

## EDITORIAL

# Improving neonatal mortality in sub-Saharan Africa: any cause for optimism?

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Of the estimated 8.8 million annual deaths that occur in children under the age of 5 years, 41% occur in neonates.<sup>1</sup> Thus, per day, the newborn is 45 times more likely to die within the first 28 days of life than in the entire period from 4 weeks to 5 years of age. More than 98% of neonatal deaths occur in low- and middle-income countries and approximately 70% occur in community settings, often the home.<sup>2</sup> These deaths frequently take place outside the formal health system and are rarely included in the vital registration process.<sup>3,4</sup>

Sub-Saharan countries have among the highest neonatal mortality rates in the world, yet some of the weakest health and vital registration systems.<sup>5,6</sup> As an example, complete data on cause of neonatal death are lacking for over 97% of neonatal deaths in this region and neonatal mortality rates are often underestimated.<sup>7–9</sup> The dearth of accurate, population-based, neonatal data that recognize and count the most common antecedents and causes of neonatal death poses significant challenges to developing a coherent neonatal health policy.<sup>10</sup>

Conducting community-based interdisciplinary research on newborn health in low- and middle-income countries is complex, time consuming and poses formidable challenges often underappreciated by clinicians or clinical trialists working in hospital settings. In addition to cultural, linguistic and disciplinary differences, logistic challenges include negotiating country-specific Ministry of Health bureaucracies, the need to submit multiple institutional review board (IRB) applications to multiple IRBs with differing requirements and application forms, often in different languages, and creating standardized Manuals of Operation that conform (in multi-country studies) to each country's clinical and public health position statements. In many rural settings there are strong cultural beliefs that preclude discussing the deceased newborn, and a belief that the dead child was a 'spirit child'. Often the child is not named before death, and is therefore not 'socially or culturally born'. Burials are therefore quick and without ceremony, lacking formal expressions of grief for fear that the family may become recipients of supernatural malevolent harm.<sup>11–13</sup>

In this *Journal of Perinatology*, Diallo *et al.*<sup>14</sup> report their findings from an important study designed to enumerate

neonatal mortality and investigate its predictors in rural Burkina Faso in West Africa. The authors enrolled 864 infants whom they followed from birth until 6 months of age in 24 villages in the Bonfora Health District. The authors utilized a technique known as verbal autopsy, which has been developed to address the lack of cause of death (COD) data from deaths that occur in community settings. Verbal autopsy is an indirect method of ascertaining COD where civil registration and health systems are weak.<sup>15</sup> During verbal autopsy, a systematic description of the signs, symptoms and circumstances preceding death is obtained through an interview with the primary care-giver (usually the mother of the deceased infant).<sup>16</sup> A variety of methods exist for interpreting verbal autopsy interviews to arrive at a COD. The most commonly used method has two or three trained physician coders who review the data and independently assign a COD. Any discrepancy between the COD assigned by each physician member of the panel is resolved by discussion and review of the verbal autopsy data, and a final consensus COD is agreed upon by the physician panel. Alternatively, COD can be assigned by the use of predetermined criteria/algorithms, computer simulations or probabilistic methods such as Inter verbal autopsy.<sup>17,18</sup> This technique has been extensively validated and is applied in over 49 countries, including India and China, at scale.<sup>19</sup> Verbal autopsy is also used to investigate outbreaks of infectious diseases, measure risk factors for certain diseases, and assess the effect of public health interventions. In the Burkina Faso study, physicians used a hierarchy adapted from the Child Health Epidemiology Reference Group Classification and the International Classification of Diseases 10th edition.<sup>20</sup> This arranges COD in a particular order based primarily on the specificity and sensitivity of the causal definition, and the presumed physiological precedence of each cause's contribution to a death. As each COD is identified, cases assigned to the cause are sequentially removed from the sample and cannot be assigned another COD.<sup>21</sup>

The authors report a neonatal mortality rate of 46.3 deaths per 1000 live births. In multivariate regression, they identified twin birth, a nulliparous mother and birth into a polygamous household as the main predictors of neonatal death. Other authors have identified prematurity and low birth weight as additional factors associated with higher risks of neonatal death in sub-Saharan Africa.<sup>2,6,22</sup>

A closer examination of the mothers and antenatal history of the women in this study suggests similarities with many other

settings in sub-Saharan Africa (relatively few nulliparous women, low literacy, and two or fewer antenatal care visits), although the authors point out that this population is from a relatively wealthy district in Burkina Faso. Of the neonates who died, the majority died within the first 7 days, mostly in the home, and without interfacing with the formal health system. This finding is in keeping with much of the published literature to date.<sup>7,21</sup> The authors also engage in a lively discussion on the relative socio-biological antecedents associated with the neonatal deaths, of which poor quality of health care, geographically inaccessible health facilities and de-motivated health personnel dominate. They conclude by suggesting that given the high neonatal mortality rates among rural populations in Burkina Faso, Millennium Development Goal 4, which proposes a reduction of under-five deaths by two-thirds by 2015 (MDG declaration 2000), is unlikely to be achieved.

Since the Alma Ata declaration which highlighted the importance of community-based primary health care, is a major pivot for attaining MDG 4, and as there is now an increased awareness that most newborn deaths occur in the home, are there success stories and lessons learned that may provide some optimism for reducing neonatal deaths through a community-based approach? Nair *et al.*<sup>23</sup> provide a useful conceptual model mediated through three broad strategies.

### Community engagement and mobilization

The Warmi program worked with rural Aymara women's groups with limited access to modern medical facilities in remote Bolivia. The intervention focused on initiating and strengthening women's organizations, developing women's skills in problem identification, prioritizing and evolving local strategies to improve maternal and newborn health, and evaluating outcomes. Perinatal mortality decreased from 117 deaths per 1000 births before the intervention to 43.8 deaths per 1000 birth after.<sup>24</sup> Manandhar *et al.*,<sup>25</sup> in a modified version of this process in rural Nepal, conducted a cluster randomized trial that suggested that women's groups, facilitated by a local female community health worker trained in facilitation techniques but without a health-care background, could reduce neonatal mortality rates by 30%. They report that approximately three-quarters of the groups remained active for 18 months after withdrawal of program support. A similar process is occurring through the MaiMwama program in Malawi, where in addition to trained female facilitators identified by local communities, volunteer counselors are trained in nutrition, breastfeeding, prevention of mother-to-child transmission and birth preparedness counseling.<sup>26</sup> Within West Africa, the Senegalese Health Hut system appears to be successfully utilizing community-based strategies to improve newborn health in poor, rural communities. Working hand-in-hand with Senegal's health districts, a consortium of stakeholders ensure that families have easy access to more than

1350 local health huts, run by trained volunteers who live in the community. The health huts, with a special focus on maternal and child health, oversee prevention and treatment of basic illnesses, refer serious cases to the nearest government health facility, and promote health education for the entire community.<sup>27</sup> The community, mobilized by influential traditional, religious and group leaders, is integral in recognizing the health gaps, choosing its vectors (traditional birth attendants (TBAs), community health workers and village agents) and paying them. Regular training and supervision of these volunteers by skilled health workers such as nurses, midwives and doctors is a key ingredient to this model. Groups such as grandmothers, husbands and pregnant mothers have an integral role, thereby ensuring community ownership or 's'approprier', of this program. Although extensive and rigorous assessment of the data from the health huts system is yet to be undertaken, preliminary program evaluation suggests strong merits. Compared with baseline, there was an increase by 20% of the following: three or more antenatal care visits by mothers; utilization of iron tablets; and delivery in a health facility and assistance by a skilled birth attendant. Similar increases were noted in mothers' abilities to recognize postpartum danger signs and two or more danger signs in the newborn.<sup>28</sup>

### Home-based maternal and child-health management

One of the main success stories for community-based reduction in newborn mortality has come from Maharashtra, India, through the efforts of the Society for Education, Action and Research (SEARCH). This group trained community health workers to conduct group health education, identify pregnant women and make antenatal care visits to their homes. The community health workers attend the delivery, give vitamin-K injections and make several postnatal visits. These visits focus on identifying and managing infants at risk from sepsis, low birth weight and birth asphyxia, as well as encouraging referral.<sup>29,30</sup> This model has resulted in a decrease in neonatal mortality by 70%. Similar studies with decreases in neonatal mortality rates of 30–70% have been reported from Bangladesh, Nepal and Pakistan. Currently there is a WHO study underway in the Democratic Republic of Congo, Nigeria and Kenya, which is investigating the benefits of simplified oral and intramuscular antibiotic regimens for community-based management of possible serious bacterial infection in neonates and young infants. Results from this trial may have promise for reducing further neonatal mortality rates in sub-Saharan Africa.

### Partnerships with community health workers and TBAs

Of the estimated 60 million women who give birth outside of health facilities, 52 million births occur without a skilled birth

attendant and 15–25 million are delivered by TBAs annually.<sup>31</sup> Although TBAs were the subject of considerable debate in the 1980s and 1990s, a recent controlled trial in Pakistan found a 30% reduction in neonatal mortality when TBA services were linked systematically with government community health workers and obstetric services, while Singhal *et al.* and Carlo *et al.* suggest that perinatal mortality rates can be decreased by up to 30% when TBAs are taught an essential newborn care package.<sup>32–34</sup> There is also strong evidence that community health workers help mobilize communities to seek care and provide essential newborn services, which may reduce perinatal mortality by 30%.<sup>35</sup>

Over the past decade, there has been increasing recognition within the global health community of the extraordinarily high mortality burden that occurs within the neonatal period. This has resulted in an explosion of funding for research and programmatic efforts to determine best practices and policies associated with improving newborn health. Focused programs such as the AAP/AHA Neonatal Resuscitation program and the WHO Essential Newborn Care program have been updated significantly. These, in addition to the recently launched USAID/SNL/WHO Helping Babies Breathe program and controlled trials such as those through the African Newborn Network, are currently underway to assess their applicability in a variety of African settings. Also, several qualitative studies that span the continuum of care across the antenatal, labor and delivery, immediate newborn, and postpartum periods<sup>36</sup> and that are designed to understand the local context in which maternal and neonatal health is managed are underway. As these periods, culturally, are imbued with tremendous cultural import and may involve strong adherence to local practices, an enhanced understanding of the knowledge, perceptions and practices of household and formal health-care providers has important ramifications for overall neonatal mortality. For example, our work in the Navrongo Health and Demographic Surveillance System (NHDSS) has shown that of 19 000 deliveries, 65% occurred in a health facility delivery, with skilled attendant advice regarding optimal cord care. Yet, well over 87% of mothers, once they went home, used some local, non-prescribed paste such as shea butter.

Finally, as successful programs have shown, active engagement of the community in recognizing and developing effective methods that address newborn mortality and that continually inputs program data that aid in reassessment and refinements is essential. This concerted mortality push to highlight the scale of the neonatal problem and to begin investigating potential novel solutions is an encouraging start to an enhanced neonatal health policy in many countries in sub-Saharan Africa.

### Conflict of interest

The author declares no conflict of interest.

C Engmann

<sup>1</sup>*Departments of Pediatrics and Maternal Child Health, Schools of Medicine and Public Health, University of North Carolina at Chapel Hill, Chapel Hill, NC, USA*  
E-mail: cengmann@med.unc.edu

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