

Impact of skill building of health care providers at public health facilities on maternal and newborn health in three districts of Uttar Pradesh

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Abstract

Background: Despite significant improvement in reduction in under-five and infant mortality in India, neonatal mortality is relatively stagnant. Facility level skilled perinatal care has been advocated as an important intervention in this context. An implementation research for improving knowledge and skill of birth attendants in perinatal and essential newborn care implemented in three districts of Uttar Pradesh also documented the changes in antenatal, perinatal and postnatal care in the districts.

Materials & Methods: This non-experimental pre-post study involved cross-sectional population proportionate to size cluster surveys at baseline (August 2014) and end-line (May 2016) in three districts of Uttar Pradesh. At baseline 642 women and at end-line 696 women who delivered in last 6 months participated in the survey. Data on care received by these women during pregnancy, delivery, postnatal periods, pregnancy outcome, neonatal status along with the socio-demography.

Results: There was significant improvement in ANC contacts and quality of care during these contacts across all the districts. There was rise in birth preparedness counseling (37% to 70%) and awareness about danger signs (19% to 46%). There was sizable rise in the institutional delivery (70% to 84%) and skilled care at birth (66% to 76%). Postnatal care contact increased from 57% to 78%. Newborn care practices including delay in bathing (after 24 hours) and breastfeeding within one hour improved (70% to 91% and 44% to 74% respectively).

Conclusions: Our findings indicate multi-dimensional impact of the knowledge and skill improvement interventions involving skilled birth attendants on the pregnancy and postnatal service delivery.

Keywords: Skill building, Newborn, Pregnancy, Postnatal care.

Introduction

During 1990 and 2012, India has witnessed a significant reduction in the number of neonatal deaths from 1.35 million to 0.76 million, a reduction by 44%.⁽¹⁾ The reduction in neonatal death is relatively lower than reduction in infant deaths (53%) and under-five child deaths (59%).⁽¹⁾ Newborn deaths contribute to 55% of all under-five deaths in India and are a major public health problem.⁽²⁾ The highest risk of death is on the first day after birth with almost 50% of newborn deaths occurring on the first day and 75% by Day 7 after birth.⁽²⁾ Globally, the main direct causes of neonatal death are estimated to be preterm birth (28%), severe infections (26%), and asphyxia (23%).⁽³⁾ According to WHO, an estimated 19% of newborn deaths in India are due to birth asphyxia.⁽⁴⁾ A large number of early neonatal deaths could be averted through implementation of simple and low cost interventions delivered during the pregnancy, at birth and after birth periods at facility and community levels.⁽⁵⁾ Several community-based research have demonstrated the impact on neonatal mortality.⁽⁶⁾ In India with rising institutional delivery there is need for

attention to improve the facility based care at birth to achieve the goal.

Under the strategy “Every Newborn: An Action Plan to End Preventable Deaths (ENAP)” adopted at global and country level, there is emphasis on improving the skilled care at birth and strengthening health systems.⁽⁷⁾ Government of India also adopted India Newborn Action Plan (INAP) in 2014 to intensify the efforts towards reducing newborn deaths. Under INAP, care at birth and immediate care of newborn have been identified as key interventions for implementation.⁽⁸⁾ It has been observed that the facility level services are challenged by poor skill and knowledge status of service providers, shortage of service providers, poor and fragile system of logistics procurement and its supply chain management.^(9,10)

The current study was designed to improve the care at birth through improving quality of services at all levels of health facilities in the districts, Gonda, Raebareli and Aligarh of Uttar Pradesh. The interventions were implemented under the USAID’s FY12 Child Survival and Health Grant Program titled “Saving Newborn Lives in Uttar Pradesh through

Improved Management of Birth Asphyxia. The implementation project was implemented in three districts (Gonda, Aligarh and Raebareli) of Uttar Pradesh with high NMR (45-53 per 1000 live births), higher than the NMR for the state.^(11,12)

These districts were selected considering the regional representation, west, central and east in consultation with the state government. In each district, all the public health facilities including the district hospital (DH), sub-district hospital (SDH), first referral units (FRUs), community health centers (CHCs), primary health centers (PHCs) conducting delivery were included. All the birth attendants in the district including the doctors, nurses and auxiliary nurse midwives (ANMs) were trained on essential newborn care and newborn resuscitation using the modified three day module. A total of 779 birth attendants including 69 doctors, 281 nurses and 429 ANMs at all level of facilities in the district (district hospital, CHCs, PHCs and sub-centers) were trained. The supporting team members at these facilities including the pharmacy, store, data, supervision and administrative team members were also orientated on the system strengthening components directed at perinatal and newborn care. While these interventions were being implemented at the health facilities, we attempted to document the changes in maternal and newborn health and care seeking parameters at community level in these districts.

Materials & Methods

This was a non-experimental pre-post study, which involved cross-sectional cluster surveys at baseline (August 2014) and endline (May 2016). The study was conducted in three districts of Uttar Pradesh, Gonda, Raebareli and Aligarh.

Based on the available literature; we estimated sample size to be 384, considering the anticipated lowest prevalence of the newborn care indicator around 50% with admissible error of 10% at 95% confidence level. For documenting the change due to intervention, we estimated sample size to be 182, assuming to observe an absolute change of 15% change in the lowest prevalent newborn care indicator with confidence level of 95% and power of 80%. Epi-info software was used for sample size calculation. Considering the design effect of 1.5 for cluster survey, non-response and refusal rate of about 10%, the final sample size estimated was about 637. The clusters were identified using PPS (population proportionate to size) technique and cluster sampling

using the census information (2011). In these clusters, we included mothers who delivered in the last 6 months of the date of survey, irrespective of the newborn status. In these districts 642 and 696 eligible women from 57 clusters (19 clusters from each district) were included during baseline and endline surveys. Survey was started from the main one side of the cluster with a prominent landmark. First house was selected by simple random sampling. All households were sequentially screened for presence of any eligible women. The houses with eligible women were listed. Any household with more than one eligible woman, the woman with the younger infant was considered. From all the eligible participants in the cluster, 12 participants (6 participants who delivered boy and 6 participants who delivered girl) were identified randomly and approached for participation. In case of refusal, replacements were identified randomly from the remaining eligible ones. These participants were included following informed consent. The protocol was reviewed and approved by institute ethics committee. Approval from the National Rural Health Mission of Uttar Pradesh and permission from the district authorities were obtained.

Data was collected by three member research staffs using structured tools, who were trained on study methodology along with the hands-on practice. The data collected was verified in field by senior team member and subsequently by site investigators. Following data validation, double data entry was done using customized data entry and quality check software (using php and mysql platform). The entered data was matched by the software and on complete matching it was passed to the final database. Descriptive statistics were used to summarize the proportions and means. The proportions were compared using Chi-square test. Data was analyzed using STATA software.

Results

A total of 642 women and 696 women from these districts participated in the baseline and end-line survey respectively. The sociodemographic parameters for the women and households included in the baseline and end-line surveys are comparable, as represented in Table 1. The differences observed in the years of education of the women, religion and caste/tribe composition, which are likely due to the variation in the clusters sampled and also the overall change in demographics. There was increase in the mobile, television penetration and availability of vehicles with the households over the time period.

Table 1: Background characteristics of pre-intervention mothers and post intervention mothers

| Characteristics | Baseline | End-line | chi-square | p-value |
|-------------------------|----------|----------|------------|---------|
| | (n=642)% | (n=696)% | | |
| Age of the woman | | | | |
| <20 years | 8.3 | 8.2 | 1.112 | NS |
| 20-34 years | 87.9 | 86.9 | | |

| | | | | |
|------------------------------|------|------|--------|-------|
| 35-49 years | 3.8 | 4.9 | | |
| Years of education | | | | |
| No education | 45 | 34.2 | 25.06 | 0.00* |
| ≤ 5 years | 20.8 | 22.7 | | |
| 6-10 years | 26.2 | 33 | | |
| >10 years | 8.1 | 10.1 | | |
| Family structure | | | | |
| Nuclear | 35 | 34 | 1.121 | NS |
| Joint | 65 | 66 | | |
| Religion | | | | |
| Hindu | 73 | 86.9 | 43.1 | 0.0* |
| Muslim | 26.7 | 12.6 | | |
| Others | 0 | 0.4 | | |
| Caste /Tribe | | | | |
| SC | 21.2 | 30 | 43.653 | 0.00* |
| ST | 2.3 | 1.7 | | |
| OBC | 41.3 | 28.5 | | |
| General | 35.2 | 39.8 | | |
| Number of children | | | | |
| 1 | 30.4 | 34.6 | 9.142 | 0.01* |
| 2 to 3 | 47 | 49.1 | | |
| ≥ 4 | 22.6 | 16.2 | | |
| Access to information | | | | |
| Mobile phone | 87% | 91% | 8.342 | 0.02* |
| Television | 39% | 47% | | |
| Vehicles | | | | |
| Two wheeler | 30 | 47 | 18.124 | 0.01* |
| Four wheelers | 5.5 | 7 | | |

Note: * indicates statistical significance

Antenatal care (ANC)

As reflected in Table 2, the antenatal care parameters improved over the observation period. As reflected, any ANC and ≥4 ANCs proportions increased and also the proportion of ANCs with all essential components assessed and counseled (including weight, height, blood pressure, abdominal examination and

danger signs). The rise in birth preparedness counseling by the ANMs almost doubled (37% to 70%) over the time. The rise in awareness on danger signs during pregnancy indicate the quality of care provided by the ANMs and doctors during the antenatal care. The women aged 20-34 years had higher antenatal contacts (any ANC and >4 ANCs) compared to the women aged <20 years or >34 years.

Table 2: Coverage of selected Indicators baseline (2014) and Endline (2016) Intervention

| Indicators | Baseline | % | End-line | % | chi-square | p-value |
|-----------------------------------|----------|----|----------|----|------------|---------|
| | (n=642) | | (n=696) | | | |
| Antenatal care | | | | | | |
| ANC in first trimester | 327 | 51 | 452 | 65 | 27.643 | 0.004* |
| Any ANC | 45 | 79 | 640 | 92 | 14.008 | 0.000* |
| ≥4 ANCs | 186 | 29 | 251 | 36 | 3.857 | 0.04* |
| All components of ANC | 58 | 9 | 218 | 31 | 25.423 | 0.001* |
| >90 IFA Tablets | 135 | 21 | 334 | 48 | 105.86 | 0.000* |
| TT injection | 488 | 76 | 624 | 90 | 5.673 | 0.02* |
| Birth preparedness | 240 | 37 | 492 | 70 | 108.56 | 0.000* |
| Danger signs awareness | 122 | 19 | 321 | 46 | 24.243 | 0.001* |
| Place and type of delivery | | | | | | |
| Institutional delivery | 469 | 70 | 571 | 82 | 15.58 | 0.02* |
| Skilled birth attendance | 449 | 73 | 529 | 76 | 6.25 | 0.012* |
| Post Natal care Seeking | | | | | | |
| Received any PNC | 366 | 57 | 543 | 78 | 73.28 | 0.00* |
| No PNC Checkup | 276 | 43 | 223 | 28 | 3.125 | NS |
| Breastfeeding Practices | | | | | | |
| Breastfeeding within 1 hr | 270 | 42 | 508 | 73 | 131.29 | 0.00* |

| | | | | | | |
|--------------------------------------|-----|------|-----|------|--------|--------|
| Colostrum as first feed | 465 | 73.9 | 649 | 94.1 | 119.1 | 0.00* |
| Newborn care | | | | | | |
| Bathing after 24 hours | 450 | 70 | 633 | 91 | 7.653 | 0.02* |
| Clean cord care | 225 | 35 | 404 | 58 | 25.446 | 0.004* |
| Neonatal morbidity and Deaths | | | | | | |
| Neonatal morbidity | 135 | 21.4 | 90 | 13 | 7.301 | 0.006* |
| Stillbirths | 45 | 7.3 | 13 | 1.8 | 21.288 | 0.00* |
| Neonatal deaths | 45 | 6.8 | 14 | 1.8 | 19.78 | 0.00* |

Note: * indicates statistical significance

Delivery

Over the observation period, institutional deliveries increased from 70% to 84% along with the skilled birth attendance from 66% to 76%. Few mothers informed about deliveries conducted by the health workers other than doctor, nurse or ANM at the health facilities. While there was improvements in institutional delivery proportion among the women aged <20 years (32% to 0%) and women aged 21-34 years (26% to 15%), there was minimal change among the women aged >34 years (32% to 29%). Stillbirth as outcome of the last pregnancy was reported by 2% women at end-line survey compared to 7% at baseline survey.

Post-natal care

The postnatal contact for mother and newborns increased from 57% to 78% over the observation period. The timing of postnatal check-ups shown in Table 3. While half (51%) of the postnatal contacts during baseline survey happened within first 24 hours, majority (73%) of the postnatal contacts during end-line survey happened after first 24 hours. All components of newborn care and counseling were received by 30% of mothers during end-line survey compared to 15% at baseline survey. It was encouraging to observe delayed bathing of newborns (after 24 hours of life) in 91% newborns compared to 70% during baseline survey. Clean cord care practices improved significantly from 35% to 58% during the observation period.

Table 3: Timing of postnatal checkup by place of delivery

| PNC contact timing | Baseline | Endline | chi-square | p-value |
|------------------------|----------|----------|------------|---------|
| | (n=642)% | (n=696)% | | |
| Had post-natal checkup | 57 | 78 | 10.0513 | 0.001* |
| < 4 hours | 47 | 43 | | |
| 4-23 hours | 4 | 7.5 | | |
| 1-2 days | 2 | 18 | | |
| 3-41 days | 4 | 23 | | |
| ≥42 days | 0 | 0 | | |
| No PNC Contact | 42 | 30 | 3.125 | NS |

Note: * indicates statistical significance

Breastfeeding practices

Near three-fourth (74%) of the newborns were put to breast soon after delivery compared to 44% during the baseline survey. Improvement on breastfeeding practices (initiation of breastfeeding within one hour and colostrum feeding) were reported over the period as reflected in Table 2. The breastfeeding initiation and colostrum feeding practices were comparable across the gender of newborn and socio-demographic strata.

Satisfaction with care

Overall experience of delivery at the health facility was good for 47% of the women at end-line compared to 30% at baseline. Proportion of women reporting

overall experience as average did not change much (28% at end-line compared to 32% at baseline).

Neonatal morbidity and mortality

The neonatal morbidity, mortality and stillbirths are reflected in Table 4. Among the participating mothers, 13% of mothers during end-line survey reported any illness in their newborn compared to 21% during baseline survey. The common illness reported were fever, lethargy, feeding problem and breathing problem. Death during neonatal period was observed in 2% households during end-line survey compared to 7% households during baseline survey.

Table 4: Newborn morbidity and mortality parameters

| Indicators | Baseline | % | End-line | % | chi-square | p-value |
|--------------------------------------|----------|------|----------|-----|------------|---------|
| | (n=642) | | (n=696) | | | |
| Neonatal morbidity and Deaths | | | | | | |
| Stillbirths | 45 | 7.3 | 13 | 1.8 | 21.288 | 0.00* |
| Neonatal morbidity | 135 | 21.4 | 90 | 13 | 7.301 | 0.006* |
| Neonatal deaths | 45 | 6.8 | 14 | 1.8 | 19.78 | 0.00* |

Note: * indicates statistical significance

Characteristics of households with stillbirth and neonatal deaths

The socio-demographic characteristics, antenatal care, and delivery care parameters for the households with stillbirth and neonatal deaths did not have significant difference from the households with live birth or live infant. The sample size was inadequate to detect the difference in mortality parameters with adequate power.

Discussion

This implementation research was aimed at reducing the neonatal mortality through improving the skill and confidence of the birth attendants in the districts. During the period of implementation in these districts, about 105424 deliveries were handled by these birth attendants. There was significant improvement in the skill and knowledge of the birth attendants, facility level readiness for newborn care. There was significant improvement in the resuscitation and documentation of the essential newborn care services delivered at the facilities. Along with the facility level changes, we were also interested in documenting the changes on other related pregnancy and postnatal services delivered by these health functionaries.

This study documented significant improvement in the antenatal and postnatal care services delivered to the pregnant women and mother-infant dyad after delivery with implementation of the essential newborn care skill and knowledge building coupled with facility level service delivery improvement efforts. The rise in postnatal care including delay in newborn bathing and clean cord care and breastfeeding practices can be linked to the essential newborn care trainings. Apart from the quantitative improvement in the antenatal and postnatal services, there was qualitative improvement in the services delivered. The rise in institutional delivery was also heartening, which reflects the penetration of safe motherhood efforts under National Health Mission.

Although there was observed reduction in neonatal deaths during this period, but the sample size was inadequate to document the change with adequate power. The similarity in household and pregnancy care parameters for stillbirth and neonatal deaths indicate the challenge to predict the events and supports need of universal skilled perinatal.

Institutional delivery has been documented to reduce the risk of neonatal mortality by 29% in low and middle income countries.⁽¹³⁾ Similarly the community level antenatal, skilled care has been documented to reduce neonatal deaths to the range of 10-26%.⁽¹⁴⁾ We could not find any article documenting the possible changes on antenatal, perinatal and neonatal care due to facility level interventions.

The observations documented in this article indicate the possible benefits of facility level interventions related to health functionaries on community level service delivery and health system

strengthening. This also indicate the cross-benefit of skill and knowledge improvement of health care providers in related service delivery domains.

The possibility of recall bias related to collection of responses from the women/mothers cannot be ruled out. But to minimize recall bias, we focused on a 6 month time window after delivery with inclusion of interviewers from medical colleges with similar past experience and use of standardized training about questionnaire and probing techniques.

This article informs the multi-dimensional impact of interventions in health and the real impact may be larger than the anticipated. We suggest systematic documentation of impact of facility level interventions on pregnancy, perinatal and neonatal parameters at community level.

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Declarations

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Conflict of interest: None

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