Born too small or too soon

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In *The Lancet Global Health*, Anne Lee and colleagues from the Child Health Epidemiology Reference Group (CHERG)[1] make an important contribution to our understanding of the global burden of intrauterine growth restriction. What is new in this work is the evidence that the majority of growth-restricted neonates (assessed with the proxy of small-for-gestational-age birth) weigh 2500 g or more at birth, even in low-income and middle-income countries. In high-income countries, most preterm infants—particularly those born at 34–36 completed weeks of gestation—also weigh at least 2500 g. Lee and colleagues show that nearly half of preterm infants from countries of low and middle income also are born above this birthweight threshold. Thus, globally, the traditional maternal and child health indicator of low birthweight (defined as <2500 g) fails to identify most newborn babies who are born either too small or too soon. This fact alone undermines Lee and colleagues' claim that "low birthweight is an important population indicator for tracking neonatal health".

Not only does the definition of low birthweight exclude most preterm and small-for-gestational-age neonates, it also conflates two problems. First, difficulties arise when distinguishing countries and regions where most low-birthweight infants are born small for gestational age (eg, south Asia) from those where most such babies are preterm (eg, sub-Saharan Africa). Second, understanding temporal trends within countries or regions is tricky. In Canada, for example, rates of low birthweight fell steadily during the 1980s and 1990s, hiding opposite trends in small-for-gestational-age births (decline) and preterm births (rise).[2] For this reason, Canada and some other high-income countries no longer include low birthweight as a perinatal health surveillance indicator. Of course, in settings in which either a large proportion of pregnant women do not have access to antenatal care or many births occur in the home, valid estimates for gestational age might be more difficult to obtain than birthweight. In those settings, low birthweight might indicate the need for extra clinical surveillance and intervention in the postnatal period.

If the 2500 g cutoff for low birthweight is arbitrary, what about the cutoffs used by Lee and colleagues to define preterm birth (<37 completed weeks of gestation) and small for gestational age (<10th centile birthweight for gestational age)? These cutoffs are the conventional accepted ones recommended by WHO yet they are no less arbitrary than that for low birthweight. Study findings show that infants born at 37–38 completed weeks of gestation, compared with those born at 39–41 weeks, are at increased risk of neonatal mortality and morbidity[3] and later neurocognitive difficulties.[4] The same is true for fetal growth. In fact, the optimum birthweight for gestational age, at least from the viewpoint of minimising risk of neonatal death, is not the 10th or even the 50th centile but is close to the 90th centile, the conventional cutoff for defining large-for-gestational-age births.[5,6] Why has evolution selected for birthweights that are so far below the weight that minimises the risk for the newborn baby? Probably because of competition from the mother. Without the option of caesarean or forceps delivery, a large fetus was a major risk to the mother's own survival and, thus, her ability to have other babies. When considering birthweight-for-gestational-age as an indicator of newborn health, perhaps we should seek a more functionally defined cutoff—eg, based on the relative risk of neonatal death or serious morbidity.[6]

The conventional cutoff for small for gestational age is based on birthweight, which is suitable for infants born at term but is far less appropriate for those born preterm. Preterm birth is itself pathological, and ultrasound-based estimates of fetal weight show that infants born preterm are much smaller than their peers who remain in utero at the same gestational age.[7] Thus, at preterm gestational ages, the poorly sensitive cutoff of lower than the 10th centile for birthweight will be even less sensitive for identification of suboptimum fetal growth when it is based on the distribution of birthweights, rather than estimated fetal weights. The ongoing Intergrowth study will provide improved ultrasound-based estimates for identification of growth-restricted preterm newborn babies.

What is the public health use of any indicator of gestational age or fetal growth? Although findings of randomised trials of balanced energy–protein and micronutrient supplementation show some effects of reducing preterm birth[8] and small-for-gestational-age births,[9,10] most countries (including those of

high, middle, and low income) have seen important reductions in infant mortality despite rises in preterm birth (mostly attributable to increases in obstetric intervention) and only modest reductions in small-for-gestational-age birth. Most recent progress in reducing infant mortality has been achieved by lowering mortality across the entire range of gestational ages and birthweights, including that of term infants of normal birthweight, not by preventing preterm or small-for-gestational-age birth.[11,12] In other words, a focus on reducing infant mortality and severe morbidity is likely to pay higher dividends for public health than are attempts to prevent preterm or small-for-gestational-age birth.

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I declare that I have no conflicts of interest.

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