Journal of Midwifery & Women's Health www.jmwh.org
Original Research

The Effect of Community Maternal and Newborn Health Family Meetings on Type of Birth Attendant and Completeness of Maternal and Newborn Care Received During Birth and the Early Postnatal Period in Rural Ethiopia

Danika Barry, MPH,* Aynalem Hailemichael Frew, RN, RM, MPH,* Hajira Mohammed, MSc, Binyam Fekadu Desta, MPH, Lelisse Tadesse, BSc, Yeshiwork Aklilu, RN, MPH, Abera Biadgo, MPH, Sandra Tebben Buffington, CNM, PNP, MPH, Lynn M. Sibley, CNM, PhD, RN

Introduction: Maternal and newborn deaths occur predominantly in low-resource settings. Community-based packages of evidence-based interventions and skilled birth attendance can reduce these deaths. The Maternal and Newborn Health in Ethiopia Partnership (MaNHEP) used community-level health workers to conduct prenatal Community Maternal and Newborn Health family meetings to build skills and care-seeking behaviors among pregnant women and family caregivers.

Methods: Baseline and endline surveys provided data on a random sample of women with a birth in the prior year. An intention-to-treat analysis, plausible net effect calculation, and dose-response analysis examined increases in completeness of care (mean percentage of 17 maternal and newborn health care elements performed) over time and by meeting participation. Regression models assessed the relationship between meeting participation, completeness of care, and use of skilled providers or health extension workers for birth care—controlling for sociodemographic and health service utilization factors.

Results: A 151% increase in care completeness occurred from baseline to endline. At endline, women who participated in 2 or more meetings had more complete care than women who participated in fewer than 2 meetings (89% vs 76% of care elements; $P < .001$). A positive dose-response relationship existed between the number of meetings attended and greater care completeness ($P < .001$). Women with any antenatal care were nearly 3 times more likely to have used a skilled provider or health extension worker for birth care. Women who had additionally attended 2 or more meetings with family members were over 5 times as likely to have used these providers, compared to women without antenatal care and who attended fewer than 2 meetings (odds ratio, 5.19; 95% confidence interval, 2.88-9.36; $P < .001$).

Discussion: MaNHEP's family meetings complemented routine antenatal care by engaging women and family caregivers in self-care and care-seeking, resulting in greater completeness of care and more highly skilled birth care.
J Midwifery Womens Health 2014;59:S44–S54

Keywords: community-based intervention, Ethiopia, maternal and newborn health, participatory, skilled birth attendance

INTRODUCTION

The global burden of maternal and newborn mortality is borne almost exclusively by low- and middle-income countries.[1] Despite progress in the last decade, Millennium Development Goals 4 and 5, which address these issues, are unlikely to be met by the 2015 target in many countries.[2] In Ethiopia, a country with one of the world's highest rates of maternal and newborn mortality, the Federal Ministry of Health has undertaken aggressive steps to enact national policies designed to meet the Millennium Development Goals.

It is well understood that a package of simple, low-tech practices—such as clean birth practices; neonatal resuscitation; and immediate, exclusive breastfeeding—can dramatically and positively improve newborn survival.[3] Evidence establishes that integrating such practices into community-based health care delivery systems is an effective means of service delivery.[4,5] Likewise, there is strong evidence that behavior change communication campaigns,[6] home visits, and participatory campaigns[7] can reduce delays in health care seeking, which are so detrimental to the well-being of mothers and newborns[8] and also promote facility births.[7,9]

Numerous governmental and nongovernmental sponsored trials have demonstrated that community-based approaches can and do save the lives of newborns, and early complication recognition and referral coordination for skilled care has been shown to save the lives of mothers.[10,11] These efforts have entailed strategies such as home visits by health workers,[12,13] training of traditional birth attendants (TBAs) and other community-level lay providers,[14–18] and the Warmi Project-derived efforts to organize women's groups that aim to improve self-care practices and identify and remove barriers to safe birth.[19–23] Several projects have demonstrated success in using local women to create demand for use of evidence-based birth packages.[24–26] Other projects have demonstrated the importance of involving husbands and men in efforts to promote safe birth.[27,28]

The Maternal and Newborn Health in Ethiopia Partnership (MaNHEP) was a 3.5-year learning project supported by the Bill and Melinda Gates Foundation and operated

*These authors contributed equally to this work.
Address correspondence to Danika Barry, MPH, 1520 Clifton Rd., Suite 261, Atlanta, GA 30322. E-mail: danika.barry@gmail.com

 1526-9523/09/$36.00 doi:10.1111/jmwh.12171

Quick Points

- Community Maternal and Newborn Health family meetings are a series of participatory educational meetings that link community-level health workers with pregnant women and family caregivers.
- There was a 151% increase in the proportion of care elements that women reported receiving during birth and the early postnatal period over a 2-year period.
- Women who participated in 2 or more meetings with a family member reported receiving even more complete care than those who participated alone, controlling for sociodemographic characteristics and maternal and newborn health service use (9 percentage points more complete).
- While antenatal care receipt was an important factor associated with use of skilled providers or health extension workers for birth care, women who had additionally attended family meetings were even more likely to have received this care.

under the leadership of the Ethiopian Federal Ministry of Health and Regional Health Bureaus.[29] MaNHEP used a 3-pronged approach: 1) maternal and newborn health training for community-level health workers, women, and family caregivers; 2) collaborative quality improvement; and 3) behavior change communications to demonstrate a community-oriented model of maternal and newborn health in rural Ethiopia. The model emphasized delivery of a package of key maternal and newborn health behaviors and practices known to improve health outcomes during the vulnerable birth and early postnatal period. These essential maternal and newborn health knowledge and skills were spread through a training cascade among community-level workers and ultimately to pregnant women and their family caregivers through Community Maternal and Newborn Health (CMNH) family meetings (henceforth referred to as family meetings). These meetings were a principal MaNHEP intervention component, and they were meant to achieve the project's main impact.

This article describes the impact of the family meetings on completeness of care received by women and newborns just before, during, and in the 48 hours after birth. Additionally, this article will explore whether participation in family meetings led to increased utilization of skilled providers (physicians, nurses, midwives) and health extension workers—government health workers stationed in pairs at community health posts—as birth attendants. The impact of family meeting attendance on receipt of postnatal care is reported elsewhere.[30] Finally, this article will examine the overall and net effect of family meetings on completeness of care and birth care utilization over time.

METHODS

Community Maternal and Newborn Health Training Program and Family Meeting Intervention

The CMNH training program was implemented in 51 MaNHEP project *kebeles* (Ethiopia's smallest administrative unit, with an approximate population of 2500-5000 each[31]) in the Amhara and Oromiya regions. More information on project sites and their selection process is described elsewhere.[29] The CMNH family meetings were first rolled out in March 2011.

The CMNH training cascade began with project-trained health extension workers and their supervisors, who subsequently trained guide teams consisting of pairs of community health and development agents and TBAs.[25,32] Community health and development agents, who are male and female volunteers living in the communities that they serve, are supervised by health extension workers for a broad range of mobilization and outreach activities. Traditional birth attendants have generally functioned outside of the government system, yet they are often trusted birth care providers within their communities.[33] The MaNHEP guide teams were a novel way of promoting teamwork and capacity strengthening among these cadres. Specifically, health extension workers, community health and development agents, and TBAs coordinated family meeting activities with MaNHEP quality improvement team members to identify pregnant women within their community, using a participatory planning, action, and evaluation cycle.[34] Once identified, the women were registered with health extension workers at their local health post and scheduled for their first antenatal care visit, thus linking the women to the formal health system, which was a Federal Ministry of Health priority. Once registered, women were enrolled in a series of 4 family meetings during their second or third trimester of pregnancy.

The family meeting curriculum covers evidence-based practices to improve maternal and newborn health and survival during the critical birth-to-48-hour period.[3,29] The agenda for the family meetings is shown in Table 1 (a full description can be found on the MaNHEP Web site[35]). The curriculum's skills-based, participatory training approach was adapted from the American College of Nurse-Midwives Home-Based Life Saving Skills program.[36,37]

The family meeting content complements and reinforces what is covered by health extension workers during routine antenatal care visits. However, the family meetings differ from routine antenatal care in several important ways. First, the meetings are facilitated by community health and development agents and TBAs (guide teams) in pregnant women's homes. Women may be more comfortable with and receptive to these workers, and these workers may have a better understanding of traditional beliefs and practices. Additionally, holding these visits in homes can increase women's participation, as well as allow husbands, mothers-in-law, and other family caregivers to participate. The family meetings process uses unique strategies adapted for adult learning and encourages full participation through discussion, negotiation, and role-playing. The instructional materials and methods are

Table 1. Agendas for Community Maternal and Newborn Health Family Meetings

Agenda	Topics
Meeting 1	Road to death/Road to life
Introduction:	Circle/breaking circle of sickness in
Problems in women	newborns
and newborns	Woman and newborn problems
Meeting 2	Woman referral
Prevention and	Newborn referral
referral	Prevent postpartum hemorrhage
Meeting 3	Prevent problems before birth
Safe birth	Prevent problems when newborn is born
	Helping newborn breathe
Meeting 4	Prevent problems after birth
Postpartum care	

tailored to persons who may be unable to read. The content addresses local knowledge and cultural practices.

In the first meeting, participants are introduced to the stories of 2 women's experiences starting in early pregnancy through the postpartum period. The stories are adapted to the local context so that women and their families can easily identify with them. The stories show how contrasting responses to a continuum of events can lead to life or death for the mother and newborn. In subsequent meetings, guide teams begin by facilitating identification of a possible life-threatening problem (eg, postpartum bleeding, newborn who has trouble breathing at birth), followed by a participatory learning process to identify ways to address the problem. Guide teams use demonstration materials and pictorial checklists called *take action cards* to role play action steps for birth preparation and complication readiness, clean birth and immediate care of the mother and newborn, and postpartum hemorrhage prevention and newborn resuscitation—as well as how to conduct a safe referral. The take action cards are given to women and their participating family members during training for practice and to be kept at home. Each of the meetings continues until participants are able to demonstrate that they have mastered the action steps covered.

Baseline and Endline Surveys

The primary data sources for the assessment were the MaNHEP baseline (June-August 2010; n = 1027) and endline (May-July 2012; n = 1019) cross-sectional surveys conducted with women in the Amhara and Oromiya regions who gave birth during the year prior to the survey. These women were systematically selected at random from the MaNHEP project area *kebeles*. The surveys are described in detail elsewhere.[29,38,39] Information was gathered on women's sociodemographic characteristics; antenatal, birth, and postnatal service utilization; family meeting attendance; and practice and receipt of 17 CMNH care package elements (Table 2). These data were analyzed in SAS version 9.3 (Cary, NC).[40] The analysis included simple descriptive statistics and 2-sided Fisher's exact tests to compare baseline and endline, as well as regional differences ($\alpha = .05$).

Completeness of Care Analysis

Overall Increase in Completeness of Care Over Time

We drew on baseline and endline survey data to determine how family meetings changed the completeness of care that women reported receiving over time. Completeness of care was defined as the mean percentage of 17 maternal and newborn health package elements performed or received.

First, we used an intention-to-treat analysis,[41] comparing the outcome for all women at baseline to all women at endline. All women in the endline survey hypothetically had the opportunity to participate in family meetings since they resided in MaNHEP implementation *kebeles*. The intention-to-treat approach analyzes women's reported care completeness, assuming they had participated in the meetings as intended. However, in reality not all women participated in the family meetings, perhaps due to the unsuccessful identification and enrollment of women or the lack of acceptability of the meetings to women and family caregivers. Thus, the intention-to-treat analysis attenuates the impact of participation as a result of real-world implementation constraints. This conservative approach can provide useful insight into more general questions of effectiveness.

Net Effect of Family Meetings on Completeness of Care

Second, we attempted to measure the net effect of family meeting participation, taking women's actual participation in the meetings into account. Since the first meeting is a general introduction to maternal and newborn health problems and is a time for guide teams to schedule future meetings, exposure was defined as participation in 2 or more family meetings. Using an internal control group, net effect was calculated by subtracting the baseline–endline difference in care completeness for unexposed women ($<$ 2 family meetings at endline) from the baseline–endline difference in care completeness for exposed women ($\geq$ 2 CMNH family meetings at endline). This uncontrolled analysis captures the plausible net effect of meeting participation, above and beyond the effects of other MaNHEP intervention components and secular trends over time.[42]

Third, we conducted a dose-response analysis using linear regression to assess whether attending a greater number of meetings (0, 1, 2, 3, 4) was associated with a higher average proportion of maternal and newborn health care package elements women received.

Last, we used linear regression to provide a controlled estimate of the net effect of family meeting participation. The model assessed the association between participation in 2 or more family meetings—either alone or with family members—and the average proportion of 17 maternal and newborn health package elements that women reported they received (in units of percentage points). The model controlled for potentially confounding individual sociodemographic characteristics, receipt of antenatal care from a skilled provider or health extension worker, and type of provider for birth and postnatal care.

Table 2. CMNH Package Elements Received or Performed at Last Pregnancy/Birth at Endline Survey by CMNH Family Meeting Attendance (n = 1019)[a]

CMNH Package Element	< 2 CMNH Family Meetings (n = 487)	≥ 2 CMNH Family Meetings (n = 527)	*P* Value[b]
Antenatal, n (%)			
Safe birth plan (eg, save money, transport, danger signs)	403 (82.9)	499 (94.6)	< .001
Labor notification	390 (80.1)	497 (94.3)	< .001
Birth—Mother, n (%)			
Clean birth environment	455 (93.6)	524 (99.4)	< .001
Clean hands (everyone present at labor)	386 (79.8)	479 (91.1)	<.001
Change positions during labor	431 (88.7)	485 (92.0)	.09
Not inserting items in vagina during birth	446 (91.6)	470 (89.2)	.20
Birth—Newborn, n (%)			
Clean cord care	411 (84.7)	503 (95.5)	< .001
Checking newborn for proper color and breathing	319 (65.5)	450 (85.4)	< .001
Keeping newborn warm and dry after birth	317 (65.1)	483 (91.7)	< .001
Breastfeeding, n (%)			
Immediate breastfeeding, < 1 h after birth	364 (74.7)	451 (85.6)	< .001
Exclusive breastfeeding for first 6 m	401 (82.9)	471 (90.2)	< .001
Proper positioning during breastfeeding	414 (85.0)	516 (97.9)	< .001
Postpartum, n (%)			
Safe birth of placenta: < 30 min and without force	478 (98.2)	525 (99.8)	< .001
Uterine massage after delivery of placenta to stop bleeding	198 (40.7)	353 (67.0)	< .001
Correct misoprostol use for postpartum hemorrhage	124 (25.6)	285 (54.2)	< .001
Postpartum check of mother for fever and bleeding	293 (60.2)	439 (83.3)	< .001
Postpartum rest for mother, ≥ 12 days after birth	425 (87.5)	506 (96.2)	< .001
Percentage of 17 package items complete, mean (SD)	76.1 (16.8)	88.7 (10.3)	< .001

Abbreviations: CMNH, community maternal and newborn health; SD, standard deviation.
[a]Missingness did not exceed n = 8 for any variable. The sample sizes reflect observations removed due to missing values for CMNH meeting participation (n = 5).
[b]The *P* value compares whether performance of a specific care element varied significantly women for who attended < 2 CMNH family meetings versus women who attended 2 or more meetings. Fisher's exact 2-sided *P* values were used (α = .05).

Analysis of Birth Attendance by Skilled Providers or Health Extension Workers

We also used logistic regression to assess the association between participation in 2 or more family meetings, either alone or with family members, and utilization of a skilled provider or health extension workers for birth care. The model controlled for potentially confounding individual sociodemographic characteristics and receipt of antenatal care from a skilled provider or health extension worker.

Ethical Considerations

The parent MaNHEP protocol was judged exempt by Emory University and Addis Ababa University institutional review boards, and it was approved by the Federal Ministry of Health and the Amhara and Oromiya Regional Health Bureaus in 2010.

RESULTS

MaNHEP community quality improvement data collected from March 2011 to December 2012 indicate that 20,238 pregnant women had been identified through the project (81% of expected pregnancies, based on census projections[43]). During this period, 11,034 women had completed at least one family meeting (55% of identified; 44% of expected); 10,520 women had completed 2 or more meetings (52% of identified; 42% of expected); and 9694 had completed all 4 meetings (48% of identified; 39% of expected).[29,44]

The endline survey data showed that women were, on average, aged 28 years (standard deviation [SD] 6 years) and had 4 (SD, 2) lifetime live births. Approximately 20% of women had a history of an infant death. Most had no formal education (varying significantly by region: 79% and 66% in Amhara and Oromiya, respectively; $P < .001$). Full background characteristics are presented elsewhere.[39,45]

Family meeting participation varied significantly by region. More Oromiya women than Amhara women participated in 2 or more family meetings (60% vs 43%; $P < .001$). Of those attending any meetings, however, more Amhara women had attended with their family members (80% vs 51%; $P < .001$).

Health service use also varied by region. More Oromiya women than Amhara women had any antenatal care from a skilled provider or health extension workers (89% vs 80%;

$P < .001$), but fewer had birth care from a skilled provider or health extension workers (skilled provider: 13% vs 17%; health extension workers: 9% vs 17%). Instead, they used TBAs and community health and development agents (57% vs 37%) (all $P < .001$). Receipt of postnatal care from a skilled provider or health extension worker within 48 hours of birth was comparable between regions at 49% of women ($P = .31$).

Overall Increase in Completeness of Care Over Time

Overall, reported completeness of care increased substantially from baseline to endline. At baseline, women reported receiving on average 32% of maternal and newborn health package elements, while at endline they reported receiving 83%—an absolute increase of 51 percentage points or a relative increase of 151% in completeness of care over baseline (Figure 1: A; $P < .001$).

Uncontrolled Net Effect of Family Meetings on Completeness of Care

The net difference in care completeness between women who participated in family meetings at endline (89%) versus those who did not participate (76%) was 13 percentage points (Figure 1: B; $P < .001$). Thus, the baseline–endline effect was greatest among women who participated in family meetings.

Furthermore, Figure 2 illustrates that at baseline, before introduction of the family meetings, a substantial number of women reported receiving none of the maternal and newborn health care package elements. At endline, after about 16 months of potential exposure to the meetings, 58% of women who participated in 2 or more meetings reported 94% of the elements complete; 37% of women who participated in 2 or more meetings reported 100% of the elements complete. The left-skewed distribution (toward 100%) and narrow box plot further indicate that women who participated in 2 or more meetings consistently reported more complete care.

This finding was consistent for bivariate analyses of each individual element, with the exception of changing positions during labor and not inserting items into the vagina after birth to slow bleeding. Adherence to both of these items were equally high (90%) in both groups ($P = .09$ and $P = .20$, respectively) (Table 2).

Finally, there was a positive dose–response relationship between the number of meetings that women participated in and the completeness of care received. Completeness of care increased by approximately 4 percentage points for each additional family meeting attended (β, 3.80; 95% confidence interval [CI], 3.29-4.31; $P < .001$).

Factors Associated With Completeness of Care

Family Meeting Attendance

The multivariate linear regression model (Table 3, outcome 1) shows that women who participated in 2 or more meetings with family members received care that was 9 percentage points more complete than women who attended fewer than 2 meetings, controlling for all other variables. The effect was slightly attenuated for women who attended meetings alone, yet still significant. Women who attended 2 or more family meetings alone had care that was on average 6 percentage points more complete, controlling for all other variables.

Sociodemographic Characteristics

Women's age, parity, history of an infant death, and education were not significantly associated with completeness of care, controlling for the other factors in the model (all $P > .05$). However, women from the Amhara region received an average of 9 percentage points fewer of the care elements compared with women from the Oromiya region.

Health Services Use

Women who used a skilled provider or health extension worker for antenatal care had an average of 8 percentage points more care elements complete compared to women who did not receive antenatal care from these providers. Similarly, women who received a postnatal care visit from a skilled provider or health extension worker within 48 hours of birth had an average of 6 percentage points more care elements completed than women who did not. Finally, the average proportion of care elements received was significantly higher for women who used a skilled provider, health extension worker, TBA, or community health and development agent for birth care, compared to women who used untrained family, friends, or no one (7, 7, and 6 percentage points higher, respectively; all $P < .001$).

Factors Associated With Use of Skilled Birth Attendants or Health Extension Workers

Family Meeting Attendance

In the logistic regression results, women who attended 2 or more meetings with family members were almost twice as likely to use a skilled provider or health extension worker for birth care, compared to women who attended fewer than 2 family meetings, controlling for all other variables (odds ratio [OR], 1.81) (Table 3, outcome 2). However, this effect was not significant for women who attended 2 or more family meetings alone ($P = .22$).

Sociodemographic Characteristics

Age, parity, history of infant death, and any primary education were not significantly associated with use of skilled birth attendants or health extension workers for birth care. However, women who had any secondary education were more than 4 times as likely to have given birth with a skilled provider or health extension worker, compared to women with no education (OR, 4.07). Amhara women were more than twice as likely to have used a skilled provider or health extension worker for birth care, compared to Oromiya women (OR, 2.24).

Health Services Use

Women who had any antenatal care from a skilled provider or health extension worker were nearly 3 times more likely to

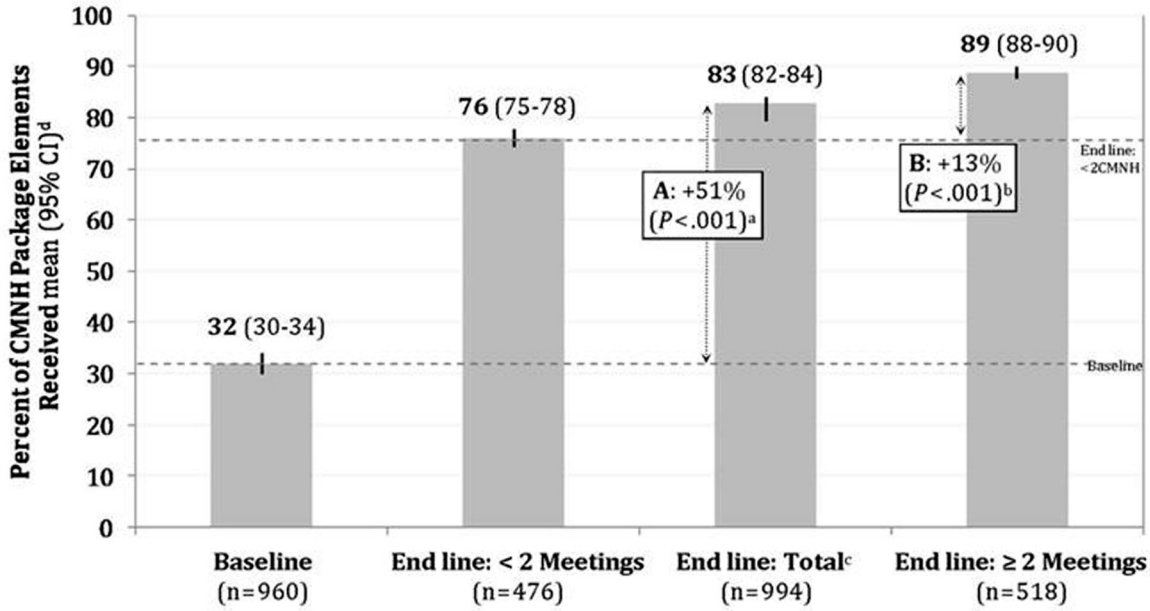

Figure 1. Uncontrolled Net Effect of CMNH Family Meetings on CMNH Care Package Elements Women Received or Performed

Abbreviations: CI, confidence interval; CMNH, community maternal and newborn health.
[a] A (+51%) is the absolute increase in care completeness from baseline to endline.
[b] B (+13%) is the net difference in care completeness from baseline to women who attended 2 or more CMNH family meetings.
[c] Endline: Total, includes all women at endline (those who attended < 2 or ≥ 2 meetings).
[d] Sample sizes reflect final sample used after excluding observations with missing values on any of the 17 CMNH package elements. All comparisons were tested using 2-sided Fisher's exact tests ($\alpha = .05$).

have used a skilled provider or health extension worker for birth care, compared to women who had no antenatal care (OR, 2.87). Women who had any antenatal care from a skilled provider or health extension worker and had also attended 2 or more family meetings with family members were more than 5 times as likely to have used these providers for birth attendance, compared to women with no antenatal care and who had attended fewer than 2 family meetings (OR, 5.19; 95% CI, 2.88-9.36; $P < .001$).

DISCUSSION

There was a significant overall change in completeness of care that women reported they had received over the 2-year period (an increase of 151%). The uncontrolled net effect of the family meeting participation was 13 percentage points. Moreover, there was a significant, positive dose-response relationship; reported completeness of care increased as the number of meetings attended increased.

Participation in family meetings, alone or with a family member, was significantly associated with an increase in the reported completeness of maternal and newborn health care that women received during birth and the early postnatal period. The effect of family meetings on completeness of care was strongest when women attended with a family member and was responsible for 9 percentage points greater completeness of care, even after controlling for sociodemographic characteristics and maternal and newborn health service use factors. Women who had participated in family meetings consistently received relatively complete care—an average of 89% of CMNH package elements. Family meeting participation was also significantly associated with a nearly 2-fold increase in use of a skilled provider or health extension worker for birth care but only for women who attended meetings with a family member (not alone).

These results demonstrate the plausible net effect of family meetings and also its programmatic success in a real-world, community setting. Even when using a conservative intention-to-treat analysis, an overall increase in completeness of care suggests that implementation of the family meetings followed after the successful identification and enrollment of pregnant women and that women's decision to participate indicates that it was accepted by women and families. Other MaNHEP program components, particularly collaborative quality improvement (which actively focused on generating local solutions to identify pregnant women and to encourage women to attend family meetings as well as antenatal care),[34] contributed to meeting participation; thus, it also indirectly contributed to the observed gains in completeness of care.

Family meeting participation is an important supplement to existing maternal and newborn health services, having an independent, significant effect on completeness of care—controlling for antenatal care, birth care, and postnatal care from a skilled provider or health extension worker. It is likely that women and family members who participated in the meetings learned improved self-care practices. Moreover, it may be that they learned to request certain maternal and newborn health care elements from their care providers. The meetings, facilitated by community-level health workers (health extension workers, community health and development agents, and TBAs) using an active learning process, were

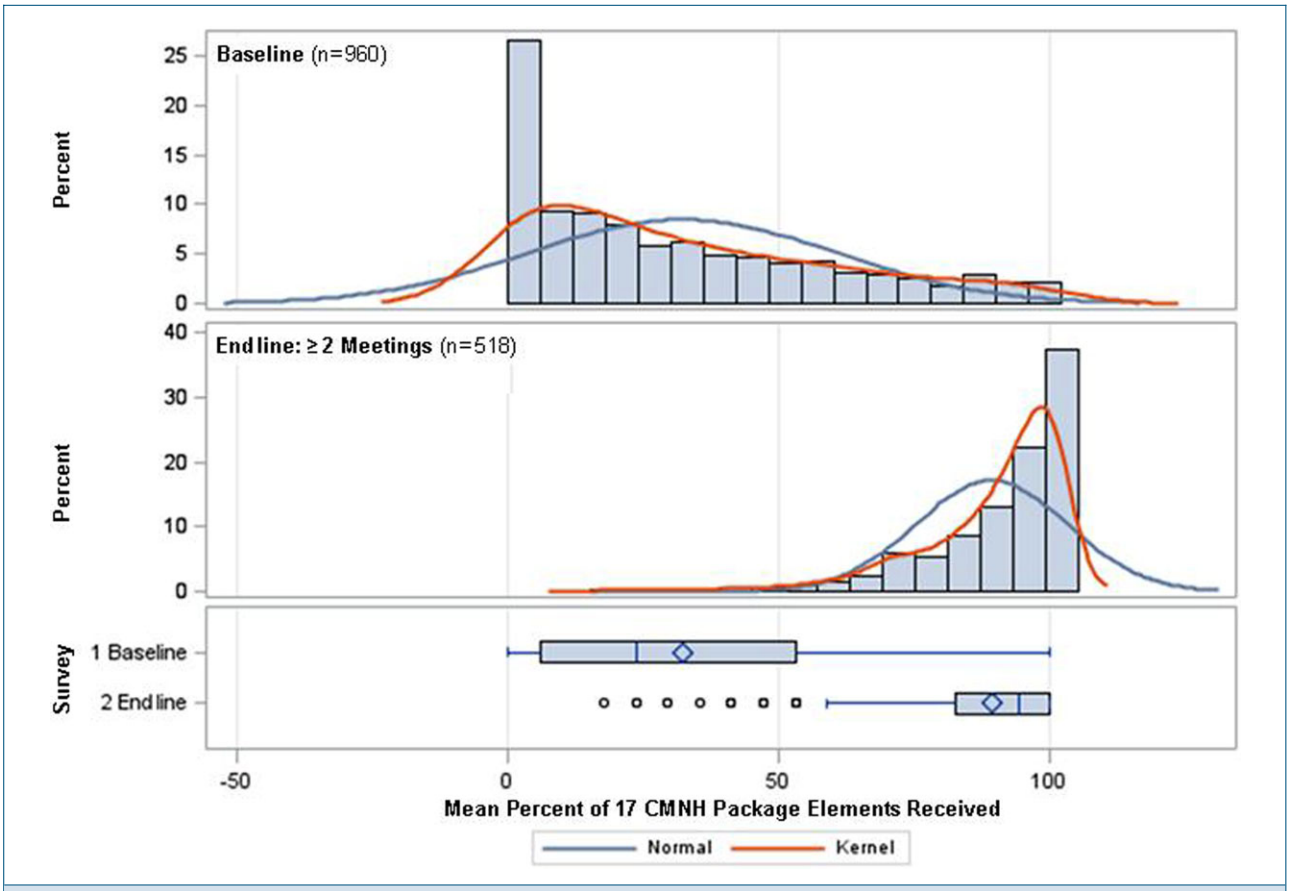

Figure 2. Proportion of CMNH Care Package Elements Received or Performed by All Women at Baseline Survey (2010) and by Women Who Participated in 2 or More CMNH Meetings at Endline Survey (2012)

Abbreviation: CMNH, community maternal and newborn health.

designed to improve awareness, shape behaviors around birth, and encourage skilled care at and immediately following birth. This approach is similar to several other community programs to reduce neonatal mortality by promoting improved maternal and newborn care through a series of meetings facilitated by lay health workers using participatory learning methods with women's groups.[20–24] Such programs often attribute their success to active engagement of women and the use of lay health workers who are more trusted and accepted by community members.[33] These providers may have greater cultural entrée to address and influence changes in practices linked to delayed care-seeking and adverse outcomes; thus, they serve an important role beyond care from formal providers during routine antenatal care.

In general, completeness of maternal and newborn health care did not vary markedly by birth care provider type (skilled providers, health extension workers, TBAs, or community health and development agents). However, there were regional differences in completeness of care by type of provider. Compared with Amhara women, Oromiya women received more complete care, yet they more often used a community health and development agent or TBA for birth care (vs a skilled provider or health extension worker). This suggests that the CMNH training of health extension workers, TBAs, and community health and development agents—relative to skilled providers—was successful in terms of the ability to provide maternal and newborn health care. In addition, since many health extension workers, community health and development agents, and TBAs were teachers and facilitators of the meetings, the repetition of skills through demonstration and simulation may have reinforced and strengthened their ability to provide maternal and newborn health care. Data from MaNHEP's clinical skills testing of health extension workers, TBAs, and community health and development agents support this finding. Traditional birth attendants and community health and development agents were able to demonstrate a high level of competency in the key maternal and newborn health skills, comparable to that of health extension workers.[32]

Involvement of family members in CMNH family meetings was a key finding, especially for use of skilled providers or health extension workers for birth care. This was also the case for use of skilled providers or health extension workers for postnatal care within 48 hours of birth.[30] Because women often do not hold decision-making power with regard to health service utilization, the involvement of other key household members such as husbands and mothers-in-law is essential.[46,47] Furthermore, while antenatal care is positively associated with use of a skilled provider or health extension worker for birth care, women who had both antenatal care and family meeting participation were most likely to

Table 3. Modeling of the Effect of CMNH Family Meeting Participation on the CMNH Package Elements Received or Performed and Use of a Skilled Provider or Health Extension Worker at Birth

	Outcome 1: Mean Percentage of CMNH Package Received or Performed (n = 940)[a]		Outcome 2: Skilled Provider or Health Extension Worker as Birth Attendant (n = 963)[a]	
Characteristic	β (95% CI)	*P* Value	OR (95% CI)	*P* Value
CMNH family meetings	–	–	–	.002
≥ 2 meetings, alone (vs < 2)	6.38 (4.21, 8.55)	< .001	1.32 (0.85, 2.05)	.22
≥ 2 meetings, with family (vs < 2)	9.15 (7.46, 1 0.84)	< .001	1.81 (1.31, 2.51)	< .001
Region (Amhara vs Oromiya)	−9.35 (−10.95, −7.74)	< .001	2.24 (1.64, 3.07)	< .001
Age, y	−0.10 (−0.29, 0.10)	.34	1.03 (0.99, 1.07)	.15
Parity	0.24 (−0.30, 0.78)	.39	0.92 (0.83, 1.03)	.14
History of infant death (any vs none)	−1.43 (−3.35, 0.48)	.14	0.77 (0.52, 1.14)	.19
Education	–	–	–	.004
Any primary (vs none)	0.67 (−1.13, 2.48)	.46	1.38 (0.97, 1.97)	.07
Any secondary or higher (vs none)	0.94 (−4.08, 5.96)	.71	4.07 (1.68, 9.89)	.002
Any antenatal care from a skilled provider or health extension worker	8.37 (6.27, 10.47)	< .001	2.87 (1.73, 4.76)	< .001
Birth provider	-	-		
Skilled (vs untrained/none)	7.12 (4.54, 9.70)	< .001		
Health extension worker (vs untrained/none)	7.11 (4.39, 9.84)	< .001		
TBA or community health and development agent (vs untrained/none)	6.15 (4.30, 8.01)	< .001		
Any postnatal care from skilled provider or health extension worker ≤ 48 hours after birth	5.60 (3.98, 7.22)	< .001		

Abbreviations: CI, confidence interval; CMNH, community maternal and newborn health; OR, odds ratio; TBA, traditional birth attendant.
[a]Sample sizes reflect final sample used in modeling after removing observations from the total number of endline survey respondents (n = 1019) with any missing values.

have used skilled providers or health extension workers for maternal and newborn services. According to the Ethiopian Demographic and Health Survey, the number-one reason that women say they do not use a skilled provider or health facility for birth care is that they do not perceive it to be necessary.[48] Thus, family meetings appear to provide an important vehicle for women to gain new knowledge about normal and abnormal birth; learn and practice skills for birth preparedness and complication readiness, clean birth, and safe referral; and understand the importance of care-seeking.

Finally, family meetings helped obviate the effect of sociodemographic disparities such as women's age, parity, or educational status, particularly for the completeness of care received. This may be due to the home-based, outreach approach of the meetings, as well as its appropriateness for low- or nonliterate populations. Furthermore, a separate study demonstrated that various sociodemographic factors (eg, age, parity, education, and remote geographical residence) were not associated with whether women participated in family meetings.[49] This indicates a level of equity in outreach and follow-up efforts to enroll women, as well as in women's acceptance of the intervention, both of which would support the equitizing effect observed in this analysis. However, social, cultural, and material inequalities remain deeply entrenched factors related to receipt of skilled care.[50,51] While MaNHEP was able to document significant shifts from untrained or no providers to the use of semiskilled and skilled providers for birth and postnatal care, especially among women with less education and personal wealth, absolute disparities persisted.[29,30,49] This analysis revealed, for example, that women with any secondary education were still more likely to have received birth care from a skilled provider or health extension worker.

Among limitations that should be noted, the assessment of maternal and newborn health care reportedly received by women within the year before the survey is subject to recall bias and reporting error. Furthermore, the comparative assessment of care received at baseline and endline was based on cross-sectional data; other secular trends or uncontrolled confounding factors may have been at play. In the absence of a controlled research design, multiple approaches were used to control for these factors and to establish a causal relationship between family meeting participation and the 2 outcomes of interest. Analyses related to the Bradford Hill criteria for causation attempted to compile the strength, consistency, specificity, temporality, and plausibility of results.[52] The concordant results of the intention-to-treat, net effect, dose-response, and regression analyses indicate the robustness of the findings in this study. Furthermore, while the study sample size was too small to directly assess referral for serious

complications as an outcome, the increased use of skilled providers and health extension workers for birth care (as well as postnatal care[30]) indicates that referrals between the community, health post, health center, and hospitals indeed occurred. Finally, although the sample size was also too small to assess changes in morbidity and mortality, a separate verbal autopsy study conducted by MaNHEP indicated that a significant decrease in newborn perinatal mortality occurred during the project period.[29] The increased performance of evidence-based, life-saving practices and the use of skilled providers for birth care, both of which were associated with participation in MaNHEP's family meetings, have been linked to decreases in newborn morbidity and mortality in other studies.[20–24]

CONCLUSION

MaNHEP's family meetings served as the primary link between community-level health workers and pregnant women and families. These meetings were associated with increased completeness of maternal and newborn health care received at birth and in the early postnatal period, as well as the increased use of skilled providers or health extension workers for birth care. These findings provide evidence that participatory, community-based approaches fill an essential role above and beyond routine antenatal care by engaging women and family caregivers in both self-care and care-seeking, resulting in greater completeness of care and more highly skilled birth care.

MaNHEP operated under the leadership of the Ethiopian Federal Ministry of Health and relied on existing governmental infrastructure in the design and implementation of all project activities. The overall MaNHEP model and the CMNH family meetings have been further streamlined for integration into the Federal Ministry of Health's new primary health care unit and health extension program structures. Cost analysis data indicate that the MaNHEP model and CMNH family meetings can be spread to new sites using minimal inputs outside of existing government staff and resources, and this can be accomplished relatively rapidly and at low cost (less than $0.05 per capita).[53] Further research into how to most effectively scale-up the MaNHEP model and CMNH family meetings within Ethiopia is needed and could inform policies in other high-mortality settings with low skilled birth attendance. Future studies could also be used to more strongly link the findings in this article to decreases in maternal and neonatal morbidity and mortality, as well as to better understand the process of referral.

AUTHORS

Danika Barry, MPH, is MaNHEP Coordinator at the Nell Hodgson Woodruff School of Nursing at Emory University in Atlanta, Georgia.

Aynalem Hailemichael Frew, RN, RM, MPH, is JSI Research and Training Institute, Inc., Oromiya Regional Team Manager for the Maternal and Newborn Health in Ethiopia Partnership (MaNHEP), based in Addis Ababa, Ethiopia.

Hajira Mohammed, MSc, is JSI Research and Training Institute, Inc., MaNHEP Monitoring and Evaluation Officer, based in Addis Ababa, Ethiopia.

Binyam Fekadu Desta, MPH, is JSI Research and Training Institute, Inc., Senior Program Manager for MaNHEP, based in Addis Ababa, Ethiopia.

Lelisse Tadesse, BSc in Public Health, is JSI Research and Training Institute, Inc., Maternal and Newborn Health Specialist for MaNHEP, at Addis Ababa, Ethiopia.

Yeshiwork Aklilu, RN, MPH, was JSI Research and Training Institute, Inc., Maternal and Newborn Health Specialist for MaNHEP, based in Bahir Dar, Ethiopia.

Abera Biadgo, MPH, is JSI Research and Training Institute, Inc., Maternal and Newborn Health Specialist for MaNHEP, based in Bahir Dar, Ethiopia.

Sandra Tebben Buffington, CNM, PNP, MPH, FACNM, is the Maternal, Newborn, and Child Health Advisor for MaNHEP, housed at the Nell Hodgson Woodruff School of Nursing at Emory University in Atlanta, GA.

Lynn M. Sibley, CNM, PhD, RN, FACNM, FAAN, is Professor at the Nell Hodgson Woodruff School of Nursing and Rollins School of Public Health at Emory University in Atlanta, Georgia. She is Principal Investigator for MaNHEP.

CONFLICT OF INTEREST

The authors have no conflicts of interest to disclose.

ACKNOWLEDGMENTS

We gratefully thank the Bill and Melinda Gates Foundation; the Ethiopian Federal Ministry of Health; the Oromiya Regional Health Bureau, Kuyu, Degem and Warajarso *woredas* (districts); and the Amhara Regional Health Bureau, North Achefer, South Achefer and Mecha *woredas*. We also thank the other members of the MaNHEP implementing team, including Dr. Abebe Gebremariam Gobezayehu, Dr. Solomon Tesfaye, Kim Ethier Stover, Alemu Kebede, Hanna Tesema, Abebe Teshome, and Lamesgin Alamineh. Furthermore, Dr. Kenneth Hepburn provided invaluable editorial review; and Helen Baker, Laura Hilb, and Rebekah Schicker were of great assistance for the literature review.

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