCA with varimax rotation	

In addition to these primary covariates, other measures of household and individual-level characteristics were included in the analysis (see Tables 10 and 11, below). In recognition of their documented influence on fertility and reproductive health outcomes (Riley, 1997; Kaggwa *et al.*, 2008; Blanc, 2001; 2008; Hogan *et al.*, 2010; Agha and Carton, 2011; Yoder et al., 2011), data on women's parity, age at marriage, ability to decide whom they married, and ethnicity were included as control variables. Religion was not factored into the analysis because nearly all women (94.3%) were Muslim.

Parity was categorized as one, two to three, four to five, or six or more children. Considering the distribution of age at first marriage among women in Mali, responses were collapsed into four categories: under 16, 16 to 19, 20 or more, and "don't know" to account for the significant proportion of women who did not know their age. Ethnicity was simplified to Dogon, Peulh, or "other" to capture the predominant patterns in

Bandiagara and Bankasse. Additionally, research on polygamous unions has suggested that the rank of the wife influences her status and health (Al-Krenawi 1999). To account for this factor, a variable was created to represent the woman's marital status as the only wife, the first wife, or a subsequent co-wife.

As Table 11 indicates, age, educational attainment, and employment status were also included in the analysis. Research on spousal power dynamics suggests that the relative difference in status between a husband and wife is more important than absolute measures (Blanc 2001). Since age, education, and employment all influence both power and reproductive health (Riley, 1997; Magadi et al., 2000; Kaggwa et al., 2008; Hogan et al., 2010; Haque et al., 2012), data on these three indicators for women and for their husbands were combined to create difference variables.

The difference between the husband's age and his wife's age was categorized as within 10 years, more than 10 years apart, or a third category of "don't know" to represent the 142 couples in which one partner did not know his or her age. The educational attainment of each partner was collapsed to dichotomous values of "none" or "some." Responses of "elementary incomplete, " "elementary complete," and "more" were combined to create the category of "some" education. Finally, for employment status, a three-level variable was created to identify households in which only the wife had work outside the home, the couple had equal employment status (either both employed or both unemployed), or only the husband had work outside the home. Work outside the home was operationally defined as work that generated cash income.

Table 10: Measures of characteristics of the index women	
Variable	Category definitions
Ethnicity	Dogon Peulh Other
Age at first marriage	Less than or equal to 15 16 to 19 Greater than or equal to 20 Don't know
Had a say in who to marry	Yes No
Marital status	Only wife First wife Other wife
Parity	One Two to three four to five Six or more
Child death in first year of life	No Yes

Table 11: Measures of characteristics of the spousal units	
Variable	Category definitions
Age discrepancy (husband's age minus wife's age)	Husband 5 years younger to 9 years older Husband 10 or more years older Either husband or wife doesn't know
Education discrepancy	Wife educated, husband not Equal educational attainment Husband educated, wife not
Difference in employment status	Wife works, husband doesn't Equal employment status Husband works, wife doesn't

Missing data for all categorical variables were recoded as “no” or “don’t know.” For scale items, missing responses were assigned the neutral value of “5.” None of the variables had more than 12 (3.8%) missing values.

Analysis

Using STATA version 12.0 (StataCorp LP, 2011), bivariate unadjusted associations between the independent variables and each of the five dependent variables were calculated using logistic regression. An alpha of 0.10 was used as the level of significance. To calculate adjusted associations, all variables that were statistically significantly associated with each dependent variable in the bivariate analysis were loaded into a multivariable logistic regression model.

Starting with the full model, the variables with the highest non-significant adjusted associations were removed one at a time in order to reduce the model. After dropping each variable, the beta estimates of the remaining factors were examined to ensure that they were not substantially changed. If an adjusted beta coefficient changed by approximately 10 percent or more, the dropped variable was re-entered into the model to control for confounding. This process was repeated for each outcome until the most parsimonious model was reached.

IV. RESULTS

Descriptive statistics

Of the 317 households included in this analysis, slightly under half (46.1%) were polygamous, and the woman surveyed was the first wife in 58.9% of the polygamous unions. Regardless of the type of union, women in the sample married young; the mean age at marriage among the 192 women who knew their age was 16.8, ranging from a low of 10 to a high of 25. Only around half of the women (55.2%) had a say in who they married, and this proportion did not vary significantly by whether the woman was the only, first, or other co-wife ($p=0.946$).

At the time of the survey, the ages of the women sampled ranged from 15 to 47 years, with a mean age of 25.2 years. Their husbands ranged from 20 to 51 years old, averaging at 36.5 years old. Among the 175 couples in which both partners knew their age, husbands were on average 10 years older than their wives and only two were younger than their wives. Most women had already given birth to one or more children at the time of the most recent birth, averaging 2.9 prior births per woman. Slightly under one third of the sample (32.5%) had experienced the death of a child in the first 12 months of life.

The educational attainment of both women and men in the sample was low. No women had achieved more than elementary education and only four men (1.3%) had. Overall, the distribution of education was fairly equal across men and women. In 32 couples (10.1%), the husband was educated and the wife was not, while in 21 couples (6.6%) the reverse was true. The majority of couples (83.3%) had equal education, only 13 of which were characterized by both partners having some education. In contrast,

employment was far more prevalent among husbands. In nearly a third of the couples (32.8%), the husband generated income but the wife did not, whereas women were the sole generators of income in only 14.2 percent of the couples. Of the 168 couples with equal employment status, both partners earned income in 51 couples and neither partner did in 117 couples. The descriptive statistics from the sample are summarized in Tables 12 and 13, below.

Table 12: Descriptive statistics: Characteristics of the index women (N=317)

Variable	Frequency (%)
Ethnicity	
Dogon	257 (81.07%)
Peulh	32 (10.09%)
Other	28 (8.83%)
Age at first marriage	
≤ 15	64 (20.19%)
16 to 19	106 (33.44%)
≥ 20	22 (6.94%)
Don't Know	125 (39.43%)
Had a say in who to marry	
No	142 (44.79%)
Yes	175 (55.21%)
Marital status	
Only wife	171 (53.94%)
First wife	86 (27.13%)
Other wife	60 (18.93%)
Parity	
1	40 (12.62%)
2 to 3	124 (39.12%)
4 to 5	76 (23.97%)
≥ 6	77 (24.29%)
Child death in first year of life	
No	214 (67.51%)
Yes	103 (32.49%)

Table 13: Descriptive statistics: Characteristics of the spousal units (N=317 households)	
Variable	Frequency (%)
Age discrepancy (husband's age minus wife's age)	
-5 to 9	89 (28.08%)
≥ 10	86 (27.13%)
Don't know	142 (44.79%)
Education discrepancy	
Wife educated, husband not	21 (6.62%)
Equal educational attainment	264 (83.28%)
Husband educated, wife not	32 (10.09%)
Difference in employment status	
Wife works, husband doesn't	45 (14.20%)
Equal employment status	168 (53.00%)
Husband works, wife doesn't	104 (32.81%)

The responses to the individual scale items, prior to be being reduced to their principal components, indicate remarkably similar opinions among women, husbands, and mothers-in-law at the aggregate level (refer to Tables 14-20, below). With regards to beliefs about traditional practices, agreement was highest in response to the statements that: women should be given hot food only (mean scores: women [w] 8.5, husbands [h] 7.8, and mothers-in-law [m] 8.1), a woman must obey her husband during pregnancy in order to have an easy delivery (w 8.6, h 8.7, m 8.6), a woman is strong if she is silent during childbirth (w 8.4, h 7.9, m 8.4), and a husband should not be present at childbirth (w 7.3, h 7.3, m 7.1). The mean scores did not drop below the neutral value of five to indicate disagreement for any of the traditional beliefs from any respondent group.

Beliefs about the value of women reveal highly gendered perceptions of personal worth in favor of men. At the aggregate level, all groups of respondents agreed that the health of the husband is more important than the health of the wife (w 8.1, h 7.9, m 7.6).

Similarly, agreement was fairly strong with statements that women have the least say in household decisions (w 6.8, h 6.9, m 6.7), women cannot make household decisions alone (w 6.7, h 7.1, m 6.7), it is more important to have sons than daughters (w 6.5, h 6.9, m 6.9), if a woman dies in childbirth she can be replaced by another woman (w 7.0, h 6.9, m 7.0), and that a woman should not start her own economic activities without the consent of her in-laws (w 7.0, h 7.3, m 7.6). Again, none of the average scores dropped below five, and overall, the sampled women, men, and mothers-in-law had similar views.

The scales relating to marital conduct and responsibility suggest distinct gender roles within the household. Women, husbands, and mothers-in-law strongly agreed that a man should have the final say on decisions in his household (w 8.7, h 8.8, m 9.0). Respondents also felt that it is not a man's responsibility to cook and clean the house for his wife (w 7.3, h 6.8, m 7.3) and that a man needs other women even if things with his wife are fine (w 6.7, h 7.6, m 7.4). On average, however, they did not agree that it is a woman's responsibility to avoid getting pregnant (w 4.0, h 4.4, m 3.5) and were fairly neutral in response to the statement that a woman should not talk to her husband directly about her pregnancy (w 5.2, h 5.1, m 5.2). Respondents—including women themselves—did agree that a man can hit his wife if she refuses to have sex with him (w 7.7, h 6.3, m 7.1), but this did not hold true if the wife is pregnant (w 3.8, h 3.7, m 4.0).

Attitudes toward the health facilities (CS-COM) were generally favorable. All three groups of respondents expressed strong agreement with the statement that the CS-COM provides high quality services (w 7.8, h 7.9, m 7.7) and that the costs of services are acceptable in relation to the benefits (w 7.2, h 7.1, m 6.7). Answering with respect to the treatment or experience of women, respondent groups generally agreed that the staff

at the CS-COM are friendly and respectful to women (w 7.2, h 7.4, m 7.3) and that they give women all the information they need for their well-being (w 6.9, h 7.3, m 7.2). While respondents felt that the CS-COM has the equipment needed to provide good care for women during childbirth (w 6.6, h 6.4, m 6.4) and is the safest place to deliver a baby (w 8.2, h 8.3, m 7.7), responses were more neutral with regards to women's ability to access CS-COM if they need to (w 5.5, h 5.5, m 6.0). Furthermore, none of the respondent groups agreed, on average, that women are treated the same by the CS-COM staff if they come without their husbands (w 3.9, h 4.1, m 4.4).

Perceptions of the efficacy of the index women were also largely similar for all respondent groups. The women, their husbands, and their mothers-in-law all disagreed with the statement that the index women could decide to have only two children if they wanted to (w 2.9, h 3.1, m 2.6). However, respondents—husbands in particular—were more positive regarding a woman's ability to deliver her baby in a CS-COM if she wanted to (w 6.3, h 7.1, m 6.4) and neutral regarding her ability to go to a health center alone (w 5.2, h 5.2, m 5.3).

The difference between the husbands' decision-making power and his wife's decision-making power from the perspective of each respondent suggests that, at the aggregate level, most decisions were considered to be driven by the husband's preferences. Respondents reported that husbands have higher decision-making power concerning how many children to have (mean differences[*]: w 1.5, h 1.6, m 1.5). Similarly, the decision on where a woman should give birth (w 1.5, h 1.9, m 1.7), whether to seek modern care during pregnancy (w 2.5, h 2.7, m 2.7), and whether to sell

[*] Difference scores measure the perceived power of the husband minus the perceived power of the index woman (his wife).

the family's animals (w 4.6, h 4.5, m 4.5) were considered to be primarily in the man's control. The only decision that women were reported to have more influence on was whether or not to circumcise a girl (w -1.5, h -1.4, m -1.0).

Considering overall decision-making power, the index women perceived their husbands to have more power than themselves (mean difference* 2.9). Yet they agreed that their husbands trust them (mean score 8.0), their mothers-in-law respect them (7.8), and that they are important members of the family (7.7). They also expressed strong agreement with the statements that they trust their husbands (8.1) and their mothers-in-law (7.3) to help them if they need help.

However, experience working with Likert-type scales to measure abstract constructs such as the value of women demonstrates that single items should not be evaluated on their own; multi-item indices are more reliable and valid (Gliem and Gliem 2003). Further, it is inaccurate to assume that individual items should be weighted equally when generating an index. For this reason, principal components analysis was used to identify the core factors driving the constructs and weight each item according to its influence on these central factors, as described above in the methods section.

Table 14: Descriptive statistics: Agreement with traditional and cultural practices (N=317 households)

Scale Item	Women [mean (SD)]	Husbands [mean (SD)]	Mothers-in-law [mean (SD)]
	Possible scores range 1 to10		
For a week after she has given birth, a woman should be given hot food only	8.47 (2.32)	7.83 (2.64)	8.13 (2.65)
A woman can use traditional herbs as an enema during pregnancy to relieve constipation	5.61 (3.23)	5.82 (3.00)	6.08 (3.09)
The baby should not be breastfed until all of the colostrum has been removed	5.44 (3.60)	5.44 (3.46)	5.26 (3.47)
A woman must obey her husband during pregnancy to make sure she has an easy delivery	8.58 (1.85)	8.73 (1.62)	8.64 (2.00)
A pregnant woman should not bathe after sunset	5.58 (3.38)	5.69 (3.10)	6.02 (3.11)
A woman is strong if she is silent during childbirth	8.43 (2.10)	7.92 (2.40)	8.42 (2.13)
The husband should not be present at the childbirth	7.33 (3.00)	7.30 (2.98)	7.13 (3.10)

Table 15: Descriptive statistics: Beliefs about the value of women (N=317 households)			
Scale Item	Women [mean (SD)]	Husbands [mean (SD)]	Mothers-in-law [mean (SD)]
	Possible scores range 1 to10		
The health of the husband is more important than the health of the wife	8.07 (2.40)	7.93 (2.59)	7.59 (2.61)
Women have the least say in household decisions	6.76 (2.83)	6.93 (2.78)	6.70 (2.86)
Women cannot make household decisions alone	6.70 (3.08)	7.06 (2.86)	6.67 (2.94)
It is more important to have sons than daughters	6.52 (3.15)	6.88 (2.99)	6.94 (3.06)
If a woman dies in childbirth, she can be replaced by her family with another woman	6.97 (2.71)	6.92 (2.74)	7.04 (2.81)
Women should not be allowed to decide who they marry	5.50 (3.09)	5.97 (3.06)	5.92 (3.08)
A woman cannot refuse to have sex with her husband towards the end of her pregnancy	5.85 (3.02)	5.50 (3.03)	6.19 (2.92)
A woman should not start her own economic activities without consent of her in-laws	7.01 (3.21)	7.28 (2.98)	7.58 (2.89)

Table 16: Descriptive statistics: Beliefs about marital conduct and responsibility (N=317 households)			
Scale Item	Women [mean (SD)]	Husbands [mean (SD)]	Mothers-in-law [mean (SD)]
	Possible scores range 1 to10		
It is a woman's responsibility to avoid getting pregnant	4.02 (3.23)	4.44 (3.21)	3.55 (3.06)
A man can hit his wife if she refuses to have sex with him	6.65 (3.04)	6.33 (3.33)	7.13 (3.04)
A man can hit his wife if she refuses to have sex with him during pregnancy	3.79 (2.86)	3.70 (3.06)	4.03 (2.96)
A man should have the final word about decisions in his home	8.73 (1.78)	8.80 (1.81)	9.01 (1.73)
A man cannot cook and clean the house for his wife	7.33 (2.77)	6.77 (3.07)	7.32 (2.77)
A man needs other women even if things with his wife are fine	6.70 (2.90)	7.65 (2.53)	7.47 (2.67)
A woman should not talk to her husband directly about her pregnancy	5.19 (2.99)	5.07 (3.18)	5.16 (2.87)

Table 17: Descriptive statistics: Attitudes towards health services (CS-COM) (N=317 households)

Scale Item	Women [mean (SD)]	Husbands [mean (SD)]	Mothers-in-law [mean (SD)]
	Possible scores range 1 to10		
The CS-COM provides high quality services	7.79 (2.31)	7.85 (2.52)	7.72 (2.37)
The staff at the CS-COM are friendly and respect women[†]	7.25 (2.49)	7.38 (2.56)	7.31 (2.38)
The staff at the CS-COM treat women the same whether or not they are with their husbands	3.95 (2.58)	4.07 (2.46)	4.36 (2.57)
The staff at the CS-COM give women all the information they need for their wellbeing	6.92 (2.39)	7.29 (2.51)	7.21 (2.46)
The CS-COM has the equipment needed to provide good care for women in childbirth	6.56 (2.60)	6.38 (2.67)	6.42 (2.54)
The CS-COM is the safest place to deliver a baby	8.19 (2.65)	8.27 (2.35)	7.69 (2.76)
Women are able to get to the CS-COM for delivery if they need to	5.52 (3.09)	5.50 (3.16)	5.99 (3.19)
The cost of services at the CS-COM is acceptable in relation to the benefits	7.19 (2.78)	7.07 (2.87)	6.74 (2.80)

Table 18: Descriptive statistics: Perceived efficacy of the index women (N=317 households)			
Scale Item	Women [mean (SD)]	Husbands [mean (SD)]	Mothers-in-law [mean (SD)]
	Possible scores range 1 to10		
If she wanted to, the index woman[†] could decide to have only two children	2.91 (2.61)	3.08 (2.71)	2.60 (2.31)
If she wanted to, the index woman could deliver her baby in a CS-COM	6.29 (3.07)	7.09 (2.92)	6.38 (2.97)
If she wanted to, the index woman could go to a health center alone	5.25 (3.15)	5.22 (3.15)	5.29 (3.08)

[†]For the index women, these questions asked about their own self-efficacy

Table 19: Descriptive statistics: Perceptions of the difference decision-making power and in overall power between husband and wife (N=317 households)			
Scale Item	Women [mean (SD)]	Husbands [mean (SD)]	Mothers-in-law [mean (SD)]
Difference in decision-making power between husband and wife	*Possible scores range -9 to 9*		
Decision on how many children to have	1.50 (2.83)	1.56 (2.90)	1.48 (2.90)
Decision on whether to circumcise a girl	-1.49 (3.83)	-1.35 (4.09)	-1.01 (4.06)
Decision on where a woman should give birth	1.52 (3.57)	1.93 (3.41)	1.67 (3.51)
Decision to seek modern healthcare during pregnancy	2.53 (3.15)	2.69 (3.09)	2.65 (3.08)
Decision on whether to sell the family's animals	4.58 (2.89)	4.47 (3.03)	4.54 (2.97)
Spousal discordance in power*	2.94 (2.57)	N/A	N/A

*From the perspective of the index women only

Table 20: Descriptive statistics: Index women's perceptions household trust and respect (N=317 households)	
Scale Item	Women [mean (SD)]
	Possible scores range 1 to10
I feel my husband trusts me	7.97 (2.41)
I feel my mother-in-law respects me	7.77 (2.20)
I feel I am an important member of this family	7.66 (2.12)
I trust my husband to help me if I need help	8.06 (2.13)
I trust my mother-in-law to help me if I need help	7.28 (2.33)

The prevalence of the five outcomes—current family planning use, four or more antenatal care visits, receipt of the first antenatal care visit within four months, delivery in an institution, and receipt of postnatal care within 48 hours from a skilled provider—are presented below in Table 21. Very few women (7.9%) reported current use of a modern contraceptive method. Levels of antenatal care were somewhat higher: 27.4 percent of women reported receipt of four or more antenatal care visits and 34.1 percent reported receipt of the first visit within four months gestation. Twenty-two percent of women delivered in an institution and nearly a quarter (24.9%) received postnatal care within 48 hours postpartum from a skilled provider.

Table 21: Prevalence of family planning use, antenatal care frequency, antenatal care timing, delivery in an institution, and postnatal care at most recent birth (N=317)	
Outcome	Frequency (%)
Current use of modern family planning	25 (7.89%)
Received four or more antenatal visits	87 (27.44%)
Received the first antenatal visit within four months	108 (34.07%)
Delivered in an institution	71 (22.40%)
Received postnatal care within 48 hours postpartum from a skilled provider	79 (24.92%)

Family planning use

Unadjusted associations. At the bivariate level, current use of family planning was associated with age at marriage, spousal age difference, and women's perceptions of their self-efficacy (Tables 22-24, below). Among women who did not know their age at marriage, the unadjusted odds of using family planning were 77 percent lower compared to women who reported that they were less than 16 years old when they married [OR 0.23 (95% CI: 0.07, 0.80)]. Similarly, women were 81 percent less likely to report use of family planning if they or their husband did not know his or her age relative to women who knew that they were within 10 years of their husband's age [OR 0.19 (95% CI: 0.06, 0.60)]. Finally, women with higher perceived self-efficacy were significantly more likely to be using a modern method of contraception relative to those with lower perceived self-efficacy [OR 1.90 (95% CI: 1.22, 2.96)].

Table 22: Unadjusted odds of current family planning use by characteristics of the index women (N=317)			
	Current use of family planning (%)	OR (95% CI)	P-value
Ethnicity			0.484
Dogon	22 (8.56%)	1.00 (reference)	
Peulh	1 (3.13%)	0.34 (0.04, 2.65)	
Other	2 (7.14%)	0.82 (0.18, 3.69)	
Age at first marriage			0.064*
≤ 15	8 (12.50%)	1.00 (reference)	
16 – 19	11 (10.38)	0.81 (0.31, 2.14)	
≥ 20	2 (9.09%)	0.70 (0.14, 3.58)	
Don't Know	4 (3.20%)	0.23 (0.07, 0.80)	
Had a say in who to marry			0.934
No	11 (7.75%)	1.00 (reference)	
Yes	14 (8.00%)	1.04 (0.45, 2.36)	
Marital status			0.467
Only wife	13 (7.60%)	1.00 (reference)	
First wife	9 (10.47%)	1.42 (0.58, 3.47)	
Other wife	3 (5.00%)	0.64 (0.18, 2.33)	
Parity			0.228
1	2 (5.00%)	1.00 (reference)	
2 – 3	14 (11.29%)	2.42 (0.53, 11.13)	
4 – 5	6 (7.89%)	1.63 (0.31, 8.47)	
≥ 6	3 (3.90%)	0.77 (0.12, 4.81)	
Child death in first year of life			0.333
No	19 (8.88%)	1.00 (reference)	
Yes	6 (5.83%)	0.63 (0.25, 1.64)	
*$p<0.10$, **$p<0.05$			

Table 23: Unadjusted odds of current family planning use by characteristics of the index women and their husbands (N=317 households)

	Current use of family planning (%)	OR (95% CI)	P-value
Age discrepancy (husband's age minus wife's age)			0.005**
-5 to 9	12 (13.48%)	1.00 (reference)	
≥ 10	9 (10.47%)	0.75 (0.30, 1.88)	
Don't know	4 (2.82%)	0.19 (0.06, 0.60)	
Education discrepancy			0.144
Wife some husband none	3 (14.29%)	1.00 (reference)	
Equal educational attainment	17 (6.44%)	0.41 (0.11, 1.54)	
Husband some wife none	5 (15.63%)	1.11 (0.24, 5.24)	
Difference in employment status			0.107
Wife works, husband doesn't	7 (15.56%)	1.00 (reference)	
Equal employment status	13 (7.74%)	0.46 (0.17, 1.22)	
Husband works, wife doesn't	5 (4.81%)	0.27 (0.08, 0.92)	

**p<0.10, **p<0.05*

Table 24: Unadjusted odds of current family planning use: Scales and indices (N=317 households)		
	Odds Ratio (95% CI)	P-value
Traditional and Cultural Practices		
Women	1.18 (0.78, 1.78)	0.435
Husbands	1.08 (0.72, 1.63)	0.716
Mothers-in-law	1.21 (0.89, 1.83)	0.375
Value of women		
Women	0.82 (0.55, 1.23)	0.341
Husbands	1.27 (0.82, 1.99)	0.272
Mothers-in-law	0.80 (0.54, 1.18)	0.262
Marital conduct and responsibilities		
Women	1.15 (0.76, 1.73)	0.513
Husbands	0.99 (0.65, 1.49)	0.948
Mothers-in-law	0.84 (0.57, 1.24)	0.380
Attitudes Towards Health Center (CS-COM)		
Women	1.32 (0.84, 2.08)	0.211
Husbands	0.85 (0.58, 1.25)	0.420
Mothers-in-law	1.12 (0.73, 1.72)	0.594
Perceived efficacy of the index women		
Women	1.90 (1.22, 2.96)	0.003**
Husbands	1.11 (0.74, 1.69)	0.608
Mothers-in-law	1.22 (0.81, 1.85)	0.337
Difference in perceived decision-making power between husband and wife		
Women	0.92 (0.61, 1.40)	0.707
Husbands	1.08 (0.72, 1.63)	0.703
Mothers-in-law	1.07 (0.71, 1.60)	0.759
Women's perceptions of household trust and respect	1.30 (0.82, 2.08)	0.247
Women's perceptions of spousal discordance in power	0.92 (0.78, 1.07)	0.274
*$p<0.10$, **$p<0.05$		

Adjusted associations. In the final model, only spousal age difference and women's perceived self-efficacy remained significantly associated with current family planning use. Among women who did not know their age or whose husbands did not know their age, the adjusted odds of current use of a modern contraceptive method were 75 percent

lower than their counterparts who were within 10 years of their spouses [OR 0.25 (95% CI: 0.06, 0.99)]. On the other hand, the adjusted odds of using family planning were higher among women who had greater perceived self-efficacy [OR 1.81 (95% CI: 1.16, 2.85)]. Although age at first marriage was not significant, it emerged as a confounder of spousal age difference, so it was retained in the final model.

Table 25: Adjusted odds of current family planning use (N=317 households)

	Odds Ratio (95% CI)
Age at first marriage	
≤ 15	1.00 (reference)
16 – 19	0.73 (0.27, 1.97)
≥ 20	0.78 (0.15, 4.12)
Don't Know	0.52 (0.12, 2.24)
Age discrepancy (husband's age minus wife's age)	
-5 to 9	1.00 (reference)
≥ 10	0.67 (0.26, 1.71)
Don't know	0.25 (0.06, 0.99)**
Index women's perceived self-efficacy	1.82 (1.16, 2.85)**

**p<0.10, **p<0.05*

Antenatal care frequency

Unadjusted associations. Among the demographic and background characteristics, high antenatal care frequency was associated with parity and age at marriage (see Tables 27 and 28, below). The unadjusted odds of obtaining four or more antenatal care visits during the most recent pregnancy were significantly higher among women who had one or two previous live births [OR 2.98 (95% CI: 1.08, 8.20)] and among women who had three to four previous live births [OR 3.86 (95% CI: 1.35, 11.00)] relative to women for whom the most recent pregnancy was their first. With regards to age at marriage, marrying later was associated with statistically significantly lower unadjusted odds of

receiving four or more antenatal care visits. Relative to women who married at age 15 or below, the unadjusted odds of frequent antenatal care were 61 percent lower among women who married between the ages of 16 and 19 [OR 0.39 (95% CI: 0.21, 0.75)] and 95 percent lower among women who married after age 20 [OR 0.05 (95% CI: 0.01, 0.38)]. The unadjusted odds of receiving frequent antenatal care were also lower among women who did not know their age at marriage [OR 0.24 (95% CI: 0.12, 0.46)].

In addition to these demographic characteristics, antenatal care frequency was influenced by mothers-in-law's perceptions of marital conduct and responsibility and of their daughters-in-law's (the index women's) efficacy (see Table 29). From the unadjusted analysis, women whose mothers-in-law had higher agreement with gendered norms of marital conduct, granting men more liberties and permitting abusive behavior, were significantly less likely to obtain four or more antenatal care visits [OR 0.81 (95% CI: 0.64, 1.04)]. On the other hand, the odds of obtaining frequent antenatal care were significantly higher among women whose mothers-in-law perceived them to have higher efficacy with regards to carrying out their reproductive health preferences and desires [OR 1.34 (95% CI: 1.04, 1.73)].

Table 27: Unadjusted odds of receiving four or more antenatal visits by characteristics of the index women (N=317)

	Four or more antenatal visits (%)	OR (95% CI)	P-value
Ethnicity			0.853
Dogon	70 (27.24%)	1.00 (reference)	
Peulh	10 (31.25%)	1.21 (0.55, 2.69)	
Other	7 (25.00%)	0.89 (0.36, 2.19)	
Age at first marriage			<0.001**
≤ 15	32 (50.00%)	1.00 (reference)	
16 – 19	30 (28.30%)	0.39 (0.21, 0.75)	
≥ 20	1 (4.55%)	0.05 (0.01, 0.38)	
Don't Know	87 (27.44%)	0.24 (0.12, 0.46)	
Had a say in who to marry			0.451
No	36 (25.35%)	1.00 (reference)	
Yes	51 (29.14%)	1.21 (0.74, 2.00)	
Marital status			0.862
Only wife	47 (27.49%)	1.00 (reference)	
First wife	25 (29.07%)	1.08 (0.61, 1.92)	
Other wife	15 (25.00%)	0.88 (0.45, 1.73)	
Parity			0.035**
1	5 (12.50%)	1.00 (reference)	
2 – 3	37 (29.84%)	2.98 (1.08, 8.20)	
4 – 5	27 (35.53%)	3.86 (1.35, 11.00)	
≥ 6	18 (23.38%)	2.14 (0.73, 6.26)	
Child death in first year of life			0.540
No	61 (28.50%)	1.00 (reference)	
Yes	26 (25.24%)	0.85 (0.50, 1.45)	

**p<0.10, **p<0.05*

Table 28: Unadjusted odds of receiving four or more antenatal visits by characteristics of the index women and their husbands (N=317 households)

	Four or more antenatal visits (%)	OR (95% CI)	P-value
Age discrepancy (husband's age minus wife's age)			0.892
-5 to 9	23 (25.84%)	1.00 (reference)	
≥ 10	25 (29.07%)	1.18 (0.60, 2.29)	
Don't know	39 (27.46%)	1.09 (0.60, 1.98)	
Education discrepancy			0.224
Wife some husband none	3 (14.29%)	1.00 (reference)	
Equal educational attainment	77 (29.17%)	2.47 (0.71, 8.63)	
Husband some wife none	7 (21.88%)	1.68 (0.38, 7.39)	
Difference in employment status			0.315
Wife works, husband doesn't	16 (35.56%)	1.00 (reference)	
Equal employment status	41 (24.40%)	0.59 (0.29, 1.18)	
Husband works, wife doesn't	30 (28.85%)	0.73 (0.35, 1.55)	

**p<0.10, **p<0.05*

Table 29: Unadjusted odds of receiving four or more antenatal visits: Scales and indices (N=317 households)		
	Odds Ratio (95% CI)	P-value
Traditional and Cultural Practices		
Women	0.93 (0.72, 1.18)	0.538
Husbands	1.05 (0.82, 1.35)	0.699
Mothers-in-law	0.97 (0.76, 1.24)	0.789
Value of women		
Women	1.07 (0.83, 1.37)	0.616
Husbands	0.91 (0.71, 1.16)	0.448
Mothers-in-law	1.01 (0.79, 1.29)	0.954
Marital conduct and responsibilities		
Women	1.11 (0.87, 1.42)	0.401
Husbands	0.97 (0.75, 1.24)	0.779
Mothers-in-law	0.81 (0.64, 1.04)	0.094*
Attitudes Towards Health Center (CS-COM)		
Women	1.12 (0.87, 1.44)	0.385
Husbands	1.22 (0.94, 1.59)	0.123
Mothers-in-law	1.14 (0.88, 1.48)	0.301
Perceived efficacy of the index women		
Women	0.10 (0.86, 1.41)	0.456
Husbands	0.86 (0.67, 1.10)	0.242
Mothers-in-law	1.34 (1.04, 1.73)	0.021**
Difference in perceived decision-making power between husband and wife		
Women	1.00 (0.78, 1.28)	0.986
Husbands	1.19 (0.93, 1.53)	0.165
Mothers-in-law	1.02 (0.80, 1.31)	0.857
Women's perceptions of household trust and respect	1.22 (0.94, 1.59)	0.129
Women's perceptions of spousal discordance in power	0.93 (0.84, 1.03)	0.144
**p<0.10, **p<0.05*		

Adjusted associations. After adjusting for all predictors that were significantly associated with antenatal care frequency in the unadjusted analysis, age at first marriage, parity, and mothers-in-laws perceptions of the efficacy of their daughters-in-law each remained highly significant. Women who married before age 16 were the most likely to obtain

four or more antenatal care visits [OR 0.42 (95% CI 0.21, 0.81)], while those who married after age 20 were the least likely to do so [OR 0.05 (95% CI: 0.01, 0.38)] (see table 30, below). Concerning parity, the adjusted odds of frequent antenatal care increased with the number of live births, peaking among women for whom the most recent birth was their fourth or fifth [OR 5.22 (95% CI: 1.73, 15.71)] and decreasing among those for whom it was their sixth or higher [OR 2.63 (95% CI: 0.85, 8.15)]. Finally, women whose mothers-in-law considered them to have higher personal efficacy were significantly more likely to obtain four or more antenatal care visits [OR 1.34 (95% CI: 1.02, 1.76)].

Table 30: Adjusted odds of receiving four or more antenatal visits (N=317 households)

	Odds Ratio (95% CI)
Age at first marriage	
≤ 15	1.00 (reference)
16 – 19	0.42 (0.21, 0.81)**
≥ 20	0.05 (0.01, 0.38)**
Don't Know	0.21 (0.11, 0.42)**
Parity	
1	1.00 (reference)
2 – 3	3.31 (1.15, 9.53)**
4 – 5	5.22 (1.73, 15.71)**
≥ 6	2.63 (0.85, 8.15)*
Mothers-in-law's perceptions of the efficacy of their daughters-in-law	1.34 (1.02, 1.76)**

**p<0.10, **p<0.05*

Antenatal care timing

Unadjusted associations. Statistically significant predictors of receiving early antenatal care included educational discrepancies between husband and wife, the index women's

beliefs about the value of women, and mothers-in-law's beliefs about the value of women (see Tables 31-33, below). Relative to women with more education than their husbands, women with equal educational attainment to their husbands had significantly higher unadjusted odds of early antenatal care [OR 3.43 (95% CI: 0.98, 11.94)]. Additionally, women who perceived the value of women to be low were more likely to obtain their first antenatal care visit within four months [OR 1.49 (95% CI; 1.16, 1.91)], as were women whose mothers-in-law perceived the value of women to be low [OR 1.22 (95% CI: 0.96, 1.55)].

Antenatal care timing was also associated with the attitudes of the index women, their husbands, and their mothers-in-law towards the health center. Among women with more favorable attitudes towards the CS-COM, the unadjusted odds of receiving early antenatal care were 30 percent higher relative to women who viewed the CS-COM less favorably [OR 1.48 (95% CI: 1.14, 1.92)]. This pattern held true for women whose husbands [OR 1.30 (95% CI: 1.01, 1.66)] and mothers-in-law [OR 1.23 (95% CI: 0.97, 1.58)] expressed positive attitudes towards the CS-COM as well.

Table 31: Unadjusted odds of receiving the first antenatal visit within the first four months of gestation by characteristics of the index women (N=317)

	First visit within 4 months (%)	OR (95% CI)	P-value
Ethnicity			0.204
Dogon	93 (36.19%)	1.00 (reference)	
Peulh	9 (28.13%)	0.69 (0.31, 1.55)	
Other	6 (21.43%)	0.48 (0.19, 1.23)	
Age at first marriage			0.239
≤ 15	27 (42.19%)	1.00 (reference)	
16 – 19	39 (36.79%)	0.80 (0.42, 1.50)	
≥ 20	6 (27.27%)	0.51 (0.18, 1.49)	
Don't Know	36 (28.80%)	0.55 (0.30, 1.04)	
Had a say in who to marry			0.742
No	47 (33.10%)	1.00 (reference)	
Yes	61 (34.86%)	1.08 (0.68, 1.73)	
Marital status			0.858
Only wife	58 (33.92%)	1.00 (reference)	
First wife	31 (36.05%)	1.10 (0.64, 1.89)	
Other wife	19 (31.67%)	0.90 (0.48, 1.69)	
Parity			0.806
1	11 (27.50%)	1.00 (reference)	
2 – 3	44 (35.48%)	1.45 (0.66, 3.18)	
4 – 5	27 (35.53%)	1.45 (0.63, 3.36)	
≥ 6	26 (33.77%)	1.34 (0.58, 3.11)	
Child death in first year of life			0.818
No	72 (33.64%)	1.00 (reference)	
Yes	36 (34.95%)	1.06 (0.65, 1.74)	

**p<0.10, **p<0.05*

Table 32: Unadjusted odds of receiving the first antenatal visit within the first four months gestation by characteristics of the index women and their husbands (N=317 households)			
	First visit within 4 months (%)	OR (95% CI)	P-value
Age discrepancy (husband's age minus wife's age)			0.573
-5 to 9	33 (37.08%)	1.00 (reference)	
≥ 10	31 (36.05%)	0.96 (0.52, 1.77)	
Don't know	44 (30.99%)	0.76 (0.44, 1.33)	
Education discrepancy			0.068*
Wife some husband none	3 (14.29%)	1.00 (reference)	
Equal educational attainment	96 (36.36%)	3.43 (0.98, 11.94)	
Husband some wife none	9 (28.13%)	2.35 (0.55, 9.96)	
Difference in employment status			0.379
Wife works, husband doesn't	17 (37.78%)	1.00 (reference)	
Equal employment status	61 (36.31%)	0.94 (0.48, 1.85)	
Husband works, wife doesn't	30 (28.85%)	0.67 (0.32, 1.40)	
**p<0.10, **p<0.05*			

Table 33: Unadjusted odds of receiving the first antenatal visit within four months: Scales and indices (N=317 households)		
	Odds Ratio (95% CI)	P-value
Traditional and Cultural Practices		
Women	1.18 (0.93, 1.49)	0.170
Husbands	1.06 (0.84, 1.34)	0.601
Mothers-in-law	1.14 (0.90, 1.44)	0.284
Value of women		
Women	1.49 (1.16, 1.91)	0.001**
Husbands	1.10 (0.87, 1.39)	0.435
Mothers-in-law	1.22 (0.96, 1.55)	0.098*
Marital conduct and responsibilities		
Women	1.10 (0.87, 1.39)	0.421
Husbands	1.06 (0.84, 1.34)	0.618
Mothers-in-law	0.97 (0.77, 1.23)	0.828
Attitudes Towards Health Center (CS-COM)		
Women	1.48 (1.14, 1.92)	0.002**
Husbands	1.30 (1.01, 1.66)	0.036**
Mothers-in-law	1.23 (0.97, 1.58)	0.085*
Perceived efficacy of the index women		
Women	0.98 (0.77, 1.23)	0.844
Husbands	0.98 (0.77, 1.23)	0.833
Mothers-in-law	0.99 (0.78, 1.25)	0.932
Difference in perceived decision-making power between husband and wife		
Women	1.05 (0.83, 1.32)	0.710
Husbands	0.89 (0.70, 1.12)	0.325
Mothers-in-law	0.86 (0.68, 1.08)	0.191
Women's perceptions of household trust and respect	1.15 (0.91, 1.47)	0.240
Women's perceptions of spousal discordance in power	1.04 (0.95, 1.14)	0.419
**p<0.10, **p<0.05*		

Adjusted associations. Upon adjusting for all predictors that were significantly associated with antenatal care timing in the bivariate analysis, only spousal discrepancy in education, women's perceptions of the value of women, and women's attitudes towards the CS-COM remained significant. Among couples with equal educational attainment,

the odds of receiving the first antenatal visit within four months were four times higher than among couples in which the wife was educated and the husband was not [OR 4.10 (95% CI: 1.15, 14.62)]. Women who perceived the value of women to be low also had higher adjusted odds of early antenatal care [OR 1.45 (95% CI: 1.12, 1.89)]. This effect appears to be confounded by mothers-in-law's perceptions of the value of women; removing mothers-in-law's perceptions from the model resulted in nearly an 11 percent increase in the beta coefficient for women's perceptions. Finally, women who expressed positive attitudes towards the CS-COM were significantly more likely to obtain antenatal care within four months [OR 1.54 (95% CI: 1.17, 2.01)], though this effect was slightly confounded by husbands' attitudes towards the CS-COM, such that husband's attitudes were retained in the final model.

Table 34: Adjusted odds of receiving the first antenatal visit within four months (N=317 households)

	Odds Ratio (95% CI)
Education discrepancy	
Wife some husband none	1.00 (reference)
Equal educational attainment	4.10 (1.15, 14.62)**
Husband some wife none	2.55 (0.58, 11.21)
Value of women	
Women	1.45 (1.12, 1.89)**
Mothers-in-law	1.17 (0.90, 1.51)
Attitudes Towards Health Center (CS-COM)	
Women	1.54 (1.17, 2.01)**
Husbands	1.17 (0.90, 1.52)

**p<0.10, **p<0.05*

Institutional delivery

Unadjusted associations. Delivering in an institution was statistically significantly associated with the index women's age at marriage, marital status, difference in age from their husbands, and difference in employment status from their husbands (see Tables 35 and 36, below). Relative to women who married before turning 16, women who did not know at what age they married were over 50 percent less likely to deliver in an institution in the unadjusted analysis [OR 0.47 (95% CI: 0.22, 0.98)]. Additionally, women who were not the first wives in polygamous unions had significantly higher unadjusted odds of institutional delivery relative to women who were the only wives in monogamous unions [OR 1.62 (95% CI: 0.84, 3.11)]. Considering characteristics of both the women and their husbands, the unadjusted odds of institutional delivery were lower if one or both partners did not know their age [OR 0.58 (95% CI: 0.31, 1.11)], or if the husband earned an income but the wife did not [OR 0.39 (95% CI: 0.17, 0.88)].

Delivery care was also associated with mothers-in-law's agreement with traditional practices, mothers-in-law's attitude towards the CS-COM, mothers-in-law's perceptions of the difference in decision-making power between their sons and daughters-in-law, and the index women's perceptions of their self-efficacy (Table 37, below). Where mothers-in-law had high agreement with traditional practices, the unadjusted odds of the index women delivering in an institution were significantly lower relative to women whose mothers-in-law expressed lower agreement with traditional practices [OR 0.77 (95% CI: 0.59, 1.01)].

In contrast, the unadjusted odds of institutional delivery were higher among women whose mothers-in-law had more favorable views of the services at the local CS-

COM [OR 1.35 (95% CI: 1.01, 1.81)]. The likelihood of institutional delivery was also higher among women whose mothers-in-law perceived that their sons had higher decision-making power relative to their daughters-in-law [OR 1.37 (95% CI: 1.04, 1.79)]. Finally, the unadjusted odds of delivering in an institution were greater among women who believed they had high self-efficacy [OR 1.65 (95% CI: 1.24, 2.18)].

Table 35: Unadjusted odds of delivering in an institution by characteristics of the index women (N=317)

	Delivered in an institution (%)	OR (95% CI)	P-value
Ethnicity			0.106
Dogon	60 (23.35%)	1.00 (reference)	
Peulh	3 (9.38%)	0.34 (0.10, 1.15)	
Other	8 (28.57%)	1.31 (0.55, 3.13	
Age at first marriage			0.025**
≤ 15	17 (26.56%)	1.00 (reference)	
16 – 19	32 (30.19%)	1.20 (0.60, 2.39)	
≥ 20	4 (18.18%)	0.61 (0.18, 2.08)	
Don't Know	18 (14.40%)	0.47 (0.22, 0.98)	
Had a say in who to marry			0.191
No	27 (19.01%)	1.00 (reference)	
Yes	44 (25.14%)	1.43 (0.83, 2.46)	
Marital status			0.094*
Only wife	38 (22.22%)	1.00 (reference)	
First wife	14 (16.28%)	0.68 (0.35, 1.34)	
Other wife	19 (31.67%)	1.62 (0.84, 3.11)	
Parity			0.529
1	12 (30.00%)	1.00 (reference)	
2 – 3	29 (23.39%)	0.71 (0.32, 1.58)	
4 – 5	16 (21.05%)	0.62 (0.26, 1.49)	
≥ 6	14 (18.18%)	0.52 (0.21, 1.26)	
Child death in first year of life			0.373
No	51 (23.83%)	1.00 (reference)	
Yes	20 (19.42%)	0.77 (0.43, 1.38)	

**p<0.10, **p<0.05*

Table 36: Unadjusted odds of delivering in an institution by characteristics of the index women and their husbands (N=317 households)			
	Delivered in an institution (%)	OR (95% CI)	P-value
Age discrepancy (husband's age minus wife's age)			0.098*
-5 to 9	23 (25.84%)	1.00 (reference)	
≥ 10	24 (27.91%)	1.11 (0.57, 2.17)	
Don't know	24 (16.90%)	0.58 (0.31, 1.11)	
Education discrepancy			0.618
Wife some husband none	3 (14.29%)	1.00 (reference)	
Equal educational attainment	61 (23.11%)	1.80 (0.51, 6.33)	
Husband some wife none	7 (21.88%)	1.68 (0.38, 7.39)	
Difference in employment status			0.073*
Wife works, husband doesn't	15 (33.33%)	1.00 (reference)	
Equal employment status	39 (23.21%)	0.60 (0.30, 1.24)	
Husband works, wife doesn't	17 (16.35%)	0.39 (0.17, 0.88)	
**p<0.10, **p<0.05*			

Table 37: Unadjusted odds of delivering in an institution: Scales and indices (N=317 households)		
	Odds Ratio (95% CI)	P-value
Traditional and Cultural Practices		
Women	0.98 (0.75, 1.27)	0.872
Husbands	1.00 (0.77, 1.31)	0.974
Mothers-in-law	0.77 (0.59, 1.01)	0.057*
Value of women		
Women	0.83 (0.64, 1.07)	0.151
Husbands	0.90 (0.69, 1.16)	0.417
Mothers-in-law	1.02 (0.78, 1.33)	0.901
Marital conduct and responsibilities		
Women	0.93 (0.71, 1.21)	0.572
Husbands	0.87 (0.66, 1.13)	0.294
Mothers-in-law	0.93 (0.71, 1.20)	0.564
Attitudes Towards Health Center (CS-COM)		
Women	1.23 (0.93, 1.62)	0.147
Husbands	1.09 (0.83, 1.43)	0.535
Mothers-in-Law	1.35 (1.01, 1.81)	0.037**
Perceived efficacy of the index women		
Women	1.65 (1.24, 2.18)	<0.001**
Husbands	1.24 (0.94, 1.62)	0.121
Mothers-in-law	1.03 (0.79, 1.34)	0.832
Difference in perceived decision-making power between husband and wife		
Women	0.87 (0.66, 1.15)	0.320
Husbands	1.14 (0.87, 1.48)	0.345
Mothers-in-law	1.37 (1.04, 1.79)	0.022**
Women's perceptions of household trust and respect	1.00 (0.77, 1.30)	0.979
Women's perceptions of spousal discordance in power	1.01 (0.91, 1.12)	0.864
**p<0.10, **p<0.05*		

Adjusted associations. As shown in Table 38 (below), a total of five factors were independently associated with institutional delivery. Even after adjusting for other predictors, women who did not know their age at first marriage had statistically significantly lower odds of delivering in an institution relative to those who married at

age 15 or younger [OR 0.50 (95% CI: 0.22, 1.11)]. Difference in employment status between the index women and their husbands was also a significant predictor. Women who did not themselves earn any income but whose husbands did were less than half as likely to deliver in an institution relative to women who earned income and whose husbands did not [OR 0.40 (95% CI: 0.16, 0.98)]. The marital status of the woman, though not itself an independent predictor, was found to confound the associations of both of these variables.

From among the indices, mothers-in-law's agreement with traditional practices and their perception of the difference in decision-making power between their sons and daughters-in-law statistically significantly influenced the likelihood of delivering in an institution. Having a mother-in-law who strongly agreed with traditional and cultural practices surrounding pregnancy and childbirth was associated with lower adjusted odds of institutional delivery [OR 0.70 (95% CI: 0.52, 0.94)]. On the other hand, the odds of delivery care were higher among women whose mothers-in-law viewed their sons to have higher decision-making power than their daughters-in-law [OR 1.64 (95% CI: 1.18, 2.26)]. The strongest predictor of institutional delivery, however, was the index women's perception of their self-efficacy, which was positively associated with delivering in an institution [OR 1.82 (95% CI: 1.31, 2.54)].

Table 38: Adjusted odds of delivering in an institution (N=317 households)	
	Odds Ratio (95% CI)
Age at first marriage	
≤ 15	1.00 (reference)
16 – 19	1.13 (0.53, 2.41)
≥ 20	0.35 (0.10, 1.49)
Don't Know	0.50 (0.22, 1.11)*
Marital status	
Only wife	1.00 (reference)
First wife	0.59 (0.29, 1.22)
Other wife	1.41 (0.68, 2.94)
Difference in employment status	
Wife works, husband doesn't	1.00 (reference)
Equal employment status	0.66 (0.30, 1.47)
Husband works, wife doesn't	0.40 (0.16, 0.98)**
Mothers-in-law's agreement with traditional and cultural practices	0.70 (0.52, 0.94)**
Index women's perceived self-efficacy	1.82 (1.31, 2.54)**
Mothers-in-law's perceptions of the difference in decision-making power between their sons and daughters-in-law	1.64 (1.18, 2.26)**
**p<0.10, **p<0.05*	

Postnatal care

Unadjusted associations. The unadjusted likelihood of receiving postnatal care was influenced by the women's age at marriage, the age difference between women and their husbands, and the difference in employment status between women and their husbands (Tables 39 and 40, below). Women were less likely to obtain postnatal care if they did not know their age at marriage relative to women who knew that they married before the age of 16 [OR 0.42 (95% CI: 0.21, 0.88)], or if either they or their husbands did not know their current age relative to couples who knew they were within 10 years of each other [OR 0.58 (95% CI: 0.31, 1.09)]. Among couples in which the husband earned cash

income but the woman did not, the woman was significantly less likely to obtain postnatal care compared to couples in which the reverse is true [OR 0.42 (95% CI: 0.19, 0.93)].

Additionally, mothers-in-law's agreement with traditional practices, attitude towards the CS-COM, and perception of the decision-making difference between their sons and daughters-in-law were statistically significantly associated with postnatal care (see Table 41, below). The unadjusted odds of a woman receiving postnatal care in her most recent pregnancy were lower if her mother-in-law reported stronger agreement with traditional practices [OR 0.74 (95% CI: 0.57, 0.96)]. Conversely, the unadjusted odds of postnatal care were higher among women whose mothers-in-law viewed the CS-COM favorably [OR 1.32 (95% CI: 1.00, 1.74)] or believed that their sons had relatively more decision-making power than their daughters-in-law [OR 1.24 (95% CI: 0.96, 1.61)].

Postnatal care was also influenced by women's attitude towards the services at the CS-COM as well as both women's and their husbands' perceptions of the women's efficacy. Women who had positive views of the CS-COM were more likely to receive timely postnatal care after their most recent birth [OR 1.32 (95% CI: 1.00, 1.74)], as were women who considered themselves to have higher self-efficacy [OR 1.54 (95% CI: 1.18, 2.02)]. Husbands' opinions of their wives' efficacy was also associated with increased odds of postnatal care [OR 1.25 (95% CI: 0.96, 1.63)].

Table 39: Unadjusted odds of receiving postnatal care from a skilled provider within 48 hours postpartum by characteristics of the index women (N=317)

	Postnatal care (%)	OR (95% CI)	P-value
Ethnicity			0.636
Dogon	65 (25.29%)	1.00 (reference)	
Peulh	6 (18.75%)	0.68 (0.27, 1.73)	
Other	8 (28.57%)	1.18 (0.50, 2.81)	
Age at first marriage			0.012**
≤ 15	19 (29.69%)	1.00 (reference)	
16 – 19	34 (32.08%)	1.12 (0.57, 2.19)	
≥ 20	7 (31.82%)	1.11 (0.39, 3.14)	
Don't Know	19 (15.20%)	0.42 (0.21, 0.88)	
Had a say in who to marry			0.919
No	35 (24.65%)	1.00 (reference)	
Yes	44 (25.14%)	1.03 (0.62, 1.71)	
Marital status			0.181
Only wife	42 (24.56%)	1.00 (reference)	
First wife	17 (19.77%)	0.76 (0.40, 1.43)	
Other wife	20 (33.33%)	1.54 (0.81, 2.91)	
Parity			0.813
1	12 (30.00%)	1.00 (reference)	
2 – 3	32 (25.81%)	0.81 (0.37, 1.78)	
4 – 5	17 (22.37%)	0.67 (0.28, 1.60)	
≥ 6	18 (23.38%)	0.71 (0.30, 1.68)	
Child death in first year of life			0.642
No	55 (25.70%)	1.00 (reference)	
Yes	24 (23.30%)	0.88 (0.51, 1.52)	

*$p<0.10$, **$p<0.05$

Table 40: Unadjusted odds of receiving postnatal care from a skilled provider within 48 hours postpartum by characteristics of the index women and their husbands (N=317 households)

	Postnatal care (%)	OR (95% CI)	P-value
Age discrepancy (husband's age minus wife's age)			0.012**
-5 to 9	24 (26.97%)	1.00 (reference)	
≥ 10	30 (34.88%)	1.45 (0.76, 2.76)	
Don't know	25 (17.61%)	0.58 (0.31, 1.09)	
Education discrepancy			0.902
Wife some husband none	5 (23.81%)	1.00 (reference)	
Equal educational attainment	67 (25.38%)	1.09 (0.38, 3.08)	
Husband some wife none	7 (21.88%)	0.90 (0.24, 3.31)	
Difference in employment status			0.060*
Wife works, husband doesn't	15 (33.33%)	1.00 (reference)	
Equal employment status	46 (27.38%)	0.75 (0.37, 1.53)	
Husband works, wife doesn't	18 (17.31%)	0.42 (0.19, 0.93)	

**p<0.10, **p<0.05*

Table 41: Unadjusted odds of receiving postnatal care from a skilled provider within 48 hours postpartum: Scales and indices (N=317 households)		
	Odds Ratio (95% CI)	P-value
Traditional and Cultural Practices		
Women	0.91 (0.71, 1.18)	0.473
Husbands	0.93 (0.72, 1.21)	0.603
Mothers-in-law	0.74 (0.57, 0.96)	0.020**
Value of women		
Women	0.92 (0.72, 1.19)	0.537
Husbands	0.91 (0.71, 1.17)	0.468
Mothers-in-law	1.03 (0.80, 1.33)	0.824
Marital conduct and responsibilities		
Women	1.04 (0.80, 1.34)	0.783
Husbands	0.93 (0.72, 1.21)	0.605
Mothers-in-law	0.93 (0.73, 1.20)	0.597
Attitudes Towards Health Center (CS-COM)		
Women	1.32 (1.00, 1.74)	0.041**
Husbands	1.07 (0.83, 1.39)	0.584
Mothers-in-law	1.32 (1.00, 1.74)	0.045**
Perceived efficacy of the index women		
Women	1.54 (1.18, 2.02)	0.001**
Husbands	1.25 (0.96, 1.63)	0.092*
Mothers-in-law	1.11 (0.86, 1.43)	0.426
Difference in perceived decision-making power between husband and wife		
Women	0.87 (0.67, 1.13)	0.302
Husbands	0.97 (0.75, 1.25)	0.804
Mothers-in-law	1.24 (0.96, 1.61)	0.098*
Women's perceptions of household trust and respect	1.03 (0.79, 1.33)	0.841
Women's perceptions of spousal discordance in power	1.00 (0.90, 1.10)	0.989
**p<0.10, **p<0.05*		

Adjusted associations. In the final adjusted model of postnatal care, significant associations remained with age at first marriage, difference in employment status, mothers-in-law's agreement with traditional practices, women's attitudes towards the CS-COM and perceptions of their self-efficacy, and mothers-in-law's perceptions of

decision-making power (Table 42). Women who did not know their age at marriage were less than half as likely to obtain timely postnatal care relative to women who married under age 16 [OR 0.45 (95% CI: 0.18, 1.12)]. Similarly, women whose husbands earned income but they did not were also half as likely to obtain postnatal care relative to women who earned income but whose husbands did not [OR 0.45 (95% CI: 0.19, 1.09)].

Mothers-in-law's higher agreement with traditional practices was statistically significantly associated with lower adjusted odds of their daughters-in-law receiving postnatal care [OR 0.69 (95% CI: 0.52, 0.91)], while their belief that their sons had more decision-making power than their daughters-in-law was associated with an increased odds of postnatal care [OR 1.38 (95% CI: 1.02, 1.87)]. From the perspective of the index women, more positive attitudes towards the CS-COM were associated with higher odds of care [OR 1.36 (95% CI: 1.01, 1.84)] as was higher perceived self-efficacy [OR 1.61 (95% CI 1.18, 2.21)].

Spousal age difference, though not itself an independent predictor of postnatal care, was found to influence the association with age at first marriage. Similarly, husbands' perceptions of women's self-efficacy influenced women's perceptions, causing the beta estimate to increase by approximately 10 percent when it was removed from the model.

Table 42: Adjusted odds of receiving postnatal care from a skilled provider within 48 hours postpartum (N=317 households)	
	Odds Ratio (95% CI)
Age at first marriage	
≤ 15	1.00 (reference)
16 – 19	0.96 (0.46, 1.99)
≥ 20	1.02 (0.32, 3.21)
Don't Know	0.45 (0.18, 1.12)*
Age discrepancy (husband's age minus wife's age)	
-5 to 9	1.00 (reference)
≥ 10	1.34 (0.66, 2.70)
Don't know	0.91 (0.40, 2.06)
Difference in employment status	
Wife works, husband doesn't	1.00 (reference)
Equal employment status	0.99 (0.45, 2.18)
Husband works, wife doesn't	0.45 (0.19, 1.09)*
Mothers-in-laws agreement with traditional and cultural Practices	0.69 (0.52, 0.91)**
Index women's attitudes towards the health center (CS-COM)	1.36 (1.01, 1.84)**
Perceived efficacy of the index women	
Women	1.61 (1.18, 2.21)**
Husbands	1.21 (0.89, 1.64)
Mothers-in-law's perceptions of the difference in decision-making power between their sons and daughters-in-law	1.38 (1.02, 1.87)**
**p<0.10, **p<0.05*	

Summary of associations

Table 43, below, provides an overview of the factors associated with the five outcome variables: current use of a modern method of family planning, four of more antenatal care visits, receipt of the first antenatal care visit within four months gestation, institutional delivery, and receipt of postnatal care within 48 hours of delivery. The specific combinations of predictors that emerged as significant in the adjusted models

differed for each outcome, however some patterns emerged in the type of predictors that served as facilitators and those that acted as barriers to care.

Table 43: Factors associated with current family planning, antenatal care frequency, antenatal care timing, institutional delivery, and postnatal care among women in Mali and their adjusted effects (N=317 households)

Outcome	Decreased odds	Increased odds
Family planning	- Age discrepancy (husband's age minus wife's age)**	- Women's perceived self-efficacy**
Antenatal care frequency	- Age at first marriage**	- Parity** - Mothers-in-law's perceptions of the efficacy of the index women**
Antenatal care timing		- Education discrepancy between husband and wife** - Women's perceptions of the value of women** - Women's attitudes towards the CS-COM**
Institutional delivery	- Age at first marriage* - Difference in employment status between husband and wife** - Mothers-in-law's agreement with traditional and cultural practices**	- Women's perceived self-efficacy** - Mothers-in-law's perceptions of the difference in decision-making power between their sons and daughters-in-law**
Postnatal care	- Age at first marriage* - Difference in employment status between husband and wife** - Mothers-in-law's agreement with traditional and cultural practices**	- Women's attitudes towards the CS-COM** - Women's perceived self-efficacy** - Mothers-in-law's perceptions of the difference in decision-making power between their sons and daughters-in-law**

**p<0.10, **p<0.05*

V. DISCUSSION

This paper set out to identify constructs related to gender and power that influence the use of family planning and maternal health care among women in Mali, assess the effects of these constructs on five reproductive health outcomes, and explore the relative power of women, their husbands, and their mothers-in-law. The results of the analysis indicate that the relevant constructs vary considerably across the five outcomes, though patterns in the associations hint at the underlying mechanisms and processes that shape power dynamics within a family. Factors that increased the odds of preventative reproductive health behaviors include perceptions of the efficacy of the index women, beliefs about the value of women, attitudes towards services at the CS-COM, and perceptions of the balance of decision-making power. Conversely, agreement with traditional and cultural practices surrounding pregnancy and childbirth was associated with decreased odds of preventative behaviors. Among this sample of women in Mali, the role of mothers-in-law in shaping patterns of reproductive health was significant, suggesting a need for future research and programs to address their preferences and beliefs.

A strong predictor of family planning use, institutional delivery, and postnatal care was women's perceived self-efficacy in realizing their reproductive health desires and goals. Women with higher perceived self-efficacy were more likely to report current use of a modern method of contraception [OR 1.82 (95% CI: 1.16, 2.85)], deliver in an institution [OR 1.82 (95% CI: 1.31, 2.54)], and receive postnatal care from a skilled provider within 48 hours of delivery [OR 1.61 (95% CI: 1.18, 2.21)]. These findings are supported by evidence from other studies, which have shown that self-efficacy is

positively associated with adoption of protective reproductive health behaviors (Pettifor et al., 2004; Boer and Mashamba, 2007).

Self-efficacy is thought to be particularly important for behaviors that are not promoted by society or by the individuals in one's immediate social surroundings (Boer and Mashamba, 2007). In Mali, where women face pressure from husbands and mothers-in-law to maximize fertility, adopting a method of contraception likely requires confidence and conviction in one's ability and right to do so. Additionally, if institutional delivery and postnatal care are not perceived as important by other family members, particularly where services are costly and difficult to access, a woman would need higher self-efficacy to overcome financial and geographical barriers to carry out these behaviors in the absence of support.

While family planning, delivery care, and postnatal care were influenced by women's perceptions of their self-efficacy, in the case of antenatal care it was the *mothers-in-law's* perceptions of the efficacy of their daughters-in-law that emerged as significant. Women whose mothers-in-law agreed that they had high efficacy were significantly more likely to obtain four or more antenatal care visits [OR 1.34 (95% CI: 1.02, 1.76)]. Antenatal care confers less direct benefits to the health and survival of the mother and infant than do delivery and postnatal care, so it is possible that having a mother-in-law's approval and support is more important for this behavior. Additionally, the presence of a mother-in-law who supports and believes in the personal efficacy of her daughter-in-law may indicate more equitable gender norms in the household and greater trust and communication between the women. However, more research is needed to

explore why women's own perceived self-efficacy was not significant, even in the unadjusted analysis.

Another construct that emerged as a significant predictor of antenatal care was women's perceptions of the value of women. Interestingly, those who reported stronger agreement with statements asserting that women have lower status and fewer rights than men were more likely to obtain their first antenatal care visit within the first four months of gestation [OR 1.45 (95% CI: 1.12, 1.89)]. Although the questionnaire prompted women to answer according to whether they personally agreed with each statement, it is possible that they responded with their perceptions as to how society frames the value of women. In that case, higher agreement may indicate that women are more perceptive and critical of gender norms, and hence more motivated to take action to promote their own health. Alternatively, women might see antenatal care as a means to having a successful birth and being a good mother, thereby conforming to what is expected of them in fulfilling their role as women (Riley, 1997).

Women's attitudes towards the health center also influenced their reproductive health care. Having more positive attitudes towards the quality of services provided at the CS-COM was significantly associated with receiving the first antenatal care visit within four months gestation [OR 1.54 (95% CI: 1.17, 2.01)] and obtaining postnatal care within 48 hours postpartum [OR 1.36 (95% CI: 1.01, 1.84)]. Although attitudes towards the CSCOM are not necessarily indicative of power dynamics, the fact that women's views of the health center were associated with service utilization even after adjusting for all other predictors suggests that women had some input and control.

From the perspective of the mothers-in-law, two constructs were significantly associated with the reproductive health behaviors of the index women. The first was their agreement with traditional and cultural practices during pregnancy and childbirth. Women whose mothers-in-law expressed high agreement with these practices were significantly less likely to deliver in an institution [OR 0.70 (95% CI: 0.52, 0.94)] or receive postnatal care [OR 0.69 (0.52, 0.91)]. These results indicate that mothers-in-law exert control over the maternal health practices of their daughters-in-law, as their beliefs as to what a woman should do during pregnancy were independently associated with health seeking patterns.

Second, mothers-in-law's perceptions of the balance of decision-making power between their sons and daughters-in-law influenced the behaviors of index women. From the principal components analysis, the items that were found to weigh most heavily in the index of decision-making power addressed decisions as to whether to circumcise a girl, where to give birth, and how many children to have. Women whose mothers-in-law reported that their sons had more control over these decisions than did their daughters-in-law were more likely to deliver in institutions [OR 1.64 (95% CI: 1.18, 2.26)] and to obtain timely postnatal care [OR 1.38 (95% CI: 1.02, 1.87)].

These results are surprising, and they point to the complexity of decision-making processes. One possible explanation is that mothers-in-law who consider questions of fertility and childbirth to be men's decisions may be less likely to intervene and impose their own views. In contrast, mothers-in-law who perceive these issues to be more in women's domain may assert their dominance as the women of higher status and insist on a more traditional delivery. This interpretation assumes that the husbands are more

accepting of modern, institutional healthcare than their mothers, however, and merits further investigation.

Notably, in this analysis, the husbands' perspectives and opinions did not emerge as independent predictors in any of the final models. Although, at the bivariate level, husbands' attitudes towards the CS-COM and perceptions of their wives' efficacy were significantly associated with antenatal care timing and receipt of postnatal care, respectively, these effects fell out in the adjusted analyses; husbands' views were kept in the final models only to account for slight confounding effects on the corresponding views of their wives. These results are important, as they suggest that men's attitudes and preferences have only minimal if any influence on their wives' family planning and maternal health behavior.

Finally, a number of socio-demographic characteristics of the index women and their husbands, which serve as proxy measures of power, were associated with the various reproductive health outcomes. Contrary to findings in previous studies (Bloom et al., 2001; Agha and Carton, 2011; Haque et al., 2012), women of higher parity were more likely to obtain four or more antenatal visits relative to those of lower parity. The adjusted odds ratio increased from 3.31 (95% CI: 1.15, 9.53) among women for whom the most recent birth was their second or third child to a high of 5.22 (95% CI: 1.73, 15.71) among those for whom it was their fourth or fifth, relative to women for whom the most recent birth was their first child. This pattern could reflect an increase in women's status correlated with their number of children (Mason and Smith, 2000), giving them more leverage and control over their health. Alternatively, these results may be

indicative of different socio-cultural or structural factors that modified the associations in the Malian context.

Age at first marriage was also associated with antenatal care frequency. Women who married between the ages of 16 and 19 were 58 percent less likely to obtain four or more antenatal visits relative to those who married at age 15 or younger [OR 0.42 (95% CI: 0.21, 0.81)], and the odds were even lower among those who married at age 20 or older [OR 0.05 (95% CI: 0.01, 0.38)]. This effect could indicate that women who married earlier were more likely to be the first wives or have higher parity (Ezeh, 1997), which elevated their status. Yet, the association remained even after controlling for marital status and parity. This finding seems to contradict previously observed patterns that suggest that higher age at marriage grants women more time to obtain education (Riley, 1997), which has in turn been suggested to provide them with greater social support outside the home, improved negotiation skills, income-generating employment, and appreciation for the importance of reproductive health services (Riley, 1997; Beegle et al., 2001).

However, the results of this analysis show that women's education does not necessarily result in increased health-seeking behaviors. Relative to women with more education than their husbands, those with equal education were over four times as likely to obtain the first antenatal visit within four months [OR 4.10 (95% CI: 1.15, 14.62)]. A woman having more education than her husband could be perceived as threatening by the husband and possibly the in-laws as well (Riley, 1997), such that these family members might curtail the woman's liberties.

Predictably, on the other hand, women who did not earn any income but whose husbands did were less likely to deliver in an institution [OR 0.40 (95% CI: 0.16, 0.98)] or to obtain postnatal care within 48 hours postpartum [OR 0.45 (95% CI: 0.19, 1.09)], relative to women who earned income but whose husbands did not. This aligns with research indicating that control over financial resources is an important predictor of reproductive health behaviors (Beegle et al., 2001; Blanc, 2001), although this analysis assumed that earning income implies having control over that income, which may not necessarily be the case.

The associations of these socio-demographic indicators highlight a need for more research. Previous investigators have concluded that such proxy measures are insufficient to capture or explain the causes or dynamics of interpersonal power (Bloom et al., 2001). Yet, the effects of these characteristics were not fully explained by the more direct measures of power; they remained significant even after adjusting for the various indices. Particularly in light of the unexpected associations of parity and age at marriage, further research and analysis is needed to explore the underlying mechanisms that drive these patterns.

Implications

The results of this analysis have a number of important implications for future programming. The strong effects of self-efficacy point to a need to design interventions and implement behavior change communication strategies that promote women's confidence and reduce perceived barriers. These efforts could entail helping women identify the concrete steps involved in obtaining services such as family planning or

antenatal care, as well as providing them with reinforcement and support. For example, an intervention to improve condom use for HIV prevention among adolescents in the United States organized a series of group sessions in which participants discussed the value of women, practiced partner communication techniques, and observed demonstrations modeling correct condom use (DiClemente et al., 2004). This intervention was reported to increase self-efficacy and result in significantly improved use of condoms. Similar skill-building and group discussion exercises could be applied to family planning and maternal health practices.

A related implication of this analysis is that health centers should focus on improving the quality of maternal health services, given the importance of women's attitudes towards the CS-COM to their receipt of adequate antenatal and postnatal care. This investment in quality will require more than obtaining better equipment and stocking necessary supplies; the items that were identified as central to the index through the principal components analysis dealt with perceptions of how women are treated at the facilities, the overall service quality, and the information that is provided. These aspects of the CS-COM could be emphasized through promotional messages, however it is likely that much of this information is passed by word of mouth. As such, ensuring that these elements of service provision are consistently positive should be a priority.

Although Mali has a strong patriarchal society, it seems that women—older women in particular—control family planning and maternal health decisions. This finding contradicts previous studies that have reported that husbands' opinions and attitudes influence fertility and childbearing (Bankole, 1995; Konaté et al., 2011; Adamu and Salihu, 2002; Agha and Carton, 2011; Ying et al., 2011). Most of these past studies,

however, have not measured complex constructs of power and few have considered the effects of mothers-in-law and men together. The present analysis suggests that the influence of mothers-in-law may overshadow the role of men in some societies.

Consequently, there is a need for programs that target mothers-in-law in order to shift their attitudes and practices. Interventions could focus on providing education to mothers-in-laws or encouraging them to accompany their daughters-in-law to the health center for counseling and information. In Nepal, a randomized controlled trial found that women whose husbands were invited to accompany them to informational sessions on maternal health practices were significantly more likely to make birth preparations and obtain postpartum care (Mullany, Becker, and Hindin, 2007). This joint counseling framework could be adapted to instead include mothers-in-law in informational sessions in order to foster understanding, communication, and support for their daughters-in-law.

Additionally, health communication campaigns could be designed to address mothers-in-law's knowledge and attitudes. As an example of this approach, an information, education, and communication campaign in Indonesia targeted mothers-in-law and husbands with print materials and radio spots concerning pregnancy health, danger signs, the value of assisted delivery, and how to plan for emergencies (Ronsmans et al., 2001). Messages that dispel misconceptions and clearly communicate what the recommended maternal health behaviors entail are particularly important given the impact of mothers-in-law's adherence to traditional and cultural practices. If they perceive that these practices are beneficial and sufficient to ensure the health of the woman and the success of the pregnancy, they are unlikely to appreciate the need for modern reproductive health services. Therefore, programs that educate mothers-in-law as

to how, when, and why women should obtain antenatal, delivery, and postnatal care could increase their understanding of the value, feasibility, and acceptability of these services for their daughters-in-law.

Despite the relative importance of mothers-in-laws reported in this study, future reproductive health research and programs should not ignore men. More investigation is needed to explore the influence of husbands while controlling for other family members as well. However, even if men's reported preferences and opinions do not have a direct impact on women's reproductive health outcomes, issues of gender and marital relations may affect women indirectly by shaping their perceptions, preferences, values, and self-efficacy. Experience from multiple countries has shown that involving men in support of their wives' family planning and maternal health practices has resulted in improved compliance and higher user satisfaction (Becker, 1996; Blanc, 2001), perhaps reflecting the benefits of spousal communication and social support. Efforts to include men, however, need to be carefully designed and monitored to insure that they don't have the unintended consequence of implying that men can assume complete control and overrule the preferences and desires of their wives (Blanc, 2001).

Limitations

This study has several noteworthy limitations. First, the data used in the analysis were collected in order to assess maternal care specifically, such that the power to detect differences in family planning use was low. Second, the scales used to measure constructs of gender and power were not validated and each comprised only a small number of items. Although principal components analysis was conducted to identify the

core factors and weight each item according to its relative influence, the small number of items limited the internal reliability of the resulting indices, as reflected by the low Cronbach's alpha reliability coefficients. Subsequent studies should incorporate cognitive interviewing and in depth qualitative research to inform the scale definitions, identify more items, and systematically validate the scales to test that they truly capture relevant constructs.

A third limitation is that this study did not control for community-level variables that have been found to be significantly associated with reproductive health indicators in other studies. These community factors include accessibility of health facilities (van den Broek et al., 2003l Overbosch et al., 2004; Gage, 2007), exposure to mass media (Kaggwa et al., 2008; Agha and Carton, 2011; Haque et al., 2012), educational attainment in the community (Gage, 2007; DeRose and Ezeh, 2009), and community norms (DeRose and Ezeh, 2009). As an exploratory analysis, this study focused solely on individual and household level characteristics; however, given the substantial modifying effects of community-level characteristics reported in previous studies, future research in Mali should assess the combined effects at all three levels.

Fourth, this analysis lacked the ability to determine causality due to the cross-sectional design of the study. Research has shown that the link between improved reproductive health and power may be bi-directional. For example, women have reported that adopting family planning resulted in an increase in their autonomy and decision-making power, as it allowed them to engage in economic activities during the time they would otherwise have spent raising children, (Konaté et al., 1998; Castle et al., 1999). This reverse causality makes it difficult to determine whether an association between

family planning use and a woman's power indicates that she is able to use family planning because she has autonomy or that she has autonomy because she uses family planning. Longitudinal studies of interfamilial power and reproductive health are needed to clarify the directionality of these patterns.

Nonetheless, this study identified a number of important associations with significant implications. The strong effects of self-efficacy and perceived gender roles suggest a need to address gender norms and help women gain confidence in their right and ability to take steps to protect their own health. Additionally, interventions must recognize the influence of the preferences and beliefs of mothers-in-law. Failure to address the household-level influences on women's health will limit progress towards reducing maternal morbidity and mortality, perpetuating the low status and dependence of women.

VI. CONCLUSION

The International Conference on Population and Development resulted in a critical shift in research and policy worldwide, calling for a global agenda that promotes reproductive rights and gender equality. But, as Cohen and Richards (1996) point out, the ICPD Programme of Action did not explain how to achieve these desired objectives. As evidenced by slow progress in much of the world towards goals of expanding family planning, reducing maternal mortality, and promoting women's rights, complex political, economic, socio-cultural, and behavioral barriers remain unaddressed. Among them is the issue of how decisions are made at the household level.

This study contributes to existing literature in revealing that women in Mali do not have independent control over their own reproductive health decisions. Social norms, gender scripts, and interfamilial hierarchies impede preventative and health-seeking behaviors. However, experience has shown that neither gender constructs nor family dynamics are static (Blanc, 2001; Char et al., 2010). Given the profound implications for health and rights, there is a critical need for well-designed, evidence-based interventions to achieve a more equitable balance of power.

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