The Intervention

Faced with the stagnation or decline in maternal health in the North West and North East zones, the Partnership for Reviving Routine Immunization in Northern Nigeria (PRRINN) was established in 2006, and expanded in 2008 to include maternal, newborn and child health (MNCH), becoming PRRINN-MNCH (hereafter "the program"). The program was funded by the Department for International Development of the United Kingdom (DFID) and the State Department of the Norwegian Government. The unacceptably high rates of maternal, newborn and child mortality were addressed by comprehensive and integrated health systems changes impinging on the provision of quality maternal and child health care, including the systemic components of governance, human resources, clinical services, health information utilisation, and community engagement. This report focuses on the program implemented in the three states of Katsina, Yobe and Zamfara, which were supported to improve MNCH services in addition to immunization promotion.

The program organized the support for health system strengthening around the World Health Organization cluster model for the establishment of comprehensive emergency obstetric care (CEOC) services for a cluster of Local Government Areas (LGAs) comprising approximately 500,000 individuals. The CEOC facility was strengthened along with four Basic Emergency Obstetric Care (BEOC) facilities (each serving 100,000 persons) and eight "24/7" primary health care facilities providing obstetric care. Comprehensive primary care services at these eight clinics was revitalized, with multiple trainings to nurses, midwives, and community health extension workers who staff the primary health care centers. Particular attention was paid to upgrading routine immunization services, as well as basic antenatal care services. Supportive supervision was introduced to provide guidance in improving quality of care, and the entire health system's information system was upgraded to an electronic health information system.

Supplementing the supply-side changes were activities that created awareness of and demand for MNCH services. Selected groups of villages served by primary care facilities linked to the upgraded emergency obstetric care (EOC) facility participated in a community engagement process, which aimed to reach entire communities and increase awareness, knowledge and practice of healthy behaviors in response to household and community level MNCH barriers (n=806 communities). Core to this process was a community discussion group which provided a space for reflection and problem solving for the most prevalent MNCH problems affecting the community. Thirty community volunteers (CVs), both male and female, were recruited in each community and trained to facilitate the discussion groups and other activities with the aim of mobilising communities around an MNCH agenda. A community-wide approach was adopted where entire communities - men, older women, traditional leaders, in addition to women of reproductive age - were encouraged to participate. The CVs were taught to use a range of participatory methodologies, including communication body tools and songs, to engage the community around critical MNCH issues. Key topics covered in the discussion groups included the maternal and newborn danger signs, the need for a safe pregnancy plan, care, nutrition in pregnancy, the vaccination schedule, the benefits of ANC, and essential newborn care. Men and women participated in separate discussion groups.

The CVs were also asked to identify and refer to the PHC any pregnant women, those nearing delivery or at risk for delivery or pregnancy complications, as well as sick children needing medical attention. As part of the community engagement approach, the program worked in partnership with the National Union of Road Transport Workers (NURTW) to implement a community-based emergency transport scheme (ETS). ETS drivers (n=4111) resided in the intervention communities and were trained to provide a fast, supportive and low-cost service in situations where women experienced a maternal complication. The CVs also mobilised their communities to establish emergency savings schemes and community blood donor schemes. These schemes addressed key barriers that the communities had identified as important in baseline qualitative studies.

Implementation research in 2009/10 (Clustering Survey) revealed that 80% of the child deaths were taking place among 20% of women in communities; and these women were likely to be lacking in social support and to feel that they lacked the respect of their families. Therefore, the community engagement activities were expanded with social supports and activities targeting these most vulnerable, to create opportunities for them to participate in the community learning

process without fear of being left out, ignored, or shunned. Beginning in 2012 the program added outreach and support activities for the most vulnerable, the young and the unsupported.

The program implemented the supply- and demand-side interventions incrementally adding more clusters to the intervention group. This allowed an implementation research approach to assessing the impact of the combined strategies, where program decision makers could be informed in a timely way about what was working and what was not. About one-third of the intervention clusters were implemented in the first year of the program, and in each successive year approximately 20-25% of the remaining clusters joined the program. By the end of 2013, the program had expanded to support CEOC/BEOC/"24/7" PHC services in virtually all LGAs in the three MNCH states, but demand-side interventions were implemented in only 82% of the LGAs.

Methods

Study Design

We used a quasi-experimental design using pre- and post-intervention household surveys in the intervention and control communities. The pre-intervention or Baseline Household Survey (BHS) was conducted in April-May 2009 and the post-intervention household survey, the Endline Household Survey (EHS), was conducted in May-June 2013. The impact evaluation contrasted respondents according to where program activities had been implemented in the sample communities and whether they had been aware of or participated in them. Availability of the program activities was assessed by a combination of information from program staff and from the community-level survey which asked what activities had taken place in the sample village.

As the baseline was entirely pre-intervention, all responses in the BHS were considered control. By 2013, virtually all 55 of the LGAs in the original sample had received the statewide supply-side interventions, e.g., training of health care workers or facility upgrades, and 82%of the LGAs had received the community engagement package. Therefore, in the EHS the control areas were defined as those which had not yet received the integrated community engagement package.

Individual exposure to the program was assessed by woman's responses to questions eliciting sources of information or health care advice and her explicit response to questions about observing or participating in activities introduced by the program. The study was approved by State Ethics Review Committees in each of the states. The Ethics Review Committees are certified by the Nigerian Federal Government's National Health Research Ethics Committee to review and approve health research protocols for their states.

Analysis

At the analysis stage, the inclusion criteria for both surveys were narrowed to ever-married women, aged 15-49 years, with a birth in the five years prior to the survey. The data from the BHS and EHS were merged into one combined data set, using one uniform variable format. Respondents were assigned to the control or intervention groups based on the level of program intervention at the time of the survey. Maternal mortality ratios (MMRs) were calculated using the sisterhood method. The dependent variables are the key health behaviors pertaining to maternal health outcomes. The bi-variate analyses of the merged data sets were conducted using sampling weights based on different sampling fractions in the intervention and control areas. We examined changes in the proportion with the designated MNCH behaviour or outcome, contrasting all BHS responses versus the EHS responses, intervention versus control.

In order to isolate the intervention effects without the possible spread to CE-Light communities, the EHS comparisons between the control and the intervention groups are restricted as follows. The control group (n=1,410) includes communities where no CE activities were documented in the community questionnaire administered to the village elder prior to the survey, that is, no CV and no community dialogues. The intervention group (n=2,451) was restricted to the communities where the village documented the full set of community engagement activities, including having CVs, community discussion groups, community savings schemes, an emergency transport scheme and specialized support for vulnerable women. They may also have received visits from trained community health workers circulating among the hard-to-reach villages

We assessed the degree to which the intervention and control groups differed using the Chi-square statistic. We used multiple logistic regression to estimate the factors affecting the the odds of the most vulnerable women participating in program activities and in learning about and practicing recommended maternal and infant care behaviors. Analyses were performed using Stata 12.1 (Statacorp, College Station, TX).

Results

In the four years of program implementation between 2009 and 2013, there were significant improvements in every targeted MNCH outcome. Under-five mortality per 1,000 live births declined from 160.0 to 102.2 and infant mortality from 90.0 to 63.0 The estimated MMR at baseline was at least 1,270 per 100,000 live births, which was calculated using the sisterhood method using the PRRINN-MNCH mid-term survey of 2011. This figure is considered conservative given other estimates for MMR in Northern Nigeria, which average 2,420 per 100,000 live births. Using the sisterhood method with data from the EHS, the MMR is estimated to have declined to 1,190 per 100,000 live births. In the control communities which did not have the complete intervention the MMR had decreased marginally to 1,262 in the CE Complete intervention communities a bigger decrease (to 1,057) was recorded.

Improvements were seen in the proportions of women delivering with a skilled birth attendant (SBA), which increased from 11.2% to 23.9%; having two or more anti-tetanus vaccinations from 71.8% to 83.6%; and having at least one antenatal care visit (ANC), which doubled from 24.9% to 48.8%. At endline, both ANC and skilled birth attendance were significantly higher in the intervention than control communities. In the intervention communities with CE-complete, the proportions with any ANC visit were 65.0%, versus 50.8% in the control communities; 26.9% delivered with a skilled birth attendant in the intervention with CE-complete versus 23.1% in the control communities, which did not have community engagement.

Knowledge of maternal danger signs significantly increased between 2009 and 2013. There was a doubling in the percentage of women who knew at least four maternal danger signs (10.2% to 21.7%). In the intervention communities, 24.0% of women knew at least four maternal danger signs, compared to 12.6% in the control communities (p<0.001). Significantly more women knew specific danger signs, and with few exceptions, those in the intervention communities knew more of the danger signs of pregnancy and delivery. At endline in the intervention communities, only 19% knew no danger signs, compared to 33% in the control communities.

In 2009, only 37.8% of women made any preparation for their delivery, with the most common preparation being setting aside money and preparing for a home delivery, namely having a clean razor blade to cut the umbilical cord and clean clothes ready to wrap the baby in. Only 5.1% had arranged for transport to a facility for delivery. Between 2009 and 2013, more women were making preparations that included being ready for maternal emergencies. One-third reported learning the maternal danger signs, and 16.4% had identified someone who would monitor labor to watch for danger signs. Ten percent had already identified the ETS driver. Well over half, 60.4%, had saved money for the delivery, and 14.3% had informed their family about the community emergency savings scheme which was available to help defray costs if needed. Almost all of these preparations were more likely in the CE-complete or intervention communities, where the radio jingles reaching all communities in the state were complemented by a structured program of community discussion groups and other dialogues led by the community volunteers.

Focus on the most vulnerable:

Based on the cluster survey's identification of the six characteristics of the undersupported, we defined the vulnerable as 1) teens, 2) women who reported that they rarely or never spoke at public gatherings or family celebrations 3) reported not having anyone to help her with difficulties

For almost all the maternal health behavior variables, the vulnerable women were less likely to have adopted the recommended practices or learned what to do to have a healthy pregnancy and delivery.

	Not Vulnerable (n=1006)	Vulnerable (n=554)
Any ANC	72.9%	27.1%
4 or more ANC	46.6%	28.4%
Knows 4 or more maternal danger signs	12.5%	14.5%
Knows 4 or more birth preparations	8.7%	3.1%
Has husband's standing permission	88.7%	80.3%
Knows 4 or more newborn danger signs	56.1%	14.6%

Had skilled attendance at birth	27.7%	24.0%
Breastfed w/in 24h.	85.7%	73.4%
Took sick child to health facility	67.6%	59.0%
Child death before age 5	2.4%	6.4%

All differences significant at p<.05 or better.

Logistic Regression Results: Predictors of Recommended Maternal Care Behaviors

Logistic Regression Predictors of ANC consultations (any ANC)

Independent variables:	Odds Ratio	Std. Err.	P>z		[95% Conf. Interval]	
Community characteristics:						
Intensity of CE program	1.20931	.1064051	2.16	0.031	1.017752	1.436923
Community relation to PHC (poor to good)	1.516562	.1174711	5.38	0.000	1.302948	1.765197
Low Quality PHC	.7860426	.0909006	-2.08	0.037	.6266287	.9860113
Household variables:						
HH Economic Status	1.05005	.0237583	2.16	0.031	1.004502	1.097664
Respondent characteristics:						
Vulnerable teen or shy	.5787421	.0599226	-5.28	0.000	.4724461	.7089538
Has cell phone	1.880233	.2063529	5.75	0.000	1.516329	2.33147
Children ever born	.9613765	.0161808	-2.34	0.019	.93018	.9936192
Literate	1.829344	.2351298	4.70	0.000	1.421964	2.353435
Health participation variables:						
Knows benefits of ANC	20.46498	2.399035	25.75	0.000	16.26402	25.75103
Standing permission	1.975745	.3007777	4.47	0.000	1.466048	2.662647
Husb. permission important	2.198102	.1790531	9.67	0.000	1.873746	2.578607
Particip in commun forum	1.421321	.1692078	2.95	0.003	1.12553	1.794848
Particip in DG about ANC	1.577739	.219288	3.28	0.001	1.201511	2.071775
Home visit from CHW	1.252849	.1459529	1.93	0.053	.9970948	1.574204
Maternal danger sign known	1.031178	.0231316	1.37	0.171	.9868233	1.077527
Saw improvmt in PHC	1.208099	.1618357	1.41	0.158	.9291295	1.570828
_cons	.0062049	.0018599	-16.96	0.000	.0034482	.0111656

Conclusions:

Regression analysis identifies the following as significant predictors of ANC visits: literate, well-maintained home, has cell-phone, someone to rely on for help with children, speaks up at ceremonies, knows danger signs, recent clinic visit, satisfied with improvements in the clinic, and higher frequency of participation in CE activities. The results show that the high intensity community engagement programs were successful in reaching the less vulnerable women, those with somewhat higher social status, but that they were less successful at reaching the most vulnerable, the youngest and most socially marginal women of the community. To reach these women, additional efforts will be needed.