Although much progress has been made in the last two decades, a recent estimate found 171 million preschool children to be stunted globally in 2010, with almost 98% from low- and middle-income countries (LMIC) [1]. This represents a prevalence of 26.7% down from 39.7% in 1990. Postnatal interventions in the first 2 years of life that may have made an impact include promotion of exclusive breastfeeding in the first 6 months of life and appropriate complementary feeding and other infant and young child feeding practices. The recent focus on the first 1,000 days of life that includes the prenatal period draws attention to the need for intervening earlier in life, during the critical period of fetal growth. Prevalence of low birthweight (LBW, <2,500 g), especially fetal growth restriction assessed using small for gestational age (SGA, defined as weight below the 10th percentile of a fetal growth reference for a given gestational age) continues to be high, ranging from 15 to 30% in LMIC. High rates of LBW and childhood stunting coexist in many populations, but few analyses have carefully examined the influence of fetal growth on childhood undernutrition. Specifically, the contributions of SGA and preterm birth (gestational age <37 weeks), two underlying biologic factors leading to LBW, to childhood undernutrition have not been established.

As part of the Child Health Epidemiology Research Group (www.cherg.org), we undertook an extensive search of the existing literature to identify potential studies from LMIC that had collected prospective data on child anthropometry among existing birth cohorts. We identified and invited investigators to provide data on birthweight, gestational age and child anthropometry (n = 18,061) from 14 birth cohorts that were analyzed to examine outcomes of stunting (height for age <-2 z), wasting (weight for height <-2 z), and underweight (weight for age <-2 z) at 24 months of age. This analysis represents a subset of that undertaken...
for children between 12 and 60 months of age [2]. Meta-analyses were conducted to produce global as well as a study-/region-specific estimates of odds ratios (OR) and 95% confidence intervals (CI). To separate out effects of SGA and preterm alone, we created four categories of exposure: adequate size for gestational age (AGA) and preterm; SGA and term; SGA and preterm, and term AGA (the reference group). Relative to term AGA, the OR (95% CI) for stunting associated with AGA and preterm, SGA and term, and SGA and preterm was 1.94 (1.59, 2.36), 2.82 (2.40, 3.32) and 4.98 (3.79, 6.55), respectively (fig. 1), whereas OR (95% CI) for wasting was 1.45 (1.00, 2.10), 2.35 (1.84, 3.01) and 6.22 (3.76, 10.27), respectively, and that for underweight was 2.06 (1.53, 2.78), 3.26 (2.55, 4.16) and 6.83 (4.36, 10.69), respectively [2]. The data show a strong association between SGA and childhood undernutrition, suggesting that growth impairment in utero impacts growth in the first 2 years of life, leading to childhood stunting and wasting. These findings have implications for policy and programs for reducing childhood undernutrition that require targeting the mothers during and even prior to pregnancy, and focusing on maternal nutrition in general.

Notably, the types of interventions that need consideration for influencing fetal growth are discrete compared with the ones being used for targeting later life stages of infancy and childhood. Interventions during pregnancy shown to impact fetal growth include balanced calorie and protein and multiple micronutrient supplementation. Recent meta-analyses provide the pooled estimates for reduced risk of SGA for these; energy

![Fig. 1. Stunting by SGA and preterm categories at 24 months. Reference: AGA and term.](image)
and protein supplementation reduces the risk of SGA by 34% [3], whereas multiple micronutrients have a significant but slightly lower impact (17%) [4]. A significant reduction of 20% in the risk of LBW associated with supplementation with iron alone or with folic acid has also been found [5]. Other interventions that are not nutritional but nutrition sensitive may be important to consider including smoking cessation and reduction in passive smoke and indoor air pollution, as well as deworming, antimalarials and antiretrovirals. Interventions for which further evidence is needed include those for improving maternal nutrition prior to conception, those targeted at adolescents, and behavior change communication strategies.

**References**