Delivering data on pregnancy outcomes through prospective studies in high-burden settings

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Reducing neonatal and maternal mortality are global health priorities included in the Sustainable Development Goals (SDGs), with targets to reduce neonatal mortality to 12 deaths per 1000 livebirths in every country, and maternal mortality to a global average of 70 deaths per 100 000 livebirths, by 2030. Stillbirths are increasingly considered as a global public health issue and the Every Newborn Action Plan set a 2030 national target of 12 or fewer stillbirths per 1000 total births.[1] National health strategies and plans increasingly include targets and interventions for stillbirths and neonatal and maternal mortality. Therefore, accurate measurement of these mortality rates is essential.

Global, regional, and country estimates have been hampered insufficient data from countries with high mortality, especially those in sub-Saharan Africa and south Asia. Two assessments by *The Lancet* Stillbirth Group with WHO,[2] and the Global Burden of Disease (GBD) project,[3] resulted in divergent estimates of stillbirth rates with non-overlapping uncertainty ranges. The *Lancet* group estimates of stillbirth rates in sub-Saharan Africa were 28·7 per 1000 births (uncertainty range 25·1–34·2) in 2015[2] and the GBD estimates were 21·3 per 1000 births (20·2–22·6) in 2016,[3] a 26% difference. In south Asia, the difference was 32%: 25·5 per 1000 births (22·5–29·1)[2] and 17·4 per 1000 births (16·7–18·1), respectively.[3] Estimates of neonatal mortality were based on a richer set of country data and the regional estimates were less divergent with overlapping uncertainty ranges, but still differed by 6% for sub-Saharan Africa and 16% for south Asia.[2,3] Monitoring maternal mortality relies heavily on statistical modelling and wide variation in global and country estimates has been reported.[4]

The Alliance for Maternal And Newborn Health Improvement (AMANHI) mortality study group provides a major contribution to data about stillbirths and neonatal mortality, and, to a lesser extent, maternal mortality, in high-mortality settings.[5] The authors used data about the outcomes of 269 630 pregnancies from large community cohorts of pregnant women in 11 sites in sub-Saharan Africa and south Asia, to study the epidemiology of stillbirths and maternal and newborn mortality. Seven cohort studies collected the data during intervention trials, but there are no compelling reasons to assume that this has greatly affected the results. The studies cannot be considered representative of the two subcontinents, but the large size, data quality, and standardised approach of AMANHI ensure a highly valuable contribution to the study of mortality rates, age patterns, and biomedical (based on verbal autopsy) and social causes of stillbirths and maternal and newborn mortality.

One main finding concerns mortality rates, especially in south Asia, which had high pooled rates of stillbirths (35·1 per 1000 livebirths, 95% CI 28·5–43·1) and neonatal mortality (43·0 per 1000 livebirths, 39·0–47·3), which were twice as high as the rates in the study sites in sub-Saharan Africa. The greater heterogeneity across African sites might play a part, but all Asian study sites had higher mortality than those in sub-Saharan Africa. For maternal mortality, there were no major differences between the two regions, with pregnancy-related deaths being a rarer event (n=812) compared with stillbirths and neonatal deaths (n=15 579), resulting in large confidence intervals.

Secondly, the AMANHI data about age patterns of mortality are valuable. Detailed knowledge about timing is needed to intervene more effectively and to assess data quality issues when relying on surveys or other sources of mortality data. The high mortality risks of the period around birth were quantified: the proportion of stillbirths that occurred intrapartum ranged from 37% (95% CI 24–47) in sub-Saharan Africa to 48% (39–57) in South Asia. These findings are similar to multicountry estimates by *The Lancet* Stillbirth group and WHO, which estimate a weighted global average of 50% intrapartum, with south Asia having the highest proportion of intrapartum stillbirths.[6] Almost half (45%) of all neonatal deaths were reported to occur on the first day of life, again consistent with large multicountry analyses of vital registration and survey data.[7] The majority of maternal deaths in the AMANHI study occurred during labour, delivery, and the first 24 h postpartum. The data about the ratio of stillbirths to first week deaths, ranging from

0·7 to 2·2 with a median of 1·1 in the AMANHI studies, is useful to consider when assessing stillbirth data in household surveys, for which under-reporting is a persistent challenge.[2,8]

Third, the AMANHI mortality study group collected information about the probable cause of death through physician-coded verbal autopsy interviews. The results for causes of stillbirths are valuable, especially given challenges with multiple classification systems,[9] and show the prominence of antepartum stillbirths due to hypertensive disorders of pregnancy (south Asia) and infections (sub-Saharan Africa), with many intrapartum stillbirths in both regions attributed to complications of labour and delivery. Among neonatal deaths, complications of prematurity as a cause of death were less common as in global estimates, and perinatal asphyxia and severe neonatal infections were the leading causes of death. However, verbal autopsy has its limitations—for example, when newborns who do not breathe at birth might be classified as having a cause of death as perinatal asphyxia, but be preterm. Also, several of the study sites implemented interventions to reduce infections, the findings should be an impetus for further empirical work in this area.

Finally, it is striking that mortality was not associated with the proportion of births in health facilities. Several study sites with high coverage of health facility births were among those with the highest stillbirth and neonatal mortality rates, which raises questions about the quality of care. There was, however, a strong association of stillbirth and neonatal mortality rates with the proportion of mothers with schooling, suggesting the importance of the underlying social causes of mortality.

The AMANHI study is a great example of what can be done with existing research data, often collected for another purpose. Greater investments are needed for prospective population-based studies, to provide unique information for programme development and epidemiological estimates at local, regional, and global levels. These investments need to go hand-in-hand with efforts to improve routine data collection through vital registration and health facility reporting of pregnancy outcomes. Ensuring good data quality will be crucial and technological developments can help, such as digitised pregnancy and maternity registers in facilities. Strengthening routine data systems is a prerequisite for obtaining reliable country-specific data to monitor progress towards global goals and track mortality by age, sex, and cause, to ensure targets are met and no one is left behind.

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