
Effects of preventive micronutrient interventions among adolescents on health and nutritional status in low- and middle-income countries: a systematic review

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Title of the review

Effects of preventive micronutrient interventions among adolescents on health and nutritional status in low- and middle-income countries: a systematic review

Background

As growth in adolescence (10-19 years) occurs faster than any other time apart from the first year of life, failure to meet the increased demands for energy and nutrients during this period pose serious health consequences for physical and cognitive development (WHO, 2001).

According to the World Health Organization, iron deficiency anemia (IDA) is one of the top five contributors to disability-adjusted life years (DALYs) for adolescents, a measure of the years of healthy life lost due to poor health, disability, or premature death (WHO, 2017).

IDA is particularly concerning for adolescent girls due to their comparatively higher iron requirements. While most iron supplementation programs target pregnant women, the depletion of iron stores starts during adolescence with the onset of menstruation (Hanson, 2015). In addition, pre-pregnancy underweight poses major maternal and perinatal risks including stillbirth, preterm birth, small-for-gestational age (SGA), and low birth weight (Black, 2013). Conversely, over the past two decades, rates of overweight and obesity have been increasing among children and adolescents in many low- and middle-income countries (LMICs) due to the adoption of unhealthy high-energy and nutrient-deficient diets.

There is a need for a comprehensive synthesis of the evidence on adolescent nutrition. Existing systematic reviews assessing the impact of nutrition interventions among adolescents are either not comprehensive (assessing a single intervention or a specific micronutrient); have overlapping age groups (includes children and youth along with adolescents); or are focused on female adolescents only (Lassi, Moin, Das, Salam, & Bhutta, 2017; Salam et al., 2016). Majority of the existing systematic reviews have restricted their inclusions to randomised trials without focusing on various contextual factors that might potentially impact the effect of nutrition interventions in this age group. Moreover, the impact of nutrition education and counselling in this age group has not been systematically reviewed. This review aims to update the evidence that exists from trials, as well as collate relevant data from evaluations of existing programmes, on the effectiveness of preventive micronutrient interventions, including iron, folic acid, vitamin A, vitamin D, vitamin C, calcium, zinc, and multiple micronutrient supplementation, among adolescents in low- and middle-income countries. As such, we will provide an overall assessment of the effectiveness of micronutrient interventions for improving adolescent health and nutrition. This evidence

will be critical to inform policy and programmatic decision-making on adolescent nutrition in LMICs.

Objectives

What is the effectiveness of preventive micronutrient interventions on adolescent health and nutritional status?

Existing reviews

Lassi ZS, Moin A, Das JK, Salam RA, Bhutta ZA. Systematic review on evidence-based adolescent nutrition interventions. *Annals of New York Academy of Sciences* 2017;1393:34-50. doi:10.1111/nyas.13335.

Intervention

The following interventions targeting adolescents will be included:

- Nutrition education and counselling
- Micronutrient supplementation and fortification
- Macronutrients
- Combination of the any of the above interventions

These will be compared against no intervention, standard of care (whatever is applicable in the setting the study was conducted), placebo.

Population

The target population is adolescents (aged 10-19 years), regardless of health status, living in low- and middle-income countries.

Outcomes

Primary

- Anaemia
- Body mass index (BMI)
- Development outcomes (as reported by authors; could include cognitive development, interpersonal development, and social development).

Secondary

- Hemoglobin
- Serum micronutrient levels
- Adverse effects

Study designs

We will include primary studies, including large-scale programme evaluations, that assess the efficacy and/or effectiveness of interventions using experimental and quasi-experimental study designs that allow for causal inference:

1. Studies where participants were randomly assigned, individually or in clusters, to intervention and comparison groups.
2. Studies where non-random assignment to intervention and comparison groups is based on other known allocation rules, including a threshold on a continuous variable (regression discontinuity designs) or exogenous geographical variation in the treatment allocation (natural experiments).
3. Controlled before-after studies in which allocation to intervention and control groups was not made by study investigators, and outcomes were measured in both intervention and control groups at baseline, and appropriate methods were used to control for selection bias and confounding, such as statistical matching (e.g., propensity score matching, or covariate matching) or regression adjustment (e.g., difference-in-differences, instrumental variables).
4. Interrupted time series studies in which outcomes were measured in the intervention group at least three time points before the intervention was implemented and at least three time points after.

References

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Roles and responsibilities

- Content: Rehana A. Salam and Zulfiqar A. Bhutta have content expertise.
 - Systematic review methods: Rehana A. Salam and Jai K. Das have systematic review methods expertise.
 - Statistical analysis: Rehana A. Salam and Jai K. Das have statistical analysis expertise.
 - Information retrieval: Rehana A. Salam and Jai K. Das have information retrieval expertise.
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Potential conflicts of interest

The authors are not aware of any conflicts of interest arising from financial or researcher interests.

Preliminary timeframe

- Date you plan to submit a draft protocol: 30 January 2018
- Date you plan to submit a draft review: 30 June 2018