Nutritional rehabilitation of severely malnourished children and interventions for moderately malnourished children aim to reduce the risk of morbidity and mortality and poor developmental outcomes. Improved growth rates and larger body size are frequently used metrics to evaluate treatment success. Concern that rapid child growth increases later risk of obesity and related chronic diseases has led to questioning the wisdom of promoting catch-up growth in previously undernourished children. In weighing the costs and benefits of catch-up growth, we must consider immediate health threats to children in developing countries where morbidity and mortality remain high. In these settings, failure to promote compensatory growth may have devastating short-term consequences.

Growth is a nonspecific indicator of overall health, influenced by nutritional adequacy, infections, and numerous other environmental and genetic factors. The literature relating growth to infectious disease incidence, severity or duration, and mortality in developing countries focuses on size in the form of short stature (a measure of chronic undernutrition), low weight-for-age, and low relative weight (thought to reflect acute malnutrition).

Malnutrition, morbidity and mortality are important concerns because of their continuing high prevalence in developing countries. In 2005, 20% of children under 5 years of age in low- and middle-income countries were underweight, 32% were stunted and 10% were wasted. The worst profiles of malnutrition occur in south-central Asia and Sub-Saharan Africa. High under-5 mortality co-occurs with undernutrition [1]. In 2006, 4.8 million Sub-Saharan African, and 3.1 million Southeast Asian children died before reaching their 5th birthday.

Poor growth relates to increased morbidity and mortality because: (a) infections and indicators of poor growth share common
underlying causes of poverty, low maternal education, poor sanitary conditions, crowding, inappropriate child feeding practices and poor health care, and (b) poor growth and infectious disease morbidity are synergistic: infections increase nutrient needs, depress appetite and accelerate nutrient losses, and poor nutritional status compromises immune function and increases susceptibility to disease [2]. Malnutrition is the most common cause of immune deficiency worldwide, acting to decrease T lymphocytes, and impair cytokine responses to infection [3], resulting in increased opportunistic infections and reduced response to vaccines. The diseases most affected by malnutrition (pneumonia, diarrhea, measles and tuberculosis) occur at the highest prevalence and contribute most to child mortality rates in developing countries.

Undernutrition is implicated in more than 50% of all deaths [1]. Mortality from common childhood infectious diseases relates to the degree of wasting, and low weight-for-age, and to a slightly lesser degree with stunting [1]. All 3 indicators relate to increased risk of pneumonia and lower respiratory infections and death from these infections [4]. Similarly, numerous studies of children in Asia, where diarrhea remains highly prevalent, find increased risk of diarrhea incidence, severity or duration with the degree of wasting. This relationship remains after accounting for prior diarrhea, the reciprocal association of diarrhea and growth, and the common underlying causes of both.

While limited by its focus on attained size, the literature shows that poor growth places children at greater risk of morbidity and mortality from common infectious diseases. Direct evidence of health benefits of catch-up growth is limited to one Brazilian study [5] where small-for-gestational age infants with rapid weight gain had 65% fewer hospital admissions, and lower mortality than those without rapid weight gain. Insufficient knowledge has been accumulated to adequately judge the tradeoffs between short-term health and survival and long-term disease risk in developing countries, but it is important to not lose sight of immediate health risks faced by children in these settings.

References
