Systematic review of the efficacy and effectiveness of complementary feeding interventions in developing countries

Dewey K G, Adu-Afarwuah S

CRD summary
This review evaluated complementary (additional to breast feeding) feeding interventions for children aged 6-24 months. The authors concluded that educational interventions and provision of fortified foods or home fortification products can improve growth and micro-nutrient status. While the review had some methodological limitations, the authors' conclusions appear generally reliable.

Authors' objectives
To assess the effectiveness of complementary feeding (additional to breast feeding) interventions aimed at children aged 6-24 months in developing countries.

Searching
The authors searched PubMed in August 2006 for relevant studies conducted in developing countries and written in English, Spanish or Portuguese. Search terms were reported. For most outcomes the search focused on studies published between 1996 and 2006, but studies dating back to 1990 were sought for some outcomes. Google and Alltheweb, and the web sites of relevant voluntary organisations, were searched for non-peer-reviewed papers and programme reports not listed in PubMed. Additional studies were identified by manual searching of reference lists and contact with experts.

Study selection
Studies of complementary feeding interventions for children aged 6-24 months in developing countries were eligible for the review. A broad definition of complementary feeding interventions was used. Studies of educational interventions, provision of complementary food with or without additional intervention, fortification of complementary foods with micronutrients, and interventions to increase energy density and/or nutrient bioavailability of complementary foods were included. Studies that assessed the impact of interventions on feeding practices were excluded. The primary outcomes of interest were growth, morbidity and child development (e.g. behavioural development); micro-nutrient intake and micro-nutrient status were also included as outcomes. Inclusion criteria for study designs were not explicitly stated, but it appears that only randomised and non-randomised controlled trials were eligible for inclusion; non-randomised studies considered to be at high risk of bias were excluded. The authors stated neither how the papers were selected for the review nor how many reviewers performed the selection.

Assessment of study quality
Validity was assessed independently by two reviewers based on the criteria presented in the original framework for the Global Review process (no further details reported). Randomised trials considered to have very low risk of bias were scored 1++ and those with low risk of bias were scored 1+. Non-randomised trials with very low risk of confounding were scored 2++ and those with low risk of confounding 2+. Trials with high risk of bias were scored 1- (randomised) and 2- (non-randomised), with the latter excluded from the review. Discrepancies between reviewers were resolved by consensus.

Data extraction
For studies reporting growth outcomes as continuous data, means and standard deviations for each group were used to calculate the effect size (ES; standardised mean difference). For other outcomes, data on percentage occurrence were used to derive a percentage point difference between groups. Group means were used to calculate the percentage difference between groups defined as (mean of intervention group – mean of control group)/mean of control group x 100. The authors stated neither how the data were extracted for the review nor how many reviewers performed the data extraction. Study authors were contacted for missing data.

Methods of synthesis
Studies were synthesised in a narrative with grouping by type of intervention and outcome. Efficacy studies (those with
a high degree of assurance that the intervention would be delivered as intended) were discussed separately from effectiveness studies (evaluations carried out in a programme setting with less ability to control delivery of and adherence to the intervention). For weight and linear growth, values of ES were averaged across studies within an intervention without weighting by study size or quality. Differences between studies were discussed in the text. The authors did not report that they assessed publication bias.

Results of the review
Forty-two studies conducted in 25 countries were included in the review (29 efficacy trials and 13 effectiveness studies). Eight efficacy trials and two effectiveness studies were considered to have very low risk of bias. Most other included studies were rated as low risk for bias.

Educational interventions (eight efficacy and 10 effectiveness studies): educational interventions had a modest effect on weight and linear growth (11 studies). The most effective interventions encouraged feeding with meat, egg or fish. Two educational interventions had a significant effect in reducing morbidity (diarrhoea and upper respiratory tract infection). Across four studies, educational interventions increased iron intake from complementary foods by 24 per cent (range -7%, 60%) and zinc intake by 26 per cent (range 9%, 53%). Four studies found an average increase in mean haemoglobin of 4g/L and a reduction in anaemia of five percentage points, but there were marked differences between studies.

Provision of complementary foods (10 efficacy and seven effectiveness studies): interventions to provide complementary foods had inconsistent effects on growth (eight studies). Based on two studies, provision of complementary food together with education was more effective than education alone. Studies in Bangladesh and India showed negative effects of intervention on morbidity outcomes. Provision of complementary foods improved motor development in one study in Ghana, but did not improve developmental outcomes in two other studies.

Fortification of complementary foods (15 studies): of six studies evaluating fortification of complementary foods, only one showed a positive impact on growth. Two studies showed positive effects on morbidity outcomes. Fortification increased iron intake by 145 per cent to 207 per cent in Mexico and Ghana, zinc intake by 207 per cent to 271 per cent in Ecuador and Ghana, and vitamin A intake by 107 per cent to more than 2,300 per cent in Ecuador and Ghana. For iron status, trials that compared fortified complementary food with no complementary food (five studies) found an average increase in mean haemoglobin of 4g/L and a reduction in anaemia of 13 percentage points in the intervention group. In trials comparing fortified with unfortified foods, there was an average increase in mean haemoglobin of 6g/L and a reduction in anaemia of 17 percentage points (seven studies).

Increasing energy density of complementary foods: two out of five efficacy trials in this category showed a positive effect of the intervention on growth; a study in Congo found a negative effect on morbidity.

Authors' conclusions
There is no single best package of components in complementary feeding interventions, because of the varying needs and circumstances of the target population. However, programmes including educational messages and provision of fortified foods or home fortification products can improve growth and micro-nutrient status, and possibly reduce morbidity and enhance behavioural development.

CRD commentary
This review addressed a clear but broad question. Inclusion criteria for participants and outcomes were clear and it appears that only controlled studies were eligible for inclusion. The authors searched a range of relevant sources and made attempts to locate unpublished studies, but some language restrictions were imposed so the review is at risk of language bias. Publication bias was not assessed. Validity of included studies was assessed and the results used in the synthesis, but details of the criteria used were not reported, making it impossible for the reader to make their own assessment. Validity assessment was conducted by two independent reviewers, reducing the risk of errors and bias, but it is unclear whether similar methods were used in study selection and data extraction. Full details of the included studies were presented in the text and tables. A narrative synthesis was appropriate in view of the heterogeneity between included interventions and settings. The authors acknowledged that the methods used to estimate the impact of an intervention across a number of studies had limitations and did not constitute a meta-analysis. The authors' conclusions
are in line with the evidence presented and appear generally reliable.

**Implications of the review for practice and research**

**Practice:** The authors did not state any implications for practice.

**Research:** The authors listed a number of research priorities (see paper for full details) including efficacy trials to:
- determine the optimal nutrient content of fortified complementary foods;
- evaluate the recommended ration of fortified complementary foods for different age groups; and
- to evaluate the use of amylase to increase energy density of complementary foods.

**Funding**

Not stated

**Bibliographic details**


**PubMedID**

18289157

**DOI**

10.1111/j.1740-8709.2007.00124.x

**Original Paper URL**

http://onlinelibrary.wiley.com/cgi-bin/fulltext/119424906/PDFSTART

**Indexing Status**

Subject indexing assigned by NLM

**MeSH**

Developing Countries; Dietary Supplements; Female; Food, Fortified; Humans; Infant; Infant Food /standards; Infant Nutrition Disorders /prevention & control; Male; Outcome and Process Assessment (Health Care); Weaning

**AccessionNumber**

12008102729

**Date bibliographic record published**

01/09/2008

**Date abstract record published**

02/03/2009

**Record Status**

This is a critical abstract of a systematic review that meets the criteria for inclusion on DARE. Each critical abstract contains a brief summary of the review methods, results and conclusions followed by a detailed critical assessment on the reliability of the review and the conclusions drawn.