Risk Factors associated with unsafe neonatal practices in rural area of Nadia district of West Bengal

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Abstract

Introduction: Neonatal mortality is the main barrier to reduction of infant mortality in West Bengal. Home based simple newborn care by mothers in the neonatal period can reduce neonatal mortality. The practices of mothers in this aspect in Nadia are not known. A cross sectional survey of mothers of Nadia with the objectives of describing their neonatal care practices, determine factors associated with it.

Methods: Nadia district has a population of 5 million and estimated pregnancies of 74000. We used PPS method cluster sampling technique. We needed 575 mothers in 23 clusters assuming 52% prevalence at 5% precision, 95% Confidence interval and design effect 1.48. Structured questionnaire was used for data collection on different socio-demographic and health system related factors and mothers’ newborn care practices. Data was analysed using Epi info 3.5 software.

Results: Among 575 mothers, 518 (90.1%) kept the neonates cord stump clean. Delaying the first bath of the neonate was least practiced 292 (50.8%). Only 39 (6.8%) mothers had all safe practices. Living below poverty line (Adjusted OR 5.2, C.I. 3.4-7.8), not registering in the first trimester (Adjusted OR 2.6, C.I 1.6-4.2), maternal education not more than secondary level (Adjusted OR 2.3, C.I. 1.3-3.9) and having home delivery(Adjusted OR 3.2, C.I. 1.5-6.8) were significant factors for non-adoption of at least five safe practices. The overall neonatal morbidity rate was 57 per 1000 live births (33/575) and neonatal mortality rate was 10 per 1000 live birth (6/575). Median contacts with the health system in the mothers having unsafe practices was 6 (range 0-11) compared to 10(range 1-11) in the other group. Out of 33 sick neonates 26(78.8%) were from mothers with unsafe practices.

Conclusion: Poor and uneducated were unaware of safe newborn care practices especially for hypothermia. They had more neonatal sickness and deaths. They had less contact with the health system. There is a need to reach out to such vulnerable group and improve their coverage in existing facilities. Training of ASHA in Home based newborn care and educating mothers can be cost effective option for this section to save neonates by promoting best neonatal practices.

Keywords: Risk factors, Unsafe practices, Neonatal morbidity, ASHA, Rural Nadia, West Bengal

Introduction

Annually three million neonates die in the world.1 Three-quarters of them die during the first week of life, 25-45% in the first 24 hour2,3. Two third of the world’s neonatal deaths occur in just 10 countries, mostly in Asia. Nearly 30% of the global neonatal deaths occur in India, the largest in the world.1,3 Neonatal deaths in India remain high at 32 per 1000 live births4,4. India’s National Population Policy had set a goal of achieving an IMR of 30 and NMR of <20 per 1000 live birth by 20105. The major causes of neonatal deaths are prematurity (35%), neonatal infections (24%), birth asphyxia and trauma (23%). Socio-economic determinants include <20 yrs age of the mother (54.2%), less than 2 yrs birth spacing (57.9%) and poverty (122% higher in poorest than richest)6.

In West Bengal, the Neonatal mortality Rate (NMR) is currently 23 per 1000 live births7. Overall, 73% of infant mortality in the state is contributed by neonatal deaths. West Bengal has an IMR of 31 per 1000 live births (2010)7 but the rate of decline has been slow since 2003 when it was 46/1000 live birth8. The Government of West Bengal is scaling up its activities to prevent neonatal deaths as it is very close to achieving the MDG target of reduction of IMR<25 per 1000 live births by 2015 which is impossible without reduction of NMR.

Nadia is district in West Bengal bordering Bangladesh. The district has better RCH parameters than the state. The IMR of Nadia district declined from 71 per 1000 live births in 1991 to 54 per 1000 live births in the year 20019. It is estimated that 42% of such deaths (23/100 live births) occur in the first week of life and 15%(8 per 1000 live births) occur within the next three weeks. The estimated NMR of Nadia is thus 31/1000 live births that is higher than the state average9.

In Nadia 21% of deliveries occur at home and only 17% institutional deliveries remain in the hospital for 48hrs after delivery10. Therefore, there is inadequate provision of care at birth and in the first 48 hours of birth. Mother is the primary caregiver of the child in its very
early days when 80% of the neonatal deaths occur in the first day of life\textsuperscript{11}. Evidence from Bangladesh, India, Pakistan, Cambodia, Kenya, Brazil, Bolivia, Senegal, has shown that home visits by trained community workers can reduce deaths of newborns in high mortality, developing country settings by 30 to 61\%\textsuperscript{12}.

The National Rural health Mission is a flagship program of the Government of India announced in 2005 to strengthen the rural health care system. Under NRHM, all vertical health programs have been integrated to optimize resource utilization and capacity building at the district and state level to respond to health priorities. Accredited Social Health Activist (ASHA) has been recruited to provide linkage with the community to deliver maternal and child health interventions. One of the functions of the ASHA is to train the mothers to provide home based neonatal care\textsuperscript{13}.

**Objectives**

Present study was conducted with the following objectives,

1. To study the socio-demographic profile of mothers of neonates in rural area of Nadia district of West Bengal
2. To describe the neonatal care practices and awareness of mothers of neonates in Rural Nadia, West Bengal
3. To determine the factors associated with unsafe essential and sick neonatal care by mothers

**Material and Methods**

**Study Design:** A cross-sectional survey was conducted among mothers of neonates who were born between 1\textsuperscript{st} July 2011 to 31\textsuperscript{st} December 2011 in Nadia district of West Bengal, India.

**Study Area & Study Population:** Nadia is the 7\textsuperscript{th} most populous district of West Bengal with a population of 5 million which is 5.7\% of the state population. Sex ratio is 947, female literacy rate 71.3\%\textsuperscript{13}.

**Sampling procedure and sample size:** Cluster sampling technique with sub-centres as Primary Sampling Units (PSU) was used. Clusters were selected by using Probability Proportionate to Size method. 52\% of mothers practised early breastfeeding and estimated pregnancies were 74,000 in Nadia\textsuperscript{3}. Thus, assuming 52\% knew correct practice, with 95\% confidence interval and absolute precision of 5\%, the sample size was calculated to be 575 mothers.

**Data collection:** Data was collected by using a pre-tested semi structured questionnaire.

Data was collected on various socio-demographic variables, neonatal care practice patterns by mothers for the normal child and sick neonate and their interaction with health system during the course of last childbirth to the end of neonatal period of the child.

**Data analysis:** Data was entered and analysed using Epi Info 3.5 and MS Excel software. Objective wise analysis was done by using mean, median, standard deviation and percentage as statistical tool for numerical and discrete data respectively.

**Human subject protection:** study was approved by Institutional Ethics Committee of National Institute of Epidemiology. Data was collected by taking necessary permissions from appropriate district authorities and written informed consent from study participants.

**Results**

**Socio-demographic Profile:** Out of total 575 respondent mothers, maximum (47.1\%) were in the age group of 18 – 22 years followed by 31.7\% in the age group of 22 – 26 years. Out of 575 mothers, 29 (5\%) were below 18 years and 93 (16.2\%) were of the age more than 26 years. Out of total 575 respondent mothers 26.3\% were illiterate, maximum (39.8\%) were educated up to secondary level, 10.3\% were educated up to higher secondary level and 3.3\% had completed graduation. Out of 575 mothers, maximum (75\%) respondents were from Hindu religion followed by Muslim (24.3\%) and Christian (0.7\%). Maximum (68.5\%) respondents were from general community, 28.7\% were from Scheduled Caste, 2.1\% were from Scheduled Tribe and 0.7\% was from Other Backward Caste. More than 80\% of the respondent mothers were housewife and 1.2\% was doing service. More than 50\% of the respondent mothers were staying in Kuchha house, followed by semipucca and pucca. Average per capita family income was Rs 817 only. Maximum (64\%) respondent mothers had per capita income in the range of Rs 500 – 1000 and 1.9\% had per capita income more than Rs 1500 only (Table 1).

**Risk Factors associated with unsafe neonatal practices:** Out of 575 mothers interviewed, only 39 mothers (6.8\%) had all the safe practices. Assuming having all breastfeeding related practices as safe breastfeeding practice and the other five practices as individual ones, 410 (71.3\%) mothers did not have at least 5 safe practices. Factors associated with lack of adoption of at least five safe practices were analysed. Education of mother up to secondary level (OR 2.6, C.I 1.6-4.3), having BPL card (OR 5.0, C.I 3.4-7.3), not registering pregnancy within first trimester (OR 2.9, C.I 2.0-4.4), not being counselled for neonatal care after delivery (OR 2.9, C.I 1.6-7.7) having home delivery (OR 0.3, C.I 0.2-0.7) and having less than or equal to seven contacts with the health system during pregnancy / childbirth and neonatal period of the child (O.R.1.8, C.I 1.02-3.1) were significantly associated with mothers not having at least 5 safe neonatal practices in univariate analysis. The two groups did not differ with exposure to visit by ASHA (Table 2).

Multivariate analysis using logistic regression method was done to study the actual risk factors associated with unsafe neonatal practices. Having a BPL card (Adjusted OR 5.2, C.I 3.4-7.8), not registering in the first trimester (Adjusted OR 2.6, C.I 1.6-4.2),...
maternal education not more than secondary level (Adjusted OR 2.3, C.I. 1.3-3.9) and having home delivery (Adjusted OR 3.2, C.I. 1.5-6.8) remained significant (Table 3).

Table 1: Socio-demographic characteristics of mothers of neonates of rural Nadia district of West Bengal (N=575)

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Number</th>
<th>Percentage</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age in Years</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>&lt;18</td>
<td>29</td>
<td>5.0</td>
<td>3.2 - 6.9</td>
</tr>
<tr>
<td>18 - 22</td>
<td>271</td>
<td>47.1</td>
<td>42.1 - 52.1</td>
</tr>
<tr>
<td>22 - 26</td>
<td>182</td>
<td>31.7</td>
<td>27.0 - 36.3</td>
</tr>
<tr>
<td>≥ 26</td>
<td>93</td>
<td>16.2</td>
<td>12.5 - 19.9</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Illiterate</td>
<td>153</td>
<td>26.6</td>
<td>22.5 - 30.6</td>
</tr>
<tr>
<td>Primary</td>
<td>115</td>
<td>20.0</td>
<td>17.7 - 22.2</td>
</tr>
<tr>
<td>Secondary</td>
<td>229</td>
<td>39.8</td>
<td>35.9 - 43.6</td>
</tr>
<tr>
<td>Higher Secondary</td>
<td>59</td>
<td>10.3</td>
<td>8.3 - 12.2</td>
</tr>
<tr>
<td>Graduation and above</td>
<td>19</td>
<td>3.3</td>
<td>2.1 - 4.5</td>
</tr>
<tr>
<td>Occupation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>House wife</td>
<td>468</td>
<td>81.4</td>
<td>76.8 - 85.9</td>
</tr>
<tr>
<td>Agriculture</td>
<td>46</td>
<td>8.0</td>
<td>5.7 - 10.2</td>
</tr>
<tr>
<td>Labourer</td>
<td>13</td>
<td>2.3</td>
<td>1.2 - 3.3</td>
</tr>
<tr>
<td>Service</td>
<td>7</td>
<td>1.2</td>
<td>0.4 - 2.0</td>
</tr>
<tr>
<td>Other</td>
<td>41</td>
<td>7.1</td>
<td>2.5 - 11.8</td>
</tr>
<tr>
<td>Religion</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hindu</td>
<td>431</td>
<td>75.0</td>
<td>66.5 - 83.4</td>
</tr>
<tr>
<td>Muslim</td>
<td>140</td>
<td>24.3</td>
<td>16.0 - 32.6</td>
</tr>
<tr>
<td>Christian</td>
<td>4</td>
<td>0.7</td>
<td>0.2 - 1.2</td>
</tr>
<tr>
<td>Caste</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>General</td>
<td>394</td>
<td>68.5</td>
<td>62.6 - 74.5</td>
</tr>
<tr>
<td>Scheduled Caste</td>
<td>165</td>
<td>28.7</td>
<td>23.4 - 34.0</td>
</tr>
<tr>
<td>Scheduled Tribe</td>
<td>12</td>
<td>2.1</td>
<td>0.4 - 3.7</td>
</tr>
<tr>
<td>Other Backward Caste</td>
<td>4</td>
<td>0.7</td>
<td>0.2 - 1.2</td>
</tr>
<tr>
<td>Per capita income (Rs)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≤ 500</td>
<td>85</td>
<td>14.8</td>
<td>10.6 - 189</td>
</tr>
<tr>
<td>500 - 1000</td>
<td>368</td>
<td>64.0</td>
<td>58.3 - 69.7</td>
</tr>
<tr>
<td>1000 - 1500</td>
<td>111</td>
<td>19.3</td>
<td>14.4 - 24.0</td>
</tr>
<tr>
<td>≥1500</td>
<td>11</td>
<td>1.9</td>
<td>0.5 - 3.2</td>
</tr>
<tr>
<td>Type of house</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kutchu</td>
<td>301</td>
<td>52.3</td>
<td>44.9 - 59.8</td>
</tr>
<tr>
<td>Semipucca</td>
<td>121</td>
<td>21.0</td>
<td>17.3 - 24.8</td>
</tr>
<tr>
<td>Pucca</td>
<td>153</td>
<td>26.6</td>
<td>21.0 - 32.2</td>
</tr>
</tbody>
</table>

Table 2: Risk factors among mothers adopting unsafe neonatal care practices in rural Nadia

<table>
<thead>
<tr>
<th>Factors</th>
<th>Mothers not adopting at least 5 safe neonatal practices</th>
<th>OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Exposed (n=410)</td>
<td>Non Exposed (n=165)</td>
<td>Number</td>
</tr>
<tr>
<td>Age of mother ≤18yrs</td>
<td>25</td>
<td>4</td>
<td>6.1</td>
</tr>
<tr>
<td>Age at marriage ≤18yrs</td>
<td>205</td>
<td>73</td>
<td>50</td>
</tr>
<tr>
<td>Mother educated up to secondary level</td>
<td>369</td>
<td>128</td>
<td>90</td>
</tr>
<tr>
<td>Having BPL card</td>
<td>261</td>
<td>43</td>
<td>63.7</td>
</tr>
<tr>
<td>Per capita income ≤1000</td>
<td>327</td>
<td>126</td>
<td>79.8</td>
</tr>
<tr>
<td>Family size ≤4</td>
<td>292</td>
<td>105</td>
<td>71.2</td>
</tr>
<tr>
<td>Not registered last pregnancy within 1st trimester</td>
<td>170</td>
<td>32</td>
<td>41.5</td>
</tr>
<tr>
<td>Not taken any ANC</td>
<td>38</td>
<td>7</td>
<td>9.3</td>
</tr>
<tr>
<td>Had Home delivery</td>
<td>76</td>
<td>10</td>
<td>18.5</td>
</tr>
<tr>
<td>Contact with health system ≤7(median)</td>
<td>225</td>
<td>67</td>
<td>54.9</td>
</tr>
<tr>
<td>Not visited by ASHA</td>
<td>175</td>
<td>63</td>
<td>42.7</td>
</tr>
<tr>
<td>Not counselled for neonatal</td>
<td>59</td>
<td>9</td>
<td>14.4</td>
</tr>
</tbody>
</table>
Notice was also given to
Roy Bibhash et al.                       Risk Factors associated with unsafe neonatal practices in rural area of Nadia…. ...
these mothers also had
were not aware of the need for hand washing 
mothers (87%) were aware of the need for hand washing 
mothers felt that the climate was too hot for wrapping the baby in multiple layers though most
wrapped it in one or two layers of clothing. This wrapping also prevented the baby from having skin to 
skin contact with the mother. About half of the babies 
were given bath within 2 days of birth to “clean” the
children or for some religious or cultural ritual. This 
makes the child vulnerable to hypothermia. Studies in
Bangladesh have shown that motivating the mothers to 
provide skin to skin care and delaying bath can prevent 
death due to hypothermia in not only the normal but also

to misconceptions among mothers. M Bandopadhyay in 
his study on four villages of West Bengal has also found
misconceptions and rituals to be a barrier in
breastfeeding.18 Mothers and family members 
responsible for care giving should be specially targeted 
for removal of hostile perceptions and barriers for 

Most of the neonates had their umbilical cord 
without any application. This may be due to the fact that
majority of the deliveries were in an institution where the
cord was clamped. Nadia has a high rate of institutional 
deliveries which is better than state average. This was 
consistent with the observations of the Common review 
Mission 2009 that stated that National Rural Health 
Mission and “Janani Suraksha Yojana” have had
increased the institutional deliveries manifold.10,15
Some seven out of ten mothers exclusively breast fed their babies. Breast feeding practices were also good 
in six out of ten mothers initiating breast feeding 
within one hour of delivery and seven out of ten
exclusively breast feeding their children. This was higher 
than the 34.9% reported for Nadia in the Concurrent 
evaluation of NRHM in 2009.10 The reference period for
this study was 28 days of neonatal period while for the
concurrent evaluation the reference period was 6 months 
of age. It is possible that as the child grows up tendency
to give extra feeds increases causing a lesser adherence
to exclusive breast feeding. We found most of the
mothers (87%) were aware of the need for hand washing
before holding the child but they did not perceive it to be
very important because they thought it was only for
cleanliness and did not link it up with chance of infection
which could be fatal. Wrapping the neonate in multiple
layers of cloth, holding the baby in skin to skin contact
and delaying bath of the child were the least practiced in
that order. Most mothers felt that the climate was too hot
for wrapping the baby in multiple layers though most
wrapped it in one or two layers of clothing. This
wrapping also prevented the baby from having skin to
skin contact with the mother. About half of the babies
were given bath within 2 days of birth to “clean” the
children or for some religious or cultural ritual. This
makes the child vulnerable to hypothermia. Studies in
Bangladesh have shown that motivating the mothers to
provide skin to skin care and delaying bath can prevent
death due to hypothermia in not only the normal but also
the low birth weight neonates. This is not effective if it
is not provided for at least 7 hours for the first 2 days.16,17
The main cause of non-practice was ignorance in case of
newer concepts like practices for prevention of
hypothermia. For practices like breast feeding, the
awareness was good and barrier was in the adoption due
to misconceptions among mothers. M Bandopadhyay in
her study on four villages of West Bengal has also found
misconceptions and rituals to be a barrier in
breastfeeding.18 Mothers and family members
responsible for care giving should be specially targeted
for removal of hostile perceptions and barriers for
improvement of child survival. Also there is need for
developing new strategies for health education based on
indigenous concerns, addressing socio-cultural
barriers.19

It was found that the population with unsafe
behaviour towards neonates to be different in many
aspects from the rest. They were more likely to be poor
and mother was not educated above secondary level in
most cases. They registered late for pregnancy had more
home deliveries and were not counselled by anyone for
newborn care after delivery. These characteristics of
the mothers made them vulnerable to adopt unsafe practices
for routine newborn care. These determinants are
important for child survival especially in its neonatal

<table>
<thead>
<tr>
<th></th>
<th>Crude OR</th>
<th>Adjusted OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Having BPL card</td>
<td>5.0</td>
<td>5.2</td>
<td>3.4 - 7.8</td>
</tr>
<tr>
<td>Had Home delivery</td>
<td>3.5</td>
<td>3.2</td>
<td>1.5 - 6.8</td>
</tr>
<tr>
<td>Not registered last pregnancy within 1st trimester</td>
<td>2.9</td>
<td>2.6</td>
<td>1.6 - 4.2</td>
</tr>
<tr>
<td>Mother educated below secondary level</td>
<td>2.6</td>
<td>2.3</td>
<td>1.3 - 3.9</td>
</tr>
<tr>
<td>Not counselled for neonatal care practises</td>
<td>2.9</td>
<td>1.3</td>
<td>0.6 - 2.9</td>
</tr>
<tr>
<td>Having less(&lt;7 median) contact with health system</td>
<td>1.8</td>
<td>1.2</td>
<td>0.8 - 1.8</td>
</tr>
</tbody>
</table>

Discussion
The study showed mothers were not fully aware of
all the safe newborn care at the household level. This was
more pronounced in practices related to prevention of
hypothermia in the child. The most prevalent safe
practice was keeping the neonatal umbilical cord clean
and the least practiced was delaying bath baby after
delivery for at least 48 hours. Poverty, lack of education
and low utilisation of health facilities available lead to
unsafe neonatal care practice. A large proportion of
morbidity and mortality of neonates was among mothers
with unsafe neonatal care practice. These mothers also
had unsafe response to newborn sickness. There was
wide variation among mothers in practice of neonatal
care.

Almost seven out of ten mothers exclusively breast fed
their babies. Breast feeding practices were also good
with six out of ten mothers initiating breast feeding
within one hour of delivery and seven out of ten
exclusively breast feeding their children. This was higher
than the 34.9% reported for Nadia in the Concurrent
evaluation of NRHM in 2009.10 The reference period for
this study was 28 days of neonatal period while for the
concurrent evaluation the reference period was 6 months
of age. It is possible that as the child grows up tendency
to give extra feeds increases causing a lesser adherence
to exclusive breast feeding. We found most of the
mothers (87%) were aware of the need for hand washing
before holding the child but they did not perceive it to be
very important because they thought it was only for

Table 3: Risk factors associated with unsafe neonatal practices in mothers of neonates in rural Nadia district of West Bengal

<table>
<thead>
<tr>
<th>Factors</th>
<th>Crude OR</th>
<th>Adjusted OR</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Having BPL card</td>
<td>5.0</td>
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<td>3.4 - 7.8</td>
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<td>3.5</td>
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</tr>
<tr>
<td>Not registered last pregnancy within 1st trimester</td>
<td>2.9</td>
<td>2.6</td>
<td>1.6 - 4.2</td>
</tr>
<tr>
<td>Mother educated below secondary level</td>
<td>2.6</td>
<td>2.3</td>
<td>1.3 - 3.9</td>
</tr>
<tr>
<td>Not counselled for neonatal care practises</td>
<td>2.9</td>
<td>1.3</td>
<td>0.6 - 2.9</td>
</tr>
<tr>
<td>Having less(&lt;7 median) contact with health system</td>
<td>1.8</td>
<td>1.2</td>
<td>0.8 - 1.8</td>
</tr>
</tbody>
</table>
age. WHO and UNICEF stated that the social determinants of health are poverty, low education of the mother, lower income opportunities and low woman empowerment. Multicultural social interventions in Sub Saharan Africa have shown to reduce child mortality by up to 25 deaths per 1000 live births by addressing social factors and motivating people.

Limitations
One of the limitations was cross sectional design and therefore mothers might have difficulty in recalling the practices.

Conclusion
Mothers lack knowledge about importance of keeping baby warm and have misconceived ideas about correct breastfeeding practices and hand washing. Poor and uneducated had higher risk of unsafe practices. Unsafe practices were associated with poor health system contact as indicated by lack of institutional delivery, late ANC registration and infrequent contact with health care providers. Mothers with lack of safe practices had most of the neonatal sickness and death.

Recommendation
Targeted IEC with specific messages of need for warmth for the neonate, importance of hand washing and myths regarding breast feeding. Early registration, ensuring the institutional delivery, regular follow up using mother and child tracking system and counselling during each contact should be the targeted at marginalized group of poor and uneducated. Number of vehicles for Nischay Yaan to be increased with special emphasis to ensure non exclusion of hard to reach areas. ASHA recruitment and training in module 6 and 7 to be completed. Increase Home based newborn care awareness among mothers can be a cost effective way of promoting safe neonatal practice and reduction of neonatal mortality and morbidity.

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