



**Partnership for Reviving Routine
Immunisation in Northern Nigeria;
Maternal Newborn and Child Health Initiative**

Changes in Maternal and Child Health Care Behaviours: Early Evidence of the Impact of Community-Based Programmes

Operations Research Technical Assistance Unit (Output 4)

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DRAFT FOR REVIEW AND COMMENT



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Introduction

Maternal health outcomes in Nigeria are among the worst in the world, with Nigeria second only to India in the number of maternal deaths (UNICEF 2008; WHO 2011). In Northern Nigeria the Maternal Mortality Ratio (MMR) is estimated to be appreciably higher than the national average (Federal Ministry of Health of Nigeria et al. 2009) with recent estimates for the north over 1,000 per 100,000 live births compared to MMR estimates for the southern region below 300 per 100,000 live births (Centre for Reproductive Rights and Women Advocates Research and Documentation Centre 2008). In northern Nigeria, high levels of mortality reflect low levels of antenatal care (ANC) utilization (31% and 43% in the North West and North East regions, respectively) and deliveries with a skilled birth attendant (9% and 13% in the North West and North East regions, respectively) (National Population Commission [Nigeria] and ICF Macro 2009). In addition, there has been slow progress in improving infant and child survival and primary care utilization. As of 2008, vaccination coverage rates in the four northern states of Zamfara, Katsina, Jigawa, and Yobe were all 5.4% and below. When their young children became sick with pneumonia, malaria or diarrhea, under half of all sick children were taken to a health facility for treatment. Infant mortality was 139 per 1,000 live births, while under 5 mortality was 217 and 222 (per 1,000 live births), respectively.

In response to the low rates of routine vaccination coverage in the North West and North East regions, 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 programme”) in the four northern states of Jigawa, Katsina, Yobe, and Zamfara. PRRINN-MNCH is a strategic attempt to reduce maternal and child mortality through systems changes addressing issues of health governance, human resources, health information utilization and community engagement alongside the strengthening of clinical services.

The programme uses an operations research approach to assessing the impact of its combined strategies, in order to inform program decision makers in a timely way about what is working and what is not. Of particular focus in this report is the implementation of community-based service delivery programmes which bring key reproductive health services directly to the hard-to-reach communities. The study reported here reports on changes in the maternal and child health care for the period 2009 to 2011, roughly at the mid-point in implementing the programme.

Methods

Intervention Design

This programme has been implemented in the four northern Nigerian states of Jigawa, Katsina, Yobe, and Zamfara, with populations of, respectively, 5.1, 5.8, 2.3, and 3.3 million according to the 2006 population census of Nigeria. The programme design focuses on revitalizing and

improving maternal care in clusters of Local Government Areas (LGAs) per state, which each comprise a catchment area for emergency obstetrical care (EOC) services. A total of 14 LGAs were selected as the first intervention clusters, averaging 2-5 per state. The clusters of LGAs where the partnership has worked first to upgrade EOC services with corresponding strengthening of demand and primary care services for MNCH were designated as the intervention areas, and the balance of LGAs were designated as control or “low-intensity,” where statewide policy changes may have an impact but intensive upgrading and systems changes have yet to be made. Within the intervention cluster the partners identify supply-side changes in the health system which support the delivery of quality maternal and child health care, such as facilitating the posting and training through the Midwife Service Scheme, improved planning and management techniques, upgrading of surgical facilities for obstetric care, and so on. One key programme initiative, for example, has been “Primary Health Care Under One Roof,” which consolidates and coordinates the different components of primary care in one health clinic or post.

Complementing these supply-side changes is the introduction or enhancement of activities that create a demand for MNCH services. In selected groups of villages served by primary care facilities linked to the upgraded EOC facility, partners work within the LGA and district structures to develop social structures and processes for talking about and encouraging preventive care and use of the primary health facility. These community engagement activities range from radio “spots” developed by the community teams to promote birth preparedness or childhood immunizations, to support for enhancing women’s groups, and to cultivating and training a network of community volunteers and community health workers to meet with groups or individual families in underserved communities more than ten kilometers from the primary health care post or clinic. In the year before the mid-term survey the programme developed a small cadre of community health workers who would provide primary health services directly to families through rotating visits or extended availability through residence in the communities.

Evaluation Design

The assessment of the impact of the community-based service delivery (CBSD) programmes at the mid-term uses a quasi-experimental design with controls. If these interventions are successful in changing health care behaviors and perspectives on service use, more women will use the available and enhanced services. The impact on use of the services and, importantly, changes in the understanding of health problems and how to address them with the help of the health care services, can only be assessed by hearing from those who have used the health care services and those who have not. Therefore, the evaluation of the impact of this integrated set of initiatives needs to include feedback from the entire community of women, those who have used services and those who have not. This means that the evaluation needs to control for two variables, whether the person lives in an intervention community where the integrated health system and community-based services were available and whether the individual participated in any of the community-based service activities or services. This impact assessment therefore was conducted

in both intervention and control areas and on a pre-post model, to capture changes in the availability of programme- and community-based services, and a quasi-experimental design, to assess changes in women's health behaviors with and without their participation in the programme-related services or activities. For purposes of this assessment, pre-intervention was defined by the time period of the baseline survey, namely 2009, and post-intervention is defined by at least six months after programme implementation, namely 2011. Availability of the enhanced supply and demand services was assessed by contrasting the intervention and control areas, and the individual exposure to the program is assessed by the woman's responses regarding the source of information or health care advice, which allowed for different sources corresponding to the alternative CBSD strategies.

Survey Design and Sample

The baseline or pre-intervention and mid-term or post-intervention (incomplete) survey used the same basic sampling design, but not including the same communities or households unless they happen to be randomly selected again. The survey is cross-sectional in that each survey can be an accurate "snapshot" of maternal, newborn, and child health at the time each survey was conducted. The survey is population-based to ensure that all families living in these participating states are reflected in the survey findings, not just the subgroups which use health care services of a particular type. Because the goal of the survey was to assess changes in health status, behaviours, and care utilisation, survey questions included all relevant health behaviours and health care utilisation patterns, as well as the sources of health care and health care advice, precisely specified by type of health care worker so that each variant on CBSD can be identified. This is critical for assessing exposure to the MNCH activities.

As the MNCH activities are implemented in key clusters in each state, the sample design needed to include enough respondents in these clusters to allow estimation of programme impact. Therefore, the sampling plan is a stratified two-stage cluster, random sample, with oversampling of individuals in the MNCH intervention clusters. Individuals from MNCH clusters are oversampled according to a ratio of 2:1, even though MNCH clusters cover a significantly lower proportion of the population of each state. In the baseline survey there were 24 LGAs, with 3,901 households sampled in the intervention area and 2,444 in the control areas. For the mid-term survey, these same LGAs were included, with the addition of six LGAs from Jigawa (not included in the baseline) and the exclusion of LGAs including the state capital, considered not an appropriate control for the largely rural intervention. This left 21 LGAs in the sampling frame for the mid-term survey. In order to balance the need for a sample which was powerful enough to detect the smallest change in MNCH outcomes between the baseline and the mid-term surveys, as well as a reduced budget, the mid-term sample size was reduced to 770 per state, yielding a sample of 2,360 households in the intervention areas and 960 in the control areas. In both the baseline and mid-term surveys, the number of households at the first stage was proportional to the size of the unit, the enumeration area in the baseline and the LGA in the mid-term survey. In the mid-term survey, communities in the intervention LGAs were included in the intervention if

it was confirmed that the programme had been active in the community. In the mid-term survey, sampling within each community was also proportional to size within each intervention and control LGA. The sampling fraction for each community was determined by information on the total households from the community leadership. For both surveys, households within each selected community were randomly sampled using a procedure similar to that used in the WHO-EPI cluster surveys, namely by numbering then sampling households according to the community sampling fraction along randomly selected paths leading out from the center of the village.

The household is the ultimate sampling unit. In compounds that comprised one to three households, one household was randomly chosen for interviews; in compounds with four to six households, two were surveyed; in compounds with seven or more households, three were surveyed. Within each randomly selected household, in the baseline survey, all ever-married women of child bearing age (15-49) were interviewed, whereas in the mid-term survey only one ever-married woman with children born in the last five years was selected for interview. In the baseline survey there were 6,842 women with successfully completed interviews, while in the mid-term survey there were 3,079 completed interviews.

Analysis

We use bivariate analyses to report on the basic findings from each survey. Both surveys included socio-demographic characteristics of the households and women interviewed. The dependent variables of interest are the key health promotion behaviors pertaining to ANC, deliveries, newborn care, immunisations, and care of sick children. The two sets of survey data were analysed separately, and bivariate tests (Chi-square, t-tests and z-scores) were used to test for significant differences between the key indicators at baseline and mid-term. Because of different sampling weights by state and LGA in the baseline survey, these are used in the calculation of the baseline survey results, but no weights were used in the calculation of the mid-term survey due to the use of proportionate sampling at the LGA and community level. Instead, we focus on the results for the mid-term for the intervention versus the control areas. Because of this focus on the differences between the control and intervention communities at the mid-term survey, results are reported for all four states in the mid-term survey, while the results at baseline are for the three states, without Jigawa. In addition to the comparison between the two periods of time, the analyses also test for significant differences between the baseline and the mid-term survey results by intervention status (intervention or control). This report does not use multi-variate analysis to control for socio-demographic differences between the samples, and it will be important to do that in more detailed analyses.

Results

Respondent Characteristics

In the mid-term survey, the selection for women only with births in the past five years led to a slightly different profile of respondent, even after excluding Jigawa. Whereas only 30.3% of the

women surveyed were aged 20-29 in the baseline survey, 49.2% were in their twenties in the mid-term survey. Slightly more were second or third wives than among the wives interviewed in the baseline. Fewer had any education, and among those who had been to school, more (72.1%) had attended primary school only, compared to 53.0% among those interviewed in the baseline. Consistent with the low level of schooling, fewer of the women interviewed for the mid-term were able to read or write in any language (Hausa, Arabic, English). In neither survey did many women list their work as farming, and there were fewer listing themselves as working in food or agricultural processing (40.7% vs. 33.0%, baseline vs. mid-term). In contrast, the women interviewed in the mid-term survey were more likely to list their occupations as trading or selling (17.5% versus 26.4%, baseline vs. mid-term) or housewife (30.3% vs. 43.6%, baseline vs. midterm). The women interviewed in the mid-term survey were also much more likely to have access to a cell phone (7.9% vs. 31.7%, baseline vs. midterm). Thus, the women interviewed with the mid-term survey appear to be younger and of lower social status, characteristics often associated with poor access health care workers or services.

1.0 Pregnancy Care

As shown in Table 1.1, there was a significant drop in the proportion of women who had no ANC for their most recent pregnancy in the past five years, from 67.4% to 49.3%. The proportion with no ANC was significantly lower in the intervention areas than in the control areas, 46.8% vs. 55.5% ($p < 0.001$). Analysis of the source of ANC shows that the increase from baseline to mid-term was completely related due to increased ANC provided by community health workers (CHEWs), in the facility or in the community. Whereas CHEWs provided ANC to only 6.9% of pregnant women at the baseline, they provided care to 24.2% of pregnant women at the mid-term assessment. Finally, the increase in ANC provided by the CHEWs was significantly greater in the intervention than control communities, 26.4% vs. 19.1%.

Table 1.1: Source of ANC during pregnancy in the past five years MNCH BS-2009 and MNCH-MTS2011

Source of Antenatal Care	Baseline 2009	Total 2011	Control 2011	Intervention 2011	p-value BS vs Int	p-value Ctl vs Int
None	67.4	49.3	55.5	46.8	<0.0001	<0.0001
Doctor, nurse or midwife	25.2	26.2	25.1	26.7	0.1855	0.3485
CHEW-facility	6.5	21.3	16.3	23.4	<0.0001	<0.0001
CHEW-community	0.4	2.9	2.8	3.0	<0.0001	0.7602
TBA (inc. trained)	0.6	0.2	0.2	0.2	0.0260	1.0000
Number	5,041	3,075	969	2,106		

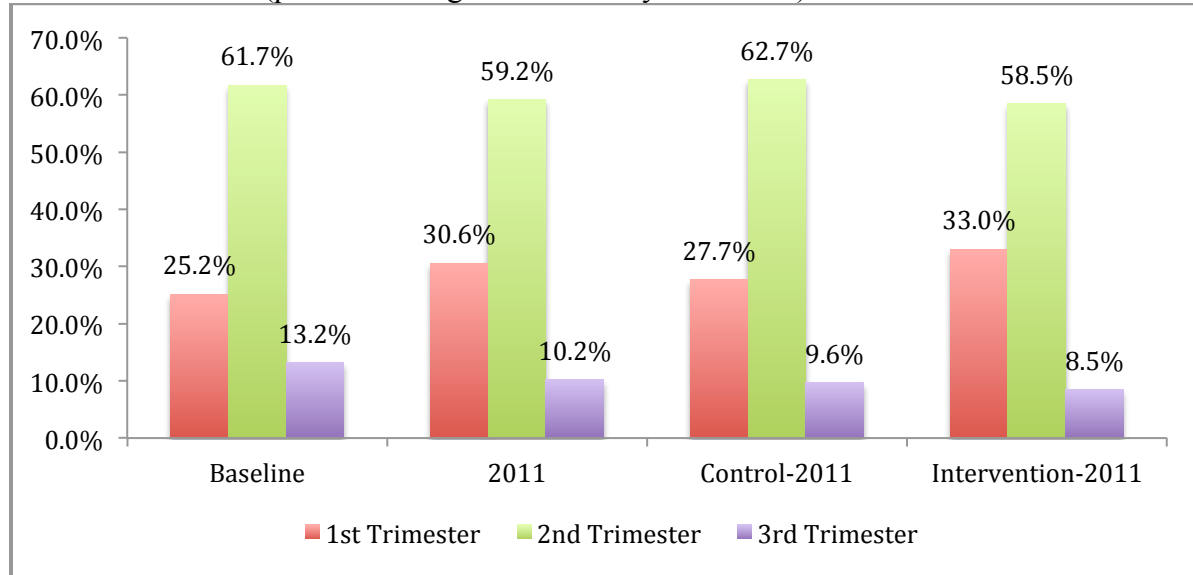
Notes: Difference between control and intervention 2011 Chi-square=32.4 (<0.001); For women with two or more live births in the five-year period, data refer to the most recent birth; Some numbers for sub-categories may not add up to the total due to (1) inconsistencies across related variables and (2) reference to specific categories. "CHEW-community" includes CHEW on outreach, CHEW providing CBSD, CHEW on a van.

As seen in Table 1.2, there was no change in the mean number of ANC visits for women with any ANC visit. However, there was a shift in the timing of the first ANC visit. At midterm, significantly more women had their first ANC visit in the first trimester, and this proportion was greater in the intervention communities (see Figure 1.1). The percent of women 15-49 who have received a recent anti-tetanus vaccination rose from 69.2% at baseline to 83.6% at mid-term, with no difference in the rate for control and intervention communities.

Table 1.2: Mean number of ANC visits for most recent birth in previous five years, if had any ANC, MNCH-BS 2009 and MNCH-MTS 2011

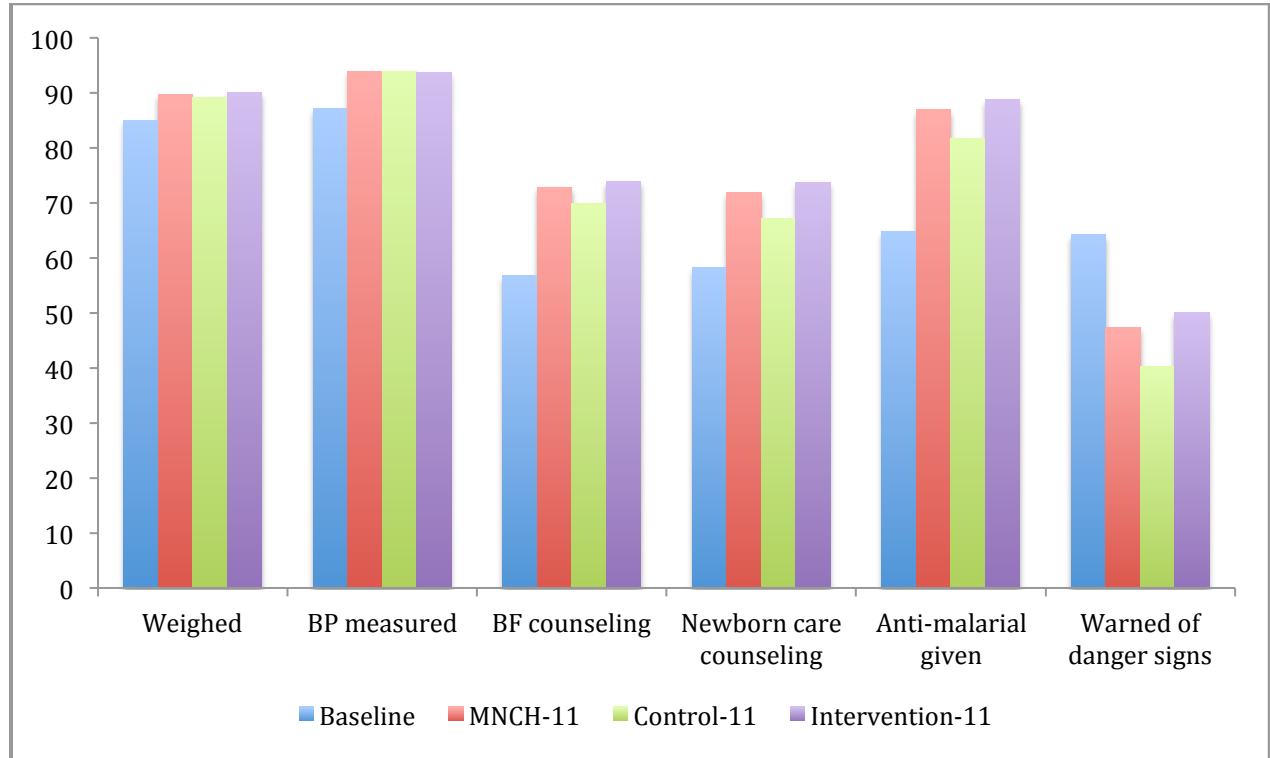
Survey	Mean	Standard Deviation	[Minimum, Maximum]	Number
MNCH-BS 2009	4.9	2.7	[1, 30]	1,747
MNCH-MTS 2011	4.8	2.2	[1, 15]	1,335
Control	4.9	2.2	[1, 12]	369
Intervention	4.8	2.2	[1, 15]	966

Figure 1.1: Timing of first ANC visit for pregnancies in previous five years, MNCH BS-2009 to MNCH MTS-2011 (percent among those with any ANC visit)



The data presented in Figure 1.2 show that the women receiving ANC also received more of the critical elements of ANC. At baseline, only 85% were weighed and had their blood pressure assessed during any ANC visit, and fewer than 60% received counseling on breastfeeding, newborn care, or danger signs. At mid-term there were significant increases in the delivery of all these key care elements, up to 90% or more being weighed and having their blood pressure assessed in both the intervention and control communities. The sharpest increase in services delivered is for the distribution of anti-malarials, which rose from 64% at baseline to 86% at mid-term, and to 88% at mid-term in the intervention communities. Breastfeeding counseling rose from 57% to 72% at mid-term, with little difference between the intervention and control communities at mid-term. There were significant differences in newborn care counseling, which increased from 58% to 71% at mid-term, rising to 73% in the intervention communities. The one counseling behavior that went down was counseling on maternal danger signs, which declined from 63% to 47% at mid-term.

Figure 1.2 ANC content for most recent pregnancy in the 5 years preceding the survey, MNCH BS 2009 vs. MNCH MTS-2011 (percent among women with any ANC)



As shown in Table 1.3, the percent of women who know no danger signs was slightly but not significantly higher at mid-term in the intervention communities (5.3% to 6.2%, $p=0.286$), and the proportion with no knowledge of pregnancy danger signs was significantly lower in the intervention than control communities (6.2% vs. 9.2%, $p=0.0087$). Between the baseline and mid-term, there were increases in the proportions knowing the critical danger signs of severe headache (42.6% to 80.5%), swelling (2.2% to 49.5%), convulsions (1.4% to 39.7%), excessive bleeding (0.3% to 41.1%), and severe abdominal pain (0.4% to 38.2%). Knowledge of these also increased in the control areas, but the knowledge was significantly greater in the intervention communities for all but the danger sign of abdominal pain.

Table 1.3: Knowledge of pregnancy danger signs for most recent pregnancy in the past five years, MNCH-BS 2009 vs MNCH-MTS 2011 (percent)

Danger Sign	Baseline	2011 Control	2011 Intervention	p-value BS vs Int	p-value Cnt vs Int
None	5.3	9.2	6.2	0.2685	0.0087
Severe headache	42.6	68.9	80.5	<0.0001	<0.0001
Blurred vision	25.7	7.9	13.9	<0.0001	<0.0001
Reduced fetal movement	16.4	12.9	15.4	0.4310	0.1014
High blood pressure	5.6	NA	NA	NA	NA
Swelling of face/hands	2.2	22.2	49.5	<0.0001	<0.0001
Convulsions	1.4	35.8	39.7	<0.0001	0.0650
Excessive vaginal bleeding	0.3	30.8	41.1	<0.0001	<0.0001
Severe lower abdominal pain	0.4	41.4	38.2	<0.0001	0.1326
Other	0.1	NA	NA		
Number	2,473	907	1,263		

There was a large increase in the numbers of women who sought advice about their own or their expected child's health, from only 25.1% at baseline to 75.4% at mid-term, with the percent higher in the intervention than control communities (77.6% vs. 69.8%, Chi-square for 2011 control vs. intervention=294.7, $p<0.001$) (see Table 1.4). While there were significant increases in the percent of women seeking advice from a doctor, nurse or midwife (5.7% to 10.8%), the most notable increases, particularly in the intervention communities, were in the percent of women seeking advice from CHEWs, either at the health facility or in the community, as well as from community volunteers. By the time of the mid-term survey, the percent of women in the intervention areas who sought advice from all community health workers or volunteers was 30.5%. In the control areas traditional birth attendants (TBAs) were increasingly sought (14.2%), compared to only 6.6% seeking advice from a TBA in the control areas. Finally, there was more discussion and advice seeking from friends and family (17% to 29.7%).

Table 1.4: Source of advice for women who sought advice about their health or the health of their future baby during their most recent pregnancy in the past five years, MNCH-BS 2009 vs. MNCH-MTS 2011 (percent)

Source of advice	Baseline	MNCH- MTS-11	2011- Control	2011- Intervention	p-value BS vs Int	p-value Ctl vs Interv'n
No one	74.9	24.6	30.2	22.4	<0.0001	<.0001
MD/nurse/MW	5.7	10.8	9.7	11.3	<0.0001	0.1841
CHEW-facility	0	8.9	7.7	9.4	<0.0001	0.1234
CHEW-commun	0	3.04	1.2	5.2	<0.0001	<.0001
CHEW-Van	0	0.62	0.8	0.6	<0.0001	0.5255
TBA	2.5	9	14.2	6.6	<0.0001	<.0001
CV	0	10.9	0	15.3	<0.0001	<.0001
Friends/fam	17	29.73	31.2	27.1	<0.0001	0.0192
Radio	NA	2.1	1.7	2.3	NA	0.2823
Number	4,730	3,075	969	2,106		

The percent of women who delivered at home declined only slightly from 89.4% to 87.1%. More women delivered at home in the intervention than control communities (88.7% vs. 83.7%, $p=0.0001$), with corresponding increases in deliveries at health facilities, 10.9% and 14.0% in the intervention and control communities, respectively. While there were more deliveries en route in the control communities, this declined to 0.2% in the intervention communities. Among those who delivered at a health facility after having complications, the proportion who had a caesarian section increased from 5.8% to 6.9%. There was no significant difference in the caesarian section rate between the intervention and control communities, 6.8% vs. 7.4%, respectively (Chi-square=0.385, $p=0.844$).

Table 1.6 Place of delivery for the most recent birth in the past 5 years, MNCH-BS 2009 vs. MNCH-MTS-2011 (percent)

Place of delivery	Baseline -2009	MNCH -MTS- 2011	MNCH -MTS- control	MNCH- MTS- intervention	p-value BS vs Int	p- value Ctl vs Int
Home	89.4	87.1	83.7	88.7	0.4493	0.0001
Health facility	9.7	11.9	14.0	10.9	0.0002	0.0140
En route	0.4	0.4	0.8	0.2	0.2238	0.0131
Other	0.5	0.1	0.3	0	0.0012	0.0120
Number	2,473	3,072	969	2,103		
Chi-square (control vs. intervention)	40.02 ($p<0.001$)					

The reasons for not delivering at a health facility continue to be dominated by feeling more comfortable at home (43.8% at baseline and not asked at midterm) or that going to a health facility was not necessary (18.6 % at baseline and 50.2% at mid-term) or not customary (7.6% at baseline and 11.8% at mid-term). At mid-term 24.8% said they did not deliver at a facility because “I am a strong woman,” with more indicating this reason in the control than intervention communities (31.0% vs. 22.1%). There was a light increase in women citing lack of their husband’s permission from 3.4% to 4.4%. In contrast, there were declines in the proportion indicating that cost was a barrier (3.8% to 1.3%) or that the facility was too far or they had no transportation (13.6% to 2.6%).

Table 1.7: Reason for not delivering at a health facility for most recent live births in the five years preceding the MNCH-BS-2009 vs. MNCH-MTS 2011 (percent)

Reason	Baseline 2009	Midterm- 2011	Midterm- Control	Midterm- Intervention	p-value Ctrl v Int
More comfortable at home	43.8	NA	NA	NA	
Not necessary	18.6	50.2	52.5	42.7	<0.0001
“I am a strong woman”	NA	24.8	31.0	22.1	<0.0001
Not customary	7.6	11.8	8.6	13.2	0.0007
Too far/no transportation	13.6	2.6	2.8	2.5	0.6536
Cost too much	3.8	1.3	1.6	1.2	0.4051
No spousal permission	3.4	4.4	6.8	4.3	0.0067
Health worker’s attitude	2.1	1.7	1.1	2.0	0.1006
Other reason	7.2	5.5	4.4	5.9	0.1161
Number	4,482	2,673	811	1,862	

2.0 Newborn and sick child care

More newborns were first breastfed within 24 hours from birth, with the percent increasing from 42.9% to 58.3%, with significantly more (62.7%) in the intervention areas (see Table 2.1). In the intervention areas, 31.4% of the mothers gave only breast milk in the first 72 hours after their baby was born, significantly more than in the control areas. Fewer infants had a postnatal check by and health worker within 48 hours of birth, down from 39.2% at baseline to 23.3% in the intervention and 17.1% in the control areas. However, there was a large shift in who checks on the newborn. At baseline, the majority of newborns were checked at home by the TBA (40.8%), while at the mid-term most newborns were checked by the nurse/midwife at the health facility, 58.3% in the control areas and 45.6% in the intervention areas. More newborns were checked by CHEWs, with even more in the intervention (45.8%) than control areas (32.4%).

Table 2.1: Selected postnatal care characteristics, most recent live births in the five years (percent)

Characteristic	Baseline 2009	Control 2011	Interven- tion 2011	p-value BS vs Int	p- value Ctl vs Int
First breastfeeding baby done within 24 hours	42.9	58.3	62.7	<0.0001	0.0190
Giving only breast milk within 72 hours	NA	26.4	31.4	NA	0.0050
First postnatal check within 48 hours	39.2	17.1	23.3	<0.0001	0.0310
Person checking newborn					
Nurse/midwife	34.5	58.3	45.6	<0.0001	0.0001
CHEW in health post	4.7	25.9	37.4	<0.0001	0.0003
CHEW in outreach	NA	6.5	8.4	--	0.2917
TBA	40.8	1.0	1.8	<0.0001	0.9068
Other	20.0	9.2	8.6	<0.0001	0.7502
Number of women	1,335	299	907		

In 2011 significantly fewer women had no one giving them advice on the care of their newborn, down from 31.0% to 21.7% (see Table 2.2). In addition, there was a change in the type of person giving information about newborn care, with a shift from family and friends (32.2% down to 27.1%) and TBAs (14.2% down to 6.6%) to nurse/midwives (11.0%) and CHEWs (13.8%). As seen in Table 2.3, most women knew at least one of the newborn danger signs, with the most commonly known danger sign being high fever, known by 83.9% in the control and 85.7% in the intervention communities. Many knew other critical danger signs that indicated the need for the baby to be seen by a health worker. One-third of women in both communities knew to worry about excessive crying, and one-fourth knew to watch out for vomiting or a swollen abdomen. In the intervention areas, just over one-fourth knew to worry about diarrhea and dehydration and about convulsions, significantly more than in the control areas. Women in the intervention areas were also more likely to know about jaundice, breathing problems and not being able to suckle.

Table 2.2: Sources of knowledge about postnatal care, most recent live birth in past five years (percent)

	Control 2011	Intervention 2011	p- value
Nurse/midwife	10.4	11.0	<0.0001
CHEW in health post	7.5	9.5	
CHEW in outreach	2.2	4.3	
TBA	14.2	6.6	
Family/ friends	32.2	27.1	
Drug vendor/ Chemist	0.4	0.0	
Other	2.1	19.8	
No one mentioned	31.0	21.7	
Number of women	888	2,187	

Table 2.3: Caregiver knowledge of newborn danger signs, most recent live births in past five years (percent)

	Control 2011	Intervention 2011	p- value
None	9.7	7.7	0.103
High fever	83.9	85.7	0.297
Convulsions	16.1	27.1	<0.001
Jaundice	4.0	15.7	<0.001
Breathing problems	14.9	18.0	0.083
Excessive crying	31.3	34.1	0.212
Not able to suckle	11.1	15.2	0.013
Diarrhea/dehydration	21.9	29.9	<0.001
Vomiting and swollen abdomen	25.7	24.0	0.426
Hypothermia	4.5	3.7	0.393
Lethargy	3.5	2.8	0.425
Local infections/sepsis	6.1	7.5	0.273
Number of women	378	980	

About half (47.2%) of the newborns experienced at least one of these danger signs during the first six weeks of life, with no difference in the frequency between control and intervention areas. Of those with one of the danger signs, the most common danger sign was fever, with significantly more of the newborns having fever in the control (30.5%) than intervention communities (26.5%) (see Table 2.4). The knowledge of the newborn danger signs is reflected in a greater distribution of the types of newborn danger signs reported among the intervention than control communities. One in five newborns in the intervention communities (20.0%) cried excessively, noted by significantly more mothers in the intervention than control communities (16.2%). More newborns in the intervention versus control communities were also noted to have breathing problems (18.0% vs. 14.9%). The next most common danger signs were diarrhea and swollen stomach, each experienced by about 16% of all newborns, regardless of control or intervention community. More newborns

in the intervention communities than control communities were observed to have jaundice and not being able to suckle.

Table 2.4: Reported incidence of newborn illness in first six weeks of life, most recent live births in the past five years (percent)

	Control 2011	Intervention 2011	p- value
Fever	30.5	26.5	0.021
Convulsions	5.2	4.2	0.244
Swollen stomach	15.1	16.9	0.216
Diarrhea	15.9	17.1	0.414
Jaundice	4.9	7.7	0.003
Breathing problems	4.9	7.1	0.019
Excessive crying	16.2	20.0	0.013
Not able to suckle	5.5	5.9	0.612
Vomiting	6.2	9.3	0.004
Number of newborns with any newborn danger signs	407	1,054	

Between the baseline and mid-term survey there was a significant increase in the proportion of women who knew basic information about immunisations. While at the baseline, the percent who knew when a child's first vaccination was due was only 10.3%, by the mid-term survey this proportion had increased to 48.8%, with the percent higher in the intervention (52.3%) than control communities (32.3%, $p < 0.0001$). There was a similar increase in the proportion knowing the number of visits needed to fully immunize a child, from 7.7% to 50.0%, with 51.7% in the intervention and 41.7% in the control communities ($p < 0.0001$). The percent of women with standing permission from their husbands to take a child to the health post doubled, from 40.2% to 78.0%, with 81.9% in the intervention and 69.7% in the control communities ($p < 0.0001$).

Table 2.5: Immunization-related knowledge, attitudes and practices among women with children under age 5, MNCH-BS 2009 vs. MNCH-MTS 2011 (percent)

Characteristic	MNCH -BS 2009	MNCH -MTS	MNCH -MTS- Control	MNCH MTS- Intervent ion	Chi-square Control v Intervention (p value)	p-value BS v Int
Knows when first shots are due	10.3	48.8	32.3	52.3	8.56(0.003)	<.0001
Knows # visits needed	7.7	50.0	41.7	51.7	3.20 (.074)	<.0001
Husband gave standing permission	40.2	78.0	69.7	81.9	56.0(<.001)	<.0001
Number of women	4441	3005	939	2066		

While the percent with no information about immunizations was not significantly changed between the baseline and the midterm survey (29.5% at baseline versus 35.9% at the mid-term, with 32.6% in the intervention communities), the sources of information showed a more diverse set of sources. In the intervention communities, 32.4% knew about immunisations from CHEWs and 8.4% from their women’s group meetings. Health workers remained a source of information for about 12% of women, while fewer heard about immunizations from other sources, such as the radio or pharmacist.

Table 2.6: Source of information about immunisations by intervention zone, MNCH-BS 2009 vs. MNCH-MTS 2011 (percent)

Source of Information	Baseline 2009	Mid-term 2011	Control 2011	Intervention 2011
None	29.5	35.9	43.2	32.6
Health worker	11.2	12.2	11.7	12.4
CHEW	NA	30.0	24.6	32.4
Traditional leader	NA	3.7	4.7	3.3
Family and friends	7.1	11.7	14.4	10.5
Women’s group	NA	5.9	0.56	8.4
Other (radio, pharmacist)	20.2	0.62	1.0	0.45
Number	1,974	2,869	899	1,970

Note: Intervention vs. Control 2011 Chi-square = 112.7, p<0.0001

Childhood vaccination rates are up significantly, with the proportion of one-year olds with measles vaccine rising from 20.1% to 47.6%, polio3 from 25.7% to 63.3%, and DPT3 from 5.1% to 21.1%. (See Table 2.7) The proportion of one-year olds fully vaccinated (all sources, BCG-polio-DPT-measles) rose from 2.2% to 17.5%.

Table 2.7: Immunization rate among one-year olds (12-23 months) by antigen, MNCH-BS 2009 vs. MNCH-MTS 2011 (percent)

Immunization Rate by Antigen	Baseline 2009	Midterm 2011	Control 2011	Interven- tion 2011	Intervention Control square(p)
Measles	20.1	48.7	44.0	50.6	2.16 (0.142)
OPV3 (polio3)	25.7	65.2	64.2	65.6	0.206(0.650)
DPT3	5.1	21.5	16.0	23.7	4.34(0.370)
Fully immunized (all sources)	2.2	18.5	8.6	22.6	16.1(<0.001)
Fully immunized, for children with vaccination cards	16.0	13.0	15.3	12.4	0.360(0.549)
Number	1,974	2,869	899	1,970	

There also was a shift in the source of advice about sick childcare between the baseline and mid-term survey (see Table 2.8). Fewer women received no advice about the care of sick children, from 36.0% down to 22.5% in the intervention communities. More women learned how to care for sick children from CHEWs, both at the health post and in the community, from 10.2% at baseline to 23.8% in the intervention communities at the mid-term survey. Fewer learned about sick childcare from TBAs or herbalists in the intervention communities, and there also was a sharp reduction in the proportion of women learning about sick child care from the itinerant drug vendors or chemists.

Table 2.8: Source of general advice on care of sick child, MNCH-BS 2009 vs. MNCH-MTS 2011(percent)

Source of advice	Baseline 2009	Control 2011	Intervention 2011	p -value BS vs Int	p-value Ctl vs Int
Nurse/midwife	28.9	11.4	12.1	<0.0001	0.5777
CHEW in health post	10.2	10.7	18.2	<0.0001	<0.0001
CHEW in outreach	NA	3.8	5.6		0.0341
TBA/herbalist	6.0	7.7	1.9	<0.0001	<0.0001
Family/ friends	NA	31.0	30.0		0.5756
Drug vendor/ Chemist	49.6	2.6	1.0	<0.0001	0.0007
Spiritualist/other	1.4	4.5	8.7	<0.0001	<0.0001
No one mentioned	36.0	28.3	22.5	<0.0001	0.0005
Number	2,206	968	2,096		

When a child became ill in the past month, the person who actually gave advice on care differed from the general sources of advice. As shown in Table 2.9, fewer women consulted the nurse/midwife, while in the intervention communities many more consulted the CHEW, at the health post (22.5%) or in the community through the CBSD intervention initiated by the programme (4.7%). Fewer relied on family and friends in the intervention communities, 20.6% vs. 30.2% in the control communities. In the intervention communities, fewer women went to a drug vendor or chemist for advice on treating a sick child.

Table 2.9: Source of advice for treating sick child in the past month, MNCH-MTS 2011(percent)

Source of advice	Control 2011	Intervention 2011	P value
Nurse/midwife	7.7	9.7	<0.0001
CHEW in health post	9.5	22.5	
CHEW in outreach	2.5	4.7	
TBA/herbalist	0.3	0.5	
Family/ friends	30.2	20.6	
Drug vendor/ Chemist	20.6	14.8	
Other/spiritualist	1.5	1.9	
No one mentioned	27.7	25.2	
Number	288	834	

As seen in the bottom row of Table 2.10, at both the baseline and mid-term survey follow-up, regardless of the child's symptoms about one-third of all mothers with sick children in the past month reported seeking no advice and providing no special care to the sick child. Although it is recommended that women continue to breastfeed and give more fluids to sick children whether they have fever, cough, diarrhea, or some combination of these, at the mid-term follow-up this recommendation was followed by fewer than one in five mothers, and slightly more mothers gave additional fluids to their sick children in the control than intervention communities. Compared to the baseline, at the mid-term follow-up fewer children received oral rehydration solution (ORS) (or its alternative labels, sugar-salt solution (SSS) or oral rehydration therapy (ORT)). Despite the general decline in the use of ORS the use of ORS was somewhat higher in the intervention than control communities.

Between the baseline and mid-term survey, there was also a substantial increase in the reported use of traditional medicine or herbs, particularly in the intervention communities, where the use of traditional medicine or herbs was almost double that reported in the control communities for the treatment of fever and/or cough. One-third in the control and one-fourth in the intervention communities also report using cough medicine or other patent medications for cough, with or without fever. These are given in combination with medications recommended for treatment of these illnesses. Over one-third used an analgesic (paracetamol) to bring down fever at both baseline and mid-term follow-up, with more using analgesics for diarrhea at mid-term than at baseline. Use of antibiotics generally was less at the mid-term than baseline, but there were different directions of change in the control and intervention communities. For fever and cough, in the control and intervention communities, the use of antibiotics was slightly lower than the baseline with more of a drop in the control than intervention communities. For children with cough only, antibiotic use went up to 38.2% in the control communities while it dropped to 30.1% in the intervention communities. Antibiotics continued to be used for diarrhea by about one-third of all parents, but the use was higher in the control (39.2%) than intervention (32.2%) communities. Use of anti-malarials dropped precipitously between the baseline, when 57.5% used them for fever and/or cough to 25% or less in both the intervention and control communities at the mid-term follow-up. Even fewer children with diarrhea were given anti-malarials, even though diarrhea is a frequent co-morbidity with malaria.

Table 2.10: Type of care given to sick child in the month preceding the survey, MNCH-BS 2009 vs. MNCH-MTS 2011 (percent)

Type of care (n with any care)	Baseline Fever/ cough n=1,205	Fever only n=884		Cough only n=407		Fever and Cough n=348		Baseline Diarrhea n=1,335	Diarrhea n=566	
		Contrl	Interv	Contrl	Interv	Contrl	Interv		Contrl	Interv
Homecare										
Gave more fluids	NA	12.8	11.0	15.0	13.7	17.3	14.2	NA	12.2	11.0
Gave ORS	18.9	11.5	12.8	6.4	9.9	7.4	11.2	32.7	15.6	20.1
Medication use										
Analgesics	39.0	37.4	38.9	27.9	33.3	31.0	33.8	29.9	33.0	35.2
Antibiotics	35.9	29.8	29.4	38.2	30.1	31.0	33.1	36.2	39.2	32.2
Anti-malarial	57.5	22.8	20.5	**	**	25.9	20.6	55.8	14.4	18.8
Other drug	8.0	9.9	7.2	13.2	7.8	15.5	7.5	13.0	13.4	10.0
Gave patent or cough medicine	NA	12.3	11.8	35.3	24.2	32.8	24.4	NA	12.4	10.7
Traditional remedies										
Traditional medicine/ herbs	13.2	19.9	26.3	14.7	29.0	15.5	30.0	11.6	24.7	26.4
Total sick	2,910	234	650	94	313	81	267	1,415	147	419
Did nothing	35.2	32.1	38.0	31.9	39.3	33.3	386	40.0	34.0	37.7

Notes: **Bold** indicates that the intervention % exceeds the control %; Percents do not sum to 100% because multiple care activities may have been used per episode; **too few cases in cell

Between the baseline and the mid-term survey, there was a significant drop in the infant mortality rate per 1000 live births (IMR), from 90 at the baseline to 55.6 at the mid-term. In the intervention communities, the rate was even lower, 45.4, versus 82.1 in the control communities. This sharp reduction in the IMR contributed to a reduction in the overall under-5 mortality rate (per 1000), from 160 to 110, in both intervention (110.2) and control communities (110.4). In contrast, the child mortality rate (per 1,000 1 to 5 year olds), stagnated or increased, from 77 to 78, with the rate higher in the intervention communities (81) than in the control communities (71.3).

Discussion and Conclusions

While the programme has been underway for just over two years, comparison of the baseline and mid-term survey results shows that there is significant improvement in several of the key maternal, newborn, and child health behaviors and outcomes.

First, more pregnant women were seeking ANC, with the proportion having care rising from 32.6% to 50.7%, slightly more in the intervention communities (53.2%). Analysis of the source of ANC shows that the increase was almost entirely comprised by ANC provided by trained CHEWs, either at the health post or in the community. While the CBSD pilots were launched only in the last year before the mid-term, it is also possible that those indicating they received their ANC from a CHEW in the community may already be benefiting from the community-based delivery of ANC consultations. Another notable change in ANC is a shift toward earlier visits, with significantly more making their first ANC

visit in their first trimester. Finally, there is evidence that the quality of ANC has improved. More women were receiving key components of ANC. The overall rise in total and first trimester ANC consultation rates reflect the intensive community engagement efforts to promote ANC and especially early ANC, whether through the community volunteers, the activation of the community health committee, or the establishment of women's groups. The increase in total and quality of ANC visits are likely to reflect the increased availability of trained staff capable of providing quality ANC, through the supply-side efforts of the programme to improve human resource skills and equipment at primary health care centers. The higher quality of the visits is also reflected by the rise in the percent of women with a recent anti-tetanus vaccination, from 69% to 84%.

The synergy of the supply-side and demand-side efforts to improve obstetric care is seen by the dramatic rise in the percent of women knowing critical danger signs of pregnancy and delivery. Although there was no reported increase in discussion of maternal danger signs in the mid-term survey (and indeed there was a drop), the fact that more women knew more about the danger signs indicates that they are learning through community sources. At baseline, 75% had not sought any advice about their own or their infant's health, while at the mid-term this had flipped to 75% having sought advice. In the intervention communities, the women obtained advice from the nurse/midwife, the CHEWs, the community volunteers, and friends and family, including women's groups.

Although more women have had ANC and know about danger signs, there is no significant increase in the proportion delivering at a facility. Women continue to feel that going to the facility for a delivery is not necessary because they are strong, nor is it customary. The impact of the ETS program and other incentives to increase the proportion of women having their infants delivered by a skilled birth attendant have yet to be seen in these communities.

Second, there is evidence that newborn care is improving. The proportion breastfeeding within 24 hours rose to 63%, and one-third of women report exclusive breastfeeding. Both shifts in breastfeeding behaviors will reduce the exposure of the infant to contaminated fluids and increase exposure to the benefits of breast milk, e.g., transfer of immunity from mother to child.

While fewer women report having a first post-natal check on the baby within 48 hours of birth (23.3% in the intervention versus 39.2% at baseline), there is a large shift in the qualifications of the person making that check. At baseline the relatively high rate of reported check-ups on newborns were made by the TBA (40.8%), and if these had been excluded as a qualifying check, the baseline rate would have been much lower. At the mid-term survey, TBAs were reported to make only 1.8% of the newborn check-ups, while the majority (83%) were made by the nurse/midwife and CHEW at the health center or post, and another 8% were made by CHEWs in the community. This shift reflects a change in understanding about what constitutes a newborn check and the importance of having it made by a trained individual very soon after the infant's birth.

Another critical change in newborn care is the increased understanding and ability to observe newborn danger signs. In the intervention communities, more women knew newborn danger signs and they also knew more of them. While we not able to monitor what happened when these danger signs were observed, women reported that almost half of their newborns had shown at least one of these danger signs, with the most common being a high fever. It is likely that this level of observation was connected to taking steps to seeking urgent care, as that is what the danger sign message is all about. The higher quality and availability of care at the primary health centers would have given women confidence that arriving their with their newborn could indeed be a life-saving trip.

Third, a number of changes in the intervention communities and in the primary care system are likely to have contributed to the decline in infant mortality from baseline to mid-term. It is very likely that the changes in understanding about newborn care-both the importance of a prompt check by a qualified person and the need to be vigilant for danger signs in the newborn- contributed to the significant decline in infant mortality which has been observed in the intervention communities. In addition, the rise in the anti-tetanus vaccination rate may have reduced the incidence of tetanus among the newborns.

Fourth, there were sharp increases in knowledge about immunizations, as well as in the vaccination coverage rates themselves. At baseline, only one in 10 knew when the first shots are due, and by mid-term this rose to 49%. Similarly, knowledge of the number of visits needed to fully immunize a child also grew by leaps and bounds to 50%. The percent of women who had received standing permission to immunize their infants doubled. All these knowledge and readiness indicators were higher in the intervention than control communities, reflecting the intense community engagement efforts in the intervention clusters. Through these efforts plus intensified efforts to assure the availability of routine vaccination services at health centers, the immunisation rate (all key antigens) went from 2.2% to 18.5%, and even higher in the intervention communities to 22.6%. Analysis of the antigen-specific one-year old vaccination coverage rates suggests that had there not been persistent stock-outs of DPT, the vaccination coverage rates would have been much higher, as that appears to have been the missing vaccination for most children who had not completed the series.

Fifth, while the under-5 mortality rate did decline significantly between the baseline and mid-term, this was primarily through the reduction in infant mortality, because the child mortality rate (1 to 5 year olds) did not decline, and indeed went up slightly. The evidence presented in the last tables in this report suggest that the area of child health is one where the program has had the least impact to date. There are some encouraging findings, such as the significant increase in women seeking advice on the care of their children. Increasingly, they are learning about recommended care practices to prevent or treat childhood illnesses from CHEWs, community volunteers, and other informed women, such as participants in the women's groups. All the CHEWs deployed by the programme have been trained in Nigeria's adaptation of the WHO/UNICEF IMCI (Integrated Management of Childhood Illnesses) programme, and they have begun to relay information about danger signs of childhood illness and how to respond to them. The nurse/midwives at the health posts have likewise been

trained in the IMCI protocol, which improves the advice and care given to mothers with sick children. The mid-term survey data on how sick children were treated do not as yet show major changes in the use of medications for fever, cough, or diarrhea, the main illnesses targeted by IMCI. Indeed, some care behaviors reflect less adherence to the IMCI-recommended treatment protocols (e.g., use of antibiotics to treat fever and/or cough; use of ORS for diarrhea). The reduction in medication use was complemented by an increase in the use of traditional medication or herbs. While we do not know why fewer sick children were given anti-biotics or anti-malarials, it is possible that this reflected a change in cost or availability of the needed drugs. Implementation of drug subsidy programmes, currently underway in the programme area, may change use, if cost or availability is the problem. In any case, it is clear that to reduce the child mortality rate is going to take additional efforts to promote knowledge of childhood illness danger signs, assuring the availability of assistance when children do become ill, and greater penetration of the prevention messages of IMCI, needed to reduce the overall incidence of these serious childhood illnesses.

In summary, this early look at the impact of the programme in the intervention communities suggests that the PRRINN-MNCH programme is beginning to have significant impact. The focus on ANC and newborn care is bearing fruit in the reduction of infant mortality. The chain of knowledge and behavioral outcomes suggest the combined influence of the supply-side and demand-side activities. While the CBSD efforts had only just been implemented at the time of the mid-term survey, these preliminary results provide encouragement that they are beginning to take hold within the community, as the CHEWs become respected sources of information and care.

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