A systematic review and meta-analysis of whole of community interventions to prevent excessive population weight gain

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CRD summary
The authors concluded that population-based, whole of community interventions could be effective in achieving modest reductions in population weight gain among children. The authors’ tentative conclusion, alongside their recommendations for future practice and research, reflect the evidence presented and seem likely to be reliable.

Authors’ objectives
To evaluate the effects of whole of community interventions to prevent excessive population weight gain.

Searching
MEDLINE, EMBASE, Cochrane Central Register of Controlled Trials (CENTRAL) and Google Scholar were searched for articles in English published in peer-reviewed journals between 1990 and 2011. A full search strategy was presented. Reference lists of included trials and relevant reviews were searched and relevant editorials were examined for additional studies.

Study selection
Eligible for inclusion were randomised controlled trials (RCTs; including cluster RCTs) and quasi-experimental designs with a parallel control group examining the effects of any population-based, whole of community intervention seeking to prevent population weight gain. Interventions had to target more than one determinant of weight gain and include community consultation or engagement to inform intervention development or delivery. Whole of community interventions were defined as those targeting the weight status of a population characterised by geographical boundaries (cities, villages or regions) and studies had to include group allocation at the geographical level. The comparisons of interest were no intervention, treatment as usual and attention or wait list controls. Studies were eligible if they objectively measured indicators of adiposity, including weight, body mass index (BMI), waist circumference, body fat percentage, skin fold thickness or population prevalence of overweight or obesity. Excluded were studies recruiting exclusively overweight or obese people, and studies of interventions primarily focusing on chronic disease reduction, or where obesity prevention was among other targeted risk factors.

The included studies were conducted in Australia, New Zealand, Fiji, Kingdom of Tonga and the United States. Studies were set primarily in schools or childcare services, and participants were aged between birth and 19 years. All interventions included various components, including physical activity and nutrition, and were delivered by multiple methods (including the provision of practical opportunities and information-related mechanisms). Interventions lasted between two and four years.

More than one reviewer was involved in the selection of studies. Study authors were contacted where further detail was needed.

Assessment of study quality
The quality of randomised studies was assessed using the Cochrane risk of bias tool, covering selection, attrition, reporting, performance, detection, and other sources of bias. The quality of non-randomised studies was assessed on the appropriateness of statistical methods to adjust for confounding.

Two reviewers independently assessed the quality of included studies. Differences were resolved by consensus.

Data extraction
Data were extracted to enable the calculation of various indicators of adiposity. In particular, mean differences were extracted relating to the BMI z-score, which represents a standardised measure of population weight status for comparison across studies; 95% confidence intervals were presented.
Two reviewers independently carried out the data extraction. Differences were resolved by consensus. Study authors were contacted for missing data, where necessary.

**Methods of synthesis**
Mean differences in BMI z-score were pooled in a random-effects meta-analysis using the inverse variance method. Sensitivity analyses were performed to incorporate studies that could provide only unadjusted estimates of intervention effect. Statistical heterogeneity was assessed using $I^2$. Sub-group analyses were carried out based on age-group (less than five years old, five to 11 years, and 12 to 18 years).

**Results of the review**
Eight trials were included in the review (six longitudinal quasi-experimental; two serial cross-sectional designs). All trials were considered to be at risk of bias due to commonly encountered issues in complex community-based interventions (selection bias due to non-random assignment to study groups, and performance bias due to lack of blinding).

Seven trials showed a positive intervention effect on at least one measure of adiposity. A meta-analysis of six trials showed a small reduction in BMI z-score in favour of the intervention communities (MD -0.09, 95% CI -0.16 to -0.02) but substantial heterogeneity was reported ($I^2$=93%). Sensitivity analysis did not alter the main finding. Sub-group analysis showed a significant reduction in BMI z-score favouring interventions in children aged between five and 11 years (MD -0.16, 95% CI -0.27 to -0.05; $I^2$=92%). There were no other statistically significant sub-group findings.

Further results are reported in the paper.

**Authors’ conclusions**
The review suggests that population-based, whole of community interventions could be effective in achieving modest reductions in population weight gain among children.

**CRD commentary**
The review question was clear, and inclusion criteria were adequately specified. The search strategy was clearly reported and a number of relevant sources were accessed. Language and publication restrictions raised the possibility that relevant studies were overlooked. The review process was clearly reported, and this included steps to minimise error and bias. Appropriate quality assessment criteria were applied to the included trials. Study details were presented, and this indicated a high level of variability. This variability, together with inherent challenges of evaluating complex interventions, was discussed in the interpretation of findings.

The authors’ tentative conclusion, alongside their recommendations for future practice and research, reflect the evidence presented and seem likely to be reliable.

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

*Practice:* The authors stated that greater investment was needed in the development and testing of innovative ways to prevent weight gain among adolescents.

*Research:* The authors stated that rigorous evaluation of population-based whole of community interventions was needed, particularly for adults.

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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.