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[Intervention Review]

Food supplementation for improving the physical and psychosocial health of socio-economically disadvantaged children aged three months to five years

Elizabeth Kristjansson¹, Damian K Francis², Selma Liberato³, Maria Benkhalti Jandu⁴, Vivian Welch⁵, Malek Batal⁶, Trish Greenhalgh⁷, Tamara Rader⁸, Eamonn Noonan⁹, Beverley Shea¹⁰, Laura Janzen¹¹, George A Wells¹⁰, Mark Petticrew¹²

¹School of Psychology, Faculty of Social Sciences, University of Ottawa, Ottawa, Canada. ²Epidemiology Research Unit, University of West Indies, Mona Kingston 7, Jamaica. ³Nutrition Research Team, Menzies School of Health Research, Charles Darwin University, Darwin, Australia. ⁴Centre for Global Health, Institute of Population Health, University of Ottawa, Ottawa, Canada. ⁵Bruyère Research Institute, University of Ottawa, Ottawa, Canada. ⁶WHO Collaborating Centre on Nutrition Changes and Development (TRANSNUT), Nutrition Department, Faculty of Medicine, University of Montreal, Quebec, Canada. ⁷Centre for Primary Care and Public Health, Barts and the London School of Medicine and Dentistry, London, UK. ⁸Cochrane Musculoskeletal Group, Ottawa, Canada. ⁹Norwegian Knowledge Centre for the Health Services, Oslo, Norway. ¹⁰Department of Epidemiology and Community Medicine, University of Ottawa, Ottawa, Canada. ¹¹Department of Psychology & Division of Haematology/Oncology, The Hospital for Sick Children, Toronto, Canada. ¹²Department of Social & Environmental Health Research, Faculty of Public Health & Policy, London School of Hygiene and Tropical Medicine, London, UK

Contact: Elizabeth Kristjansson, School of Psychology, Faculty of Social Sciences, University of Ottawa, Room 407C, Montpetit Hall, 125 University, Ottawa, ON, K1N 6N5, Canada. kristjan@uottawa.ca.

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ABSTRACT

Background

Undernutrition contributes to five million deaths of children under five each year. Furthermore, throughout the life cycle, undernutrition contributes to increased risk of infection, poor cognitive functioning, chronic disease, and mortality. It is thus important for decision-makers to have evidence about the effectiveness of nutrition interventions for young children.

Objectives

Primary objective

1. To assess the effectiveness of supplementary feeding interventions, alone or with co-intervention, for improving the physical and psychosocial health of disadvantaged children aged three months to five years.

Secondary objectives

- 1. To assess the potential of such programmes to reduce socio-economic inequalities in undernutrition.
- 2. To evaluate implementation and to understand how this may impact on outcomes.
- 3. To determine whether there are any adverse effects of supplementary feeding.

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Search methods

We searched CENTRAL, Ovid MEDLINE, PsycINFO, and seven other databases for all available years up to January 2014. We also searched ClinicalTrials.gov and several sources of grey literature. In addition, we searched the reference lists of relevant articles and reviews, and asked experts in the area about ongoing and unpublished trials.

Selection criteria

Randomised controlled trials (RCTs), cluster-RCTs, controlled clinical trials (CCTs), controlled before-and-after studies (CBAs), and interrupted time series (ITS) that provided supplementary food (with or without co-intervention) to children aged three months to five years, from all countries. Adjunctive treatments, such as nutrition education, were allowed. Controls had to be untreated.

Data collection and analysis

Two or more review authors independently reviewed searches, selected studies for inclusion or exclusion, extracted data, and assessed risk of bias. We conducted meta-analyses for continuous data using the mean difference (MD) or the standardised mean difference (SMD) with a 95% confidence interval (CI), correcting for clustering if necessary. We analysed studies from low- and middle-income countries and from high-income countries separately, and RCTs separately from CBAs. We conducted a process evaluation to understand which factors impact on effectiveness.

Main results

We included 32 studies (21 RCTs and 11 CBAs); 26 of these (16 RCTs and 10 CBAs) were in meta-analyses. More than 50% of the RCTs were judged to have low risk of bias for random selection and incomplete outcome assessment. We judged most RCTS to be unclear for allocation concealment, blinding of outcome assessment, and selective outcome reporting. Because children and parents knew that they were given food, we judged blinding of participants and personnel to be at high risk for all studies.

Growth. Supplementary feeding had positive effects on growth in low- and middle-income countries. Meta-analysis of the RCTs showed that supplemented children gained an average of 0.12 kg more than controls over six months (95% confidence interval (Cl) 0.05 to 0.18, 9 trials, 1057 participants, moderate quality evidence). In the CBAs, the effect was similar; 0.24 kg over a year (95% Cl 0.09 to 0.39, 1784 participants, very low quality evidence). In high-income countries, one RCT found no difference in weight, but in a CBA with 116 Aboriginal children in Australia, the effect on weight was 0.95 kg (95% Cl 0.58 to 1.33). For height, meta-analysis of nine RCTs revealed that supplemented children grew an average of 0.27 cm more over six months than those who were not supplemented (95% Cl 0.07 to 0.48, 1463 participants, moderate quality evidence). Meta-analysis of seven CBAs showed no evidence of an effect (mean difference (MD) 0.52 cm, 95% Cl -0.07 to 1.10, 7 trials, 1782 participants, very low quality evidence). Meta-analyses of the RCTs demonstrated benefits for weight-for-age z-scores (WAZ) (MD 0.15, 95% Cl 0.05 to 0.24, 8 trials, 1565 participants, moderate quality evidence), and height-for-age z-scores (HAZ) (MD 0.15, 95% Cl 0.024, 9 trials, 4638 participants, moderate quality evidence), but not for weight-for-height z-scores MD 0.10 (95% Cl -0.02 to 0.22, 7 trials, 4176 participants, moderate quality evidence). Meta-analyses of the CBAs showed no effects on WAZ, HAZ, or WHZ (very low quality evidence). We found moderate positive effects for haemoglobin (SMD 0.49, 95% Cl 0.07 to 0.91, 5 trials, 300 participants) in a meta-analysis of the RCTs.

Psychosocial outcomes. Eight RCTs in low- and middle-income countries assessed psychosocial outcomes. Our meta-analysis of two studies showed moderate positive effects of feeding on psychomotor development (SMD 0.41, 95% CI 0.10 to 0.72, 178 participants). The evidence of effects on cognitive development was sparse and mixed.

We found evidence of substantial leakage. When feeding was given at home, children benefited from only 36% of the energy in the supplement. However, when the supplementary food was given in day cares or feeding centres, there was less leakage; children took in 85% of the energy provided in the supplement. Supplementary food was generally more effective for younger children (less than two years of age) and for those who were poorer/ less well-nourished. Results for sex were equivocal. Our results also suggested that feeding programmes which were given in day-care/feeding centres and those which provided a moderate-to-high proportion of the recommended daily intake (% RDI) for energy were more effective.

Authors' conclusions

Feeding programmes for young children in low- and middle-income countries can work, but good implementation is key.

PLAIN LANGUAGE SUMMARY

Supplementary feeding for children aged three months to five years: does it work to improve their health and well-being?

Background

Undernutrition is a cause of child mortality; it contributed to the deaths of more than three million children in 2011. Furthermore, it can lead to higher risk of infection, poorer child development and school performance, and to chronic disease in adulthood. Evidence about the effectiveness of nutrition interventions for young children, therefore, is fundamentally important; not only for governments, funding agencies and nongovernmental organisations, but also for the children themselves.

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Review question

How effective are supplementary food programmes for improving the health of disadvantaged children? What factors contribute to the effectiveness of such programmes?

Methods

We included studies that compared children who were given supplementary feeding (food, drink) to those who did not receive any feeding.

We followed careful systematic review methodology, including the use of broad searches. At least two people were involved in every stage of the review. Where possible, we performed analyses to combine results of several studies and get an average effect. We looked carefully for factors that may have impacted on the results (child age, sex and disadvantage, family sharing food, amount of energy given, etc.).

The evidence is current to January 2014.

Study characteristics

We included 32 studies; 21 randomised controlled trials (in which children were randomly assigned to receive either supplementary feeding (intervention group) or not (a control group), and 11 controlled before-and-after studies (in which outcomes were observed before and after treatment in a group of children who were not randomly assigned to an intervention and a control group). The number of children in them ranged from 30 to 3166. Most studies were from low- and middle-income countries; three were from high-income countries.

Key findings

We found that, in low- and middle-income countries, providing additional food to children aged three months to five years led to small gains in weight (0.24 kg a year in both RCTs and CBAs) and height (0.54 cm a year in RCTs only; no evidence of an effect in other study designs), and moderate increases in haemoglobin. We also found positive impacts on psychomotor development (skills that involve mental and muscular activity). We found mixed evidence on effects of supplementary feeding on mental development.

In high-income countries, two studies found no benefits for growth. The one effective study involved Aboriginal children.

We found that food was often redistributed ('leakage') within the family; when feeding was home-delivered, children benefited from only 36% of the energy given in the supplement. However, when the supplementary food was given in day care centres or feeding centres, there was much less leakage; children took in 85% of the energy provided in the supplement. When we looked at different groups supplementary food was more effective for younger children (under two years old) and for those who were poorer or less well-nourished. Results for sex were mixed. Feeding programmes that were well-supervised and those that provided a greater proportion of required daily food for energy were generally more effective.

Quality of the evidence

We judged evidence from the RCTs to be of moderate quality and evidence from the CBAs to be of low quality.