are people who are going back into our communities all across the country, who are potentially going to be struggling," said Warden. "Keep in mind, these patients, because of the nature of their brain injuries, can be the ones at highest risk of falling through the cracks."

French said that Pepper and Emme have had better-than-average recoveries so far, in part because they are highly motivated and are working hard at their rehabilitation programs.

"Not all of them recover," noted Colonel Jean Dailey, a nursing supervisor on the neuroscience unit. "It can wear on you." Dailey added that nurses on her unit have higher turnover rates than those on the hospital's orthopedic ward, which chiefly treats soldiers with limb injuries. Unlike the young amputees, she said, "these guys' personalities are not the same" as before they were injured. In fact, she says, "they may never be the same."

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Perinatal Mortality in Developing Countries

Jelka Zupan, M.D.

Each year, 10.7 million children under the age of five years die — 4 million during the first four weeks of life. Another 3.3 million are stillborn. And these are only the official reports. In the less developed countries, which account for 98 percent of reported neonatal deaths and 97 percent of reported stillbirths, these births and deaths are not always registered.

Since 2000, when the United Nations Millennium Declaration was signed, efforts to reduce mortality among children younger than five years of age have been accelerating. It will be difficult to reach the stated goal — cutting the rate by two thirds by 2015 — without reducing the number of neonatal deaths. Many useful interventions can be implemented in resource-poor settings, but weak health care delivery systems remain an important barrier. Research is ongoing on alternative approaches, including the training and deployment of traditional birth attendants, as reported by Jokhio et al. in this issue of the *Journal* (pages 2091–2099). But the problems involved are so many, and the resources so limited, that the task remains daunting.

The highest neonatal mortality rates and rates of stillbirth occur in sub-Saharan Africa, followed by Asia and Latin America (see graph). In countries where the mortality is highest, almost 10 percent of babies do not survive more than one month.

Neonatal deaths generally result from complications of preterm birth, asphyxia or trauma during birth, infections, severe malformations, or other specifically perinatal causes. The proportion attributable to each cause varies: in areas where neonatal mortality is lower, preterm birth and malformations play a larger role; where mortality is higher, the contributions of asphyxia, tetanus, and infections are greater. Maternal health and nutrition are important for neonatal health, and maternal infections contribute to adverse outcomes.

But the real causes of adverse outcomes are untreated or poorly treated maternal complications, inadequate neonatal care, and harmful home care practices, such as the discarding of colostrum, the application of unclean substances to the umbilical-cord stump, and the failure to keep babies warm. The risk of death for a pregnant woman with severe preeclampsia, for example, is 0.5 percent, and the risk of perinatal death for her child is 13 percent. If the condition remains untreated and eclampsia develops, the risk of death increases to 5 percent for the mother and 28 percent for the baby.

In addition, infections, which cause many infant deaths, have diverse origins; many are community-acquired bacterial infections in previously healthy infants. It is estimated that in about 25 percent of the stillbirths in less developed countries, death occurs shortly before birth and most likely results from complications of delivery.[1]

Targeting new interventions for neonatal survival should be easy in one sense: we know when pregnant women and newborns will need care, since we estimate in advance the date of birth and most complications arise during late pregnancy and

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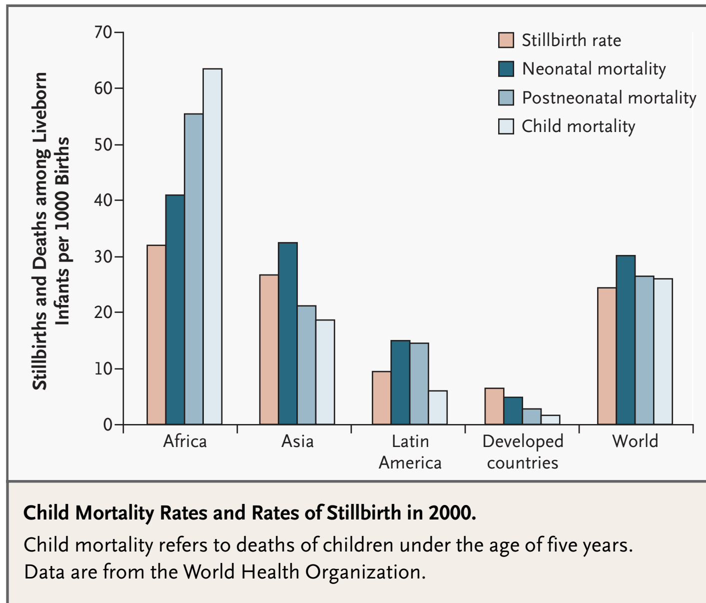

Child Mortality Rates and Rates of Stillbirth in 2000.
Child mortality refers to deaths of children under the age of five years. Data are from the World Health Organization.

childbirth. There is no substitute for professional care during the critical 24 hours after birth. A skilled provider can support a woman during childbirth in a manner that is in keeping with her culture and beliefs and can promote breast-feeding, detect complications, and organize care by obstetricians or pediatricians as needed.

Techniques for treating most critical medical problems and complications have been available for more than half a century. The benefits are the greatest when there is a continuum of care throughout pregnancy, childbirth, and the postpartum period. Although care during childbirth is most crucial, antenatal care plays an important role, primarily because it offers an important means of addressing other health care needs, such as family planning, immunization against tetanus, and the prevention and treatment of human immunodeficiency virus (HIV) infection, other sexually transmitted diseases, and malaria.

Yet half the women in the world still give birth at home without skilled care. Furthermore, not all institutions that offer maternity services meet the minimal standards for safe childbirth and newborn care. Such facilities are often hampered by a scarcity of health care providers, outdated knowledge and inadequate skills, overcrowding, inadequate hygiene, and a lack of essential medicines, supplies, and equipment. Countries face the challenge of building health care systems that can meet the needs of an increasing number of women and infants.

The barriers to appropriate maternity care are not insurmountable. The cost, for example, is moderate, and some poor countries have proved that it is affordable.[1] However, universal access to high-quality care requires the financing of services without a substantial fee at the point of service. Basic maternity care must be provided near women's homes, whereas care for complications requires centralized hospitals employing teams of doctors, midwives, and nurses who have essential equipment, supplies, and support. And the two types of services must be made available in an ongoing and integrated way.

Several approaches for improving birth outcomes in places without such services are being tested. They include such efforts as training volunteers to provide neonatal care, working with women's groups to improve the seeking of care and home care practices, and the provision of multivitamins.

Still, professional care remains the most effective way of addressing high neonatal mortality,[2] and access to such care is improving too slowly to meet the targets defined by the international community. Although birth rates are decreasing, the need for services will grow as a generation of women who were born at a time of high birth rates comes into childbearing age. Most women in the developing world will continue to begin childbearing in adolescence, before reaching biologic and social maturity. These women and their infants risk not only pregnancy-related complications but also sexually transmitted diseases, including HIV infection.

While we are busy finding solutions to old problems, new ones are emerging. Assisted reproductive techniques are becoming increasingly available in less developed countries and are resulting in multiple pregnancies and preterm births. As many as half of all twins and almost all triplets are born before term and die at rates several times as high as those among full-term infants.[2]

Women continue to risk death in order to give life. Unfortunately, the requisite changes in antenatal and neonatal care are slow in coming — too slow for more than half the world's women and babies.

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