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## Should birth preparedness and complication readiness (BPCR) interventions be scaled up in developing countries?

Soubeiga D, Gauvin L, Hatem MA, Johri M. (Department of Health Administration; Department of Social and Preventive Medicine Faculty of Medicine, University of Montreal; Division of Global Health, University of Montreal Hospital Research Centre [CRCHUM], Montreal, Canada.) Birth preparedness and complication readiness (BPCR) interventions to reduce maternal and neonatal mortality in developing countries: Systematic review and meta-analysis. *BMC Pregnancy Childbirth* 2014;**14**:129.

### SUMMARY

This meta-analysis aimed to put together evidence on effectiveness of birth preparedness and complication readiness (BPCR) interventions on maternal and neonatal mortality. BPCR activities cover antenatal, intranatal, postnatal and neonatal periods with the strategy to inform mothers about location of emergency services, potential occurrence of obstetric complications and signs of complications, encourage the mother to take decisions before the onset of labour and to save money needed to pay for services and, finally, be able to take decisions during an emergency or complications.<sup>1</sup> The intervention was BPCR, which could be any individual intervention or any of the above components combined, received by pregnant women residing in developing nations. In the comparator group were women who did not receive any BPCR interventions. The primary outcomes were maternal mortality ratio (MMR) and neonatal mortality rates (NMR) while the secondary outcomes were process indicators such as use of skilled services, and hygienic practices in the home. The review included randomized controlled trials; the level of randomization was either at the individual or at the cluster level. Articles published in French or English language were considered. Major search engines were used to look for relevant articles. Finally, 14 studies were selected and the quality ascertainment was done using McMaster Quality Assessment Tool. Meta-analysis was done to combine relative risks (RR), and a random effects model was used. Data were re-analysed on the basis of the intention-to-treat principle. Combinations

were carried out using the Mantel–Haenszel method.

A total of 307 018 women participants, with 292 256 live-births were included in the meta-analysis. Maternal mortality was measured in only seven studies. There was 28% reduction in RR of maternal mortality but this was non-significant (RR 0.72; 95% CI 0.46, 1.13). In subgroup analysis where at least 30% of targeted women participated in interventions, there was significant reduction of 53% in maternal mortality risk (four studies, RR 0.47; 95% CI 0.26, 0.87).

Neonatal mortality was measured in 12 studies. There was a significant reduction of 18% in RR of neonatal mortality (RR 0.82; 95% CI 0.74, 0.91). In subgroup analysis (9 studies where at least 30% of targeted women participated in interventions) there was statistically significant reduction of 24% in NMR (RR 0.76; 95% CI: 0.69, 0.85). Two trials that combined home visits with community-based group sessions showed a higher reduction in NMR (RR 0.68; 95% CI 0.40, 0.98) compared to either of them alone—home visits strategy (RR 0.86; 95% CI 0.79, 0.94), community-based group sessions (RR 0.83; 95% CI 0.70, 0.98). The neonatal mortality risk decreased by 25% (RR 0.75; 95% CI 0.63, 0.89) in trials where the NMR in the control group was >40/1000.

There was improvement in some process outcomes associated with child survival such as the use of care in the event of newborn illness (RR 1.66; 95% CI 1.23, 2.25), practice of clean cutting of the umbilical cord (RR 1.33; 95% CI 1.14, 1.55) and breastfeeding within the first hour after birth (RR 1.79; 95% CI 1.27, 2.51).

### COMMENT

This meta-analysis showed that BPCR intervention reduced the NMR and more so in the group with baseline NMR >40/1000 live-births. It also improved care in the event of newborn illness, practice of clean cutting of the umbilical cord and breastfeeding within the first hour after birth. The effect on maternal mortality reduction was not significant.

The ascertainment of quality is an important component while reviewing and including studies in a meta-analysis. It was found that blinding to the outcome assessment was missing in most studies being adequate in only three studies. This could lead to bias and thus future trials conducted with similar interventions should include blinding of outcome assessment. All published studies have been included in this meta-analysis, and the possibility of publication bias could not be ruled out. The results had

considerable heterogeneity and the main cause of heterogeneity was the type of intervention. Other causes were study-setting, population, baseline characters, etc. BPCR is a broad concept and while some studies utilized all the components, others included only a few. Hence, the interventions were diverse. It would be difficult to delineate which component of BPCR would have resulted in maximum reduction of neonatal mortality owing to the complexity of the intervention. The studies included in the meta-analysis were evenly distributed among the developing countries and thus results should be generalizable to those nations.

In India, the burden of neonatal and maternal mortality continues to be high and community-based interventions with a potential to reduce burden are needed to reach the Millennium Development Goal (MDG) 4 and MDG 5 goal by 2015. The NMR in India is 29 per 1000 live-births while in rural areas it is 33 per 1000 live-births (Sample Registration System [SRS] 2012),<sup>2</sup> and the MMR is 178 per 100 000 live-births (SRS 2012).<sup>3</sup>

In India, under the National Rural Health Mission (NRHM), several initiatives have been taken to ensure access to skilled care at birth and emergency obstetric care for complications.<sup>4</sup> These include financial benefits for availing antenatal and intranatal care including free referral transport.<sup>4</sup> Thaddeus and Maine have documented 'three delays'—seeking, reaching and obtaining appropriate care as the crucial factors responsible for maternal mortality.<sup>5</sup> According to NRHM guidelines, the community health workers (CHW) (especially accredited social health activist [ASHA]) need to implement BPCR interventions. They need to visit pregnant women and motivate them to complete their antenatal care visits, advise them for adequate dietary intake. They are also supposed to give advice to save money for emergency preparedness, determine the blood group of pregnant women and identify a donor, and advise regarding emergency transportation. They should also explain the danger signs and guide pregnant women to visit an appropriate healthcare facility, if there are any risk factors.

Several Indian studies have shown that BPCR interventions could reduce the NMR. The first study, a field trial in Gadchiroli<sup>6</sup> which provided home-based neonatal care, the NMR (net percentage reduction) reduced to 25.5 (62.2%,  $p < 0.001$ ) over 3 years. The study reported that home-based neonatal care could avert one death (foetal or neonatal) per 18 neonates at a cost of US\$ 5.3 per neonate. While the other from Shivgarh, Uttar Pradesh,<sup>7</sup> used a preventive package for essential newborn care and reduced the NMR by 54%, and there was an improvement in birth preparedness, hygienic delivery, thermal care (including skin-to-skin care), umbilical cord care, skin care and breastfeeding. Finally, a study in rural Jharkhand and Orissa<sup>8</sup> engaged with women groups leading to a 32% lower NMR in the third year compared to the control group. These studies have shown that home-based neonatal care, preventive packages for newborn and women help groups could reduce neonatal mortality.

The BPCR index comprising six separate indices—individual, family, community, provider, facility and policy—one for each level has been devised. The set of indicators for each level has a possible total score of 100. Each index contains 5 to 12 items. The aggregate of all the six separate indices is done to make a composite score.<sup>9</sup> Two studies, one from Madhya Pradesh and the other from West Bengal, had calculated the BPCR index for India.

The Madhya Pradesh study<sup>10</sup> showed that the BPCR index was 47.5. This was found to be significantly high in above poverty line families (50.9), higher educational level (63.6), primi-para (50.9) and in service and business group (59.3). This study also reported that women had lower knowledge of danger signs (18.6%), transportation facilities (18.6%) and first trimester antenatal care (24.1%). The other study from Uttar Dinajpur district of West Bengal<sup>11</sup> showed the BPCR index was 34.5. Both studies showed that the BPCR index was poor in Indian settings and suggested strengthening of BPCR interventions and field-level implementation. A single study (cross-sectional survey) in urban slums of Indore<sup>12</sup> showed that 47.8% of mothers were well-prepared for BPCR and the factors associated with well-preparedness were maternal literacy and availing antenatal services.

A close scrutiny of interventions that comprise the broader complex of BPCR hold promise in reducing NMR. Thus, it would be crucial for scaling it up to maximize gain in neonatal health. For India with a huge diversity and high baseline NMR, BPCR intervention through community-level workers, should be implemented with greater vigour and supervision.

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