Poor prenatal growth and development manifested as low birthweight and small size for gestational age at birth strongly increase the likelihood of adult short stature, reduced cognitive capacity and lower educational attainment [1]. Obesity and many adult noncommunicable diseases (NCDs) also have origins as early as the peri-conception period. Inadequate fetal nutrition, subsequent to poor maternal nutritional status or impaired placental transport, and fetal overnutrition related to maternal obesity and gestational diabetes are key early-life exposures that elicit anatomical, hormonal, and physiological changes to enhance short-term survival but contribute to NCDs when nutritional resources are more plentiful later in life [2]. After birth, the trajectory of growth influences adult body size and composition, cognitive and brain function, and cardiometabolic and other NCD risk.

Given the importance of the first 1,000 days for adult health, it is vital to identify interventions focused on this time period. By identifying vulnerable periods and tailoring prevention efforts to those vulnerabilities, we can try to capitalize on the same developmental plasticity that alters susceptibility to disease.

The evidence base relating early life interventions to adult outcomes (particularly NCDs) is quite weak owing to a scarcity of long-term follow-up studies of randomized trials. Thus, we currently need to focus on interventions aimed at improving maternal, fetal, and infant growth, and assume that they will also be effective for improving adult outcomes and reducing NCD risk.

For the periconception period, prevention must focus on optimizing maternal nutritional status through promotion of early growth in girls and ensuring dietary adequacy of micronutrients close to the time of conception. Owing to their importance in epigenetic regulation of growth and metabolic regulation, micronutrients that serve as methyl...
donors may be of particular importance. During pregnancy, nutrient restriction may impair overall fetal growth, but also differentially limit organ and tissue growth – important because some deficits are difficult to reverse later in life, and smaller organs may have reduced functional capacity. Inadequate nutrition may trigger metabolic adaptations that enhance survival in the short run but increase the risk of metabolic diseases when nutrients are no longer in short supply. Maternal obesity and gestational diabetes increase the risk of later obesity and diabetes in the offspring. Thus, prevention needs to focus on optimizing maternal weight status and pregnancy weight gain, and on an adequate supply of micronutrients to meet the needs for fetal growth and appropriate metabolic regulation. Maternal iron, calcium, vitamin D, vitamin B₆, n-3 long-chain polyunsaturated fatty acids, multiple micronutrient, and balanced protein-energy supplementation supplements have positive effects on birthweight [3].

Well-established associations of infant underweight and stunting with adult stature, school attainment and productivity provide a strong rationale for interventions aimed at improving early child growth, but numerous systematic reviews show limited effects of supplemental feeding and micronutrients on linear growth [4]. Studies showing increased risk of later obesity and insulin resistance related to ‘rapid growth’ in infancy have raised concerns about promotion of catch-up growth in malnourished children, but studies in low- and middle-income countries suggest that the benefits of growth promotion for child health and human capital outweigh the small elevated risks of adult NCDs [5].

While there is clearly an urgent need for early-life interventions to optimize health and human capital (height, body composition, intellectual development and educational attainment, and freedom from chronic disease risk), the current evidence base is insufficient to provide specific guidance over and above what we already know about how to foster optimal birth outcomes and early child growth.

While the primary focus for attaining MDGs needs to remain on reducing mortality and undernutrition, the MDG call for more emphasis on nutrition in the development agenda could also benefit from a stronger focus on linear growth and a forward look to the prevention of adult disease.

References