



EDITORIAL

Maternal and neonatal mortality: time to act^{☆,☆☆}



Mortalidade materna e neonatal: hora de agir

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Maternal, infant, and neonatal mortality rate are benchmarks for maternal/infant care and the health of a society in general. Global efforts to reduce these mortality rates have been led by the World Health Organization (WHO) and the United Nations; the rates have decreased substantially worldwide, but the ambitious reductions set forth by the Millennium Development Goals have not been achieved. Maternal mortality has decreased by approximately 45% from the Millennium Development Goals baseline rate in 1990.¹ One in four babies worldwide are delivered without the presence of a skilled birth attendant. Every day, hundreds of preventable maternal deaths occur due to pregnancy or childbirth-related complications. Infant mortality rates have decreased in developing countries, but these reductions have been largely due to decreases in deaths from pneumonia and diarrheal disease after the neonatal period, while earlier deaths relating to prematurity, birth asphyxia, and infection have experienced a lower decrease.² As a consequence, neonatal deaths now account for 44% of the childhood mortality, the highest rate ever.² Approximately 2.8 million babies worldwide die each year during the first month after birth; most of these deaths occur in developing countries.² Scaling up interventions proven to be very effective could substantially reduce the regrettable loss of young lives.

The article “Temporal and spatial evolution of maternal and neonatal mortality rates in Brazil, 1997–2012,” by Rodrigues et al.³ reports the trends in maternal mortality ratio and neonatal mortality rate in a large geographical area with significant disparities in socioeconomic status. The study highlights that the maternal mortality rate remained relatively constant during the study period in spite of decreases in the neonatal mortality rate. Furthermore, important geospatial differences in mortality were documented; the largest reductions in neonatal mortality rates were observed in regions with the highest socioeconomic status, when compared to regions with the lowest socioeconomic status in Brazil. International comparisons of the neonatal mortality rate are difficult to interpret due to major differences in reporting, as infants at the lowest birth weights and gestation ages may be counted as fetal deaths regardless of signs of life after birth.^{4,5}

Efforts related to the Millennium Development Goals have been associated with a reduction of approximately 45% in maternal mortality and over 50% in neonatal and child mortality. The reduction in neonatal and child mortality has resulted in almost six million lives saved per year. However, similar to the results from Brazil in the study by Rodrigues et al.³ these reductions in maternal and neonatal mortality have not been homogeneous, with smaller reductions or even increases in the most vulnerable populations. Most maternal, neonatal, and child deaths are preventable with implementation of well-proven and effective health-care interventions.

Thus, what can be done to reduce neonatal and maternal mortality? The first two days after birth account for over 50% of neonatal deaths, while the first week of life accounts for over 75% of all neonatal deaths. Neonatal deaths are

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most frequently due to birth asphyxia, prematurity, sepsis, and congenital malformation, indicating that interventions should focus on during labor and the early post-natal period, based on the timing of the causes of death, with some efforts to reduce neonatal deaths extended beyond the first week after birth. Therefore, the WHO has made a strong recommendation for postnatal care in facilities for at least 24 h after birth and postnatal contact within 24 h after birth for infants born at home.⁶ Training in resuscitation and in essential newborn care reduces perinatal and neonatal mortality.^{5,7} It has been estimated that these programs have the potential to reduce up to a million deaths per year if implemented worldwide.⁸ The Helping Babies Breathe and the Essential Care for Every Baby training programs are available, but have not been scaled up as needed. The new program Essential Care for Small Babies also has the potential to reduce deaths due to prematurity, the current main cause of infant mortality. These programs can be implemented in such a way to be one of the most cost-effective interventions to reduce neonatal mortality.⁹ In addition, postnatal contacts are recommended on the third day (48–72 h), between the seventh and 14th day, and six weeks after birth. Public health initiatives that aim to improve access to health care and target those at highest risk of adverse outcomes can reduce maternal and neonatal mortality. Such interventions include home visits by community health workers, especially in selected high mortality settings. Home visits for neonatal care by community health workers are associated with reduced neonatal mortality in resource-limited settings with poorly accessible facility-based healthcare. Trained healthcare workers can identify seriously ill children. Data from several controlled studies in settings of poor access to facility-based healthcare in South Asia indicate that home-based neonatal care through community healthcare workers reduced neonatal and perinatal mortality, particularly in those settings with the highest baseline neonatal mortality rates.¹⁰ The adoption of this policy is justified in such settings.

There is a large body of evidence on effective healthcare packages of selective low-cost effective interventions to reduce neonatal mortality in resource-limited settings in low- and middle-income settings, which are particularly appropriate for scaling up.¹¹ Large scale trials have demonstrated the feasibility and effectiveness of packages of interventions to reduce neonatal mortality.^{5,11} In the recent Every Newborn series by *Lancet*, it has been estimated that very large neonatal survival benefits would accrue from scaling up interventions consisting of healthcare packages particularly focused on small and sick neonates.^{5,11} In that light, the WHO recommendations⁶ based on these reviews provide an opportune policy impetus toward achieving the post-2015 neonatal mortality targets.

Neonatal hypothermia occurs in as many as 50% of infants in low- and middle-income settings; the severity of hypothermia is associated with a higher risk of mortality during the first seven days after birth.¹² To reduce neonatal hypothermia, the WHO recommends a set of interlinked procedures called the “warm chain” to be followed after birth. Interventions include warm delivery rooms, immediate drying, skin-to-skin contact as continuously as possible, early breastfeeding, delayed bathing and weighing, appropriate bundling of mother and baby together, warm transportation,

warm resuscitation, along with training and raising awareness of the risks of hypothermia. Kangaroo mother care, a method of skin-to-skin contact, promotes breastfeeding, reduces hypothermia, neonatal mortality, sepsis, and length of hospital stay at discharge or at 40 weeks in preterm and low birth weight infants compared to conventional hospital care.¹³ Multiple applications (daily for seven to ten days) of chlorhexidine to the umbilical cord can reduce the risk of neonatal mortality and omphalitis in infants born at home in high neonatal mortality settings (30 or more neonatal deaths per 1000 live births),¹⁴ and is recommended by WHO. However, there is insufficient evidence for recommending this intervention in infants born in health facilities and/or lower neonatal mortality settings. Observational studies suggest that hospital mortality in preterm infants could be reduced with implementation of continuous positive airway pressure, which is consistent with data from randomized controlled trials conducted in high-resource settings.¹⁵ Evidence from randomized and observational studies indicates that routine intramuscular administration of 1 mg of vitamin K at birth reduces vitamin K deficiency bleeding during infancy.¹⁶ Extensive evidence from high income settings indicate that surfactant replacement therapy reduces mortality and air leaks;¹⁷ surfactant therapy has the potential to reduce neonatal mortality and air leaks in low-resource settings. Some studies in low-resource settings that tested therapies with proven efficacy in high-resource settings have had disappointing results. For example, a large cluster-randomized controlled trial of antenatal corticosteroid administration in resource-limited countries did not observe a survival benefit among preterm infants exposed to antenatal corticosteroids; exposure was associated with an increased risk of maternal infection.¹⁸

Maternal mortality targets are not declining at the rate set in the Millennium Development Goals. The maternal mortality ratio declined from 385 deaths per 100,000 live-births in 1990–2015, worldwide, having decreased in all WHO regions.¹ The major causes of maternal deaths are post-partum hemorrhage, pre-eclampsia/pregnancy-induced hypertension and eclampsia, and infections, all of which are largely preventable with proven and effective interventions. To date, successful strategies that have reduced maternal mortality in low-resource settings have included investment in transportation and access to care,¹⁹ as well as investment in antiretroviral therapy in countries with high prevalence of human immunodeficiency virus infection.²⁰ Access to maternal and child health services has been improved by opening health centers 24 h per day and by adding maternity waiting houses and delivery rooms at health centers.²¹ Increasing the number of skilled birth attendants has also been linked to reductions in the maternal mortality ratio.²¹ National training programs have increased the number of midwives and trained community healthcare workers available, particularly in underserved areas through targeted deployment and incentivization.²¹ Continued research efforts and improved data are needed to determine cost-effective ways to implement interventions that can reduce maternal mortality in low-resource settings.

In summary, as reported for Brazil, despite major reductions in mortality, the Millennium Development Goals regarding the reduction in maternal and neonatal mortality

have not been achieved, particularly for the most vulnerable populations worldwide. Geospatial and temporal data can help identify the most vulnerable areas that are in particular need of improved maternal and neonatal care. As stated by Nobel laureate Gabriela Mistral, “we are guilty of many errors and many faults, but our worst crime is abandoning the children, neglecting the fountain of life.” It is time to act to scale up interventions proven to be efficient and cost-effective.

Conflicts of interest

Dr. Waldemar A. Carlo is on the Board of Directors of Mednax. Dr. Colm P. Travers declares no conflicts of interest.

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