Supplementary Feeding for Preventing Undernutrition – What Works?

A narrative review and commentary

Bindi Borg[1] and Seema Mihrshahi[1]

Background and aims

Undernutrition affects over 150 million children under 5 years, contributing significantly to child morbidity and mortality. Adequate complementary feeding from 6-23 months may reduce or prevent undernutrition. Supplementary foods may be specially formulated or readily available foods. Specially formulated supplementary foods are energy-dense foods containing a source of protein and lipids such as powered milk, soy or peanuts, and multiple micronutrients. Most supplementary foods have been trialled with severely or moderately acutely malnourished children, or in food insecure settings. Few trials have been with representative populations in food secure settings. Decision-makers need evidence for the potential effectiveness of different supplementary feeding (SF) interventions for young children.

Aim

We aimed to assess whether supplementary feeding reduces or prevents undernutrition in representative populations of children i.e. weight-for-height (WHZ) > -3 and/or mid upper arm circumference (MUAC) > 11.5cm, aged 6-23 months in food secure settings. We also aimed to assess what kinds of supplementary foods were most promising.

Method

We conducted a narrative review of the literature including 4 reviews and 13 individual trials. Most were randomised controlled trials which provided supplementary foods to representative populations of children in food secure settings, in low- and middle-income countries. Trials were were usually 6 months in duration, and children were generally 6-18 months, with a range of 3-59 months. Feeding interventions included lipid-based nutrient supplements (LNSs), ready-to-use therapeutic foods (RUTFs), cereal and protein blended foods, and readily-available foods.

Results

Evidence of the impact of supplementary feeding was mixed. In some trials, supplementary foods slowed growth faltering in comparison to an unsupplemented control, but the impact was modest. The difference in change in weight-for-age (WAZ), height-for-age (HAZ), and WHZ between supplemented and unsupplemented groups was usually less than 0.25 z-scores over six months, and improvements in WAZ and WHZ were more likely than improvements in HAZ. The clinical significance of such an impact is questionable. The largest positive impacts were seen in trials that used non-specialised foods - eggs or meat – as the supplement.

Conclusions

Our review suggested that supplementary foods had an inconclusive, or at best, modest impact on undernutrition prevention. They did not prevent growth faltering, although they may slow it. This needs to be considered when allocating resources to undernutrition prevention in the general population. Where supplementary feeding interventions are used, food-based approaches, using readily-available local foods may be preferable to supplementing with specialised foods.

Author (year)	Intervention	Outcomes/Conclusion	
Narrative reviews, systematic reviews, meta-analyses			
Sguassero et al. (2012)	Various (meals, drinks, snacks)	Mean difference (MD) length: 0.19 cm (95%CI 0.07 - 0.31) SF has a negligible impact on child growth.	
Matsungo et al. (2017)	Small quantity LNSs (SQ-LNSs)	Inconclusive evidence on the efficacy of SQ-LNSs for improving linear growth.	
Dewey & Adu-Afarwuah (2008)	Various, usually fortified	The impact of CF alone on child growth was mixed. Two studies showed improved growth; three studies showed no impact.	
Kristjansson et al. (2015)	Various (meals, drinks, snacks, rations)	MD between intervention and control over 6 months: • Weight: 0.12kg (95%CI 0.05 – 0.18) • Height: 0.27cm (95%CI 0.07 – 0.48) • WAZ: 0.15 (95%CI 0.05 - 0.24) • HAZ: 0.15 (95%CI 0.06 - 0.24) • WHZ: 0.10 (95%CI -0.02 - 0.22) SF had positive effects, especially for younger and poorer/ less well-nourished children.	
Studies with untreated control group and representative population			
Maleta et al. (2015)	12 months	No statistically significant differences for WAZ, HAZ, WHZ, or MUAC.	
Lutter et al. (2008)	BF, 11 months	Positive differences for HAZ, WAZ, but growth faltering not halted.	
Mangani et al. (2015)	LNS, 6 months	Mean change in HAZ: -0.15, -0.02, -0.12 and -0.18 (P = 0.045) for control, milk–LNS, soy–LNS and BF groups, respectively. Limited impact. No evidence that LNS supplementation lowers stunting.	
Borg et al (forthcoming)	LNS, BF, micronutrients (MNs), 6 months	MUAC increased for LNS (0.24cm; 95% CI 0.06 - 0.36, p=0.008) and BF (0.18cm; 95% CI 0.06 - 0.36, p=0.027). Improvements were of limited clinical significance.	
Iannotti et al. (2014)	LNS, 6 months	LNS group HAZ increased by 0.13 ± 0.05 and WAZ by 0.12 ± 0.02.	
Isanaka et al. (2009)	LNS, 3 months	Intervention group had increased WHZ (0.22), decreased wasting.	
Mahfuz et al	Egg, milk, MNs	HAZ increased 0.23 (95% CI: 0.18, 0.29; P < 0.05).	
Iannotti et al. (2017)	1 egg per day, 6 months	Intervention group had significantly increased: • HAZ (0.63, 95%CI 0.38–0.88) • WAZ (0 61, 95%CI 0.45–0.77) • WHZ (0.33, 95%CI 0.14–0.51) • Stunting was reduced by 47%. • Underweight was reduced by 74%	
Tomedi et al. (2012)	Local foods, 7 months	Significant difference between intervention and control groups: • Difference in change in mean WAZ (0.82) • Difference in change in mean WHZ (1.19) • wasting prevalence (0% v. 8.9%) • underweight prevalence (6.3% v. 23.0%). • HAZ decreased in both groups.	
Studies with no control group or treated control group			
Sayyad-Neerkorn et al. (2015)	LNS vs BF, 15 months	No significant differences in MAM, SAM or stunting.	
Skau et al. (2015)	BFs, 9 months	WAZ, HAZ and WHZ decreased for all groups. No statistically significant differences between groups.	
Choudhury et al. (2016)	Food+MNs vs MNs only	Suboptimal weight and height gain.	
Lin et al. (2008)	LNS vs BF, 12 months	Children receiving the fortified spread gained more weight (110g; 95% CI 220 - 10), but growth still not normal.	

No significant impact | Limited/mixed impact | Positive impact

THE UNIVERSITY OF SYDNEY

1. School of Public Health The University of Sydney, Sydney, NSW Australia