

## Commentary

# Optimal weight gain in recovering children treated for severe acute malnutrition

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Severe acute malnutrition (SAM) remains a major public health problem. Prudent estimates suggest that it is associated with several hundred thousands of deaths per year globally (Black et al., 2013). Major progress has been made in recent years for its treatment and currently the focus is moving beyond simply improving survival of children with SAM, but also to ensuring that treated children remain in good health throughout their life. The contribution of Thompson et al. in this issue of *World Nutrition* highlighting the association between rapid weight gain during nutritional rehabilitation of SAM children and fat infiltration of the liver later in life is welcome in this regard.

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The public health implications of this finding, however, are not straightforward. In malnourished children, all anthropometric deficits are associated with an increased risk of mortality (Olofin et al. 2013) and there may be some benefit in having high weight gains to rapidly correct these deficits and move SAM children away from the low weight danger zone as early as possible. In small for gestational age children, who have many similarities with malnourished children, higher weight gains are associated with less hospital admission and a trend towards a lower mortality (Victora et al. 2001). So, when determining the optimal weight gain during recovery, considerations regarding the long-term risk of chronic disease should be balanced with plausible short-term benefits of a rapid weight gain in terms of morbidity and mortality. For children treated in hospital, a rapid weight gain also has the advantage of reducing the risk of hospital acquired infection. It also re-

duces the duration of hospitalization and the cost of treatment.

The 2003 WHO recommendation of a minimal weight gain of 10g/kg/day was made for SAM children treated as inpatients in hospital settings (Ashworth et al. 2003). This recommendation lost its relevance in 2007 when WHO and UNICEF recommended treating SAM children in community based programs using ready-to-use therapeutic foods (RUTF) (World Health Organization et al. 2007). This approach reduces treatment costs and made possible a vast increase in the number of treated children. Nowadays, virtually all SAM children are fully treated in the community and only those with complications such as infections are admitted for a few days to inpatient treatment centers, with the rehabilitation phase taking place mainly in the community. For children treated in the community, a rapid recovery is not as important as in hospital settings. In its initial 2007 statement and in its 2013 update on the management of SAM in infants and children, WHO did not give any target weight gain for children treated in the community with RUTF (World Health Organization et al. 2007; World Health Organization 2013).

RUTF given within inpatient treatment centers can lead to very high weight gains, above 10g/kg/day (Diop et al. 2003), but the growth rate of children treated in the community with RUTF is much lower. A systematic review of the weight gain of SAM children treated in the community is lacking but typical well-run programs achieve a weight gain around 3 to 4g/kg/day (Trehan et al. 2013; Daures et al. 2019). This is well below the weight gains of 9.2 g/kg/

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day reported in the Thompson et al. study. This should lead to caution when trying to extrapolate the findings from this study to children treated in community settings.

Recent developments could also limit the long-term risk of metabolic consequences of nutritional rehabilitation: there is now evidence that SAM children can be treated successfully with reduced doses of RUTF compared to the doses originally recommended and previously used in hospital settings (Maust et al. 2015; Kangas et al. 2019; Cazes et al. 2022). These new reduced dosing schemes are likely to become widely adopted in the near future with an objective of cost reduction, but they can also be adopted with the secondary objective of limiting any possible undesirable long-term impact of treatment on children's metabolism.

It is quite plausible that this association of rapid weight gain with risk factors of chronic disease will not be the same for lower weight gains: in a slightly different context, a randomized trial assessing the effect of a nutritional intervention on weight gain of children during the first two years of life found some evidence of reduced metabolic risk at adolescence in the intervention group which had a higher weight gain (Santos et al. 2015).

The important study by [Thompson et al.](#) should prompt investigators to further study the association between weight gain during nutritional rehabilitation and the metabolic profile later in life of children treated for SAM in the community with current protocols associated with lower average weight gains. Ideally, these difficult long-term studies should fully explore the long-term metabolic profile of these children and not look at only one parameter. The possible short-term advantages of a rapid weight gain during treatment such as reduced incidence of complications and relapses should also be documented in these children to have a proper assessment of the balance of risks.

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#### CONFLICT OF INTEREST

None.

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