



The global challenges of improving newborn survival in the community

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While substantial progress has been achieved over the past decade for global newborn survival, reductions of deaths during the first month of life lag behind improvements in overall mortality of children under five. Nearly 3 million newborns still die every year; 99% of these deaths occur in low-resource countries (1). Southeast Asia, including the Indian subcontinent, accounts for almost one-third of global mortality in neonates and children under 5 years of age (2). The major causes of neonatal mortality worldwide are intrapartum complications (birth asphyxia), severe infections, and complications due to prematurity (3). Most of these are preventable with currently available interventions. These global statistics thus suggest that interventions preventing these deaths, i.e., emergency obstetrical and newborn care including neonatal resuscitation, antibiotics for treatment of infections, and measures to prevent hypothermia are not being effectively implemented.

Over the last two decades, complex intervention packages including multiple components designed to improve newborn health and survival have been evaluated in several large trials. Community-based health interventions are often facilitated by (female) community-based health workers (4,5), traditional birth attendants (TBAs) (6), and mothers' groups (7). The community-based intervention packages have implemented health promotion and disease prevention activities by delivering care and health education for the communities during pregnancy, delivery and the postnatal period.

For example, in Makwanpur, Nepal women's and mothers' groups fostered community ownership through female facilitators, who implemented an action-learning cycle in which women's groups identified local perinatal problems and developed strategies to address them (7). This resulted in lower maternal and newborn mortality in intervention clusters than in control clusters, and helped women receive antenatal care and deliver at health institutions, or at least with a TBA using a clean delivery kit (7). A strategy of newborn care at home in Sylhet, Bangladesh (consisting of two antenatal visits to promote birth and readiness to care for their newborn plus postnatal home visits on days 1, 3 and 7 of life to evaluate and refer the baby if signs of illness were present) found a reduction of 34% in the neonatal mortality rate (NMR) in the intervention arm (5).

In rural Gadchiroli (India), training female health workers in home-based neonatal care consisting of neonatal resuscitation, temperature maintenance, referral for or treatment of neonatal sepsis and health education for mothers was associated with a reduction in neonatal and infant mortality by almost half (8). The combination of home-based care and health education in this project also reduced the incidence of neonatal morbidities and low birth weight in the community (4). Provision of essential newborn care and efforts to prevent newborn hypothermia in Shivgarh (Uttar Pradesh, India) were associated with a NMR reduction of about 50% (9). A cluster, randomized controlled trial in rural Lufwanyama, Zambia, showed that

training TBAs in neonatal resuscitation and treatment and referral for suspected infection reduced neonatal mortality, particularly on the first day of life (6), when the mortality risk is greatest. Many other home-based interventions have been studied in Hala, Pakistan (10,11) and Mchinji District, Malawi (12). A meta-analysis showed that community-based interventions, while having limited effects on maternal health, can reduce stillbirths and NMR, and improve referral to health facilities as well as breastfeeding rates (13).

Taken together, the current literature suggests that various cadres of community health workers (CHWs) in diverse ecological settings can be effectively trained to diagnose and treat common childhood illnesses. However, CHWs may require supplemental skills to be able to fully address the most common diseases afflicting newborns. A recent study conducted in rural Pakistan (14) tried to address this gap by training community-based lady health workers (LHWs) in neonatal bag and mask resuscitation and administration of oral antibiotic therapy for suspected neonatal infections. Together with a basic preventive and promotive interventions package, the project aimed to strengthen public sector delivery of life-saving newborn care. In this cluster-randomized, controlled trial conducted in rural Sindh, Pakistan, LHWs were trained in and provided supplies for basic newborn resuscitation and diagnosis and oral amoxicillin for treatment of suspected neonatal respiratory infections. Other components of the intervention included improved thermal care for LBW and premature babies, and supplies such as clean delivery kits, resuscitation bag and masks, and educational materials. The LHWs were linked with TBAs so that they would be able to attend home deliveries. The primary outcome of this cluster, randomized controlled trial was all-cause neonatal mortality.

Study implementation proved to be challenging under real-world conditions. While the LHWs conducted 80% of the planned community mobilization sessions, they were able to attend only 14% of the more than 8,000 deliveries that happened during the study and only 25% of neonatal visits within 72 h of birth. LHWs performed resuscitation in only 4% of potentially eligible neonates with intrapartum events. The package of interventions was associated with a 20% reduction in neonatal mortality (risk ratio 0.80; 95% CI, 0.68–0.93) including reductions in early and late neonatal mortality (which were not defined in the paper), and with significant improvements in household practices and newborn care practices. However, there was no impact on stillbirth rates. The intervention had no effect on cause-

specific neonatal mortality due to asphyxia or suspected serious infections, and no impact on care seeking for facility births and stillbirths in the intervention clusters.

There were a number of important limitations to this study. Firstly, Soofi and colleagues estimated that the package of interventions would result in a 30% reduction in neonatal mortality (with 80% power), a substantial effect size, based on other studies in South Asia (8,9,15). They were fortunate that their initial estimate of NMR (40 deaths per 1,000 live births) proved to be incorrect as the control clusters had a NMR of 55 deaths per 1,000 live births. Secondly, unanticipated events including the unavailability of LHWs during roughly a third of the duration of the trial and lack of LHWs in 7 of the 34 clusters in the study area presented implementation challenges. Thirdly, it proved to be challenging to have the LHWs coordinate their home visits at the time of delivery by the TBA. Finally, there was relatively poor uptake of several components of the intervention including limited use of clean delivery kits at home births (55% intervention *vs.* 19% control clusters), few postnatal visits by LHWs, relatively few sick neonates visited by LHWs (only 29% in the intervention clusters), limited use of amoxicillin for newborns with possible infections, and, as noted above, insufficient efforts to resuscitate babies with respiratory distress.

This study thus suggests that tasking LHWs with home-based newborn care responsibilities presents major logistical challenges, since they have to reach the homes at or close to the time of delivery and coordinate these potentially life-saving perinatal activities with TBAs. In contradiction to recommendations for skilled delivery in health facilities, community-based deliveries still account for a substantial proportion of births globally. Calls for improvement of maternal and newborn care in facilities and promotion of care seeking and transportation are futile, as long as such capacity does not exist in most low- to middle-income countries.

In order to deliver interventions to newborns at the time and place of a home delivery, bold innovative approaches are needed to ensure that a skilled health workforce can assist deliveries at that place, at that time. However, even seemingly simple interventions such as skin-to-skin care have proven difficult to implement in many contexts. Health workforce capacity building therefore needs to be linked with innovative health technologies, new approaches for community ownership and participation, and novel models of financing and policy making (16,17). Even in low-income settings, market mechanisms can be leveraged

to create demand and supply chains for newborn health interventions. For example, selling or renting newborn health devices for a limited fee to TBAs or mothers groups could be coupled with newborn care capacity building (18). This could create an incentive to deliver care at the time and place where and when it is needed: at the time of delivery in a mother's home. Indeed, appropriately trained TBAs are a health care cadre that, just like LHWs, could deliver maternal and newborn health interventions at home.

Bold approaches are needed to reduce the tragic number of newborns dying at home. While it is known what we have to do in global newborn health, and often we know how to do it, it still does not happen. Innovative approaches are needed to implement effective interventions to improve newborn survival and to strengthen the continuum of care for mothers and newborns from the community and the primary health center to the referral hospital.

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