FISTULA CARE

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Evaluation of Community-Level Fistula Prevention Interventions in Guinea

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EXECUTIVE SUMMARY

In late 2007, EngenderHealth's Fistula Care project in Guinea—in collaboration with local officials in the urban commune of Kissidougou Region—began supporting community-level efforts to prevent fistula and to improve maternal health. Village safe motherhood committees (VSMCs) were established in 10 villages, and members were trained to promote maternal health care seeking through community-level awareness-raising sessions and through pregnancy monitoring visits at the household level. Between 2007 and 2009, additional VSMCs were established in other villages in Kissigoudou, as well as in selected villages in the urban commune of Labé Region.

In 2011, Fistula Care undertook an in-depth evaluation of the community-level fistula prevention efforts. The purpose of the evaluation was to explore (1) whether the establishment and support of the VSMCs in the intervention areas had led to measurable outputs in terms of enhanced community capacities and support systems related to maternal health, as well as (2) whether enhanced community support systems were associated with desired population-level outcomes, such as knowledge about obstetric risks, birth preparedness, and use of maternal health services.

The evaluation used a post-intervention quasi-experimental design with purposively sampled intervention and comparison villages in each region. Intervention villages were selected based on their duration of exposure to the intervention. Comparison villages were selected by the National Institute of Statistics, based on their access to maternal health services; efforts were made to exclude communities known to have been exposed to the activities undertaken by the VSMCs.

In-depth interviews (N=88) were conducted with community-level leaders and health resource persons—i.e., members of the VSMCs (where they existed), and members of the local Health and Hygiene Committee in nonintervention communities. In addition, a population-based household survey was conducted among women of reproductive age (N=2,335) and their co-resident husbands (N=1,431) in intervention areas and comparison areas.

Indexes were constructed from the women's data for measuring contextual factors, as well as intervention exposure, to enable exploration of the effects of these predictors on outcomes of interest. These composite variables included an index measuring the existence of community support systems for maternal health in each village (e.g., community-level resource persons who are active in conducting pregnancy monitoring and awareness-raising activities to promote maternal health), as well as indexes that measured women's individual exposure to maternal health promotion interventions at the community level and during antenatal consultations at the health facility level. Indexes were also constructed to measure three intermediate outcomes at the population level: knowledge about obstetric risks, knowledge about birth preparedness, and level of household preparation for childbirth.

Descriptive frequencies were run for all variables of interest, and two-sample t-tests and chi squares were used to determine whether there were significant differences between intervention and comparison villages in each region, as well as to compare pre-intervention births to post-intervention births. Bivariate analyses were performed to explore the association of contextual and intervention exposure indexes with outcomes of interest. Multivariate regression analyses were then performed to examine whether the effects of contextual factors and intervention exposure persisted after controlling for other known determinants.

The study showed measurable differences between intervention and comparison villages in terms of community capacity—namely, the knowledge and activities of community-level committees and resource persons involved in maternal health promotion. In addition, significant differences were

observed at the population level in terms of women's exposure to community-level maternal health promotion efforts and their knowledge about maternal health and obstetric fistula. Significant differences between intervention and comparison villages were also observed in the percentage of women living in villages with a community support system for maternal health.

The study identified several important determinants of care seeking during childbirth. Where effective community-level support systems for maternal health promotion existed (i.e., where more than 60% of women in a village reported the presence and activities of community-level maternal health promoters), they had a strong and positive influence on maternity care seeking; once wealth, literacy, age, parity, and distance to a health facility were controlled for, women living in a village with strong community support systems for maternal health were more than twice as likely to deliver at a facility than were women living in a community without such support networks. Living in such a community appeared to have a much stronger effect than household wealth status and was nearly comparable to the influence of women's literacy levels and distance to a health facility—two known determinants of maternity care seeking.

Another salient finding from the study concerns the importance of household preparation for childbirth. Controlling for contextual and intervention exposure variables, as well as for known individual and socio-demographic factors, such as wealth, age, parity, literacy, and distance to a health facility, shows that women who reported making at least three advance preparations for childbirth were almost two times as likely to deliver at a health facility as women who did not. Birth preparedness was considerably more important than knowledge about obstetric risks, danger signs and fistula causes, which was not associated with delivery at a facility.

Women's individual exposure to community-level maternal health resource persons was significantly associated with household preparation for birth, as was exposure to counseling on birth preparedness during antenatal care. Women with high levels of exposure to community-level maternal health promotion activities were more than twice as likely to make three or more preparations for childbirth, compared with women with low levels of exposure. Those who received counseling on birth preparedness during antenatal care visits were more than five times as likely to make at least three preparations for childbirth, compared with women with women who received little such counseling. Given the strong effect of a high level of preparation for birth on facility delivery, this finding highlights the importance of increased attention to birth preparedness in both community-level and facility-based interventions to promote maternity care seeking.

Based on the study findings, the following recommendations are offered for ensuring the effectiveness of community-level approaches to prevent fistula and improve maternal health:

- Build the capacity of community-level agents who are well-positioned to be trusted sources of information and help on maternal health issues, and reinforce their knowledge and competence through regular refresher training and skills training.
- Ensure that community-level agents involved in maternal health promotion are assigned realistic areas of coverage, to ensure that they can reach pregnant women with information and advice to safeguard their health.
- Provide ongoing support to help community-level cadres continue to refine their awarenessraising approaches and their skills for monitoring the status of maternal health in their communities.
- Emphasize birth preparedness in community-level health promotion efforts.

• Ensure that community-level initiatives to promote maternal health are coordinated with and reinforced by facility-level interventions to ensure the availability and quality of maternal health services, including effective counseling during antenatal care.

I. Introduction

Globally, skilled attendance during childbirth is recognized as an essential strategy for reducing maternal mortality (AbouZahr & Wardlaw, 2001; Stanton et al., 2007), and skilled attendance rates are one of the primary indicators for measuring progress toward Millennium Development Goal 5, improving maternal health (United Nations, 2006). Ensuring skilled attendance at birth is also widely recognized as a key intervention for preventing obstetric fistula, a devastating type of maternal morbidity caused by prolonged and obstructed labor (Miller et al., 2005). Other critical interventions for preventing obstetric fistula include improving access to family planning, antenatal care, and emergency obstetric care (Liskin, 1992; Wall, 2006).

While skilled maternity care is widely recognized as one of the most promising strategies for reducing both maternal mortality and maternal morbidity, increasing the rates of skilled attendance in low-resource settings remains challenging, due to a constellation of both health systems and community-level factors that limit the availability, quality, and utilization of services. As Miller et al. (2003) note in their article "Where is the 'E' in MCH?", the evidence on how best to ensure that women have access to essential maternal health services, particularly during delivery and the postpartum period, remains insufficient.

Since 2005, EngenderHealth has been implementing a multifaceted package of interventions aimed at addressing obstetric fistula in Guinea through the initiation of sustainable treatment services and through fistula prevention interventions implemented at the health facility and community levels. Community-level fistula prevention activities were initiated in late 2007, as part of the Fistula Care project, when, in collaboration with the Ministry of Health and the Mayor of Kissidougou Urban Commune, the project supported the establishment and training of village safe motherhood committees (VSMCs) in 10 villages of Kissidougou Urban Commune. Comprised of six or seven community members each, both men and women—the VSMCs received basic training on interpersonal communication, the importance of antenatal care (ANC), danger signs during pregnancy, obstetric fistula, birth spacing and family planning, and the risks of early marriage. Members of the committees were also trained in data collection and were oriented to a set of tools for recording information on pregnancies, births, and maternal and newborn deaths in their communities. Based on action plans developed at the training, the VSMCs began to collect data on maternal health in their communities through visits to the households of pregnant women, and they also began to conduct health education talks to raise awareness about maternal health risks and the importance of care seeking during pregnancy and delivery. Each quarter, the 10 committees met together in Kissidougou to review their progress and activities and to develop new quarterly action plans.

Based on the positive response to the VSMCs and on demand from other villages in the Urban Commune, 10 additional committees were established and trained in Kissidougou in 2008 and 2009. In addition, 10 VSMCs were launched in Labé Urban Commune, where Fistula Care Guinea is supporting another fistula repair site, the Labé Regional Hospital. Working on a voluntary basis, the committees have remained active in monitoring pregnancies and in leading awareness-raising sessions in their own communities, as well as in neighboring villages. In both regions, the VSMCs' community-level awareness-raising efforts have been complemented by radio programming through community radio stations, which have broadcast testimonials by women treated for fistula, as well as other health information related to maternal and reproductive health.

Figure 1 presents the logic model that describes the process through which the establishment and support of community-level committees is expected to contribute to improved maternal health outcomes. It posits that the process of training and supporting VSMCs in monitoring and promoting maternal health in their respective communities will enhance community capacities, including the

knowledge and **skills** of community resource persons, as well as **social capital** (i.e., community networks and support systems) for improving and ensuring maternal survival. These capacities and support systems in turn are expected to contribute to population-level differences in exposure to community-level maternal health support systems and differences in knowledge, attitudes, and practices related to maternal health.

PROCESS AND ACTIVITIES	OUTPUTS Enhanced community capacities and community assets related to maternal health	OUTCOMES Changes in maternal health attitudes, intentions, and behaviors among the general population in the intervention area
 VSMC members are elected by communities and trained in key knowledge/skills. VSMC members promote maternal health care – seeking through home visits to pregnant women, in community forums, and at social events. VSMC members meet quarterly to report on and plan activities. 	 CAPACITIES are developed among VSMC members/community health agents: Knowledge is improved about maternal health, including: 	 Differences in exposure to community-level maternal health support systems: Exposure to information on maternal health from community resource persons (home visits and/or community meetings) Receipt of regular pregnancy monitoring visits by community resource person Differences in knowledge/awareness about: Obstetric fistula (causes, consequences, how to avoid/prevent, where to go for treatment) Recommended number and timing of ANC visits Danger signs during pregnancy and delivery Differences in attitudes/perceptions about: Risks associated with early marriage and childbearing Importance of maternal health to community leaders/community members (i.e., perceptions about leaders involvement in maternal health) Differences in behaviors and practices related to care seeking Use of antenatal care (timing and number of visits) Use of facility delivery care Care seeking for complications before, during, and after delivery

Figure 1. Logic model for improving maternal health through enhanced community capacities

In 2011, EngenderHealth undertook an in-depth evaluation of the community-level fistula prevention efforts, as part of a larger program evaluation. This report presents the study methodology and findings and outlines key recommendations for future community-level efforts to improve maternal health and prevent obstetric fistula.

II. Study Purpose and Hypothesis

The purpose of the evaluation was to explore whether the establishment and support of the VSMCs in the intervention areas has led to measurable outputs in terms of increased capacities among community-level resource persons to promote maternal health, as well as whether enhanced community support systems were associated with population-level outcomes, including changes in knowledge, attitudes, intentions, and practices related to maternal health and maternity care seeking.

The hypothesis tested through the evaluation is that (1) measurable differences in core community capacities and assets related to maternal health care promotion will be found in communities where VSMCs have been established, and (2) that these enhanced capacities will contribute to increased knowledge, attitudes, and care-seeking behaviors at the population level in these communities, as compared with matched comparison sites where VSMCs have not been established.

A. Study Design and Methodology

Because no baseline survey was conducted at the start of the community-level interventions, a postintervention quasi-experimental design was used to compare intervention areas with matched comparison areas where no VSMCs had been established. Intervention areas were purposively sampled to focus on villages in each region that had the longest exposure to the intervention. In Kissidougou, the 10 communities where the first VSMCs were established in late 2007 were surveyed, and in Labé, the 10 communities where VSMCs were established in early 2009 were surveyed.

In consultation with the National Institute of Statistics, 10 comparison villages were selected in Kissidougou and Labé (five per region), based on the following considerations:

- Similar health programming in terms of community-based services, facility-level interventions, and mass media messaging related to maternal health
- Comparable distance/geographic access to health facilities where basic maternal health care services are available
- Not being contiguous to any of the villages covered by the VSMCs

In addition, because the VSMCs were known to conduct awareness-raising activities in neighboring villages—often at the request of local leaders—efforts were made to try to avoid non-intervention communities that had been exposed to the intervention. Each of the VSMCs was asked to provide the names of any villages where they had been active, and these villages were excluded from consideration as comparison areas.

A population-based household survey and key informant interviews were conducted in intervention and comparison areas, with the following objectives:

- To gather basic data on demographic, socioeconomic, and other variables that may influence maternal health care seeking
- To assess knowledge, attitudes, and behaviors related to maternal health, obstetric fistula, birth preparedness, and care seeking during pregnancy, delivery, and the early postpartum period
- To measure the use of maternal health services during pregnancy, delivery, and the postpartum period, as well as during obstetric emergencies
- To assess differences in the above indicators between intervention and comparison areas
- To gather information from key informants on the maternal health knowledge and health promotion activities of community resource persons in intervention and comparison villages

The household survey instruments included the following questionnaires:

- The **Household Questionnaire** collected information on all household members, including their name, age, sex, and relationship to the household head, as well as basic information on household assets and amenities (type of roof and flooring, source of water, toilet facilities, and ownership of various possessions, such as radio, television, bicycle, mobile telephone, etc.).
- The Woman's Questionnaire collected basic demographic information on respondents' schooling, literacy, exposure/access to the media, employment, ethnicity, and religion. It also explored knowledge and attitudes related to maternal health and obstetric fistula, as well as experiences and care seeking during recent (within the past five years) and current pregnancies. Among respondents who experienced complications during a recent pregnancy/delivery, additional questions explored decision making and care seeking related to those complications.
- The **Husband's Questionnaire** was similar in structure to the Woman's Questionnaire and gathered information on male partners' schooling, literacy, media exposure, and other sociodemographic indicators. It also explored partners' knowledge about and attitudes toward a range of issues related to maternal health and obstetric fistula.

A substantial portion of the survey questions were based on those used in the Demographic and Health Survey (DHS), as these questions have been developed and tested over the years in various country settings, including Guinea, as well as other internationally tested survey tools on maternal health care-seeking (Family Care International 2009). In addition, questions related to birth preparedness, maternity care seeking, and obstetric fistula were added to explore exposure to and awareness of the VSMCs' health promotion activities.

Structured interview guides for **key informants** included a subset of questions from the woman's and husband's questionnaires to explore respondents' knowledge about maternal health issues and obstetric fistula. Additional questions explored respondents' knowledge about maternal health status in their community and awareness of and/or involvement in community-level activities to promote maternal health and prevent obstetric fistula.

The study protocol and survey tools were reviewed and approved as required by institutional and government guidelines in the Republic of Guinea and followed EngenderHealth's standard operating procedures for conducting research. Approval was obtained from the Comité National d'Ethique pour la Recherche en Santé. Standard informed consent procedures were followed in all interviews.

B. Sample Design and Estimation

The sample for the household survey was a representative probability sample of the population of women of reproductive age (15–49) and their co-resident husbands in private households in selected villages in Kissidougou and Labé. In each household, up to two women of reproductive age (15–49) were interviewed for the survey, along with their co-resident husbands, regardless of age.

In each of the 30 selected villages (20 intervention, 10 comparison), a random number list was used to select 62 households for interview from updated household listings prepared for the 2011 national census by the National Institute of Statistics, Ministry of Planning. The target sample was designed based on the assumption that there are 1.3 women of reproductive age per household and that 17% of these women will be pregnant in any one year (Direction Nationale de la Statistique & ORC Macro, 2006). Planning for a 10% nonresponse rate, it was expected that 62 households per village would yield access to 2,176 women of reproductive age and approximately 2,055 pregnancies/births within the last five years (since January 2006), with approximately half of these

pregnancies/births taking place after the launch of the VSMCs in late 2007 (Kissidougou) and early 2009 (Labé).¹

The target sample was designed to measure at least an 8% difference in use of ANC (four or more visits) during recent pregnancies between intervention and comparison areas. ANC use (four or more visits) was selected as a key indicator for determining the sample for the evaluation because early and routine use of ANC had been a key message promoted by the VSMCs at the village level, both through home visits to pregnant women and through community-level awareness-raising activities. The estimated difference that the sample was designed to measure was based on regional-level estimates of antenatal coverage (four or more visits) from the 2005 Guinea DHS (Direction Nationale de la Statistique & ORC Macro, 2006).

For the key informant interviews, a total of 90 interviews were planned—three in each village. These included interviews with a community leader and up to two members of the VSMC (or comparable community-level health resource persons) in each village.

C. Data Collection

Data collection and entry were supervised by staff of StatView International, a consultant research firm based in Conakry. A total of 24 interviewers (17 male and seven female) and six supervisors (two female and four male) were recruited and trained for the data collection. Training of data collectors took place in June 2012, and data collection took place over a six-week period, between July and August, 2011.

To reduce possible interviewer bias, data collectors were not told which villages were intervention areas or comparison areas. Therefore, to identify appropriate key informants for interview, data collectors first interviewed the village leader (*chef du village*) and requested him to identify at least two members of any local committee that was actively involved in promoting maternal health. In intervention villages, this led interviewers to members of the VSMC; in nonintervention areas, these referrals generally led interviewers to members of the local committee for health and hygiene.

At least two attempts were made to interview selected households, and a total of 1,846 households were successfully interviewed. The household response rate was 99%. The main reason for failing to obtain a household interview was that household members were absent. Table 1 shows survey response rates for eligible women and husbands by region and study area (intervention or comparison). Overall, response rates for men were lower than those for women. The most common reason that eligible husbands were not interviewed was that they were not at home.

n = D
$$\frac{\left[Z_{1-\alpha}\sqrt{2P(1-P)} + Z_{1-\beta}\sqrt{P_1(1-P_1) + P_2(1-P_2)}\right]^2}{(P_2 - P_1)^2}$$

Where D is the design effect (set at 1.56, from the 2005 DHS), P_1 is the estimated proportion at the time of the first survey (set at 52%, from the 2005 DHS), P_2 is the target proportion (so that $[P_2-P_1]$ is the desired magnitude of change that we expect to detect [60%]), P equals $(P_1+P_2)/2$, Z_{1-a} is the z-score corresponding to desired level of confidence (set at 1.96, 95%), and Z _{1-b} is the z-score corresponding to the desired level of power (set at 0.0835, 80%).

¹ These numbers were calculated using the standardized sample size calculation formula for measurement of change over time for an indicator expressed as a proportion (FHI, 2000):

Desults	Region		Total	Villa	age
Results	Kissidougou	Labé		Intervention	Comparison
Household interviews					
No. of households sampled	930	930	1,860	1,240	620
No. of households occupied*	912	927	1,695	1,221	618
No. of households interviewed	876	810	1,686	1,153	533
Household response rate (%)	96%	87%	99%	94%	86%
Individual interviews: women					
No. of eligible women	1,265	1,269	2,534	1,654	880
No. interviewed	1,131	1,204	2,335	1,515	820
Eligible woman response rate (%)	89%	95%	92%	92%	93%
Individual interviews: husbands					
No. of eligible husbands	897	750	1,647	1,069	578
No. interviewed	759	672	1,431	943	488
Eligible husband response rate (%)	85%	90%	87%	88%	87%
Key informant interviews					
No. of community leaders	15	15	30	20	10
No. of committee members	30	28	58	41	17

Table 1. Survey response rates, by region and study area

*"Occupied" excludes addresses that were not dwellings, as well as vacant and destroyed dwellings.

D. Measures of Key Predictor and Outcome Variables

Household survey data were entered into a CSPro database and exported to SPSS (version 20.0) for analysis. Key informant data were entered directly into SPSS. After data entry and cleaning were completed, data were recoded and new variables were created to measure important predictors and outcomes of interest.

Socioeconomic status was measured using data related to household assets. Such data were collected through the household questionnaire, which included questions related to the household's ownership of various consumer items, as well as dwelling characteristics, water source, toilet facilities, and other characteristics related to wealth status. Following the methodology used in the DHS to create wealth quintiles (Rutstein & Johnson, 2004), principal components analysis was used to assign a weight, or factor score, to each household asset. The resulting asset scores were standardized in relation to a standard normal distribution, with a mean of zero and a standard deviation of one (1). These scores were summed for each household, and individuals were ranked according to the total score of the household in which they resided. The sample was then divided into population quintiles—five groups with the same number of individuals in each. The quintiles thus represent the poorest 20% of the population, second poorest 20%, middle 20%, second richest 20%, and richest 20% of the population.

Births to women in the sample were considered "pre-intervention births" if they occurred before the launch of the VSMCs—i.e. before January 2008 in Kissidougou or January 2009 in Labé. Births that took place after these time periods were considered "post-intervention births."

A set of indexes, or composite variables, were developed using women's data to measure community support systems related to maternal health, as well as women's exposure to maternal health promotion interventions. These indexes were created to allow for exploration of the association between contextual and intervention factors and the outcomes of interest—namely, increased knowledge and improved maternal health care-seeking behaviors at the population level. The following indexes were created to measure *contextual factors*, such as community support

networks related to maternal health, and *individual exposure to maternal health promotion interventions*:

- The **Community Support System Index** was derived from the Women's Questionnaire data. A mean village score was calculated based on the *percentage of women in each village* who reported that community-level resource persons (committee members, community-based agents) in their village conduct pregnancy monitoring visits to pregnant women, lead discussions or awareness-raising sessions on maternal health, and are the main source of information and help for maternal health concerns. A dichotomized social capital variable was created to categorize villages as "high" or "low," with villages where more than 60% of women reported that these maternal health support systems existed in their community being categorized as "high." The cut-off of 60% was selected based on an analysis of the overall village means in intervention and comparison areas in both regions, which ranged from 5% to 87% of women reporting the presence of maternal health support systems in their village. This cut-off was slightly higher than the overall mean of 51% in intervention villages.
- Similar to the Community Support System Index, a composite index called the Community Support Exposure Index was created based on *each individual woman's exposure* to communitylevel maternal health support systems. The Community Support Exposure Index was derived based on whether a woman agreed that there was a local committee involved in promoting maternal health; mentioned (unprompted) either the VSMC or another local committee or agent as the main source of maternal health information and help; or had personally attended a community-level meeting on maternal health. Based on their responses to these questions, scores between 0 and 3 were assigned to each woman, and a cut-off of 2 was used to create a dichotomous variable for "high" vs. "low" exposure to community-level maternal health support systems.
- The quality of ANC can strongly influence care seeking during childbirth (Barber, 2006; Bloom et al., 1999; Mpembeni et al., 2007), so a composite variable was developed to summarize the counseling provided to women during their ANC visits. The Quality Antenatal Care Exposure Index was based on whether women reported that during any of their ANC visits, they were: advised on any delivery preparation; advised to deliver at a health facility; or advised about danger signs during pregnancy and delivery. Based on their responses to these questions, scores between 0 and 3 were assigned to each woman, and a cut-off of 2 was used to create a dichotomous variable for "high" vs. "low" exposure to quality ANC counseling.

In addition, three indexes were created to measure important *intermediate outcomes* related to individual knowledge about maternal health and household preparation for childbirth:

- The **Obstetric Risks Knowledge Index** measured women's knowledge related to the main topics that the VSMCs were engaged in addressing. It was derived based on whether respondents agreed that every pregnancy was risky; were able to spontaneously mention at least three danger signs during pregnancy and childbirth; could spontaneously mention at least three danger signs during the postpartum period; and could identify at least two causes of obstetric fistula. A score between 0 and 4 was assigned to each woman, and a cut-off of 3 was used to create a dichotomous variable for "high" vs. "low" individual knowledge about obstetric risks and danger signs.
- The Birth Preparedness Knowledge Index measured women's knowledge about important birth
 preparations, including deciding on the place of delivery; discussing delivery plans with her
 husband/family members; saving money for delivery; making arrangements for transport to the
 place of delivery; and identifying a potential blood donor. Women received a score of 1 for each

of the birth preparations that they were able to mention spontaneously. A cut-off of 2 was used to create a dichotomous variable for "high" vs. "low" individual knowledge about birth preparedness.

• The **Birth Preparedness Index** was created based on the number of preparations that women reported (unprompted) that they had made for their most recent birth, including whether they had: discussed facility delivery with their partner; discussed transport; discussed how to pay for the delivery; or set aside money for the delivery. A score between 0 and 4 was assigned to each woman, based on her responses, and a cut-off of 3 was used to create a dichotomous variable for "high" vs. "low" birth preparedness.

E. Data Analysis

Descriptive analyses were run for all variables of interest. Two-sample t-tests (for continuous variables) and chi squares (for categorical variables) were used to determine whether there were significant differences (defined at the conventional p<0.05 level) between intervention and comparison villages in each region, as well as to compare pre-intervention births to post-intervention births.

Bivariate analyses were performed to explore the association between facility delivery and various individual socio-demographic, contextual, and intervention factors. A cut-off value of p<0.10 was used as the criterion for excluding variables from the multivariate regression models. Multivariate logistical regression analysis was used to explore the effect of contextual and intervention variables on key outcomes of interest—namely women's knowledge about maternal health, level of birth preparedness, and facility delivery—while controlling for known determinants of maternity care (e.g., wealth, literacy, distance to a health facility, age, and parity). The association between intermediate outcomes (e.g., women's maternal health knowledge and level of birth preparedness) and facility delivery were also explored in a multivariate model.

III. Findings

The characteristics of women in the study sample are described below, followed by an overview of study findings related to community capacities and key outcomes of interest related to maternal health knowledge and care-seeking behaviors in intervention and comparison villages. Also discussed are findings related to the association between intervention and contextual factors and key outcomes of interest related to women's knowledge and maternity care seeking. Data from interviews with husbands are not presented; these data will be analyzed separately and presented in a subsequent report.

A. Sample Characteristics

The mean age of respondents was 30.5 years, and 84% were married; the mean age at marriage was 16.5 years (see Table 2). Approximately half of respondents reported being part of a polygamous marriage (data not shown). About one-third (34%) of women reported that they had ever attended school. Fewer than one-fifth (19%) reported that they could read easily, and the vast majority (76%) said that they could not read at all (not shown). Although the study sample focused on residents of the urban commune in both regions, most respondents (76%) reported that they had not traveled outside of their community/village during the past 12 months (not shown).

About half of the survey respondents (51%) reported being a member of a community group or association (e.g., a women's group, agricultural group, savings group, religious group, etc.); however, such membership was considerably higher in Kissidougou Region than in Labé (70% vs. 34%), and the mean number of groups in which respondents were involved was 1.5 in Kissidougou and 0.5 in Labé (not shown).

Characteristic	Total (N=2,335)	Intervention (N=1,515)	Comparison (N=820)
Mean age (in years)	30.5 years	30.6 years	30.4 years
Currently married	83.7%	84.9%	81.4%*
Mean age at marriage (in years)	16.5 years	16.6 years	16.3 years
Any education/schooling	33.8%	34.8%	31.9%
Literacy (read easily)	18.6%	17.6%	20.5%
Religion Muslim Christian	82.3% 17.7%	74.3% 25.7%	97.1%*** 2.9%***
Employed in remunerated activity	56.7%	53.8%	62.1%***
Member of community group	51.4%	56.0%	42.9%***
Mean wealth index score	3.05	2.94	3.25***
Had a birth in the past 5 years	57.1%	57.7%	55.8%
Live within 2km of health facility (maternity)	53.2%	47.9%	63.1%***
Live within 30 min of health facility (maternity)	45.2%	39.4%	55.9%***

Table 2. Characteristics of women, by study area

*Difference between intervention and comparison groups is statistically significant at $p \le 0.05$; *** Difference between intervention and comparison groups is statistically significant at $p \le 0.001$

While most characteristics of the study sample were comparable across intervention and comparison villages, there were small but statistically significant differences in several sociodemographic characteristics (see Table 2). Women in the intervention villages were more likely to be a member of a community group or association than were those in the comparison villages (54% vs. 48%). In contrast, women in the comparison villages were more likely to be employed in a remunerated activity, and their overall household wealth status was higher, than in the intervention areas.

Although the study covered a relatively small geographic area, there were large differences between the intervention and comparison villages in terms of religious affiliation. Almost all (97%) women in the comparison villages identified themselves as Muslim, compared with 74% of those in the intervention areas. Most of these differences were in Kissidougou, where some villages are almost entirely comprised of Muslims or of Christians.

Just over half of the women in the sample (57%) had had a live birth or a stillbirth during the five years prior to the study (Table 2). Of these women, 66% had given birth since the VSMCs were launched, and 34.1% had given birth prior to the launch of the intervention (data not shown). In addition, among those women who had given birth since the establishment of the VSMCs, there were some important differences between the intervention and comparison villages. As summarized in Table 3, women who gave birth after the launch of the VSMCs were generally younger and lower in parity, and they were less likely to be employed in a remunerated activity. The overall household wealth status of these women was significantly lower than that of women who gave birth during the period before the committees were established (2.66 vs. 3.41). Access to maternity care appeared to be comparable, however, between women with "post-intervention" births and those with "pre-intervention" births.

Characteristic	Pre-intervention births (N=455)	Post-intervention births (N=878)
Mean age (in years)	31.9	28.5***
Mean parity	4.47	4.02**
% with any education	29.9%	30.1%
% literate (i.e., can read easily)	15.6%	13.3%
% employed in remunerated activity	65.3%	59.3%*
% who are members of community group	52.1%	60.6%**
Mean wealth index score	3.41	2.66***
% living within 2km of health facility (maternity)	49.9%	49.1%
% living within 30 min. of health facility (maternity)	45.1%	41.6%

Table 3. Selected characteristics of women with a birth in the past 5 years, by timing of birth

* $p \le 0.05$; ** $p \le 0.01$; *** $p \le 0.001$

Among the subset of women who gave birth after the launch of the intervention (N=878), there were significant differences between intervention and comparison areas in education, membership in a community group, and employment in a remunerated activity (see Table 4). However, as with the full study sample, there was no significant difference between the intervention and comparison areas in women's ability to read. There also was no significant difference between areas in the mean household wealth index score. However, women's access to a facility providing maternity care did

differ significantly: More than half of women in the comparison areas (51%) reported living within 30 minutes of a health facility providing maternity care, compared with only 38% of women in intervention areas. Consistent with these findings, 58% of women in comparison villages reported living within 2 km of a facility where maternity care is provided, compared with 45% of women in intervention villages (Table 4).

Characteristic	Intervention (N=601)	Comparison (N=277)
Mean age (in years)	28.6	28.3
Mean parity	4.01	4.04
% with any education	32.3%	25.3%*
% literate (i.e., can read easily)	13.6%	12.6%
% employed in remunerated activity	56.1%	66.3%**
% who are members of community group	65.0%	50.5%***
Mean wealth index score	2.62	2.76
% living within 2km of health facility (maternity)	45.3%	57.5%**
% living within 30 min. of health facility (maternity)	37.5%	50.6%***

Table 4. Selected characteristics of women with a birth during the post-intervention period, by study area

* $p \le 0.05$; ** $p \le 0.01$; *** $p \le 0.001$

B. Community Capacities and Resources Related to Maternal Health

As described earlier, interviews with key informants and women were used to explore the extent to which community capacities had been created or enhanced in villages where the VSMCs were established. Differences between intervention and comparison areas were explored for the full sample and within each region (Kissidougou and Labé).

Survey results showed significant differences in basic knowledge related to maternal health between key informants in intervention villages (i.e., members of the VSMCs and community leaders) and comparable respondents in comparison villages. As shown in Table 5, almost all respondents in intervention villages (95%) were able to cite at least one way to prevent obstetric fistula, compared with 74% of respondents in comparison areas. Larger differences were observed in key informants' knowledge related to the causes of fistula and knowledge about danger signs during pregnancy or delivery. Two-thirds (67%) of key informants in intervention areas were able to cite at least two causes of obstetric fistula, compared with 29% in comparison villages. Knowledge about pregnancy and delivery-related danger signs was lower overall, but twice as many respondents in intervention areas as in comparison areas were able to cite at least three such danger signs (44% vs. 22%).

Significant differences were also observable between intervention and comparison villages in terms of the maternal health promotion activities reported by community-level resource persons. In response to a question about their activities during the past 12 months, 84% of respondents in intervention villages spontaneously mentioned conducting pregnancy monitoring activities and providing individual consultations to pregnant women as one of their main activities, compared with only 41% of similar cadres in comparison villages. There was little difference between villages in terms of community-level awareness-raising activities reported by community-level resource persons. In both areas, slightly more than half of respondents mentioned conducting health

talks/discussions on maternal health as an activity that they had conducted during the past 12 months. Fewer than half of respondents reported raising community concerns related to maternal health with local leaders (41% and 11%, respectively, in intervention and comparison villages) or referring or accompanying pregnant women to health services (20% and 4%).

Table 5. Maternal health knowledge among community resource persons and activities conducted by then
during previous 12 months, by study area

Maternal health knowledge	Intervention (N=61) Frequency (%)	Comparison (N=27) Frequency (%)
Able to cite 3 or more danger signs during pregnancy/delivery	27 (44.3%)	6 (22.0%)
Able to cite 2 or more causes of fistula	41 (67.2%)	8 (29.6%) **
Able to cite 1 or more ways to prevent fistula	58 (95.1%)	2 (74.1%) **
Maternal health promotion activities during past 12 months		
Had conducted individual counseling and/or pregnancy monitoring activities	51 (83.6%)	11 (40.7%) ***
Had led health talks/discussions on maternal health	37 (60.7%)	15 (55.6%)
Had raised community concerns with local leaders and/or participated in community action planning	25 (41.0%)	3 (11.1%) **
Had referred or accompanied women to health services	12 (19.7%)	1 (3.7%)

* $p \le 0.05$; ** $p \le 0.01$; *** $p \le 0.001$

Interviews with women were also used to assess the existence of effective support systems for maternal health within communities. Women in intervention communities were significantly more likely than women in comparison communities to report that such maternal health networks and resources existed within their communities (see Table 6). Two-thirds of respondents in intervention communities (66%) reported that there was a community-level committee involved in promoting maternal health, compared with 21% of women in comparison villages. Women in intervention areas were also more likely than their counterparts in comparison villages to report that community-level resource persons organized regular meetings to provide maternal health information (64% vs. 35%) and to spontaneously mention any community-level committee or agents as a main source of maternal health information and help for women in their community (45% vs. 14%).

Almost half of women in the intervention villages (47%) reported that pregnant women in their community received visits by community-level agents or resource persons, compared to 24% of women in comparison villages. However, these differences between intervention and comparison areas were primarily due to large differences observed in Labé Region, where 40% of women in intervention communities reported that pregnant women received such visits, compared with only 7% of women in comparison communities. In Kissidougou Region, there was no significant difference between intervention and comparison villages in the proportion of respondents reporting that pregnant women in their community received such visits (52% and 50%, respectively). This finding suggests either that women in comparison villages in Kissidougou were exposed to the VSMCs or that similar household-level maternal health promotion activities were being conducted in some of the comparison villages by other community-level agents (e.g., members of the local Health and Hygiene Committee or other community health promoters).

Table 6. Communit	v-level resources and	community norms re	ported by wom	en. by stud [.]	v area
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Community resources and networks for maternal health (MH)	Intervention (N=1,515)	Comparison (N=820)
Community committee is engaged in promoting maternal health.	66.5%	20.9%***
Pregnant women in community are regularly visited by community agents. Kissidougou Labé	46.5% 52.2% 40.0%	23.5%*** 50.0% 6.8%***
Community committee/agents organize regular meetings to provide maternal health information.	64.2%	35.0%***
Any community committee/agents mentioned as main source of maternal health information and help.	45.4%	13.7%***
Community environment and social support		
Maternal health is an issue that is taken seriously and discussed in public forums	63.5%	43.5%***
Community leaders actively involved in ensuring that women with complications reach care. [§]	63.4%	48.3%***
A poor family can access community funds during an obstetric emergency. [§]	27.7%	16.1%***
If a husband is traveling, community members will help a woman experiencing complications to reach help. [§]	75.2%	72.2%

***p ≤ 0.001; [§]Intervention/comparison differences not significant in Kissidougou region

In terms of perceptions about the community environment and social support for maternal survival, small but significant differences were observed between the intervention and comparison villages (see Table 6). Although differences between the intervention and comparison areas were statistically significant for the combined sample, this was due primarily to large differences between the intervention and comparison villages in Labé. In Kissidougou, most of these differences were not significant.

C. Women's Exposure to Community-Level Maternal Health Resource Persons

While the majority of respondents in the intervention areas appeared to be aware of the VSMCs, a much lower proportion of women reported first-hand exposure to community-level maternal health resource persons. For example, only 39% of women in intervention villages reported that they had ever attended a community discussion on maternal health, compared with 23% of women in comparison villages (see Table 7). Larger differences between intervention and comparison villages were observed in Labé, where the committees were established more recently, than in Kissidougou, where the committees have been active for a longer period. Interestingly, however, overall exposure appeared to be similar in the intervention areas in both regions.

Relatively large differences were observed in the proportion of women who spontaneously cited community-level resource persons or committees as the main source of information or help on maternal health issues (see Table 7). Approximately one-third of women in intervention communities specifically identified the VSMC as a main source of information or help, as did 4% of women in the comparison villages—a finding suggesting that a small percentage of women in comparison areas were exposed to the intervention under study.

About half of women in the intervention areas cited either the VSMC or some other community-level resource persons (members of the Health and Hygiene Committee, or a community-based health agent) as their main source of maternal health information (52%) or help (48%). Fewer than 20% of women in the comparison villages cited any community-level cadres or committees as the main source of maternal health information or help in their community.

	Intervention (N=1,515)	Comparison (N=820)
Ever attended a community-level discussion on maternal health	38.7%	22.8%***
Kissidougou	41.4%	27.2%***
Labé	35.6%	15.1%***
Cited VSMC as a main source of information	35.4%	4.1%***
Kissidougou	28.0%	5.3%***
Labé	44.1%	3.4%***
Cited VSMC as a main source of help	30.6%	3.7%***
Kissidougou	27.4%	3.1%***
Labé	34.2%	4.0%***
Cited any community committee or agent as a main source of information	51.9%	14.8%***
Cited any community committee or agent as a main source of help	47.8%	14.3%***

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Table 7.	womensex	posure to co	ommunity-leve	i resources/a	agents, ov	study are	a and	region
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***p ≤ 0.001

D. Women's Knowledge about Maternal Health and Obstetric Fistula

All women in the sample were interviewed to explore their knowledge about maternal health. Questions explored women's knowledge about the recommended number and timing of antenatal care visits, as well as their knowledge about danger signs during pregnancy and delivery and during the postpartum period. In addition, women's knowledge about obstetric fistula, the causes of fistula, and fistula prevention were also explored.

Maternal health knowledge was significantly higher in intervention villages than in comparison villages (see Table 8). For most variables, knowledge was considerably higher among women in Kissidougou than among those in Labé, and almost all differences between intervention and comparison villages in Kissidougou were statistically significant.

In both regions, knowledge about obstetric danger signs was generally low, and while differences between intervention and comparison areas were significant, they were small. For example, fewer than one-third of respondents (31% in intervention villages vs. 19% in comparison villages) were able to list three or more danger signs during pregnancy and delivery. Knowledge of danger signs after delivery was slightly higher, with 38% of respondents in intervention villages and 31% in comparison villages being able to list three or more danger signs after delivery.

Knowledge related to obstetric fistula was generally comparable to knowledge related to obstetric danger signs. Overall, 34% of women in intervention areas reported that they had heard of obstetric fistula and were able to describe what obstetric fistula is, compared with 25% of women in comparison areas (see Table 8). These differences between intervention and comparison areas were due to large differences in Labé, where the committees were recently established. Surprisingly,

knowledge about obstetric fistula was much lower overall in Kissidougou than in Labé, and in Kissidougou it was significantly higher in comparison villages than in intervention villages.

Maternal health knowledge questions	Intervention (N=1,515)	Comparison (N=820)
Know that women should have at least 4 ANC visits	69.4%	58.9%***
Kissidougou	69.9%	64.5%
Labé	68.9%	55.4%***
Able to list 3 or more danger signs during pregnancy or delivery	30.8%	19.1%***
Kissidougou	42.4%	28.9%**
Labé	17.2%	12.9%*
Mean number of pregnancy/delivery danger signs cited	1.95	1.58***
Kissidougou	2.36	1.92***
Labé	1.48	1.36
Able to list 3 or more danger signs after delivery	38.3%	30.9%***
Kissidougou	49.7%	44.7%
Labé	25.1%	22.1%
Mean number of postpartum danger signs cited	2.31	1.91***
Kissidougou	2.88	2.45***
Labé	1.64	1.57
Have heard of and able to describe obstetric fistula	33.7%	25.1%***
Kissidougou	17.1%	24.5%**
Labé	53.0%	25.5%***

Table 8. Women's knowledge about maternal health, by study area and region

*p ≤ 0.05; **p ≤ 0.01; ***p ≤ 0.001

Among those who had heard of obstetric fistula, the most commonly cited sources of information about fistula were radio (52%), the VSMC (21%), health workers (19%), and women who had been treated for fistula (15%) (data not shown). As described earlier, the Fistula Care project has supported radio programming in both regions, and women treated for fistula often give testimonials on community radio. There were large and significant differences between intervention and comparison villages in terms of the percentage of women who mentioned the VSMC or a community agent as their source of information about fistula (see Table 9). In intervention villages, the percentage of women citing the VSMC as a source of information about fistula was much higher in Labé (47.3%) than in Kissidougou (18%) (data not shown).

Table 9. Information sources and knowledge about obstetric fistula among women who had heard of fistula,by study area and region

Among women who had heard of obstetric fistula	Intervention (N=855)	Comparison (N=428)
Source of information about fistula		
Radio	45.5%	65.4%***
VSMC	30.9%	0.7%***
Community agent	15.9%	4.9%***
Health worker	18.6%	19.4%
Woman treated for fistula	15.9%	14.5%

Among women who were able to describe obstetric fistul	a	Intervention (N=511)	Comparison (N=206)
Able to list 2 or more causes of obstetric fistula	Kissidougou Labé	47.9% 54.0% 45.7%	31.6%*** 21.8% *** 37.5%
Able to list at least 1 way to prevent obstetric fistula	Kissidougou Labé	95.7% 87.8% 98.7%	90.3%*** 76.9%* 98.4%

*p ≤ 0.05; ***p ≤ 0.001

Among women who had heard of and were able to describe obstetric fistula, 48% of those in intervention villages were able to list at least two causes of the condition, compared with 32% in comparison villages (see Table 9). Differences by study area in knowledge about fistula causes and fistula prevention were significant in Kissidougou, but not in Labé.

Although it was not a focus of the intervention, the study also explored women's knowledge about important birth preparedness measures (see Table 10). Only about one-third of respondents were able to spontaneously list at least two of the following as important preparations for childbirth: decide on the place of delivery; discuss the delivery plan with their partner; save money for delivery; make arrangements for transport to the place of delivery; or identify a potential blood donor. Knowledge of birth preparedness was higher in intervention areas than in comparison areas (38% vs. 24%, respectively), as was the mean number of birth preparedness measures spontaneously mentioned by respondents (1.39 and 0.99, respectively). Differences in knowledge about birth preparedness were only significant for Kissidougou (50% vs. 20%). In Labé, overall knowledge about birth preparedness measures was lower (only about one-quarter of respondents could identify at least two birth preparations), and there was no difference between intervention and comparison areas.

		Intervention (N=1,515)	Comparison (N=820)
Able to cite 2 or more important preparations for childbirth	Kissidougou Labé	38.2% 49.9% 24.5%	23.5%*** 20.4%*** 25.5%
Mean number of birth preparedness measures mentioned	Kissidougou Labé	1.39 1.72 1.03	0.99*** 0.87*** 1.07

Table 10. Women's knowledge about important birth preparedness measures, by study area and region

***p ≤ 0.001

E. Attitudes Related to Maternal Health and Maternity Care Seeking

Respondents were asked whether they agreed or disagreed with statements concerning social, gender, and cultural norms surrounding childbirth in their community. Statements included:

- Delivering at a health facility is considered a sign of a woman's weakness or fault/sin.
- Pregnancy and childbirth are issues that only concern women.
- Men are increasingly involved in maternal health issues.
- Men see it as their responsibility to help their wives prepare for safe delivery.
- Birth preparedness is increasingly a norm/common practice in the community.

Although most respondents in both regions reported that pregnancy and childbirth were issues that only concern women, the majority also reported that men in their community were increasingly involved in maternal health. Fewer than one-third of women reported that delivering at a health facility was perceived in their community to be a sign of weakness or some fault/sin on the woman's part (e.g., adultery).

A few significant differences between intervention and comparison villages were observed in each region (see Table 11). Generally, in Kissidougou, women in intervention villages were more likely than their counterparts in comparison villages to view community norms as supportive of birth preparedness and of male partner involvement in maternal health. In Labé, the reverse was true. For the combined sample (across both regions), differences in this measure were small and not statistically significant (see Table 11).

Table 11. Women's perspectives on community attitudes and norms related to maternal health issue	es, by
study area	

	Intervention (N=1,515)	Comparison (N=820)
Believe that pregnancy and childbirth are viewed as issues that only concern women	60.5%	60.4%
Believe that delivering at a health facility is not perceived as a sign of weakness/fault	68.4%	71.7%
Agree that men are increasingly involved in maternal health issues Kissidougou Labé	75.2% 79.8% 69.9%	72.9% 69.2%*** 75.3%*
Agree that birth preparedness has become community norm Kissidougou Labé	65.6% 73.7% 56.9%	63.7% 56.9%*** 67.9%***

*p ≤ 0.05; ***p ≤ 0.001

As the VSMCs focus much of their awareness-raising efforts on obstetric fistula, women's perceptions of community attitudes toward fistula and how a woman with fistula would be treated in their community were also explored. While more than half of respondents indicated that a woman with fistula would be accepted in their community as a person with a disability, responses suggested that such women are nonetheless likely to be socially marginalized. Close to two-thirds of respondents said that in their community women with fistula might be socially excluded, and more than half said that most people in their community would likely refuse to eat food prepared by a woman with fistula. About three-fourths of respondents said that a woman with fistula would be unlikely to be invited to share meals, and fewer than one-third said that a woman with fistula would be welcomed at community events or meetings. These differences between intervention and comparison villages were small, but significant (see Table 12).

Table 12. Perspectives on community attitudes toward women living with fistula, by study area

	Intervention (N=1,515)	Comparison (N=820)
Believe that a woman with fistula would be accepted as a person with a disability by others in the community	59.3%	57.4%
Perceive that women with fistula might be socially excluded by other community members	61.3%	67.3%**

	Intervention (N=1,515)	Comparison (N=820)
Believe that most people in the community might refuse food prepared by a woman with fistula	56.9%	57.3%
Believe that a woman with fistula would be invited to share meals with others	24.4%	18.5%**
Believe that a woman with fistula would be welcome to attend community events/meetings	33.8%	28.3%**

*p ≤ 0.05; **p ≤ 0.01

F. Exposure to Community- and Facility-Based Interventions to Promote Maternal Health among Women with Recent Births

Among the subset of women who had given birth since the committees were established, exposure to community-level committees or resource persons appeared to be comparable to exposure in the full sample (see Table 7). Although women in intervention communities were more likely to report such exposure, fewer than half of the women with a post-intervention birth (43%) reported having attended any community discussion on maternal health (see Table 13). In comparison villages, one-quarter (25%) of women with a recent birth reported such exposure. The difference between intervention and comparison villages was relatively large and significant in Labé (43% vs. 15%, respectively); this difference was smaller in Kissidougou (42% vs. 29%, respectively), but nonetheless significant.

Overall, about one-third of women who gave birth since the VSMCs were established reported having been visited by a community agent or resource person during their pregnancy (see Table 13). Across both regions, differences between intervention and comparison villages were relatively small but significant (37% vs. 22%). In Labé, a large and significant difference was observed in pregnancy monitoring: Thirty-one percent of women in intervention villages reported having been visited at least once by a community agent or VSMC member during their most recent pregnancy, compared with only 1% of women in comparison villages. In Kissidougou, however, among women with a post-intervention birth, there was no difference in this measure between the intervention and comparison villages (40% vs. 34%); this suggests that women in the comparison villages in Kissidougou were exposed to comparable pregnancy monitoring activities at the community level.

In Kissidougou, there were significant differences in the advice provided during these visits: Women in the intervention villages in Kissidougou who had been visited at least once during pregnancy were more likely to have been advised on a place of delivery and on birth preparedness than were women in the comparison villages (see Table 13). In Labé, where very few women in the comparison villages reported being visited during their pregnancies, the sample was too small to detect differences in the content of the advice provided during these visits.

Table 13. Exposure to community-level support systems during pregnancy among women with post-
intervention birth, by study area and region

	Intervention (N=601)	Comparison (N=277)
Attended a community discussion on maternal health	42.6%	24.9%***
Kissidougou	42.4%	28.9%**
Labé	43.0%	15.6%***
Visited by community agent/VSMC member at least once during	37.3%	22.4%***
pregnancy Kissidougou	39.9%	33.7%
Labé	30.8%	1.0%***
Among women who were visited at least once during pregnancy:	(N=224)	(N=62)
Mean no. of visits made by community agent/committee member	4.4	3.9
Informed about danger signs by community agent/VSMC member	56.2%	58.1%
Advised on place of delivery by community agent/VSMC member	79.0%	61.3%**
Kissidougou†	76.0%	60.7%*
Advised on any birth preparedness measure by community agent/VSMC		
member	67.0%	56.5%
Kissidougou†	73.1%	57.4%*
Mean no. of birth preparedness measures advised by community		
agents/VSMC member	1.6	0.7**
Kissidougou†	1.9	0.7***

* $p \le 0.05$; ** $p \le 0.01$; *** $p \le 0.00.1$ †Labé data not presented because of small numbers.

Among women who sought professional ANC at least once during pregnancy, the content of this care appeared to be comparable across the intervention and comparison areas. For the full sample, slightly more than half of the respondents reported that they had been advised during an ANC consultation about where to deliver. Fewer women recalled being advised on danger signs or on any birth preparation (see Table 14). Within Labé Region, there were significant differences between intervention and comparison villages in the content of ANC counseling on place of delivery and birth preparedness (see Table 14).

Table 14. Content of antenatal care consultations	, among women with post-intervention births who
attended ANC at least once, by study area	

Information and advice given during ANC	Intervention (N=541)	Comparison (N=258)
Informed about danger signs	42.5%	38.4%
Advised on place of delivery	55.5%	59.5%
Kissidougou	60.5%	55.2%
Labé	42.9%	68.7%***
Advised about any birth preparation	47.3%	46.5%
Kissidougou	54.8%	48.6%
Labé	28.8%	42.2%*

As described earlier (see Section II), indexes were constructed to describe and measure women's exposure to multifaceted influences and interventions at both community and health facility levels. These indexes included a **contextual index** related to community support systems for maternal

health, as well as two **intervention exposure indexes** that measured women's individual exposure to maternal health promotion interventions at the community and facility levels (see Box 1). Differences between intervention and comparison villages were explored among women with recent births through bivariate analyses.

Box 1. Summary of Composite Variables Related to Contextual Factors and Intervention Exposure

- The Community Support System Index reflects "High" or "Low" levels of social support systems at the community/village level, based on whether more than 60% of women in the village reported that community-level resource persons (committee members, community-based agents) were actively involved in all of the following: conducting pregnancy monitoring visits to pregnant women; leading discussions or awareness-raising sessions on maternal health; and being the main source of information and help for maternal health concerns.
- The **Community Support Exposure Index** reflects a "High" or "Low" level of exposure at the individual level to community-level maternal health support systems. The Community Support Exposure Index is based on whether an individual woman agreed that there was a local committee involved in promoting maternal health; mentioned (unprompted) either the VSMC or another local committee or agent as the main source of maternal health information and help; or had personally attended a community-level meeting on maternal health.
- The **Quality Antenatal Care Exposure Index** reflects "High" or "Low" levels of exposure to ANC counseling on pregnancy- and delivery-related danger signs, birth preparedness, and delivery at a health facility.

As shown in Table 15, the intervention and comparison villages differed significantly in terms of the community's having a strong maternal health support system (Community Support System Index) and in terms of individual exposure to community-level efforts to promote maternal health (Community Support Exposure Index). Although a significant percentage of women in comparison villages reported that that community-level resource persons were active in promoting maternal health through community discussions and visits to pregnant women, none of the comparison villages received a high score on the Community Support System Index, suggesting that the coverage and intensity of these activities was lower than in the intervention villages, where the VSMC are very active and engaged.

Contextual index	Intervention (N=601)	Comparison (N=277)
Community Support System Index (i.e., >60% of women in community reported existence of maternal health support system in their village) Kissidougou Labé	28.6% 36.8% 8.1%	
Intervention Exposure Indexes	Intervention (N=601)	Comparison (N=277)
Community Support Exposure Index (indicating individual exposure to community-level maternal health support/resources) Kissidougou Labé	<u>55.6%</u> 57.6% 50.6%	<u>15.5%***</u> 22.7%*** 2.1%***
ANC Counseling Index (indicating that they received counseling on place of delivery and birth preparedness during ANC) Kissidougou Labé	47.5% 54.5% 30.1%	45.5% 45.4% 45.8%*

Table 15. Percentage of women with "high" scores on contextual and intervention indexes, by study area

*p ≤ 0.05; ***p ≤ 0.001

Women in intervention villages were three times more likely than women in comparison villages to report individual exposure to community-level maternal health promotion interventions (Community Support Exposure Index). Large and significant differences in individual exposure were observed in each region (see Table 15).

In terms of facility-level maternal health promotion interventions (e.g., the content of ANC counseling), no differences between intervention and comparison villages were observed for the combined sample (both regions) or in Kissidougou in terms of the percentage of women with high scores on the ANC Counseling Index. In Labé, however, women in comparison villages were significantly more likely to have high scores on the ANC Counseling Index, indicating that exposure to this potentially confounding intervention was not comparable across the study areas in Labé (see Table 15); women in comparison villages in Labé appeared to have received better counseling during their ANC visits than women in the intervention villages.

G. Outcomes of Interest: Knowledge, Birth Preparedness, and Care Seeking during Pregnancy and Childbirth

Differences between intervention and comparison villages in terms of intermediate outcomes (as measured by the Obstetric Risk Knowledge Index, the Birth Preparedness Knowledge Index, and the Birth Preparedness Index) are presented in Table 16. Women in intervention villages were significantly more likely to have high scores on the Birth Preparedness Knowledge Index (41% vs. 27%). However, there were no significant differences between intervention and comparison villages in the percentage of women with high scores on the Obstetric Risk Knowledge Index.

Levels of birth preparedness did not differ significantly for the combined sample; however, there were significant differences between the intervention and comparison villages within each region. In Kissidougou, significantly more women in intervention villages had high scores on the Birth Preparedness Index than in comparison villages (30% vs. 15%). In Labé, the opposite was true: The percentage of women with high scores on the Birth Preparedness Index was higher in comparison villages (44% vs. 25%).

	Intervention (N=601)	Comparison (N=277)
Percentage of women with a "high" score on the Obstetric Risk Knowledge Index	22.3%	22.0%
Percentage of women with a "high" score on the Birth Preparedness Knowledge Index	40.9%	26.7%***
Percentage of women with a "high" score on the Birth Preparedness Index Kissidougou Labé	28.3% 29.7% 25.0%	25.0% 15.0%*** 43.8%***

Table 16. Intermediate outcomes (knowledge and birth preparedness) among women with postintervention births, by study area

***p ≤ 0.001

Some small but important differences were observed in the use of professional maternal health services during pregnancy and delivery (see Table 17). Overall, women in intervention villages were more likely to attend ANC at least four times (60% vs. 50%). In Kissidougou, women in intervention villages were more likely to deliver at a health facility (50% vs. 40%). In Labé, where the VSMCs were

more recently established, no significant differences were observed between intervention and comparison villages in women's use of facility delivery.

Table 17. Care seeking during pregnancy, delivery, and postpartum among women with post-intervention	ı
births, by study area	

Care-Seeking Outcomes	Intervention (N=601)	Comparison (N=277)
Attended ANC at least once	90.0%	93.1%
Attended ANC at least four times	59.6%	50.0%**
Mean number of ANC visits	4.67	4.52
Mean timing of first ANC visits (in months of gestation)	3.1 months	2.9 months
Delivered at a health facility Kissidougou Labé	51.9% 49.7% 57.6%	49.1% 40.3%* 65.6%
Sought care for signs related to severe obstetric complications	77.7%	78.7%

*p ≤ 0.05; **p ≤ 0.01

Delivery care seeking among women with post-intervention births was compared with that of women with pre-intervention births across intervention and comparison villages. Interestingly, the data showed that use of facility delivery was significantly lower among women with a post-intervention birth (see Table 18). Care seeking for signs of severe obstetric complications was also lower among the group of women who had given birth since the committees were launched. These findings were surprising, as they suggest a decline in use of both routine and emergency obstetric care. However, the differences could be attributable to observed socioeconomic differences between the two groups of women. As noted earlier (see Table 3), women who gave birth after the committees were established were significantly younger and poorer than those who gave birth before the VSMCs were established.

Table 18. Differences in care seeking, among women with pre-intervention and post-intervention births, by study area

	Pre- Intervention I (N=455)	
Delivered at a health facility	58.9%	51.0%**
Sought care for signs related to severe obstetric complications	85.5%	78.1%*

*p ≤ 0.05; **p ≤ 0.01

H. Determinants of Maternal Health Knowledge

As described in the logic model underlying the intervention (see Figure 1), contextual factors (such as enhanced community support systems) and exposure to the intervention are expected to contribute to increased knowledge and awareness about maternal health risks at the population level. To test this hypothesis, bivariate analyses were performed to explore the association between contextual and intervention exposure indexes and a high level of knowledge about obstetric risks, danger signs, and fistula causes (the Obstetric Risk Knowledge Index), as well as about birth preparedness (the Birth Preparedness Knowledge Index). In addition, the association between quality counseling during ANC (the ANC Counseling Index) and individual knowledge was also

explored. These analyses were performed for the subset of women (both intervention and comparison villages) who gave birth after the VSMCs were established.

As shown in Table 19, women's **knowledge about obstetric risks and danger signs** was positively and significantly associated with the content of ANC and with women's individual exposure to community-level maternal health promotion activities. However, living in a community with a high score on the Community Support System Index was not significantly associated with women's knowledge about obstetric risks.

Table 19. Associations between contextual and intervention exposure and knowledge index scores amon	g
women with post-intervention births	

Contextual and Intervention Exposure Indexes	"High" Obstetric Risks Knowledge Index Score Crude OR (95% CI)	"High" Birth Preparedness Knowledge Index Score Crude OR (95% CI)
Community Support System Index (>60% of women in community report existence of maternal health support system in their village)	1.26 (0.86, 1.86)	6.04 (4.19, 8.72)***
Community Support Exposure Index (Individual exposure to community-level maternal health support/resources)	1.67 (1.23, 2.30)**	2.90 (2.18, 3.85)**
ANC Counseling Index(Counseling on place of delivery and birth preparedness during ANC)	2.23 (1.58, 3.15)***	2.05 (1.53, 2.76)***

p ≤ 0.01; *p ≤ 0.001

The contextual variable (Community Support System Index) and individual exposure to communityand facility-level maternal health promotion interventions were positively associated with high levels of **knowledge about birth preparedness**. Women living in communities with high Community Support System Index scores were more than six times as likely to have a "High" score on the Birth Preparedness Knowledge Index (crude odds ratio [OR] 6.04) as were women living in communities with low Community Support System Index scores. Women reporting individual exposure to community-level maternal health promotion activities (Community Support Exposure Index) were almost three times as likely to have high levels of knowledge about birth preparedness as were women with low levels of exposure. The content of antenatal counseling on birth preparedness was also positively and significantly associated with women's level of birth preparedness knowledge (crude OR, 2.05).

Based on the results of the bivariate analyses, multivariate regression analysis was used to explore the association of contextual and intervention variables with high knowledge scores. For the Obstetric Risk Knowledge Index, the two intervention exposure indexes shown to be significantly associated with high knowledge (i.e., Community Support Exposure Index and ANC Counseling Index) were included in a basic model (see Model 1, Table 20). This multivariate analysis showed that ANC counseling was significantly associated with high knowledge about obstetric risks and danger signs (adjusted OR, 2.1), but that individual exposure to community-level support systems was not.

A second model controlled for literacy, which was significantly associated with knowledge about obstetric risks in bivariate analysis (crude OR, 1.18; 95% CI, 0.75, 1.859). In this multivariate model (see Model II, Table 20), only the content of ANC counseling appeared to be a significant determinant of high levels of knowledge about obstetric risks and danger signs. Women with high

scores on the ANC Counseling Index were two times as likely to have high levels of knowledge about obstetric risks and danger signs as were women with low scores on the index.

Knowledge of Obstetric Risks, Danger Signs and Fistula	Model I Adjusted OR (95% CI)	Model II Adjusted OR (95% CI)
Contextual & intervention exposure variables		
Community Support Exposure Index (Individual exposure to community-level maternal health support/resources)	1.35 (0.96, 1.926)	1.32 (0.93, 1.87)
ANC Counseling Index(Counseling on place of delivery and birth preparedness during ANC)	2.10 (1.48, 2.99) ***	2.08 (1.47, 2.97) ***
Socio-Demographic Variables Literacy (ability to read easily)		1.07 (0.99, 1.15)
		- (

Table 20. Determinants of individual knowledge related to obstetric risks, among women with "post-intervention" births

***p ≤ 0.001

Similar analyses were performed to explore determinants of knowledge about birth preparedness. As shown in Table 21, all three contextual and intervention indexes were positively and significantly associated with high scores on the Birth Preparedness Knowledge Index. Bivariate analyses also showed that high scores on the Birth Preparedness Knowledge Index were associated with women's literacy (crude OR, 1.53; 95% CI, 1.03, 2.27) and household wealth status, which was negatively associated with birth preparedness knowledge (crude OR, 0.86; 95% CI, 0.78, 0.95). Being 25 years of age or older at time of most recent birth also appeared to be associated with increased knowledge related to birth preparedness; however, statistical significance was marginal (p=0.06). Other individual and socioeconomic variables, such as parity, and distance to a health facility providing maternity care were not associated with knowledge about birth preparedness.

In a basic multivariate model, all three contextual and intervention exposure indexes remained significantly and positively associated with women's knowledge about birth preparedness (see Model 1, Table 21). The contextual variable (i.e., living in a village with a high score on the Community Support System Index) had the strongest effect on birth preparedness knowledge; women living in communities with strong and effective community-level support systems for maternal health were more than four times as likely to have high levels of knowledge about birth preparedness. Individual exposure to community-level support systems and to good counseling during antenatal care also remained significantly and positively associated with birth preparedness knowledge (see Model I, Table 21).

Literacy, wealth, and age were included in a second multivariate model (see Model II, Table 21). In the expanded model, all three contextual and intervention exposure indexes remained significantly and positively associated with birth preparedness knowledge, as was women's literacy (i.e., ability to read easily). Wealth and age were not associated with women's birth preparedness knowledge.

Table 21. Determinants of individual knowledge related to birth preparedness among women with postintervention births

Knowledge of Birth Preparedness	Model I Adjusted OR (95% Cl)	Model II Adjusted OR (95% CI)
Contextual & intervention variables		
Community Support System Index (>60% of women in community report existence of	4.45 (2.96, 6.70) ***	4.22 (2.77, 6.42) ***
maternal health support system in their village)		
exposure to community-level maternal health	1.88 (1.36, 2.62)	1.91 (1.372, 2.66) ***
ANC Counseling Index(Counseling on place of	1.72 (1.25, 2.36) **	1.67 (1.21, 2.31) **
delivery and birth preparedness during ANC)		
Socio-demographic variables		
Wealth (richest quintile)	—	0.94 (0.83, 1.06)
Literacy (ability to read easily)	—	1.73 (1.07, 2.79) *
Age (age \geq 25 years at time of recent birth)	—	1.16 (0.83, 1.61)

* $p \le 0.05$; ** $p \le 0.01$; *** $p \le 0.001$

I. Determinants of Birth Preparedness

Similar analyses were performed to explore determinants of high levels of household preparation for childbirth (i.e., at least three out of five important birth preparations made) among women with post-intervention births. Bivariate analyses showed that high scores on the Community Support System Index, the Community Support Exposure Index, and the ANC Counseling Index were all significantly associated with high levels of birth preparedness (see Table 22). The receipt of ANC counseling on birth preparedness was especially important: Women with a high score on the ANC Counseling Index were more than six times as likely to engage in high levels of preparation for childbirth. Similarly, women living in communities with a high score on the Community Support System Index were more than two times as likely to engage in high levels of birth preparedness, compared with women living in communities with a low score on the Index.

Table 22. Associations between contextual and intervention exposure and high scores on the BirthPreparedness Index among women with post-intervention births

	High levels of Birth Preparedness Crude Odds Ratio (95% CI)
Community Support System Index (>60% of women in community report existence of maternal health support system in their village)	2.04 (1.44, 2.90) ***
Community Support Exposure Index (Individual exposure to community-level maternal health support/resources)	2.69 (1.98, 3.66) ***
ANC Counseling Index(Counseling on place of delivery and birth preparedness)	6.40 (4.42, 9.27) ***

***p ≤ 0.001

Of the individual and socio-demographic variables, only literacy was associated with high levels of preparation for childbirth; however, its significance was marginal (p=0.07). Wealth, parity, age, and distance to a health facility providing maternity care were not associated with high levels of preparation for childbirth.

The three contextual and intervention exposure variables were included in a multivariate model (see Model 1, Table 23). In this model, living in a community with a strong support system for maternal

health did not appear to be associated with higher levels of birth preparedness. However, individual exposure to community-level resource persons was significantly and positively associated with such preparation; women with individual exposure to community-level resource persons were twice as likely as others to engage in high levels of preparation for childbirth. ANC counseling was especially important; women with high scores on the ANC Counseling Index were more than five times as likely to engage in high levels of preparation for birth as were women with lower scores on this index.

Literacy² and the two intermediate knowledge variables (Obstetric Risk Knowledge Index and Birth Preparedness Knowledge Index) were included in a second multivariate model. In the expanded model, ANC counseling and individual exposure to community-level resource persons remained significantly and positively associated with birth preparedness, along with high scores on the Birth Preparedness Knowledge Index. Controlling for literacy, women with high scores on the ANC Counseling Index were more than five times as likely to prepare for childbirth; women with individual exposure to community-level maternal health resource persons were almost two times as likely to make such preparations. Literacy and knowledge about obstetric risks were not associated with women's level of birth preparedness; these findings suggest that women with low levels of literacy are able to prepare for childbirth. They also suggest that knowledge about obstetric risks and danger signs is not a significant driver of preparation for childbirth.

Variables	Model I Adjusted OR	Model II Adjusted OR
Contextual & intervention exposure variables Community Support System Index (>60% of women in community report existence of	1.112 (0.712, 1.736)	0.736 (0.475, 1.227)
maternal health support system in their village) Community Support Exposure Index (Individual exposure to community-level maternal health	2.151 (1.485, 3.116) ***	1.846 (1.255, 2.714) **
ANC Counseling Index(Counseling on place of delivery and birth preparedness during ANC)	5.632 (3.864, 8.208) ***	5.573 (3.774, 8.230) ***
Socio-demographic variables Literacy (cannot read/reads with difficulty)	1.32 (0.81,2.16)	1.21 (0.73, 8.23)
Intermediate outcome variables Obstetric Risk Knowledge Index (knowledge about obstetric risks, danger signs & fistula causes)	_	0.706 (0.458, 1.088)
Birth Preparedness Knowledge Index (Knowledge about birth preparedness)	_	3.376 (2.277, 5.006) ***

Table 23. Determinants of birth preparedness among women with post-intervention births

p ≤ 0.01; *p ≤ 0.001

J. Determinants of Facility Delivery

Bivariate analyses were performed to explore the association between contextual and intervention exposure indexes and facility delivery, as well as the association between intermediate outcomes (Obstetric Risk Knowledge Index, Birth Preparedness Knowledge Index, and Birth Preparedness Index scores) and facility delivery. Bivariate analyses were also used to explore the association between common individual and socio-demographic determinants of facility delivery, such as wealth, literacy, age, parity, and distance to a facility providing maternity care. As shown in Table 24, these bivariate analyses showed that women were significantly more likely to deliver at a health facility if they lived

² As noted earlier, a cut-off criterion of $p \le 0.10$ was used to exclude variables from the multivariate model.

in a village with a high score on the Community Support System Index; if they were individually exposed to the maternal health promotion activities of community resource persons; and if they received counseling on facility delivery and birth preparedness during their ANC consultations.

Women's birth preparedness knowledge and their level of birth preparation were also positively and significantly associated with facility delivery in the bivariate analyses, as were individual and sociodemographic variables, such as wealth, literacy, and distance to a facility where maternity care is provided (see Table 24). Parity and age at the time of the most recent birth appeared to be negatively associated with facility delivery; however, age was only marginally significant (p=0.064). It was noteworthy that women's knowledge about obstetric risks, danger signs, and fistula causes (i.e., the Obstetric Risk Knowledge Index) was *not* associated with increased use of facility delivery.

Table 24. Associations between contextual variables, intervention exposure, and intermediate outcomes
and facility delivery among women with a post-intervention birth

Contextual and Intervention Exposure Indexes	Facility Delivery Crude OR (95% Cl)			
Community Support System Index (>60% of women in community report existence of maternal health support system in their village)	2.33 (1.64, 3.32) ***			
Community Support Exposure Index (Individual exposure to community- level maternal health support/resources)	1.50 (1.15, 1.96) **			
Antenatal Counseling Exposure Index (Counseling on place of delivery and birth preparedness during ANC)	1. 70 (1.28, 2.25) ***			
Intermediate Outcome Indexes				
Obstetric Risks Knowledge Index (Obstetric Risk Knowledge Index (knowledge about obstetric risks, danger signs & fistula causes)	1.22 (0.89, 1.68)			
Birth Preparedness Knowledge Index (Knowledge about birth preparedness)	2.08 (1.57, 2.76) ***			
Birth Preparedness Index (≥ 3 birth preparations made)	3.31 (2.21, 4.18) ***			
Individual and Socio-Demographic Variables				
Wealth (richest quintile)	1.29 (1,17, 1.42) ***			
Literacy (ability to read easily)	3.96 (2.50, 6.27) ***			
Parity (higher parity vs. lower parity)	0.91 (0.86, 0.97) **			
Age at most recent birth (≥25 years)	0.77 (0.59, 1.02) (p=0.064)			
Distance to nearest facility providing maternity care (≤2 km)	2.98 (2.251, 3.938) ***			

*p ≤ 0.05 ; **p ≤ 0.01 ; ***p ≤ 0.001

The contextual and intervention exposure variables were included in a multivariate model, along with the five individual/socio-demographic variables that met criteria for inclusion (see Table 24). As shown in Table 25 (Model I), all three contextual and intervention indexes were significantly associated with women's use of health facilities for delivery; controlling for wealth, literacy, parity, age, and distance to maternity care, women living in villages with strong and effective maternal health support systems were more than twice as likely to deliver at a health facility than were women living in communities without such support systems. Similarly, women reporting individual exposure to community-level and facility-level interventions to promote maternal health were 1.4

and 1.5 times, respectively, more likely to deliver in a health facility than were women without such exposure.

A second multivariate model controlled the two intermediate outcome variables shown to be significantly associated with facility delivery in addition to individual and socio-demographic variables. In this expanded model, the Community Support System Index remained significantly associated with facility delivery; women living in villages where more than 60% of women reported the existence of community-level support systems for maternal health were more than twice as likely to deliver at a facility than were women living in villages with a low score on the index (adjusted OR, 2.161).

Variables	Model I Adjusted OR (95% Cl)	Model II Adjusted OR (95% Cl)
Contextual & intervention exposure variables		
Community Support System Index (>60% of women in community report existence of maternal health support system in their village)	2.37 (1.54, 3.43) ***	2.161 (1.381, 3.382) **
Community Support Exposure Index (Individual exposure to community-level maternal health support/resources)	1.42 (1.01, 1.98) *	1.266 (0.898, 1.786)
ANC Counseling Index(Counseling on place of delivery and birth preparedness during ANC)	1.54 (1.12, 2.12) **	1.265 (0.901, 1.776)
Socio-demographic variables		
Wealth (richest quintile)	1.24 (1.12, 2.12) ***	1.23 (1.09, 1.39) **
Literacy (ability to read easily)	2.64 (1.57, 4.44) ***	2.50 (1.48, 4.19) **
Distance (≤2 km from maternity care) Parity (higher parity vs. lower parity))	3.09 (2.25, 4.24) ***	3.08 (2.24, 4.25) ***
Age (<a>25 years old at time of recent birth)	0.94 (0.86, 1.12)	0.93 (0.86, 1.02)
	1.01 (0.67, 1.49)	0.97 (0.65, 1.44)
Intermediate outcome variables		
Birth Preparedness Knowledge Index	—	1.308 (0.90, 1.78)
Birth Preparedness Index (≥ 3 birth preparations made)	_	1.88 (1.27, 2.79) **

Table 25. Determinants of fa	cility delivery, among v	women with post-int	ervention births

*p ≤ 0.05; **p ≤ 0.01; ***p ≤ 0.001

In the expanded model, individual exposure to community- or facility-level maternal health interventions was not significantly associated with higher levels of facility delivery after inclusion of the intermediate outcome variables. However, women's level of birth preparation remained significantly associated with their use of facility delivery. In other words, controlling for wealth, literacy, and distance to a health facility, women making at least three preparations for childbirth were almost twice as likely to deliver at a facility as those who did not engage in such preparations. The effect of women's knowledge about birth preparedness was attenuated in the expanded model and was not statistically significant—a finding that is not surprising, given the significant association between birth preparedness knowledge and levels of birth preparedness (see Table 23).

IV. Discussion

The study found **measurable differences between intervention and comparison villages in terms of community-level capacity for maternal health promotion**. In intervention villages, community-level resource persons had higher levels of knowledge about maternal health and fistula prevention than their counterparts in nonintervention villages, and these cadres reported higher levels of activity in promoting maternal health. Confirming the findings from key informants, the study showed measurable differences at the population level between intervention and comparison villages in terms of exposure to community-level maternal health promotion efforts.

Importantly, the study showed that **knowledge about maternal health was higher in intervention villages than in comparison villages**. Significantly more women in intervention communities knew the recommended number of antenatal care visits, and were able to list danger signs during pregnancy and childbirth, as well as after delivery. **Knowledge about obstetric fistula**—**the focus of the VSMCs' awareness-raising efforts**—**was also significantly higher in intervention villages**.

Women's knowledge about maternal health was generally higher in Kissidougou Region, where the VSMCs were originally established, than in Labé. In contrast, knowledge about obstetric fistula was considerably higher in Labé, where the committees had been active for a shorter period of time, than in Kissidougou. These findings were surprising, but it is possible that in Kissidougou, where the committees had been in existence longer, "fatigue" had set in on among both VSMCs and community members at large: The VSMCs may have decreased their emphasis or focus on obstetric fistula after several years, and community members may have become less interested in attending sessions. On the other hand, possible differences in the content of the training provided to the committees in Labé may have rendered these committees more effective in their awareness-raising efforts—whether through home visits/pregnancy monitoring or through other awareness-raising activities, such as health education talks and community discussions.

Among women who gave birth after the VSMCs were established, small but significant differences were observed between intervention and comparison villages in women's use of antenatal care (at least four ANC visits. In addition, in Kissidougou Region, women in intervention villages were significantly more likely to deliver at a health facility than were women in comparison villages. However, no such difference was observed in Labé Region. In both regions, there was no difference in care seeking for signs of serious obstetric complications during pregnancy, delivery, or the postpartum period. While disappointing, these findings should be viewed in context; it was noteworthy that in both intervention and comparison villages, there was a small but significant decline in the use of intrapartum care and care seeking for complications between women who gave birth before the VSMCs were launched and those who gave birth subsequently. This result was surprising but may be due to significant differences in the sample; in intervention villages, women who gave birth in the period after the committees were launched were significantly younger and poorer than those who gave birth before the committees were established.

The study identified several important determinants of maternity care seeking. Overall, the study suggests that where effective community-level support systems for maternal health promotion existed, they had a strong and positive influence on maternity care seeking; controlling for wealth, literacy, parity, age, and distance to a health facility, women living in a village where a high proportion of women reported the presence of active community-level maternal health promoters were more than twice as likely to deliver at a facility than were women living in a community without such support networks. Living in such a community appeared to have a much stronger effect than household wealth status and was nearly comparable to the influence of women's literacy levels and distance to a health facility—other known determinants of maternity care seeking. In the

multivariate regression model, the Community Support System Index outweighed the effect of women's individual exposure to both community-level and facility-level interventions promoting maternal health.

The study findings also underscore the **importance of household preparation for birth**. Women who reported making advanced preparations for childbirth were almost three times as likely to deliver at a health facility as women who did not. Birth preparedness was considerably more important than knowledge about obstetric danger signs, which was not associated with women's use of facility delivery. This finding merits attention, as considerable efforts are made in community-level maternal health interventions to raise awareness of pregnancy-related danger signs in order to address "the first delay" (Thaddeus & Maine, 1994) that contributes to maternal death. The results of this study indicate that knowledge about danger signs does not influence women's preparation for childbirth or their use of facilities for delivery, which suggests that women's planning for and use of *preventive* maternal health services (e.g., normal delivery care) may not be motivated by fear or concerns about risks.

The content of antenatal counseling on birth preparedness was shown to have a large and significant association with actual preparation for birth. Controlling for literacy, women who received counseling on birth preparedness were more than five times as likely to make at least three preparations for childbirth as were women who did not receive such counseling. Given the strong effect of birth preparation on the use of facility delivery, this finding highlights the importance of increasing attention to birth preparedness during women's ANC visits. Currently, many women do not get advice on birth preparedness during their ANC consultations; while more than 90% of women with recent births attended ANC at least once, fewer than half were advised on any preparation for childbirth during those visits, and only about half were advised to deliver at a health facility. Given the importance of such counseling, it appears that women's ANC visits currently represent a critical "missed opportunity" for promoting maternity care seeking.

The study has several limitations—notably the lack of a comparable baseline study for analysis. While the design of the study attempted to address this issue by using a five-year reference period, which included births that pre-dated the establishment of the VSMCs, analyses of the survey data showed significant socioeconomic differences between women who gave birth before the launch of the committees and those who gave birth subsequently. Recall bias may also be a problem; although women are unlikely to forget where they gave birth, they may not accurately recall the content of the care, counseling, and advice for a pregnancy that took place several years earlier.

In addition, despite efforts to select comparison villages that had equal access to health facilities routinely providing maternity care, women in the comparison villages had significantly better access to such sites than did women in the intervention villages, and this difference was greatest for the subset of women who gave birth after the committees were established. It should also be noted that distance was significantly associated with the use of health facilities for delivery. Women who lived within 2 km of a facility providing maternity care were about three times more likely to deliver in a facility than were women living more than 2 km from such care.

Another important limitation is that the quality of available maternity care is unknown in both the intervention and the comparison villages. The study did not include assessments of the readiness of local health facilities to provide normal delivery care or the competence of maternity care providers at these sites. Clients' perceptions of service quality are known to influence care-seeking behaviors; however, if differences in service quality existed between the intervention and comparison areas, there is no way to control for them in this study.

Finally, while efforts were made to select comparison villages that were unexposed to the activities of the VSMCs, a small percentage of women in the comparison villages specifically—and without a prompt—mentioned the VSMCs as a main source of maternal health information and help. This finding suggests that some comparison villages may have been exposed to the intervention under study. As such, it confirms the need for evaluation frameworks that go beyond traditional intervention/comparison designs to measure and explore the influence of contextual factors and intervention exposure. As Bryce et al. (2011) have noted, randomization is rarely possible in program evaluations and, with continued scale-up of maternal and child survival programs, finding "virgin" comparison areas is more and more challenging, if they can be found at all. In addition, traditional evaluation designs ignore an important reality of programming—that interventions are never implemented or "deployed" with uniform intensity or effectiveness across different regions or areas of a country. In short, it cannot be assumed that intervention areas were uniformly exposed to programmatic interventions as intended or designed.

These limitations notwithstanding, the study results suggest that where the VSMCs or other community-level cadres were effective and active enough to be recognized by a significant percentage of community respondents, they had a strong and positive effect on women's knowledge and on their care-seeking behaviors related to maternal health. Where community resource persons were less active and less relied upon as a primary source of maternal health information and help, no such effects were observed.

V. Conclusions and Recommendations

The study results confirm that community-level support systems related to maternal health promotion can positively influence maternal health care seeking during childbirth, as well as contribute to important behavioral determinants of such care seeking, such as household preparation for birth. Overall, the study findings suggest that efforts to build the capacity of community-level health structures and community-based health promoters can contribute to progress in increasing utilization of skilled care during childbirth.

The study findings yield the following recommendations for ensuring the effectiveness of community-level approaches to promote maternal health and for strengthening their contribution to improved maternal health outcomes:

- Reinforce the knowledge and competence of community-level cadres through regular refresher training and skills updates, to ensure that they can be effective as a frontline source of information and help for communities. Whether community-level structures are established through a project, such as Fistula Care, or through government directives and policies, such as the local health and hygiene committees, the education levels of such community cadres tend to be low, and training tends to be minimal. For such cadres, it is crucial to find ways to regularly reinforce knowledge and to support ongoing skills development. Such continuous competency-based training and skills building can also help sustain their motivation for undertaking voluntary activities. The results of this study showed that where community-level resource persons were relied upon as a main source of information and help, there was a positive association with women's use of maternity care.
- Ensure that community-level structures and cadres responsible for maternal health promotion are assigned realistic areas of coverage. While exposure to the community-level resource persons was considerably higher in the intervention areas, coverage was far from universal. Among women who gave birth in the intervention areas since the VSMCs were established, fewer than half (37%) reported receiving at least one pregnancy monitoring visit by a community-level resource person. For women exposed to the activities of these cadres, maternal health care seeking appears to be significantly and positively associated with other outcomes of interest. However, even in intervention areas, a significant proportion of women with recent births appear not to have been reached by these community-level resource persons.
- Provide ongoing support to help community-level cadres continue to refine their awareness-raising approaches. It was noteworthy that in Kissidougou, where the committees have been active longer, overall knowledge about fistula was lower than in Labé, where the committees were established more recently. This finding—combined with feedback from committees in Kissidougou that they have found it increasingly difficult to motivate community members to attend their sessions—may be indicative of the need to help such community-level cadres continually refine and strengthen their approaches to sustain interest and support higher levels of knowledge acquisition at the community level.
- Emphasize birth preparedness in community-level health promotion efforts. While much effort has been invested in raising awareness about obstetric risks and danger signs, such knowledge was not actually associated with delivery at a facility or with intermediate behaviors, such as birth preparation. In contrast, women's knowledge about and level of preparation for childbirth *were* strongly associated with facility delivery. Community-level health promoters can potentially be powerful advocates for such advance preparation for childbirth, and they may be well-positioned to help address cultural, religious, or other normative barriers to birth preparedness.

In addition to the above recommendations related to community-level fistula prevention and maternal health interventions, it is critical to look at the content and quality of facility-based interventions and to ensure that community- and facility-level initiatives are mutually reinforcing and coordinated to promote maternal health. Key recommendations include:

- Strengthen the content of antenatal care and counseling. In Guinea, as in most countries in Sub-Saharan Africa (Wang et al., 2011), almost all women attend ANC at least once during pregnancy. Yet many of these women are not advised to deliver at a health facility. This study showed that receiving advice on birth preparedness during ANC consultations is significantly associated with the practice of birth preparedness, which in turn is strongly linked to facility delivery. In view of these findings, increased attention should be given to the content of ANC, to ensure that these visits are used optimally to promote women's use of the continuum of maternal health services throughout pregnancy, childbirth, and the postpartum period.
- Ensure the availability and quality of maternity care at primary care facilities. This evaluation focused on a community-level fistula prevention initiative conducted in two urban communes of Guinea. While Fistula Care has actively worked to strengthen emergency obstetric care and fistula repair services at regional hospitals in both regions, the project did not undertake activities to increase the availability and quality of maternity care at the primary care facilities that are most accessible to women in the intervention communities. Use of maternity care was significantly and negatively associated with distance to maternity care; in this study, distance appeared to have a stronger effect on care seeking than other socio-demographic factors, such as wealth, and the odds ratio for facility delivery among women living near (within 2 km) a facility providing maternity care was comparable to that among women living in a community with high social capital. For women living far from such facilities, intervention exposure alone may not be sufficient to achieve desired changes in maternal health care seeking.

REFERENCES

AbouZahr, C., and Wardlaw, T. 2001. Maternal mortality at the end of a decade: signs of progress? *Bulletin of the World Health Organization* 79(6):561–568.

Barber, S. 2006. Does the quality of prenatal care matter in promoting skilled institutional delivery? A study in rural Mexico. *Maternal and Child Health Journal* 10(5):419–425.

Bloom, S. S., Lippeveld, T., and Wypij, D. 1999. Does antenatal care make a difference to safe delivery? A study in urban Uttar Pradesh, India. *Health Policy and Planning* 14(1):38–48.

Bryce, J., Victora, C. G., Boerma, T., Peters. D. H., and Black, R. E. 2011. Evaluating the scale-up for maternal and child survival: a common framework. *International Health* 3(3):139–146.

Direction Nationale de la Statistique (DNS) (Guinée) et ORC Macro. 2006. Enquête Démographique et de Santé, Guinée 2005. Calverton, MD, USA.

Family Care International. 2009. Household survey tools. Retrieved from: <u>http://www.familycareintl.org/en/issues/38, November 1, 2012.</u>

Family Health International (FHI). 2000. Behavioral Surveillance Surveys: Guidelines for Repeated Surveys in Populations at Risk for HIV. Arlington.

Liskin, L. S. 1992. Maternal morbidity in developing countries: a review and comments. *International Journal of Gynecology & Obstetrics* 37(2):77–87.

Miller, S., Sloan, N. L., Winikoff, B., et al. 2003. Where is the "E" in MCH? The need for an evidencebased approach in safe motherhood. *Journal of Midwifery & Women's Health* 48(1):10–18.

Miller, S., Lester, F., Webster, M., and Cowan, B. 2005. Obstetric fistula: a preventable tragedy. *Journal of Midwifery & Women's Health* 50(4):286–294.

Mpembeni, R. N., Killewo, J. Z., Leshabari, M. T., et al. 2007. Use pattern of maternal health services and determinants of skilled care during delivery in Southern Tanzania. *BMC Pregnancy Childbirth*, doi: 10.1186/1471-2393-7-29.

Rutstein, S. O., and Johnson, K. 2004. *The DHS Wealth Index.* DHS Comparative Reports No. 6. Calverton, MD: ORC Macro.

Stanton, C., Blanc, A., Croft, T., and Choi, Y. 2007. Skilled care at birth in the developing world: progress to date and strategies for expanding coverage. *Journal of Biosocial Science* 39(1):109–120.

Thaddeus S., and Maine, D. 1994. Too far to walk: maternal mortality in context. *Social Science and Medicine* 38(8):1091–1110.

United Nations (UN). 2006. UN millennium development goals. New York: United Nations. Retrieved from: <u>http://www.un.org/millenniumgoals/</u>, November 13, 2012.

Wall, L. L. 2006. Obstetric vesicovaginal fistula as an international public-health problem. *Lancet* 368(9542):1201–1209.

Wang, W., Soumya, A., Wang, S., and Fort, A. 2011. *Levels and trends in the use of maternal health services in developing countries.* DHS Comparative Reports No. 26. Calverton, MD, USA: ICF Macro.