

Curbing early childhood undernutrition in lower and middle income countries – findings and lessons for the future

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Undernutrition is the single biggest cause of the global burden of disease, and many of those affected are children. Early childhood undernutrition has severe consequences; it accounts for more than 35 per cent of deaths and another 35 per cent of the disease burden in children under five years old. It can harm both physical and intellectual development. Undernourished children are less likely to attend school, and those who do attend are less likely to benefit from it.

Nutritional measures taken during early childhood and school years can maximize developmental potential and lifelong health. Feeding programmes for disadvantaged young children are designed to provide energy and nutrients to help them develop. A great deal of money is currently invested in such programmes. Crucially, their impact can be enhanced as we learn more about their effectiveness.

A large body of studies now exists on such programmes. Systematic reviews and implementation evaluations can be effectively used to bring together the knowledge. A key advantage of systematic reviews of evidence is that they carefully bring together the best available evidence from around the world, instead of being based on single studies, thus increasing confidence in the results of a given programme or policy.

Effects of supplementation

The meta-analysis suggested that those receiving interventions outperformed control or comparison groups in many categories. The effects reported are statistically meaningful, but rather moderate. The following figures indicate the gain relative to the respective comparison group who did not receive supplements.

Weight:

- preschool (15 studies): a gain of 0.12 to 0.25 kg per year
- school (6 studies): a gain of 0.25 to 0.75 kg per year

Height:

- preschool (15 studies): a gain of 0.48 to 0.67 cm. per year
- school (6 studies): a gain of 0.25 to 1.47 cm per year

Psychomotor development:

- preschool (5 studies, 4 statistically significant)
- One study gives a gain on developmental quotient of 3.25 points per year

Mental development:

- preschool (3 studies, 2 statistically significant)
- school (2 studies, both statistically significant)
- One study suggests a gain of 2.2 IQ points per year.

Follow-up of mental development:

- preschool (3 studies): one study showed a gain of 6.2 points on the Stanford-Binet IQ measure a year after supplementation ceased
- one found that the only children to show long-term benefits of supplementation were those whose mothers had higher verbal ability
- one study showed long-term benefits for working memory among children who were supplemented earlier in life

Math performance:

- school review (4 studies, all significant)
- one study reported a gain equal to 30 per cent of the annual learning in math at that grade level

School attendance:

- school review (3 studies, all significant)
- an increase in attendance of 4 to 6 days a school year



Barriers to effectiveness

As mentioned above, the gains we found were small, in fact the growth in the preschool review was smaller than would be expected after giving supplementation. While our study found important gains, we also identified barriers to effectiveness.

Redistributing the supplement in the family might lead to the child getting less nutrition at

home. Our preschool meals review found that the children took in only 36 per cent of the energy provided by the supplement when the supplement was given in the home. In daycare and feeding centers, the children benefited from 75 per cent of this energy on average. In school feeding programmes, the net benefit was around 50 per cent. This is a well-known dilemma. With home-based delivery, some of the food provided for one child often gets redistributed within poor families. When food is given at school or a daycare centre, families may give that child less at home so that other family members can have more.

Breakdown in the supply chain. In one Brazilian study, parents reported that they only received the food 50 per cent of the time.

Insufficient energy is provided. In the preschool meals review, the percentage of the Recommended Daily Amount (RDA) provided ranged from as low as 8 per cent to more than 100 per cent. In the school meal programmes, three programmes provided less than 15 per cent of the recommended energy.

Persistent unfavourable environment with poor sanitation and exposure to infections detracts from feeding programmes.

What can programme and/or policy makers do to enhance effectiveness?

There is strong evidence to suggest that:

Community healthcare organizations or schools need to be well-organized and prepared to deliver food and to supervise consumption. This has been documented by several reviewers.



The food provided needs to be palatable and well-accepted by children and the community. One implication is that programmes should be discussed in the community and the foods should be pilot-tested with children.

Distribution and child's supplement intake need to be closely supervised. In the preschool meals review, it was found that children thrived better in programmes which closely monitored the child's intake by directly watching consumption or conducting random visits.

A high portion of the RDA for energy is more beneficial. In the preschool meals review, it was found that children thrived better in programmes that gave a moderate (30-60 per cent) or high (60 per cent or more) amount of the RDA for energy. In the school meals review, we found that programmes which gave a low percent of the RDA were ineffective. It has been suggested that feeding programmes should provide 40-60 per cent of the RDA for energy. The percent of RDA may be lower for breastfed infants, but it should increase as they grow older.

The age of the child needs to be taken into account for the amount of supplement provided. Older children are heavier and taller and therefore have higher energy requirements compared to younger children.

Breastfeeding needs to be encouraged since reductions in breastfeeding may actually decrease growth and increase infections in young children.

Supplementation should begin early and continue for several years. In both reviews, younger children tended

to benefit more in terms of growth. In the preschool review, this was also true for cognitive development, though older children continued to benefit. We suggest that supplementation should begin in infancy, and in early grades of primary school. It often takes time for supplementation to affect certain aspects of growth and cognitive development, and therefore supplementation should continue, ideally throughout childhood.

The poorest/most undernourished children should be targeted. In both the preschool and the school meals review, the poorer or more undernourished children generally grew more and showed more improvement in cognitive development as a result of supplementation. If targeting is necessary, the poorest areas/schools should be prioritized.

There is some evidence to suggest that:

Food should be fortified with micronutrients. Several authors have suggested that this can help to correct deficiencies and may enhance cognitive benefit.

The supplement should be easy to prepare. This reduces the burden on the caregivers or teachers.

Extra rations should be provided for the entire family in order to reduce the redistribution problem. Seven programmes in the preschool review gave the family extra rations to reduce sharing of the target child's supplement. The World Food Programme's (WFP) school feeding programmes are increasingly using take-home rations to ensure that children, especially girls, are able to come to school regularly.

Foods that have higher energy density should be provided. Several authors have suggested that it might be better to give food that is more densely packed with energy and lower in volume. This makes it more likely that children will consume the full supplement.

Foods should be presented as a snack. Several authors have suggested that if supplements are treated as a snack, families are less likely to cut down on the child's regular meals.

Work is needed with parents and caregivers to enhance their motivation and their capacity to deliver the supplement to the target child. In the preschool meals review, a few studies noted that supplementation was only effective for children whose mothers were better educated or had higher verbal fluency. Several programmes have worked with mothers to show them how to prepare the supplement and to give nutritional education.

Stimulation should be provided in addition to supplementation. One study found that supplementation and stimulation had independent and positive effects on psycho-motor development.

Seasonal differences in food security are important in delivering food supplements. That is, food supplements are critically important when food insecurity is highest; i.e., before the harvest.

This Research brief is based on a series of systematic reviews and evaluations conducted by Elizabeth Kristjansson, Damian Francis, Selma Liberato, Trish Greenhalgh, Vivian Welch, Eamonn Noonan.