Global estimates indicate that the neonatal component of deaths in children younger than 5 years (38% in 2000) is increasing. Although there are substantial regional variations in these proportions (24% in Africa to 56% in the western Pacific), even in areas with similar neonatal mortality rates (47% in Southeast Asia and 26% in sub-Saharan Africa), it is obvious that the Millennium Development Goal for child survival cannot be met without substantial reductions in neonatal mortality. For effective neonatal survival efforts, reasonably accurate information about the causes of deaths is essential.

Using rigorous and transparent methods, Lawn et al. have provided, for 193 countries in the year 2000, systematic estimates, with associated uncertainty, of the distribution of neonatal deaths for programme-relevant causes. Only 2.5% of neonatal deaths had reliable cause-of-death information available through vital registration systems, primarily in well-developed countries. The distribution of reported causes of deaths varied substantially between countries and across studies. The major direct causes of neonatal deaths globally were estimated to be infections (sepsis, pneumonia, tetanus, and diarrhoea; 35%), preterm birth (28%), and birth asphyxia (23%). There was substantial uncertainty around these estimates owing to the limited quantity and quality of data from settings in which the great majority (97.5%) of neonatal deaths had occurred. It is obvious that complex statistical models are not a panacea, and collecting reliable information on the causes of deaths should receive due attention. Simultaneously, it would be pertinent to highlight other important limitations and practical implications of this review.

Several studies included in this review, primarily from low-income and middle-income countries, used verbal autopsy (lay reporting) tools to determine the causes of deaths. The neonate, especially in the first week of life, offers a limited symptomatic response to different insults resulting in substantial overlap of clinical manifestations of several diseases. The sensitivity and specificity of verbal autopsy technique in correctly identifying various causes of deaths is, therefore, sub-optimal. Validation studies suggest that although major congenital malformations and neonatal tetanus have high levels of sensitivity (0.79–0.98 for tetanus) and specificity (≥0.9), the performance for other important conditions like septicemia is poor. The instrument using both open-ended and closed questions identified at least one diagnosis accurately in 71% of the newborns in Pakistan, and resulted in a best agreement (kappa index) of 0.64 for all causes of deaths in India. Comparisons of verbal autopsy data collected and/or analysed by paramedical personnel, paediatricians, and computer algorithms yield disparate results for some but not all causes. Factoring for these aspects would have increased the uncertainty of the estimates provided by Lawn et al. Thus verbal autopsy data can only be a crude pointer to the leading causes of deaths in neonates with understandable limitations for health impact evaluation.

Customarily each death is attributed to a single cause, which is an oversimplification. Clinicians would, however, concur that neonatal deaths invariably have multiple and competing causes. In an urban hospital in New Delhi, India, 75.2% of 129 subjects between the ages of 1 week and 2 months had two or more co-existent morbidities; the co-morbidities being higher in children with a relatively severe condition (2.3 vs 1.8; P = 0.002). Only recently, attention has begun to be directed to methodological advances to account for co-morbidity at the time of death. Appropriate translation into macro-level estimates, and its subsequent adoption for programmatic interventions, therefore, seems distant. Intuitively, what are the possible...
programmatic implications of multiple and competing causes of death? Focusing on a single cause of neonatal mortality, for example birth asphyxia, may not prevent all asphyxial deaths as some survivors could succumb to co-morbidities like infections or prematurity. Programmes addressing multiple causes of neonatal mortality, for example improving access to essential newborn care, are more likely to yield richer dividends.

Considering substantial variations in regional mortality and causes of neonatal deaths, for relevant programmatic inputs including surveillance, it is necessary to establish and strengthen routine collection of local estimates in nations with weak or non-existent vital registration systems. Useful leads could emerge from some ongoing experiments in this context. India is evaluating the feasibility of integrating a standardized neonatal verbal autopsy instrument with the routinely collected mortality statistics at the micro level, for example, through the Sample Registration System. Other experiments include a verbal autopsy tool that directly maps computer-diagnosed causes of deaths employing simple lay reporting algorithms.

In future, increasing attention is likely to be directed to the avoidable burden of late fetal deaths and stillbirths, which could be considered to be an extended spectrum of neonatal mortality. Currently, in most countries with weak vital registration systems, these deaths may either be ignored or under-reported, or result from misclassification (early neonatal death being categorized as stillbirth), and attempts to determine their causes are virtually non-existent. It is possible that preventive efforts directed to these deaths may also improve neonatal survival due to overlapping underlying causes. There is thus a need to initiate efforts to collect relevant and reliable information in this context also.

Paucity of extremely reliable data on causes-of-deaths should not dampen the current programmatic thrust on neonatal survival. Enough information is available to focus on effective and low-cost interventions that simultaneously address the important identified causes of neonatal mortality (infections including neonatal tetanus, preterm birth, and birth asphyxia) through a package of essential newborn care including tetanus toxoid vaccination, safe birth practices, exclusive breastfeeding, improved care of low birth weight infants, and antibiotics for neonatal infections. Until accurate statistics of causes of deaths emerge at the micro level to refine the programmatic direction, broadly the effectiveness of such interventions can be evaluated through time trends of absolute and relative changes in early neonatal, neonatal, and post-neonatal mortality rates.

References