

Impact of alternative community engagement strategies on improved maternal and child health behaviours and outcomes among the most vulnerable in northern Nigeria

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Abstract

Low-status women typically have poorer maternal and child health outcomes. In northern Nigeria, we piloted alternative models for engaging vulnerable women and facilitating an improvement in their maternal health outcomes. We assess the net impact of an integrated health system improvement model focusing on ensuring emergency obstetrical services for clusters of affiliated primary health care clinics, on the relative additional impact of alternative community engagement (CE) strategies. Analysis of baseline to endline survey data (2009-2013) showed that proportions of women making antenatal care (ANC) visits and who delivered with a skilled birth attendant doubled. Maternal and infant mortality also declined. Greater improvements with more ANC visits and skilled birth attendance were associated with being non-poor, owning a cell-phone, being less socially excluded, being satisfied with improvements in the clinic, and participating more in CE activities. Efforts to increase participation in CE activities can further enhance outcomes for the vulnerable women.

Keywords: health systems research; community engagement; maternal and child health; Nigeria

Background and Approach

Low-status women typically have the poorest maternal and child health outcomes, particularly in settings with poor maternal and child health outcomes (Muchabaiwa et al., 2012, Amoakoh-Coleman et al., 2015, Bintabara et al., 2015, Buttenheim and Asch, 2013, Fapohunda and Orobato, 2013, Maine, 2001, Thaddeus and Maine, 1991). If maternal mortality is to be reduced in such settings, it is critical that the programs particularly address the needs of the most vulnerable, namely those who are among the poorest, least educated, and with the lowest levels of social capital. Further, it is important that the program elements be specifically designed so that these women are engaged into the maternal care services, as they would otherwise not seek out or use the health care services. Provision of information about maternal health care needs and service benefits, complemented by clearly defined processes for assisting vulnerable women in accessing these services

is key to closing the gap between the vulnerable and less vulnerable in terms of maternal health service utilization and outcomes. (Menke et al., 2014, Brazier et al., 2009, Kongnyuy et al., 2009, Magoma et al., 2013, Benova et al., 2015, Campbell and Graham, 2006).

As articulated in the World Health Organization Ending Preventable Maternal Mortality (EPMM) Working Group, the strategic framework for reducing inequities in maternal health requires special attention to eliminating disparities among vulnerable subgroups (EPMM Working Group of the World Health Organization, 2016). The EPMM strategic framework identifies the following as the key elements for this targeted approach:

- People-centered outreach and support: Peer support or community health workers who engage

populations, provide information, and are accountable to the population.

- Patient-centered Medical Homes Women coming to the clinic for maternal care will have a continuum of care tailored to their needs, with integrated reproductive health services including both maternal and family planning services

- AAAQ: Maternal care which is available, accessible, acceptable, and of high quality

- Integrated resources to help women overcome barriers to health and well-being

If we want programs to reach the vulnerable (people-centered), we must start with support for preventive care in the community and then follow through on the process of linking women to maternal care at the facility (continuum of care) which meets the standards of AAAQ. If this linkage occurs, then we can expect vulnerable women to have better maternal health outcomes. However, because vulnerable women often have difficulty accessing health services, the lever in this process of change is the mechanism for reaching and encouraging the vulnerable to use the available services. Hence, a premium is put on the work of the community health worker or community volunteer who meets with women in the community to explain to them about the importance of antenatal care and a facility based delivery.

Study Setting

Nigeria is one of the countries with the highest number of maternal and child deaths in sub-Saharan Africa, and with the highest mortality rates in the northern region. Whereas the national maternal mortality ratio (MMR) was estimated at around 550 in 2008-2013, it was twice that high in four northern Nigeria states (Doctor et al., 2012b). The high maternal mortality levels reflect the low level of care available in the primary health care systems in northern Nigeria, along with very low levels of access to the system and low levels of confidence in the health system. Much care is provided by male Community Health Extension Workers (CHEWs) at the clinics, who women do not feel free to consult. If women needed emergency obstetrical services, they had to travel great distances to the state's general hospitals. According to the Demographic and Health Survey 2008 (DHS), over half of the women in the North eastern and North western zones had no antenatal care (ANC), and fewer than 15% delivered with a skilled birth attendant. Further, the trend was in the opposite direction, with declines in women receiving care at the clinics (National Population Commission, 2009). Across many dimensions, the health system in rural areas was dysfunctional, poorly

equipped, staffed, and inaccessible to many rural women.

Faced with the daunting health challenges in maternal and child health outcomes in northern Nigeria, the Partnership for Reviving Routine Immunization in Northern Nigeria (PRRINN) was established in 2006 and extended in 2008 to include maternal, new born, and child health (MNCH), becoming PRRINN-MNCH (hereafter "the program"). As a collaboration with the Ministry of Health and Local Governments in the four states of Jigawa, Katsina, Yobe, and Zamfara, the program worked from the top-down and bottom-up with the appropriate government authorities to strengthen the delivery and effective demand for maternal and child health services.

While the strategic framework articulated above provides the overall framework, turning it into a functional program required a further tailoring for how and where the program components could be implemented. We adopted the WHO cluster approach, because this enabled the program to maintain the AAAQ standard. At the center of the intervention was the provision of emergency obstetric care services for a surrounding cluster of Local Government Areas (LGAs) comprising approximately half a million individuals. The package implemented through the partnership included an integrated package of health system changes, establishing emergency obstetrical care capabilities in each cluster while strengthening primary care services and working in communities to engage women and men in supporting and seeking care at their newly revitalized clinics. (For details see (Findley et al., 2012, Findley et al., 2013).

In the PRRINN-MNCH model, community health workers (CHWs) serve as a critical linkage between the health system changes and the community. As in many other rural African settings, CHWs are on the frontline reaching dispersed rural populations, bringing them information about improvements in maternal health services and helping communities implement changes to enable more women to access and benefit from the health services (Bhutta et al., 2010, Singh and CHW Technical Task Force, 2011). Nigerian local governments employ Community Health Extension Workers (CHEWs), who account for 38% of Nigeria's health workforce, but due to understaffing at primary health centres, these CHEWs function as clinicians, and rarely if ever to out into the community. If PRRINN-MNCH wanted to reinvigorate primary care and mobilize women to use maternal health services, there was a need to pilot CHW models with the CHW working in the community (Doctor et al., 2012a). This paper describes the alternative models piloted by the

PRRINN-MNCH program, and then presents an evaluation comparing the differences in their impact on maternal, new born, and child health behaviours.

The Intervention: Alternative Models of the Community Health Workers

Community volunteers (CV) were the heart and soul of the community engagement (CE) program. In each community, about 30 men and women were recruited and trained to lead a series of six community forums for men and women in their community, using jingles and interactive communication tools. These dialogues served multiple purposes: build community ownership of the recommended improvements, help people learn about their health risks and what they could do to confront them, and serve as a forum for organizing key community initiatives such as the Emergency Transport System, a community fund to support women needing assistance in covering health costs, a blood bank, a facility health committee to provide oversight of their local clinic, and community monitoring of life events, births and deaths.

Small community forums, essentially peer group discussions, were the building blocks of community ownership of the CE process. These were facilitated by their own CVs. Discussions began by focusing on maternal emergencies which are frequent in northern Nigeria and are an urgent concern of most community members. Different groups were held with different age groups of women, of men, and then of religious leaders. By including the whole community, all key members were able to learn and share new knowledge with their spouses, family, and friends, facilitating adoption of healthier behaviours or actions. These dialogues also helped to saturate the community with important health information. The jingles used by the community volunteers to teach key maternal health concepts were simultaneously disseminated statewide on the radio.

With the support of social workers, the CVs organized activities specifically targeting women most at risk for exclusion from the health system. Research conducted in 2009 showed that a small minority of women had experienced multiple deaths. If these women could be reached through proactive outreach, the community could reduce overall mortality levels. The at-risk women were generally women of low social and economic status, the youngest cohort of married women with little or no personal assets or resources. Therefore, the CE strategy included Young Women's Support Groups (YWSG).

Recognizing that there were still communities too far from a clinic to realistically access services, the program also established a CHW program for community-based service delivery (CBSD). Modelled

after the Ghana Community-Based Health Planning and Service nurse and other CBSD models, these CHWs had training as Community Health Officers and were trained to deliver maternal health services (including ANC and family planning) as well as integrated care for newborns and children, following the UNICEF-WHO model of integrated management of new born and childhood illnesses. These CHWs rotated in visiting distant hamlets.

Implementation of the Community Engagement Strategy

Because of the emphasis on community ownership and integration of health system strengthening initiatives, the PRRINN-MNCH strategy was rolled out in phases, each phase extending the number of LGA clusters where the Primary Health Care (PHC) and emergency obstetrical facilities were developed alongside CE activities. The integrated package was spread progressively from 2009-2014 until it covered clusters of 72 LGAs in four states with a combined population of 14.7 million people. Just under 3 million were part of CE complete communities.

In addition, the CE package was implemented in steps, starting with the recruitment and training of CVs and the conduct of community forums, and then progressively adding each of the components as these were developed in conjunction with the community. The Intervention in the community, the CE program, was distributed as follows:

CV only (n=1,028 communities): Here, CV facilitated the implementation of community strategies to overcome barriers to safe delivery (e.g. an Emergency Transport Scheme [ETS], community blood donor groups, emergency maternal care savings schemes), and community monitoring to inform the program and collect data.

CV-Plus: CV with YWSG (n=220 communities) added YWSG to the CV activities.

CE-complete: CV + CBSD (n=204 communities) added other activities, including facility health committees (FHC), CBSD.

In this paper we are contrasting the impact of the program with these three different intensities of service, focusing on the extent to which the different packages reached the most vulnerable women and changed their maternal and child health care behaviours. All three are contrasted with the control group, where there were no CVs (n=307 communities). Communities which had "spread" effects from nearby communities participating in activities organized by other community volunteers (CE-light) were excluded from this analysis.

Data and Methods

Pre- and post-survey design

We employed a quasi-experimental design using pre- and post-intervention household surveys in the intervention and control communities. The pre-intervention or Baseline household survey was conducted in May-June 2009, whereas the post-intervention or Endline household survey was conducted in May-June 2013. Evaluation teams developed a common set of questions based on the 2008 Nigeria DHS, standardized IN-DEPTH network questions, which were used at the Nahuche Health and Demographic Surveillance System (Zamfara State), with additional details on sources of information and care to cover types of CHWs. Topics covered in the household surveys included household demographics and resources, ANC and child care, PHC use with details about type of provider, interactions with each type of CHW, health behaviours and outcomes of most recent pregnancy and new born.

The sampling plan was a stratified two-stage, cluster random sampling in the control and intervention areas, with oversampling in the program intervention communities. Individuals from intervention clusters were oversampled using a ratio of 2:1 because intervention clusters cover a significantly lower proportion of the population of each state. Oversampling enabled generation of a sufficient sample in the intervention areas to assess the impact of key elements within the intervention package on key MNCH outcomes. The LGA was the primary sampling unit and consisted of 24 in the Baseline and 51 in the Endline survey. WHO-EPI cluster survey method was used to select households in sampled communities. The study was designed with an 80% power to detect a 2.5% change in the percentage of women delivering with skilled birth attendance between the Baseline and the Endline Surveys. Within each selected household, a randomly selected ever-married woman aged 15-49 years with a birth occurring in the 5 years preceding the survey was selected leading to a response rate of 92% of selected women. The final sample for analysis in the Endline Survey was 3,321 women in the intervention communities and 441 women in the control areas. The sample in the Baseline Survey (all control communities) was 2,360 women.

Statistical Analyses

All ever-married women aged 15-49 years with a birth in the 5 years before the survey were included in the analytic sample. After applying this inclusion criterion to the separate data files (Baseline and Endline Surveys), we next identified the common set of variables that would be used in the analysis for this paper. The variables selected for the analyses were identified and then were made consistent in terms of

variable name, labels, and data formats. Identifiers were added to indicate if the record was from the baseline or the Endline Survey. The data from the two surveys were merged into one combined data set by appending the records from the Endline Survey at the end of the Baseline Survey data file.

Variables Retained for the Analyses

Main effects variables: We generated a variable measuring exposure to the alternative CHW and CE models. A code was generated in the dataset to identify women belonging to the intervention and control groups in both surveys. Because no elements of the program had been implemented in 2009 when the baseline survey was conducted, this is designated the pre-intervention control group. In the Endline Survey, the comparison groups are control (health system changes but no CE program elements), CV only, CV-Plus, and CE-Complete. In addition to a variable indicating the intensity of the CE program in the woman's community (CE Intensity), we also control for the individual woman's participation in specific CE activities, using an additive variable (CE Participation) for the total different types of CE activities in which the woman participated.

Contextual variables (AAQ):

Community access to improved primary health care services are measured by the CE-intensity variable, where control group indicates health systems improvements implemented across the entire LGA but no CE interventions versus progressively higher degrees of health systems changes, reaching down into the management of the PHC. Additional variables assessing community access to quality health care are if the community has a good relation to the PHC (Appropriate), whether the individual saw an improvement in the PHC over the past 5 years (Quality) and the location of the community more than 5 km to the PHC (Access).

Household and Individual Vulnerability: Household economic status was assessed using the summative wealth index of the number of consumer durables owned by the household, with the average being 5.2. Individual economic status was measured by ownership of a cell phone.

We used a definition of vulnerable which was not dependent on socio-economic status, but rather focused on the social status of the women within the family and community. Based on the focus groups conducted by the program to assess vulnerability, the following were the criteria for defining vulnerability:

- No family member to help with child care when needed (n=110)

- Never or rarely goes out to ceremonies or meetings (n=558)

Application of these criteria resulted in 647 (14%) being classified as vulnerable.

Control variables: At the individual level, we controlled for age and parity.

Dependent Variables: The changes in maternal and child health care seeking behaviour are assessed using dichotomous variables for each health behaviour for ANC consultations, skilled birth attendants at delivery, breastfeeding within 24 hours, and care of sick children. Changes in infant deaths are assessed for the specific woman's experience, using the variable the number of her own infants born in the 5 years preceding the survey who died during infancy.

Analytic methods: We contrast these outcome behaviours for the women from Baseline to Endline (all with the CE intervention), and then compare the results for the Endline group, using Chi-square tests to assess the differences in the behaviours for the control group versus each higher level of CE intensity. After comparing differences in CE participation and health behaviours for vulnerable vs. non-vulnerable women by simple bi-variate comparisons, we use logistic regression to assess the extent to which the vulnerable women are more likely than non-vulnerable women to make any ANC visits or to have a skilled birth attendant, after controlling for their accessibility to quality health care services, household and individual economic status, and individual participation in CE activities.

Results

Characteristics of respondents

Respondents in both the Baseline and Endline surveys had similar background characteristics: 33% were aged 20-29 years and slightly more 30-34 years at Endline. Virtually all women were married at the time of the interview in both surveys, with 20-25% in polygynous unions in both surveys. About 30% were illiterate. Compared to the 2009 respondents, more of the 2013 respondents had gone to school (9% in Baseline and 24% in Endline). Cell phone access was greater in 2013 (43%) than in 2009 (5%).

Overall Impact of the Program, Baseline to Endline by Intervention Intensity

Significant improvements were made in the proportion of women receiving one or more antenatal care sessions: from 25% at Baseline to 51% at Endline in the control areas and much higher (60%) in the Endline CE-intervention areas (Table 1). In the CE-intervention communities, women with standing permission from their husband to go to a health facility to seek care rose from 40% at Baseline and more than double that, 88%, at Endline. Knowledge of at least four maternal danger signs increased from 10% among women in Baseline to 21% at Endline. Birth preparation was 38% at Baseline, increasing by Endline to 72% in the control areas and to 80% in the CE-intervention areas. The proportion of women who had a skilled birth attendant at their most recent birth doubled from 11% to 21% in the Endline control areas, with further increases to 24% in the CE-intervention communities.

Table 1: Maternal and child health behaviours and outcomes by program intensity, Baseline 2009 to Endline 2013

Characteristic	Baseline	Endline Control	EndlineCV only	Endline-CV-Plus	Endline-CE complete	Endline Any CE	Endline Chi-square (p)
<i>Health behaviours</i>	%	%	%	%	%	%	
Made 1+ antenatal care visit	25	51	65	67	61	60	34.3 (<0.001)
Had standing permission	40	79	87	88	90	88	35.7 (<0.001)
Knows 4+maternal danger signs	10	18	18	27	29	21	52.3 (<0.001)
Prepared for birth	38	72	78	85	79	80	28.2 (<0.001)
Had skilled birth attendant	11	21	27	21	24	24	11.6 (0.009)
<i>Maternal and child health outcomes</i>							

Maternal mortality ratio	1,270	1,260	NA	NA	NA	1,057	NA
Infant deaths in past 5 years(/1000 births)	90	54	38	41	42	41	2.08 (0.556)
Number of women	2,360	441	1,717	834	770	3321	

Source: PRRINN-MNCH Baseline (2009) and Endline (2013) surveys

Notes: CE – community engagement. CV – community volunteer;

MMR at baseline was estimated at 1,270 deaths per 100,000 live births. This was calculated using the sisterhood method based on data from the program’s mid-term household survey in 2011 (Findley et al., 2012).

Using the same sisterhood method, the MMR had declined to 1,057 deaths per 100,000 live births in the intervention communities by the Endline. Among infants born in the 5 years preceding the survey, infant deaths declined from 90 to 38 per 1000 births, with the greatest declines in the intervention areas.

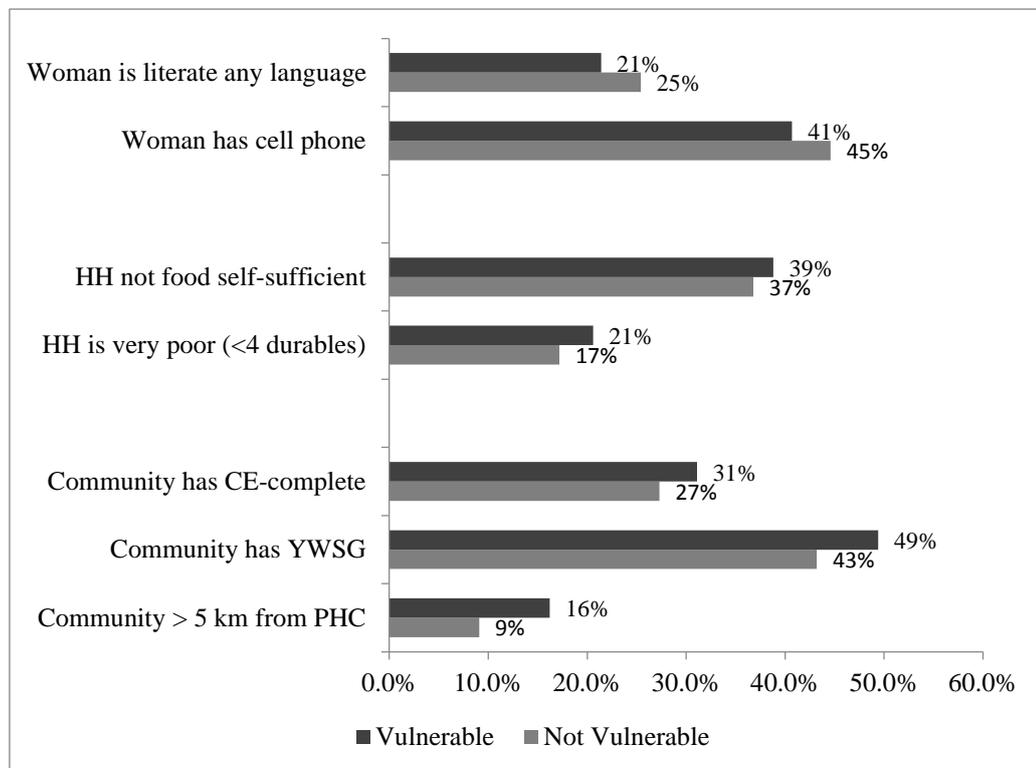
There were significant differences in the maternal and child health behaviours and outcomes by CE intensity. Higher CE intensity is associated with more women

having standing permission to go to the health facility and knowing 4 or more maternal danger signs, but not with the variation in any ANC visits, making birth preparations, or skilled birth attendance, or infant deaths. For these latter behaviours and outcomes, the largest difference at Endline is between the control communities and those with any CE intervention.

Reaching the most vulnerable

Compared to other women, the vulnerable women are somewhat less likely to own a cell phone (40.7% vs. 44.6%) or to be literate in any language (21.4% vs. 25.4%) (See Figure 1).

Figure 1: Characteristics of vulnerable women at Endline, 2013



Notes: CE – community engagement. YWSG – Young Women Support Group. PHC – Primary Health Centre. HH – household.

They do not come from significantly poorer households: 20.6% vs. 17.2% from households with

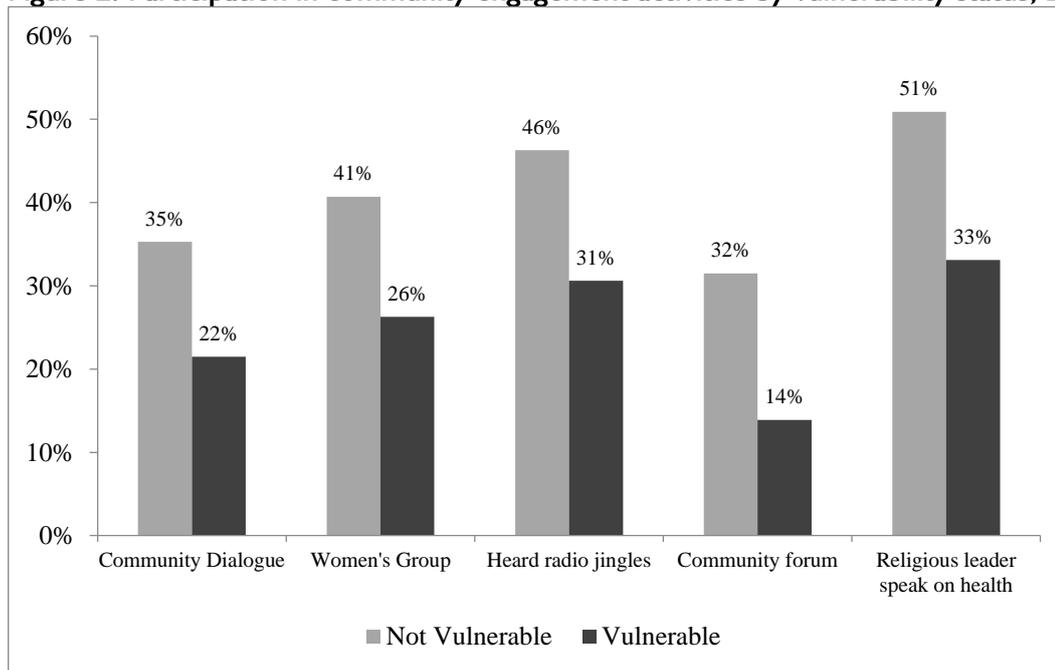
less than 4 consumer durables and 38.8% vs. 36.8% from households not food self-sufficient. However,

they are located in communities with a significant locational disadvantage, with 16.2% living greater than five kilometers from the nearest PHC, compared to 9.1% among those as vulnerable. In a reflection of the PRRINN-MNCH strategy to target the communities of greatest need, the vulnerable women lived in communities more likely to have a community volunteer and the YWSG (49.4% are CV-Plus) or in communities with CE-complete (31.1%), both greater than for the less vulnerable women.

Vulnerability and participation in communication engagement activities

While CE activities were implemented in the program areas, vulnerable women were less likely to participate by the Endline (Figure 2). For example, while 32% of non-vulnerable women participated in community dialogue on health issues only 14% of vulnerable women did so. For every activity related to CE, the vulnerable women participated much less frequently than the less vulnerable women.

Figure 2: Participation in community engagement activities by vulnerability status, 2013

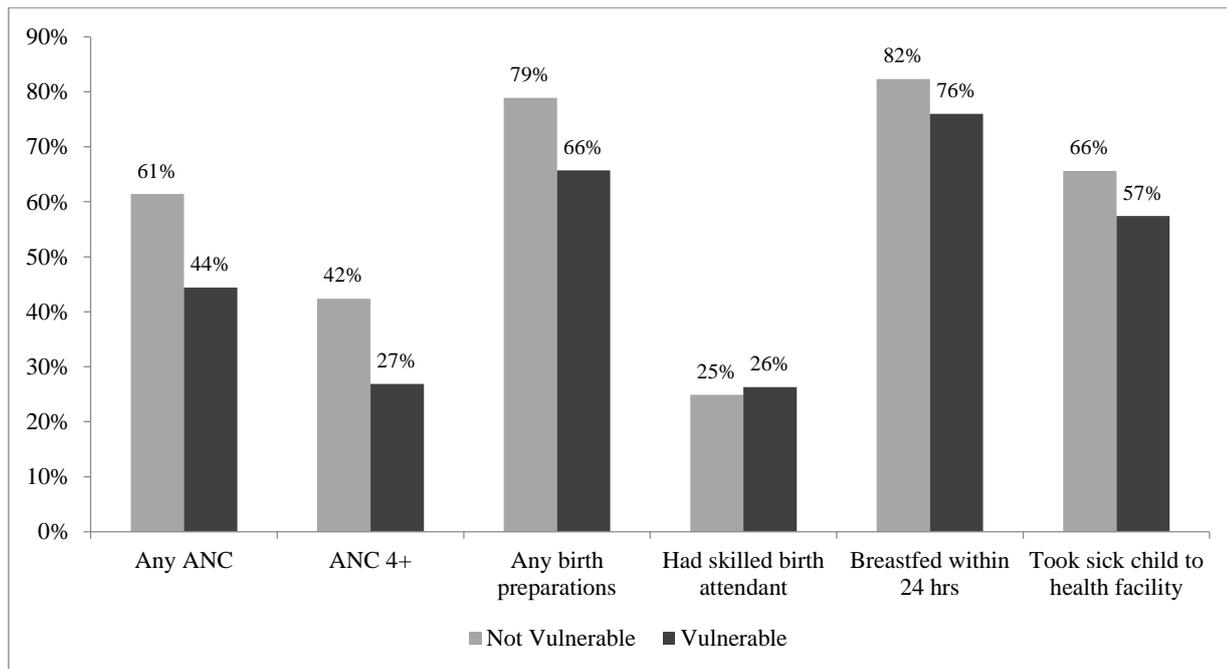


Variations in maternal and child health care by vulnerability

Figure 3 shows that the proportions with ANC attendance, any birth preparations, breastfeeding a child within 24 hours, and taking sick children to a health facility were greater among non-vulnerable women than among vulnerable women. The proportions delivering their last infant with a skilled birth attendant were approximately the same, around 25%.

Although they had lower rates of adoption of recommended maternal and child health care practices, the survival rate of infants born in the five years preceding the survey was not significantly different for the vulnerable versus the non-vulnerable women, 95.1 vs. 96.1 per 100 among infants born in the five years preceding the survey, respectively (Chi-square = 0.969).

Figure 3: Maternal and child health care by vulnerability, 2013



Note: ANC – Antenatal care

Predictors of Maternal Health Behaviours

After controlling for the community’s access to improved health care services, including implementation of the CE program, vulnerable women were 0.80 times less likely than the non-vulnerable to make any ANC visit, even after controlling for their participation in the CE activities in their community (see Table 2, first panel of regression results). When considering the likelihood of having a skilled birth attendant, however, they were 1.3 times more likely than the non-vulnerable to have delivered their last infant at the facility with a skilled birth attendant.

Not all aspects of better community access to quality health care had a positive impact on the probability of any ANC visit or having a skilled birth attendant. The community’s access to the CE program had no significant relation to making any ANC visit, while it reduced the probability of a skilled

birth attendant by 0.91 times. The program effect appears to work through the individual’s participation in the CE activities. Women who participated in more of the CE activities were 1.33 times more likely to make any ANC visits and 1.07 times more likely to have a skilled birth attendant. Both outcomes also were greater in communities with better relations to the PHC, but significantly only for the odds of making any ANC visit, for which they increased the odds by 1.61 times. The most significant positive predictor for both outcomes was if the woman saw that the PHC had improved in the five years preceding the survey. If this was the case, she was 3.20 times more likely to make at least one ANC visit and 1.34 times more likely to have a skilled birth attendant for her last delivery. For both outcomes, women located in communities distant from the PHC were less likely to use its services.

Table 2: Logistic regression of antenatal care attendance and of skilled birth attendance on selected community, household, respondent, and program participation characteristics, 2013

Independent variables:	Predictors of making at least one ANC visit				Predictors of skilled birth attendance			
	OR	Z	P(z)	[95% CI]	OR	Z	P(z)	95% CI
Community characteristics:								
Intensity of CE program	1.02	0.53	0.60	0.94, 1.11	0.91	-2.20	0.03	0.83, 0.99
Community relation to PHC (poor to very good)	1.61	6.29	0.00	1.38, 1.86	1.08	0.92	0.36	0.91, 1.29
Saw improvement in PHC	3.20	11.8	0.00	2.64, 3.89	1.34	2.31	0.02	1.05, 1.72
More than 5 km to PHC	0.43	6.27	0.00	0.33, 0.56	0.71	-2.12	0.03	0.52, 0.98
Household variables:								
Low HH economic status (<4 consumer durables)	0.53	6.04	0.00	0.44, 0.66	0.80	-1.77	0.07	0.63, 1.02
Respondent characteristics:								
Vulnerable	0.80	1.94	0.05	0.64, 1.00	1.32	2.16	0.03	1.03, 1.70
Has cell phone	1.96	8.34	0.00	1.67, 2.30	1.54	5.10	0.00	1.30, 1.81
Health participation variables:								
Participation in CE (Number of CE activities in which participated)	1.33	10.9	0.00	1.30, 1.41	1.07	2.59	0.01	1.00, 1.10
Number of observations	3,755				3,453			
Pseudo R2	0.192				0.043			

Notes: ANC – Antenatal care. CE – community engagement. CI – Confidence interval. HH – household. PHC – Primary Health Centre. OR – Odds ratios

After controlling for all other variables, women living in the poorest of households, with three or fewer consumer durables (25% rank or lower) were 0.53 times less likely to make any ANC visits and 0.80 times less likely to have a skilled birth attendant. In addition to the vulnerability effects of social exclusion discussed above, individual economic status within the household had an additional effect on these outcomes. Women who had their own cell phone were 1.96 times more likely to make any ANC visits and 1.54 times more likely to have a skilled birth attendant.

Discussion

Women in the communities with the PRRINN-MNCH intervention were significantly more likely to engage in recommended maternal and child health care behaviours at the end of the intervention period. Knowing key maternal health facts, making ANC visits, and having skilled birth attendance were all

significantly greater at Endline than at Baseline, and maternal and infant mortality also declined between the Baseline and Endline. While we expected a greater improvement in maternal outcomes in the communities with a greater intensity of CE activities, there were fewer differences between the outcomes by CE intensity than between the control group and any level of CE intervention. These results suggest that it is not as important for communities to have specific CE activities as it is for them to have their own community volunteers who lead discussion groups, and support the community in developing community-based resources to support women to have a safe delivery.

However, we cannot evaluate the impact of CE intensity in isolation from the rest of the program. The CE intervention is linked to the health systems reforms implemented throughout the PHC and emergency obstetrical care structures by the entire

PRRINN-MNCH program. The regression results support the conclusion that CE intensity was important only for skilled birth attendance. The larger contributing factors to women making any ANC visit and to skilled birth attendance were in the improvements that they saw in the health facility, the establishment of a very good relation between the PHC and the community, and, of course, proximity to the PHC.

In this study, we focused on the extent to which the most vulnerable women were benefiting from the intervention. While the study specifically included Young Women's Support Groups, women's discussion groups, and other outreach aimed at the socially excluded women, we found that the most vulnerable, those who have no one to help them with their children and who rarely go out, continue to have lower participation rates in the CE activities. However, the regression results show that when participation in CE activities is higher, women were more likely to seek ANC and to have skilled birth attendance. Therefore, programs need to continue to focus on facilitating the participation of the vulnerable in the CE activities. When their participation rates increase, their protective maternal health behaviours are also likely to increase.

After controlling for community access and quality of their PHC, vulnerability status, and participation in the CE program, household and individual economic status additionally influence maternal health outcomes. Despite efforts to ensure that the program reach all women regardless of socioeconomic status, women in the poorest households and those without their own cell phones are less likely to seek ANC or have skilled birth attendance. This is consistent with most studies showing an economic disadvantage. However, our results add a new dimension to the consideration of vulnerability and disadvantage. Both social exclusion, which we have measured in our vulnerability variable, and economic disadvantage make it harder for women to use maternal health care services. Improving maternal care use involves addressing both levels of disadvantage. Our study showed that after controlling for both economic and social vulnerability, women with higher levels of participation in the CE activities were more likely to make ANC visits and to have skilled birth attendance. Thus, we recommend that continued stress on promoting participation of the vulnerable - economically and socially - in the CE activities will help overcome the exclusionary impact of both dimensions of vulnerability.

Conclusion

Perhaps the most important result of this study is that it shows that when all the parts of an integrated program are operating well together, even vulnerable women are more likely to make use of the PHC for skilled birth attendance, albeit less than among the less vulnerable women. The key is participation. Regardless of their social or economic vulnerability, when women participate in activities in their own communities, learning in their home community about protective maternal health behaviours and the supportive life-saving services available at the facility, the community and the woman's views of the PHC change. When they know that the PHC has improved and is now providing the community-responsive care, women will overcome the distance and access barriers and proceed to the health facility for ANC consultations and skilled birth attendance for their deliveries.

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