BMJ Open

BMJ Open

Preventive zinc supplementation for children, and the effect of additional iron: A systematic review and meta-analysis

Journal:	BMJ Open
Manuscript ID:	bmjopen-2013-004647
Article Type:	Research
Date Submitted by the Author:	09-Dec-2013
Complete List of Authors:	Mayo-Wilson, Evan; UCL, Clinical, Educational & Health Psychology Imdad, Aamer; SUNY Upstate Medical University, Department of Pediatrics Junior, Jean; Harvard, Medical School Dean, Sohni; Albert Einstein Medical Center, Bhutta, Zulfiqar; SickKids Center for Global Child Health,
Primary Subject Heading :	Global health
Secondary Subject Heading:	Nutrition and metabolism, Public health, Paediatrics
Keywords:	PREVENTIVE MEDICINE, PUBLIC HEALTH, Clinical trials < THERAPEUTICS, Nutrition < TROPICAL MEDICINE
	·



BMJ Open

1	Preventive zinc supplementation for children, and the effect of additional iron: A systematic
2	review and meta-analysis
3	Evan Mayo-Wilson (DPhil), ¹ Aamer Imdad (MD), ² Jean Junior (MSc), ³ Sohni Dean (MD), ⁴ Zulfiqar
4	A. Bhutta (PhD) ⁵
5	
6	
7	¹ Assistant Scientist Center for Clinical Trials
8	Department of Epidemiology
9	Johns Hopkins Bloomberg School of Public Health
10	615 North Wolfe Street, E6610
11	Baltimore, MD 21205
12	USA
13	
14	² Pediatric Resident
15	Department of Pediatrics
16	SUNY Upstate Medical University
17	Syracuse, New York
18	USA
19	³ Medical Student
20	Harvard Medical School
21	107 Avenue Louis Pasteur
22	Boston, MA 02115
23	USA
24	
25 26	⁴ Paediatric Resident
26 27	Albert Einstein Medical Center
	5501 Old York Road
28	Philadelphia, Pennsylvania 19141
29 30	USA
31	⁵ Robert Harding Chair in Global Child Health, SickKids Center for Global Child Health,
32	555 University Avenue
33	Toronto M5G 1X8, Canada &
34	Founding Director
35	Center of Excellence in Women and Child Health
36	The Aga Khan University, Karachi, Pakistan
37	Correspondence to: zulfiqar.bhutta@sickkids.ca
38	
39	
40	
41	
42	
43	
44	
45	
46	
47	
48	
49	
50	
51	
52	
53	
54	
55	
56	
57	

ABSTRACT

Objective

Zinc deficiency is widespread, and preventive supplementation may have benefits in young children. Effects for children over 5 years of age, and effects when coadministered with other micronutrients are uncertain. These are obstacles to scale-up. This review seeks to determine if preventive supplementation reduces mortality and morbidity for children ages 6 months to 12 years.

Design

Systematic review conducted with the Cochrane Developmental, Psychosocial and Learning Problems Group. Two reviewers independently assessed studies. Meta-analyses were performed for mortality, illness, and side effects.

Data sources

We searched multiple databases, including CENTRAL and Medline in January 2013. Authors were contacted for missing information.

Eligibility criteria for selecting studies

Randomised trials of preventive zinc supplementation. Hospitalised children and children with chronic diseases were excluded.

Results

Eighty randomised trials with 205401 participants were included. There was a small but nonsignificant effect on all-cause mortality (risk ratio 0.95 [95% CI 0.86 to 1.05]). Supplementation may reduce incidence of all-cause diarrhoea (risk ratio 0.87 [0.85 to 0.89]), but there was evidence of reporting bias. There was no evidence of an effect of incidence or prevalence of respiratory infections or malaria. There was moderate quality evidence of a very small effect on linear growth (SMD 0.09 [0.06 to 0.13]) and an increase in vomiting (RR 1.29 [1.14 to 1.46]). There was no evidence of an effect on iron status. Comparing zinc with and without iron co-supplementation and direct comparisons of zinc plus iron versus zinc administered alone favoured co-intervention for some outcomes and zinc alone for other outcomes. Effects may be larger for children over one year of age, but most differences were not significant.

Conclusions

Benefits of preventive zinc supplementation may outweigh any potential adverse effects in areas where risk of zinc deficiency is high. Further research should determine optimal intervention characteristics and delivery strategies.

STRENGTHS AND LIMITATIONS OF THIS STUDY

This large review was conducted according to best practices and includes the highest quality current evidence about the effects of zinc supplementation.

We investigated several outcomes made multiple comparisons to explore the most important main effects and interactions.

The analyses in this review could not identify the best way to deliver zinc supplements to children in need.

INTRODUCTION

Regular dietary zinc intake is required because zinc cannot be produced or stored.^{1,2} In 2011, 116000 deaths in children under 5 years were attributable to zinc deficiency (1.7% of mortalities in this group).³

Previous reviews reach disparate conclusions about the benefits of zinc supplementation for young children,⁴⁻¹² and most have not examined evidence for children over 5 years of age. Zinc deficiency is prevalent in areas with other micronutrient deficiencies. Concerns about the administration of zinc with iron have been an obstacle to widespread delivery.¹³ Understanding the effects of preventive zinc supplementation alone and with iron is crucially important to the future of global health policy.

To evaluate the effects of zinc with or without iron on illness and mortality, as well as growth, we analysed direct comparisons (i.e. zinc plus iron versus zinc alone) as well as subgroups within an overall analysis.

METHODS

Selection criteria and search strategy

Following a published protocol,¹⁴ we conducted a systematic review of randomised clinical trials (RCTs) of orally administered zinc compared with placebo and non-zinc co-interventions received by both groups (e.g. vitamin A). We also compared zinc with and without iron co-supplementation. Participants were six months to 12 years of age. We excluded studies of food fortification and children who were acutely ill.

We searched African Index Medicus, CENTRAL, Conference Proceedings Citation Index, EMBASE, Global Health, ICTRP, IndMED, LILACS, MEDLINE, metaRegister of Controlled Trials, ProQuest Dissertations & Theses Database, and WHOLIS in December 2012 and January 2013 (Appendix 1). Reference lists from previous reviews and from included studies were examined, and trial authors were contacted for unpublished data. Two authors independently reviewed citations and extracted data, including participant demographics, details of the intervention, outcomes, and risk of bias.¹⁵

Data synthesis

Relative risks and 95% confidence intervals (CIs) were calculated using Mantel-Haenszel methods. Standardised mean differences (SMDs) and 95% CIs were calculated for continuous measures using Hedges *g* and combined using inverse variance methods. When studies reported data in multiple formats, we calculated the SMD and its standard error in Comprehensive Meta-Analysis (CMA) Version 2 before entering data in Review Manager (RevMan) Version 5.2. For incidence data, we combined risk ratios (events per child) and rate ratios (events per child year) because trials were relatively short and we did not anticipate interactions between the intervention and time at risk. For cluster-randomised trials, we used effects controlling for clustering, or we used a intra-cluster correlation coefficient (ICC) to estimate robust standard errors.¹⁵ We used fixed-effect methods for all meta-analyses. Effects favour intervention when the relative risk is reduced (RR<1) or the standardised difference is positive (SMD>0).

When 10 or more studies reported an outcome, we conducted subgroup analyses to explore the effects of iron co-supplementation, national income (low-income countries compared with others), stunting, age (6-12 months, more than 12 months), dose (0-5mg, 5-10mg, etc.), duration (0-6 months, 6-12 months, more than 12 months), and formulation.

Quality of the evidence

Quality of the evidence was judged independently using GRADE.¹⁶ The GRADE system rates evidence from each analysis (i.e., pooled data where possible) as "high", "moderate", "low" or "very low". A "high" rating suggests that evidence is unlikely to be affected by further studies; a "low" rating suggests that further research is required to confirm the direction and magnitude of the true effect. Ratings for meta-analyses of randomised controlled trials start at "high" and may be downgraded for threats to internal validity (i.e. within-study bias), inconsistency (i.e. heterogeneity in results across studies), indirectness (e.g. measures are proxies for the true outcome of interest), imprecision (e.g. few participants, wide confidence intervals), and reporting bias (i.e. publication bias and selective outcome reporting). Because GRADE considers several domains in addition to internal validity, confidence in overall effects may be "low" or "very low" even when all studies were conducted rigorously. The following sections include both significant and non-significant statistical results, and GRADE ratings in the text and tables provide further information about our confidence in these estimates.

RESULTS Posults of the

Results of the search

From 6384 records, 80 studies were included (Figure 1). Seventy-five studies were published in English, two each in Spanish and Portuguese, one in Chinese. Reasons for excluding 27 studies were enumerated (Appendix 2); additionally, 11 on-going studies were identified, and 5 studies could not be obtained. Seven included studies did not contribute to any meta-analysis because they did not report sufficient data (Appendix 3).

Study characteristics

Included studies assigned 205923 eligible participants (Appendix 4). Twenty trials used factorial designs; there were 100 independent comparisons isolating zinc, and co-interventions were provided to both groups in 51 comparisons. There were 8 independent comparisons of iron with zinc versus zinc alone including 1898 eligible participants. Sample sizes ranged from 21 to 72438 eligible participants (median=200). Nine studies were cluster-randomised, including two randomising households. Three studies included 88% of participants.¹⁷⁻¹⁹ Forty-six studies reported the mean baseline plasma or serum zinc concentration of their participants; the median of these mean concentrations was 72.5 μ g/dL.

Thirty-two countries are represented; most studies were conducted in low- or middle-income countries: 37 in Asia, 26 in Latin America and the Caribbean, and 10 in sub-Saharan Africa. The median of mean age at baseline was 28 months, and 22 studies included children over 5 years of age. Both stunted and non-stunted children were included in 42 studies; 5 included only stunted children, 5 included only non-stunted children, and 28 did not specify if participants were stunted.

Studies provided zinc for less than 6 months (30), 6 to 12 months (33), and 12 months or more (16). Of those reporting frequency of zinc supplementation, 48 provided zinc daily and 11 provided zinc weekly. Where reported, daily dose was 0 to 5 mg (5), 5 to 10 mg (19), 10 to 15 mg (30), 15 to 20 mg (8), and 20 mg or more (12). Studies reporting the chemical compound of their zinc supplements provided zinc as sulfate (45), gluconate (12), acetate (six), and other compounds (8). Studies comparing zinc with iron versus zinc alone provided daily dose equivalents of 3 to 36 mg of iron. Outcomes were observed for about 26 weeks (median) after randomisation, with follow-up from 2 to 80 weeks.

Risk of bias

Randomisation and allocation concealment were adequate in 34 and 32 studies; 46 and 48 studies were unclear (Figure 2). For blinding of participants and personnel, 63 studies were at low risk of bias. For blinding of outcome assessment, 65 studies were at low risk of bias. For both types of blinding, 15 studies were unclear.

For all analyses, we attempted to include all randomised study participants; 47 studies were at low risk of bias for incomplete data, 31 were unclear, and 2 were at high risk. For selective reporting, 3 studies were at low risk of bias, 44 were at unclear risk, and 32 were at high risk (Appendix 5).

Bias may affect secondary outcomes in this review, but it does not appear to be important for the primary outcome. For example, mortality and other objective measures are not vulnerable to bias related to blinding, and many missing outcomes were biomarkers or growth related.

Effects of zinc supplementation

In addition to outcomes included in the Summary of Findings Table (Table 1), we analysed results for hospitalisation; prevalence of morbidities; additional measures of growth; as well as biological indicators of zinc, haemoglobin, iron, and copper status (Table 2). Subgroup analyses compare the effects of zinc supplementation with and without iron coadministration (Table 4, Appendix 6).

Fourteen studies including 138302 participants were analysed for all-cause mortality, though other studies included no deaths in either group (Figure 3), and there was high quality evidence of a small effect (risk ratio 0.95 [0.86 to 1.05]). There were similar effects for mortality due to diarrhoea (RR 0.95 [0.69 to 1.31]), mortality due to LRTI (RR 0.86 [0.64 to 1.15]), and mortality due to malaria (RR 0.90 [0.77 to 1.06]), and the evidence for these outcomes was moderate quality.

In 25 studies including 15042 participants, there was low quality evidence of a 13% reduction in incidence of all-cause diarrhoea (Figure 4; RR 0.87 [0.85 to 0.89]). Other measures of diarrhoea were consistent with no difference or with a small reduction in morbidity, including: prevalence of all-cause

BMJ Open

diarrhoea, hospitalisation due to all-cause diarrhoea, incidence of severe diarrhoea, prevalence of severe diarrhoea, incidence of persistent diarrhoea, and prevalence of persistent diarrhoea.

In twelve trials (9610 participants), there was high quality evidence of no effect on LRTI incidence (Appendix 7; RR 1.00 [0.94 to 1.07]). One trial reported no LRTI in either group.²⁰ Results for prevalence were consistent with no difference in respiratory morbidity.

Four trials (2407 participants) found moderate quality evidence that would be consistent with no effect or a harmful effect on malaria incidence (RR 1.04 [0.94, 1.14]). One study reported no significant effect on malaria prevalence.

Fifty studies reported height for 13669 participants (Figure 5). There was moderate quality evidence of a very small but statistically significant increase in linear growth (SMD 0.09 [0.06 to 0.13]). Results for weight, weight-to-height ratio and prevalence of stunting were consistent with no difference or a small effect on growth.

Forty-six studies reported serum zinc for 9810 participants. There was evidence of a medium effect (SMD 0.62 [0.58 to 0.67]) on zinc concentration. Results consistently favoured zinc rather than no-intervention, but they were extremely inconsistent in magnitude, possibly due to differences in participants and settings (Chi²=582.45, df=47 (P <0.00001); I²=91%). Eleven studies reported serum copper for 3071 participants (1% of participants in this review). There was very low quality evidence of a small reduction in copper (SMD -0.22 [-0.29 to 0.14]); as above, the results were inconsistent (Chi²=37.47, df=10 (P <0.0002); I²=68%). There was no evidence of an effect on haemoglobin, prevalence of anaemia, or iron status.

In five trials (35192 participants) there was high quality evidence of increased vomiting (RR 1.29 [1.14 to 1.46]). Two trials reported no adverse events in either group (i.e. supplemented or non-supplemented).^{21,22} Results for study withdrawal, participants with one or more side effects, and number of vomiting episodes indicate some short-term side effects; there was no evidence of serious adverse events.

Effects of zinc plus iron compared with zinc alone

Effects on mortality were not significantly different between subgroups with and without iron $(Chi^2=1.30, p=0.25)$; however, there was no mortality effect in groups receiving iron (RR 0.99 [0.86 to 1.15]) while the effect for groups that did not receive iron was nearly significant (RR 0.89 [0.79 to 1.00]). Effects on incidence of diarrhoea differed between groups (Figure 4; Chi^2=65.11, p<0.00001), with no benefit for the group that received iron (RR 1.00 [0.96 to 1.05]) and a significant benefit for the group that receive iron (RR 0.82 [0.80 to 0.84]). There were significant effects with and without iron co-supplementation on zinc status; these were greater in the studies without iron for serum zinc (Chi^2=27.07, p<0.00001) and prevalence of zinc deficiency (Chi^2=34.27, p<0.00001). There were also differences between these groups of studies for serum ferritin and serum copper; zinc had no effect in studies with iron co-intervention, but zinc without iron co-intervention reduced ferritin and copper. Overall effects on growth were small; there was a significant difference between subgroups for height but not weight, and the difference for weight-to-height ratio favoured the group that received iron (i.e. the opposite of other results). There were no significant effects in either subgroup for lower respiratory tract infections, serum haemoglobin, prevalence of anaemia, or prevalence of iron deficiency.

Several trials compared zinc coadministered with iron versus zinc given alone (Appendix 6). One trial reported no significant difference in all-cause mortality (323 participants; RR 0.33 [0.01 to 8.39]). In five trials (1530 participants), effects on incidence of all-cause diarrhoea favoured zinc alone (RR 1.10 [1.03 to 1.18]). In one trial (399 participants), effects on prevalence of all-cause diarrhoea favoured zinc with iron, but this was not significant (RR 0.90 [0.79 to 1.06]). Five trials (1329 participants) reported no difference in height (SMD 0.06 [-0.04 to 0.16]). There was similarly low quality evidence and mixed results for other outcomes (Table 3).

Additional subgroup analyses

Studies in high-income countries did not evaluate most outcomes, so we were unable to explore differences in effect by national income. Effects on weight and weight-to-height ratio were not statistically different, and there was no evidence of consistent differences in biological outcomes (Appendix 6).

Most studies included both stunted and non-stunted children, and it was not possible to compare effects between studies for most outcomes. Differences between groups were not significant for growth, but these would be consistent with larger effects in studies of stunted children.

Age was not significantly associated with effects on mortality or incidence diarrhoea, but results would be consistent with greater benefits in children over 1 year of age (Figure 3). Effects on weight were greatest in studies of older children, and there was a similar pattern for height, though the largest study of children over 5 years of age included only 804 participants. The effect of supplementation on zinc deficiency was greater in studies of older children, as was the negative effect on copper. There was no evidence of consistent differences in other biological outcomes.

Dose was not significantly associated with effects on mortality, incidence of LRTI, haemoglobin, or weight-to-height ratio. The pattern of results was inconsistent for incidence and prevalence of diarrhoea, height, weight, and plasma ferritin (Appendix 6). Subgroups were significantly different for serum zinc, prevalence of zinc deficiency, prevalence of iron deficiency, and plasma copper; only these results are consistent with a dose-response relationship.

Duration of supplementation was not significantly associated with effects on mortality, incidence of diarrhoea, incidence of LRTI, or weight-to-height ratio, or prevalence of iron deficiency (Appendix 6). There was a significant difference for prevalence of diarrhoea, but the magnitude of this difference may not be important. Studies of longer supplementation were associated with greater effects on height; the pattern of results was not consistent for weight. By contrast, the largest benefits for biological markers (serum zinc and prevalence of zinc deficiency) were reported in the shortest studies.

Formulation was associated with differences among subgroups, though few studies included capsules or powder. Comparing solution and tablets, differences were not significant for mortality, incidence and prevalence of diarrhoea, incidence of LRTI, blood haemoglobin, prevalence of anaemia, or prevalence of iron deficiency. There were significant differences in the effects of serum ferritin and serum copper, but only three studies of each outcome used tablets, and they were highly heterogeneous. Effects on height, weight, and serum zinc were greater in studies using solution compared with tablet, but all effects were small (Appendix 6).

Reporting bias

For outcomes included in the Summary of Findings Table with 10 or more studies, we also conducted a trim-and-fill analysis to investigate reporting bias (Appendix 8).²³ There was some evidence of small study bias—studies were trimmed for all-cause mortality (1 trimmed) and incidence of all-cause diarrhoea (13 trimmed; Figure 6). None were trimmed for incidence of LRTI, nor were any trimmed for height. The adjusted effect for mortality was not importantly different from the observed effect, but the observed effect for diarrhoea (RR 0.87 [0.85 to 0.89]) was larger than the adjusted value (RR 0.95 [0.93 to 0.97]).

DISCUSSION

Consistent with previous reviews, this review finds high quality evidence from several large, wellconducted trials.^{5,7,10} We believe that these results suggest zinc supplementation is probably associated with a small reduction in all-cause mortality for children at risk of deficiency. In interpreting these results, we considered that the results of this meta-analysis are drawn from 13 trials including almost 140,000 participants. The results of those studies are statistically consistent, the overall confidence intervals are relatively small, and the balance of probability favours zinc supplementation rather than placebo. Small reductions in cause-specific mortality were consistent with effects on illness and cause-specific mortality, and the results were biologically plausible. Benefits in any specific are may be related to level of deficiency; countries with very high levels of deficiency could expect the largest reductions in mortality as a result of supplementation.²⁴ This review also suggests that benefits may not be restricted to young children; there is some evidence of benefits on secondary outcomes in trials including children over 5 years of age, but there is a lack of evidence about effects on mortality in this group.

Results for secondary outcomes suggest modest benefits. Main results for diarrhoea morbidity were consistent with previous reviews,^{4,5,7,10} but an asymmetrical funnel plot was indicative of small-study bias. After adjustment, the effect for diarrhoea was halved, and the reduced estimate was consistent with other critical outcomes in this review. Previous reviews have also suggested beneficial effects on respiratory infections^{4,5,9-12} and malaria,¹⁰ which this review does not confirm. Previous reviews have reported variable effects on growth;^{5,6,8} this review suggests that preventive zinc supplementation

BMJ Open

alone is unlikely to have large effects on linear growth and morbidity. Supplementation is associated with increased risk of vomiting, but there is no evidence of lasting adverse effects.

Critical outcomes included data for 2407 to 138302 participants, so further placebo-controlled trials of preventive zinc supplementation for young children may not be necessary. However, subgroup analyses did not identify an optimal supplementation strategy (i.e. dose, formulation, and frequency), and large trials comparing active interventions could inform clinical guidelines. Subgroup analyses identify some sources of observed heterogeneity; however, subgroups that were statistically different included a large amount of residual heterogeneity, which is reflected in our judgements about the quality of the evidence (Table 1). Analyses of group-level data are of limited value for identifying moderators, particularly in analyses dominated by a few large studies. Further analyses of individual patient data would be more conclusive.

Effects on biological indicators were inconsistent across studies, but large effects on these measures were not always reflected in clinical outcomes. Supplementation may increase serum zinc, but the magnitude of the effect appears to differ across populations and interventions. Effects on other micronutrients, including iron and copper, are uncertain. Researchers have suggested that iron supplementation may interfere with the absorption of zinc and, conversely, that zinc may interfere with iron and copper absorption;^{25,26} however, the relationships between these biomarkers and clinical outcomes (i.e. mortality and morbidities) have not been established.

Subgroup analyses comparing zinc with and without iron did not resolve uncertainty about the effect of co-supplementation. Only four studies with iron co-supplementation reported mortality outcomes, and evidence of outcome reporting bias for diarrhoea incidence leads to cautious interpretation of differences in this outcome. There was no evidence that larger doses or increased duration were associated with increased iron deficiency, but these comparisons are observational and could be affected by uncontrolled covariates.

Direct comparisons within trials provide the only experimental evidence about the effects of cosupplementation with iron. For rare events like mortality, effects of zinc and iron can only be detected in large studies, so studies of interaction effects will need to be very large to detect real differences. Future studies are needed to identify main effects and to explore how administration (i.e. separate or combined) affects uptake and costs.

Dietary intake and supplementation have reduced micronutrient deficiencies in Asia, but micronutrient deficiencies remain common.^{3,27} The prevalence of micronutrient deficiencies is declining in Africa, but the absolute number of deficient children is increasing.³ This review suggests that the overall benefits of preventive zinc supplementation outweigh potential harms in areas with a high risk of zinc deficiency. Further research is needed to determine if these benefits extend to children over 5 years of age. Current estimates suggest that delivering 10 evidence-based nutrition-specific interventions, including preventive zinc supplements, could reduce global mortality in children under 5 years of age by 15%.²⁸ To that end, research is needed to identify the most effective strategies for delivering zinc supplements to populations in need.²⁹



BMJ Open

Acknowledgements

We thank the Cochrane Developmental Psychosocial and Learning Problems Group, particularly: Margaret Anderson helped develop and conduct the searches; Laura MacDonald, Joanne Wilson, and Geraldine Macdonald assisted with the preparation of the protocol and review; Geraldine Macdonald provided detailed comments on the protocol and completed review. The Cochrane Methods Group provided statistical advice and assistance. Chris Champion extracted one study in Portuguese. Evelyn S Chan, Xin Hui Chan, Jai Das, and Aneil Jaswal extracted study data.

Contributors

All authors contributed to the background. EMW and JJ were responsible for the methods. JJ executed the first literature search, and EMW and AI executed the update. JJ, EMW, AI, and EC reviewed citations for inclusion. JJ, EMW, AI, SD, XHC, and AJ extracted data. JJ and EMW entered outcome data into RevMan and analysed the data. EMW, JJ, and AI wrote the results and discussion. EMW and AI drafted the summary of findings table, which was agreed on by all authors. ZB contributed to the writing and interpretation of findings. EMW is the guarantor.

Funding

No funding bodies had any role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. We received internal support from the Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health (US); Centre for Outcomes Research and Effectiveness (CORE), Research Department of Clinical, Educational & Health Psychology, University College London (UK); the Centre for Evidence Based Intervention, Department of Social Policy and Intervention, University of Oxford (UK); and the Division of Women and Child Health, Aga Khan University Hospital (PK).

Competing interests

All authors have completed the ICMJE uniform disclosure form at <u>www.icmje.org/coi_disclosure.pdf</u> (available on request from the corresponding author) and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years. ZAB is an author of some of the included trials. ZAB and AI have published previous reviews about zinc.

Ethical approval

Not required.

Data sharing

Data are provided in the appendices and available from the authors upon request.

APPENDICIES

Appendix 1: Electronic searches Appendix 2: Excluded studies Appendix 3: On-going studies Appendix 4: Included studies Appendix 5: Risk of bias Appendix 6: Subgroup analyses Appendix 7: Additional forest plots Appendix 8: Tests for reporting bias

REFERENCES

1. Hotz C BK. International Zinc Nutrition Consultative Group (IZiNCG). Assessment of the risk of zinc deficiency in populations and options for its control. Food and Nutrition Bulletin. 2004; **25**((1 Suppl 2)): S94-203.

2. Maggini S, Wenzlaff S, Hornig D. Essential role of vitamin C and zinc in child immunity and health. The Journal of international medical research. 2010; **38**(2): 386-414.

3. Black RE, Victora CG, Walker SP, Bhutta ZA, Christian P, de Onis M, et al. Maternal and child undernutrition and overweight in low-income and middle-income countries. Lancet. 2013; **382**(9890): 427-51.

4. Aggarwal R, Sentz J, Miller MA. Role of zinc administration in prevention of childhood diarrhea and respiratory illnesses: a meta-analysis. Pediatrics. 2007; **119**(6): 1120-30.

5. Brown KH PJ, Baker SK, Hess SY. Preventive zinc supplementation among infants, preschoolers, and older prepubertal children. Food and Nutrition Bulletin. 2009; **30**(1): S12-40.

6. Imdad A, Bhutta ZA. Effect of preventive zinc supplementation on linear growth in children under 5 years of age in developing countries: a meta-analysis of studies for input to the lives saved tool. BMC Public Health. 2011; **11 Suppl 3**: S22.

7. Patel A MM, Badhoniya N, Kulkarni H. What zinc supplementation does and does not achieve in diarrhea prevention: a systematic review and meta-analysis. BMC Infectious Diseases 2011; (11): 122.

8. Ramakrishnan U, Nguyen P, Martorell R. Effects of micronutrients on growth of children under 5 y of age: meta-analyses of single and multiple nutrient interventions. American Journal of Clinical Nutrition. 2009; **89**(1): 191-203.

9. Roth DE, Richard SA, Black RE. Zinc supplementation for the prevention of acute lower respiratory infection in children in developing countries: meta-analysis and meta-regression of randomized trials. International Journal of Epidemiology. 2010; **39**(3): 795-808.

10. Yakoob MY, Theodoratou E, Jabeen A, Imdad A, Eisele TP, Ferguson J, et al. Preventive zinc supplementation in developing countries: impact on mortality and morbidity due to diarrhea, pneumonia and malaria. (Special Issue: Technical inputs, enhancements and applications of the Lives Saved Tool (LiST).). BMC Public Health. 2011; **11**(Suppl. 3): S23. 11. Bhutta ZA, Black RE, Brown KH, Gardner JM, Gore S, Hidayat A, et al. Prevention of diarrhea and pneumonia by zinc supplementation in children in developing countries: pooled analysis of randomized controlled trials. Zinc Investigators' Collaborative Group. Journal of Pediatrics. 1999; **135**(6): 689-97.

12. Lassi ZS, Haider BA, Bhutta ZA. Zinc supplementation for the prevention of pneumonia in children aged 2 months to 59 months. Cochrane Database of Systematic Reviews. 2010; (12): CD005978.

13. Pasricha S-R, Hayes E, Kalumba K, Biggs B-A. Effect of daily iron supplementation on health in children aged 4—23 months: a systematic review and meta-analysis of randomised controlled trials. The Lancet Global Health. 2013; 1(2): e77-86.

14. Junior JA, Dean S, Mayo-Wilson E, Imdad A, Bhutta ZA. Zinc supplementation for preventing mortality and morbidity, and promoting growth, in children aged 6 months to 12 years of age (Protocol). Cochrane Database of Systematic Reviews. 2011; **10**: Art. No.: CD009384. DOI: 10.1002/14651858.CD009384.

15. Higgins JP, Green S. Cochrane Handbook for Systematic Reviews of Interventions. Version 5.1.0 [updated March 2011]: The Cochrane Collaboration; 2011.

16. Balshem H, Helfand M, Schunemann HJ, Oxman AD, Kunz R, Brozek J, et al. GRADE guidelines: 3. Rating the quality of evidence. Journal of Clinical Epidemiology. 2011; **64**(4): 401-6.

17. Bhandari N, Taneja S, Mazumder S, Bahl R, Fontaine O, Bhan MK, et al. Adding zinc to supplemental iron and folic acid does not affect mortality and severe morbidity in young children. Journal of Nutrition. 2007; **137**(1): 112-7.

18. Sazawal S, Black RE, Ramsan M, Chwaya HM, Stoltzfus RJ, Dutta A, et al. Effects of routine prophylactic supplementation with iron and folic acid on admission to hospital and mortality in preschool children in a high malaria transmission setting: community-based,

BMJ Open

randomised, placebo-controlled trial.[Erratum appears in Lancet. 2006 Jan 28;367(9507):302]. Lancet. 2006; **367**(9505): 133-43.

19. Tielsch JM, Khatry SK, Stoltzfus RJ, Katz J, LeClerq SC, Adhikari R, et al. Effect of routine prophylactic supplementation with iron and folic acid on preschool child mortality in southern Nepal: community-based, cluster-randomised, placebo-controlled trial. Lancet. 2006; **367**(9505): 144-52.

20. Sempertegui F, Estrella B, Correa E, Aguirre L, Saa B, Torres M, et al. Effects of short-term zinc supplementation on cellular immunity, respiratory symptoms, and growth of malnourished Equadorian children. European Journal of Clinical Nutrition. 1996; **50**(1): 42-6.

21. Alarcon K, Kolsteren PW, Prada AM, Chian AM, Velarde RE, Pecho IL, et al. Effects of separate delivery of zinc or zinc and vitamin A on hemoglobin response, growth, and diarrhea in young Peruvian children receiving iron therapy for anemia. American Journal of Clinical Nutrition. 2004; **80**(5): 1276-82.

22. Mazariegos M, Hambidge KM, Westcott JE, Solomons NW, Raboy V, Das A, et al. Neither a zinc supplement nor phytate-reduced maize nor their combination enhance growth of 6- to 12-month-old Guatemalan infants. Journal of Nutrition. 2010; **140**(5): 1041-8.

23. Duval S, Tweedie R. Trim and fill: A simple funnel-plot-based method of testing and adjusting for publication bias in meta-analysis. Biometrics. 2000; **56**(2): 455-63.

24. Wessells KR, Brown KH. Estimating the global prevalence of zinc deficiency: results based on zinc availability in national food supplies and the prevalence of stunting. PLoS ONE. 2012; 7(11): e50568.

25. Maret W, Sandstead HH. Zinc requirements and the risks and benefits of zinc supplementation. J Trace Elem Med Biol. 2006; **20**(1): 3-18.

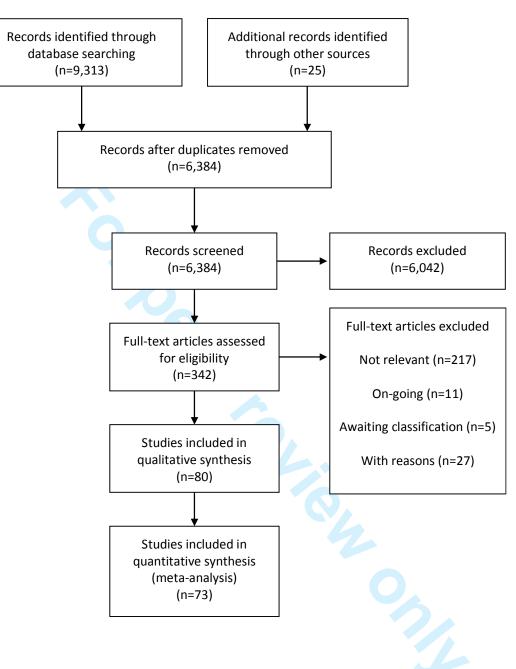
26. Sandstrom B. Micronutrient interactions: effects on absorption and bioavailability. The British journal of nutrition. 2001; **85 Suppl 2**: S181-5.

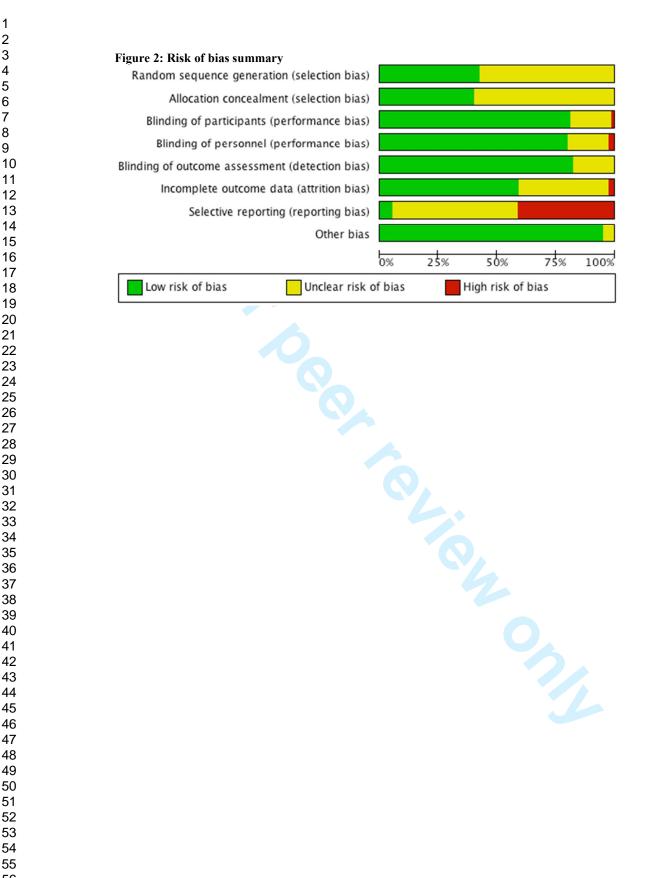
27. Ram U, Jha P, Ram F, Kumar K, Awasthi S, Shet A, et al. Neonatal, 1–59 month, and under-5 mortality in 597 Indian districts, 2001 to 2012: estimates from national demographic and mortality surveys. The Lancet Global Health. 2013; **Online first**.

28. Bhutta ZA, Das JK, Rizvi A, Gaffey MF, Walker N, Horton S, et al. Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost? Lancet. 2013; **382**(9890): 452-77.

29. Wazny K, Zipursky A, Black R, Curtis V, Duggan C, Guerrant R, et al. Setting research priorities to reduce mortality and morbidity of childhood diarrhoeal disease in the next 15 years. PLoS Medicine. 2013; **10**(5): e1001446.

TABLES AND FIGURES Figure 1: PRISMA flowchart





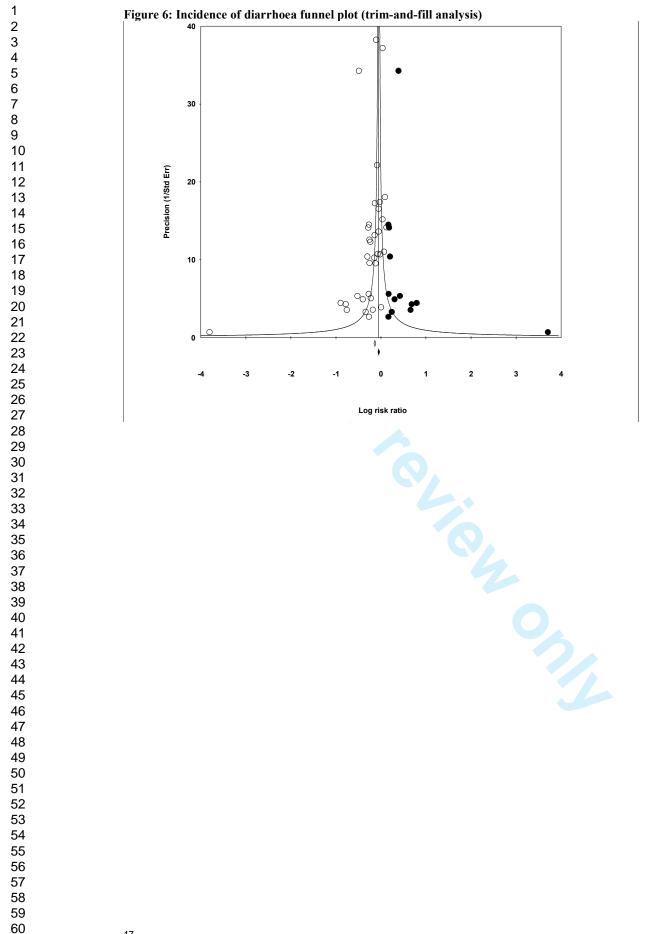
3.1.1 6 months to < 1 year Baqui 2003 1.07361099 1.62916074 161 157 0.1% 2.93 [0.12, 71.29] Chang 2010 -1.59447504 1.54597037 198 201 0.1% 0.20 [0.01, 4.20] Lind 2003 1.60943791 1.54541389 170 170 0.1% 5.00 [0.24, 103.38] Chhagan 2009 0.02643326 0.99114872 112 115 0.2% 1.03 [0.15, 7.16] Tielsch 2006 (2) 0.01267064 0.31113591 1017 966 2.4% 1.00 [0.55, 1.86] Sazawal 2006 0.05826891 0.10048763 13294 13318 23.0% 1.06 [0.88, 1.27] Subtotal (95% Cl) 14952 14927 25.9% 1.06 [0.88, 1.27] 14952 Heterogeneity: Chi² = 2.56, df = 5 (P = 0.77); l² = 0% 1.06 [0.88, 1.27] 1.06 [0.88, 1.27] 1.06 [0.88, 1.27] Sataval 2000 1.10424611 1.6295395 176 177 0.1% 3.02 [0.12, 73.56] 1.06 [0.88, 1.27] Heterogeneity: Chi² = 2.56, df = 5 (P = 0.75); 1121248 1236 0.1% 0.14 [0.01, 2.78] 1.06 [0.88, 1.27] Bandari 2002					BN	IJ Op	en	
Zinc No Zinc Risk Ratio Risk Ratio Risk Ratio 31.1 6 months to < 1 year 5E Total Weight IV, Fixed, 95% CI IV, Fixed, 95% CI Baqui 2003 -1.59447504 1.54557037 198 201 0.1% 0.293 [0.12, 71.29] Chang 2010 -1.59447504 1.54557037 198 201 0.1% 0.00 [0.2, 1.1, 20] Chang 2010 -1.59447504 1.54597037 198 201 0.1% 0.00 [0.2, 1.1, 20] Chang 2010 -0.1585346189 170 170 0.1% 5.00 [0.2, 1.2, 1.29] Chang 2009 0.0267064 0.31113591 1017 966 2.4% 1.01 [0.57, 1.86] Subtotal (95% CI) -1.58534036 1.54139551 183 3.02 [0.01, 2.73,56] 14952 14922 25.9% 1.06 [0.88, 1.27] Penny 2004 -1.58534036 1.54139551 51 83 0.1% 0.20 [0.01, 4.20] 1.1424611 Larson 2010 -1.0424611 1.6295395 175 175 1.05 2.60 1.06 [0.68, 1.27] Penny 2004 -1.58534036 1.54139551 51<	Figure 3. All co-	160 martalit	y hy ago					
Baqui 2003 Charg 2010 -1.59447504 1.54597037 198 201 Charg 2010 0.2643326 0.99114872 112 115 0.2% 1.03 [0.15, 7.129] Heterogeneity: Ch ² = 2.55, df = 5 (P = 0.77); l ² = 0% Test for overall effect: Z = 0.60 (P = 0.55) 31.21 to 6 5 yeas Larson 2010 1.10424611 1.6295395 176 Event 2004 Lind 2003 1.04436750 1.54139551 81 83 0.1% 0.20 [0.12, 73.56] Heterogeneity: Ch ² = 0.560 (P = 0.55) 31.21 to 6 5 yeas Larson 2010 1.10424611 1.6295395 176 Event 2004 -1.58534036 1.54139551 81 83 0.1% 0.20 [0.01, 4.20] Heterogeneity: Ch ² = 0.430; li22170764 81 344 1.088 0.42 [0.15, 1.18] Heterogeneity: Ch ² = 1.02948879 0.11924028 8120 Fielsch 2006 -0.03756725 0.11932628 8120 7950 16.3% 0.96 [0.76, 1.22] Sanawal 2006 (2) -0.03756725 0.11932628 8120 7950 16.3% 0.96 [0.76, 1.22] Favours 2Inc Favours N Sanawal 2006 (2) -0.03756725 0.11932628 8120 7950 7954 24.0% 0.82 [0.68, 0.99] Subtotal (95% CI) Faterogeneity: Ch ² = 1.5.32, df = 15 (P = 0.43); l ² = 1% Test for overall effect: Z = 1.49 (P = 0.14) Test for subgroup differences: Ch ² = 2.48, df = 1 (P = 0.11), l ² = 59.8% Favours Zinc Favours N	Study or Subgroup	log[Risk Ratio]				Weight		
Chang 2010 -1.59447504 1.54597037 198 201 0.1% 0.20 [0.01, 4.20] Lind 2003 1.60943791 1.54541389 170 170 0.1% 5.00 [0.24, 103.8] Chhagan 2009 0.02643326 0.99114872 112 115 0.2% 1.03 [0.15, 7.16] Telsch 2006 (2) 0.01267064 0.31113591 1017 966 2.4% 1.01 [0.55, 1.86] Subtotal (95% CI) -2.55, df = 5 (P = 0.77); l ² = 0% Test for overall effect: Z = 0.60 (P = 0.75); 3.1.2 1 to < 5 years Larson 2010 1.10424611 1.6295395 176 177 0.1% 3.02 [0.12, 73.56] Bhandari 2002 -1.93942189 1.51132133 1228 1236 0.1% 0.14 [0.01, 2.78] Veenemans 2011 (2) -0.6670019 1.2193957 151 155 0.2% 0.51 [0.05, 5.16] Shankar 2000 1.11321109 1.14836145 136 138 0.2% 3.04 [0.32, 28.09] Muller 2001 -0.26670956 0.25677681 371 8484 14.0% 0.79 [0.62, 1.02] Sazawal 2006 (2) -0.03756725 0.11932628 8120 7950 16.3% 0.96 [0.76, 1.22] Bhandari 2007 0.04493755 0.11922408 36293 36145 18.4% 1.06 [0.88, 1.92] Heterogeneity: Chi ² = 1.028, df = 9 (P = 0.33); l ² = 12% Test for overall effect: Z = 2.08 (P = 0.04) Test for overall effect: Z = 1.49 (P = 0.14); l ² = 2% Test for overall effect: Z = 1.49 (P = 0.14); l ² = 2% Test for overall effect: Z = 1.49 (P = 0.14); l ² = 59.8%			1 62916074	161	157	0.1%	2 93 [0 12 71 29]	·
Chhagan 2009 0.02643326 0.99114872 112 115 0.2% 1.03 [0.15, 7.16] Tielsch 2006 (2) 0.0126706 0.3113591 1017 966 2.4% 1.01 [0.55, 7.16] Sazawal 2006 0.05826891 0.10048763 13294 13318 23.0% 1.06 [0.87, 1.29] Subtotal (95% CI) 1.10424611 1.6295395 176 177 0.1% 3.02 [0.12, 73.56] Penny 2004 -1.58534036 1.54139551 81 83 0.1% 0.20 [0.01, 4.20] Shankar 2001 1.10424611 1.6295395 151 155 0.2% 0.51 [0.05, 5.60] Shankar 2000 1.11321109 1.14836145 136 138 0.2% 3.04 [0.32, 28.90] Muller 2001 -0.6670019 1.2193957 151 155 0.2% 0.51 [0.05, 5.60] Shankar 2000 1.11321109 1.14836145 136 138 0.2% 3.04 [0.32, 28.90] Muller 2001 -0.08670956 0.5267764 8731 8484 1.0% 0.79 [0.62, 1.02] Shankar 2000 (2) -0.03756725 0.11932628 8120 7950 10.63, 0.96 [0.76, 1.22] Bhandari 2007 0.04493755 0.11212408 36293 36145 18.4% 1.05 [0.84, 1.30] Sazawal 2006 (2) -0.03756725 0.11932628 8120 7950 10.68, 0.82 [0.68, 0.99] Heterogeneity: Chi ² = 1.28, df = 9 (P = 0.33); l ² = 2% Test for overall effect: Z = 2.08 (P = 0.04) Total (95% CI) 78189 77593 100.0% 0.93 [0.85, 1.02] Heterogeneity: Chi ² = 1.532, df = 15 (P = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (P = 0.14); l ² = 2% Test for overall effect: Z = 1.49 (P = 0.14); l ² = 2% Test for overall effect: Z = 1.49 (P = 0.14); l ² = 2% Test for overall effect: Z = 1.49 (F = 0.14); l ² = 2% Test for overall effect: Z = 1.49 (F = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (F = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (F = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (F = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (F = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (F = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (F = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (F = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (F = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (F = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (F = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (F = 0.43); l ² = 2% Test for	Chang 2010							
Telsćn 2006 (2) 0.01267064 0.31113591 1017 966 2.4% 1.01 [0.55, 1.86] Sazawal 2006 0.05826891 0.10048763 13294 13318 23.00% 1.06 [0.88, 1.27] Heterogeneity, Chi ² = 2.56, df = 5 (P = 0.77); l ² = 0% Test for overall effect: Z = 0.60 (P = 0.55) 3.1.2 1 to < 5 years Larson 2010 1.10424611 1.6295395 176 177 0.1% 3.02 [0.12, 73.56] Penny 2004 -1.58534036 1.54139551 81 83 0.1% 0.20 [0.01, 4.20] Mandari 2002 -1.93942189 1.51132135 1228 1236 0.1% 0.20 [0.01, 4.20] Mandari 2002 -1.93942189 1.1435145 136 138 0.2% 0.51 [0.05, 5.60] Muller 2001 -0.6670019 1.2193957 151 155 0.2% 0.51 [0.05, 5.60] Muller 2001 -0.86670956 0.52677681 341 344 0.8% 0.42 [0.15, 1.18] Tielsch 2006 (2) -0.03756725 0.11932628 8120 7950 16.3% 0.96 [0.76, 1.22] Bhandari 2007 0.04493755 0.11932628 8120 7950 16.3% 0.96 [0.76, 1.22] Bhandari 2007 0.0493755 0.11932628 8120 7950 16.3% 0.82 [0.68, 0.99] Subtotal (95% CI) 60.9383509 9380 7951 24.0% 0.82 [0.68, 0.99] Subtotal (95% CI) 78189 77593 100.0% 0.93 [0.85, 1.02] Test for overall effect: Z = 1.30 (P = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (P = 0.14) Test for subgroup differences: Chi ² = 2.48, df = 1 (P = 0.11), l ² = 59.8%								
Sazawal 2006 0.05826891 0.10048763 13294 13318 23.0% 1.06 [0.87, 1.29] 14952 14927 25.9% 1.06 [0.87, 1.29] 14952 14927 25.9% 1.06 [0.88, 1.27] Heterogeneity: Chi ² = 2.56, df = 5 (P = 0.77); l ² = 0% Test for overall effect: Z = 0.60 (P = 0.55) 3.1.2 1 to < 5 years Larson 2010 1.10424611 1.6295395 176 177 0.1% 3.02 [0.12, 73.56] Penny 2004 -1.58534036 1.54139551 81 83 0.1% 0.20 [0.01, 4.20] Bhandari 2002 -1.93942189 1.51132135 1228 1236 0.1% 0.14 [0.01, 2.78] Weenemans 2011 (2) -0.66670916 9.12193957 151 155 0.2% 0.21 [0.05, 5.60] Shankar 2000 1.11321109 1.14836145 136 138 0.2% 3.04 [0.32, 28.90] Muller 2001 -0.086670956 0.5267768 1341 344 0.8% 0.42 [0.15, 1.18] Bhandari 2007 0.0443755 0.11212408 36293 36145 18.4% 1.05 [0.64, 1.30] Sazawal 2006 -0.19845094 0.09838509 780 7954 24.0% 0.82 [0.68, 0.99] Subtotal (95% CI) 70.9845094 0.09838509 780 7954 24.0% 0.82 [0.68, 0.99] Subtotal (95% CI) 70.9845094 0.09838509 77593 100.0% 0.93 [0.85, 1.02] Heterogeneity: Chi ² = 1.28, df = 9 (P = 0.33); l ² = 2% Test for overall effect: Z = 0.04) Total (95% CI) 71.52 df = 15 (P = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (P = 0.11), l ² = 59.8%	Tielsch 2006 (2)							·
Heterogeneity: $Chi^2 = 2.56$, $df = 5$ ($P = 0.77$); $l^2 = 0\%$ Test for overall effect: $Z = 0.60$ ($P = 0.55$) 3.1.2 1 to < 5 years Larson 2010 1.10424611 1.6295395 176 177 0.1% 3.02 [0.12, 73.56] Penny 2004 -1.58534036 1.54139551 81 83 0.1% 0.20 [0.01, 4.20] Bhandari 2002 -1.93942189 1.511322135 1228 1236 0.1% 0.14 [0.01, 2.78] Veenemans 2011 (2) -0.6670019 1.2193957 151 155 0.2% 3.04 [0.02, 2.8:90] Muller 2001 -0.6670019 0.5267768 1341 344 0.8% 0.42 [0.15, 1.02] Sazawal 2006 (2) -0.2948879 0.12870764 8731 8484 14.0% 0.79 [0.62, 1.02] Sazawal 2006 (2) -0.03756725 0.11922408 36293 36145 18.4% 1.05 [0.84, 1.30] Tielsch 2007 0.04493755 0.11212408 36293 36145 18.4% 1.05 [0.84, 1.30] Bhandari 2007 0.0493755 0.11212408 36293 36145 18.4% 1.05 [0.84, 1.30] Heterogeneity: $Chi^2 = 10.28$, $df = 9$ ($P = 0.33$); $l^2 = 12\%$ Test for overall effect: $Z = -2.08$ ($P = 0.04$) Total (95% CI) 78189 77593 100.0% 0.93 [0.85, 1.02] Heterogeneity: $Chi^2 = 15.32$, $df = 15$ ($P = 0.43$); $l^2 = 2\%$ Test for subgroup differences: $Chi^2 = 2.48$, $df = 1$ ($P = 0.11$), $l^2 = 59.8\%$	Sazawal 2006			13294	13318	23.0%	1.06 [0.87, 1.29]	<u>+</u>
Test for overall effect: $Z = 0.60 (P = 0.55)$ 3.1.2 1 to < 5 years Larson 2010 1.10424611 1.6295395 176 177 0.1% 3.02 [0.12, 73.56] Penny 2004 -1.58534036 1.54139551 81 83 0.1% 0.20 [0.01, 4.20] Bhandari 2002 -1.93942189 1.51132135 1228 1236 0.1% 0.14 [0.01, 2.78] Veenemans 2011 (2) -0.6670019 1.21393957 151 155 0.2% 0.51 [0.05, 5.60] Muller 2001 -0.86670956 0.52677681 341 344 0.8% 0.42 [0.15, 1.18] Tielsch 2006 -0.22948879 0.12870764 8731 848 140.% 0.79 [0.62, 1.02] Bhandari 2007 0.04493755 0.11212408 36293 36145 18.4% 1.05 [0.84, 1.30] Sazawal 2006 (2) -0.03756725 0.11212408 36293 36145 18.4% 1.05 [0.84, 1.30] Sazawal 2006 -0.19845094 0.09838509 07980 7754 24.0% 0.82 [0.68, 0.99] Heterogeneity: Chi ² = 10.28, df = 9 (P = 0.33); l ² = 12% Test for overall effect: $Z = 2.08 (P = 0.04)$ Total (95% C) 78189 77593 100.0% 0.93 [0.85, 1.02] Heterogeneity: Chi ² = 15.32, df = 15 (P = 0.43); l ² = 2% Test for overall effect: $Z = 1.49 (P = 0.14)$ Total (95% C) 78189 77593 100.0% 0.93 [0.85, 1.02] Heterogeneity: Chi ² = 15.32, df = 15 (P = 0.43); l ² = 2% Test for overall effect: $Z = 1.49 (P = 0.14)$ Total (95% C) 78189 77593 100.0% 0.93 [0.85, 1.02] Heterogeneity: Chi ² = 15.32, df = 15 (P = 0.43); l ² = 2% Test for overall effect: $Z = 1.49 (P = 0.14)$ Test for subgroup differences: Chi ² = 2.48, df = 1 (P = 0.11), l ² = 59.8%		$P_{156} df = 5 (P = 0)$	$(0,77) \cdot I^2 = 0\%$	14952	14927	25.9%	1.06 [0.88, 1.27]	–
Larson 2010 1.10424611 1.6295395 176 177 0.1% 3.02 [0.12, 73.56] Penny 2004 -1.58534036 1.54139551 81 83 0.1% 0.20 [0.01, 4.20] Bhandari 2002 -1.93942189 1.5113213 1228 1236 0.1% 0.14 [0.01, 2.78] Veenemans 2011 (2) -0.6670019 1.2193957 151 155 0.2% 0.51 [0.05, 5.60] Muller 2001 -0.66670956 0.52677681 341 344 0.8% 0.42 [0.15, 1.18] Telsch 2006 -0.22948879 0.12870764 8731 8484 14.0% 0.79 [0.62, 1.02] Sazawal 2006 (2) -0.03756725 0.11932628 8120 7950 16.3% 0.96 [0.76, 1.22] Bhandari 2007 0.04493755 0.11212408 36293 36145 18.4% 1.05 [0.84, 1.30] Sazawal 2006 -0.19845094 0.09838509 7980 7954 24.0% 0.82 [0.68, 0.99] Heterogeneity: Chi ² = 10.28, df = 9 (P = 0.33); l ² = 12% Test for overall effect: Z = 2.08 (P = 0.04) Total (95% CI) 78189 77593 100.0% 0.93 [0.85, 1.02] Heterogeneity: Chi ² = 15.32, df = 15 (P = 0.43); l ² = 2% Test for subgroup differences: Chi ² = 2.48, df = 1 (P = 0.11), l ² = 59.8% Favours Zinc Favours N								
Penny 2004 -1.58534036 1.54139551 81 83 0.1% 0.20 [0.01, 4.20] Bhandari 2002 -1.93942189 1.51132135 1228 1236 0.1% 0.14 [0.01, 2.78] Weenemans 2011 (2) -0.6670019 1.2193957 151 155 0.2% 0.510(0.5, 5.60] Muller 2001 -0.86670956 0.52677681 341 344 0.8% 0.42 [0.15, 1.18] Telsch 2006 (-0.22948879 0.12870764 8731 8484 14.0% 0.79 [0.62, 1.02] Sazawal 2006 (2) -0.03756725 0.11932628 8120 7950 16.3% 0.96 [0.76, 1.22] Bhandari 2007 0.0449375 0.11212408 36293 36145 18.4% 1.05 [0.84, 1.30] Sazawal 2006 (-0.19845094 0.09838509 7980 7954 24.0% 0.82 [0.68, 0.99] Subtoal (95% CI) 78189 77593 100.0% 0.93 [0.85, 1.02] Heterogeneity: Chi ² = 10.28, df = 9 (P = 0.33); l ² = 12% Test for overall effect: Z = 2.08 (P = 0.04) Total (95% CI) 78189 77593 100.0% 0.93 [0.85, 1.02] Heterogeneity: Chi ² = 1.5.32, df = 15 (P = 0.43); l ² = 2% Test for subgroup differences: Chi ² = 2.48, df = 1 (P = 0.11), l ² = 59.8%		1.10424611	1.6295395	176	177	0.1%	3.02 [0.12, 73,56]	•
Veenemans 2011 (2) -0.6670019 1.2193957 151 155 0.2% 0.51 [0.05, 5.60] Shankar 2000 1.11321109 1.14836145 136 138 0.2% 0.42 [0.51, 1.18] Tielsch 2006 -0.86670956 0.52677681 341 344 0.8% 0.42 [0.15, 1.18] Tielsch 2006 -0.22948879 0.12870764 8731 8484 14.0% 0.79 [0.62, 1.02] Sazawal 2006 (2) -0.03756725 0.11932628 8120 7950 16.3% 0.96 [0.76, 1.22] Shandari 2007 0.04493755 0.112212048 36293 36145 18.4% 1.05 [0.84, 1.30] Sazawal 2006 -0.19845094 0.09838509 7980 7954 24.0% 0.82 [0.68, 0.99] Subtoal (95% CI) Heterogeneity: Chi ² = 10.28, df = 9 (P = 0.33); l ² = 12% Test for overall effect: Z = 1.49 (P = 0.44) Total (95% CI) Heterogeneity: Chi ² = 15.32, df = 15 (P = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (P = 0.14) Test for subgroup differences: Chi ² = 2.48, df = 1 (P = 0.11), l ² = 59.8% Test for subgroup differences: Chi ² = 2.48, df = 1 (P = 0.11), l ² = 59.8%	Penny 2004	-1.58534036	1.54139551		83	0.1%	0.20 [0.01, 4.20]	•
Shankar 2000 Muller 2001 -0.86670956 0.5267768 341 344 344 0.8% 0.42 [0.15, 1.18] Tielsch 2006 -0.22948879 0.22870764 8731 8484 14.0% 0.90 [0.62, 1.02] Bhandari 2007 0.04493755 0.11932628 8120 7950 16.3% 0.96 [0.76, 1.22] Bhandari 2007 0.04493755 0.11212408 36293 36145 18.4% 1.05 [0.84, 1.30] Subtotal (95% CI) Fest for overall effect: Z = 2.08 (P = 0.33); l ² = 12% Test for overall effect: Z = 2.08 (P = 0.33); l ² = 12% Test for overall effect: Z = 2.08 (P = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (P = 0.14) Test for subgroup differences: Chl ² = 2.48, df = 1 (P = 0.11), l ² = 59.8%	Bhandari 2002							
Muller 2001 -0.86670956 0.52677681 341 344 0.8% 0.42 [0.15, 1.18] Tielsch 2006 -0.022948879 0.12870764 8731 8484 14.0% 0.79 [0.62, 1.02] Sazawal 2006 (2) -0.03756725 0.11322628 8120 7950 16.3% 0.96 [0.76, 1.22] Bhandari 2007 0.04493755 0.11212408 36293 36145 18.4% 1.05 [0.84, 1.30] Sazawal 2006 -0.19845094 0.09838509 7980 7954 24.0% 0.82 [0.68, 0.99] Meterogeneity: Chi ² = 10.28, df = 9 (P = 0.33); l ² = 12% Test for overall effect: Z = 2.08 (P = 0.04) Total (95% CI) 78189 77593 100.0% 0.93 [0.85, 1.02] Heterogeneity: Chi ² = 15.32, df = 15 (P = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (P = 0.14) Test for subgroup differences: Chi ² = 2.48, df = 1 (P = 0.11), l ² = 59.8% Test for subgroup differences: Chi ² = 2.48, df = 1 (P = 0.11), l ² = 59.8%	Shankar 2000							·
Sazawal 2006 (2) -0.03756725 0.11932628 8120 7950 16.3% 0.96 [0.76, 1.22] Bhandari 2007 0.04493755 0.11212408 36293 36145 18.4% 1.05 [0.84, 1.30] -0.19845094 0.09838509 7980 7954 24.0% 0.82 [0.68, 0.99] Subtotal (95% CI) 63237 62666 74.1% 0.89 [0.80, 0.99] Heterogeneity: Chi ² = 10.28, df = 9 (P = 0.33); l ² = 12% Test for overall effect: Z = 2.08 (P = 0.04) Total (95% CI) 78189 77593 100.0% 0.93 [0.85, 1.02] Heterogeneity: Chi ² = 15.32, df = 15 (P = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (P = 0.14) Test for subgroup differences: Chi ² = 2.48, df = 1 (P = 0.11), l ² = 59.8%	Muller 2001	-0.86670956	0.52677681	341	344	0.8%	0.42 [0.15, 1.18]	<+
Bhandari 2007 0.04493755 0.11212408 36293 36145 18.4% 1.05 [0.84, 1.30] Sazawal 2006 -0.19845094 0.09838509 7980 7954 24.0% 0.82 [0.68, 0.99] Subtotal (95% CI) 62337 62666 74.1% 0.89 [0.80, 0.99] Heterogeneity: Chi ² = 10.28, df = 9 (P = 0.33); l ² = 12% Test for overall effect: Z = 2.08 (P = 0.04) Total (95% CI) 78189 77593 100.0% 0.93 [0.85, 1.02] Heterogeneity: Chi ² = 15.32, df = 15 (P = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (P = 0.14) Test for subgroup differences: Chi ² = 2.48, df = 1 (P = 0.11), l ² = 59.8%								
Subtotal (95% CI) 63237 62666 74.1% 0.89 $[0.80, 0.99]$ Heterogeneity: Chi ² = 10.28, df = 9 (P = 0.33); l ² = 12% Test for overall effect: Z = 2.08 (P = 0.04) Total (95% CI) 78189 77593 100.0% 0.93 $[0.85, 1.02]$ Heterogeneity: Chi ² = 15.32, df = 15 (P = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (P = 0.14) Test for subgroup differences: Chi ² = 2.48, df = 1 (P = 0.11), l ² = 59.8%	Bhandari 2007							
Heterogeneity: $Chi^2 = 10.28$, $df = 9$ (P = 0.33); $l^2 = 12\%$ Test for overall effect: Z = 2.08 (P = 0.04) Total (95% CI) 78189 77593 100.0% 0.93 [0.85, 1.02] Heterogeneity: $Chi^2 = 15.32$, $df = 15$ (P = 0.43); $l^2 = 2\%$ Test for overall effect: Z = 1.49 (P = 0.14) Test for subgroup differences: $Chi^2 = 2.48$, $df = 1$ (P = 0.11), $l^2 = 59.8\%$	Sazawal 2006	-0.19845094	0.09838509					
Total (95% CI) 78189 77593 100.0% 0.93 [0.85, 1.02] Heterogeneity: Chi ² = 15.32, df = 15 (P = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (P = 0.14) Test for subgroup differences: Chi ² = 2.48, df = 1 (P = 0.11), l ² = 59.8% Favours Zinc Favours N	Heterogeneity: Chi ² = 1				62666	74.1%	0.89 [0.80, 0.99]	•
Heterogeneity: Chi ² = 15.32, df = 15 (P = 0.43); l ² = 2% Test for overall effect: Z = 1.49 (P = 0.14) Test for subgroup differences: Chi ² = 2.48, df = 1 (P = 0.11), l ² = 59.8%		Z = 2.08 (P = 0.04)	4)	78189	77593	100.0%	0.93 [0.85, 1.02]	•
Test for overall effect: Z = 1.49 (P = 0.14) Test for subgroup differences: Chi ² = 2.48, df = 1 (P = 0.11), l ² = 59.8%	Heterogeneity: $Chi^2 = 1$							
				0 1 1) 1	2 - 59.8%			
	i est for sus group unie				55167			

BMJ Open

3.9.1 Long co-intervention Meeks Gardner 2005 -4.43672263 1.42163731 55 59 0.0% 0.01 0.00 0.18 • Aarcon 2004 -0.3504349 0.93738896 75 68 0.1% 0.77 0.37 0.18 • Rosido 1997 (2) -0.25044108 0.18860745 55 54 0.4% 0.59 0.4% 0.59 0.4% 0.59 0.4% 0.59 0.4% 0.59 0.4% 0.59 0.4% 0.59 0.4% 0.59 0.4% 0.59 0.4% 0.59 0.4% 0.59 0.4% 0.59 0.4% 0.59 0.4% 0.59 0.4% 0.59 0.5% 0.5% 0.6% 0.4% 0.99 0.5% 0.5	Meeks Cardner 2005 -4.48367263 1.42163731 55 59 0.0% 0.01 0.07 0.03 1.601 Cole 2012 -0.2603449 0.37388896 55 54 0.4% 0.59 0.41 0.33 0.23 Rosado 1997 (2) -0.52044108 0.18860745 55 54 0.4% 0.59 0.41 0.86 Vennemas 2011 (2) -0.2710424 0.17803183 151 155 0.4% 0.66 0.91 - Chang 2016 (2) -0.25350318 0.09341843 100 1.04 0.93 1.221 - Sodi 2013 0.03849306 0.05540904 162 165 1.71% 1.04 (0.99, 1.09) - </th <th>Meeks Gardner 2005 Cole 2012</th> <th>ntion</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>IV, Fixed, 9</th>	Meeks Gardner 2005 Cole 2012	ntion						IV, Fixed, 9
Cole 2012 -0.26503449 0.37388996 75 68 0.1% 0.77 0.37, 1.50 Aaron 2004 -0.33963305 0.30181636 111 110 0.1% 0.71 0.39, 1.29 Rosado 1997 (2) -0.52044108 0.18660745 55 54 0.4% 0.59 0.41, 0.68 Lind 2003 (2) -0.2715896 0.09311961 170 170 1.4% 0.33 (0.57, 1.12) Chag 2010 (2) -0.23350318 0.0794888 400 201 2.0% 0.76 [0.54, 1.08] Richard 2006 (2) 0.08849308 0.05540904 162 165 4.0% 1.09 [0.99, 1.09] Subtoal (05% CD) 0.03774033 0.02689562 283 865 1.71% 1.04 (0.99, 1.09] Subtoal (05% CD) 0.03774033 0.2680564 201 201 0.1% 0.76 [0.37, 1.56] Chag 2010 (2) -0.27537422 0.36843806 201 201 0.1% 0.55 [0.29, 1.06] Han 2002 (2) -0.77517058 0.228075433 32 2.02% 0.41 (0.26, 0.44) 1.44 Meeks Cardner 1998 0.00421645	Cole 2012 -0.26503449 0.37388396 75 68 0.1% 0.77 0.37 1.001 Alarcon 2004 -0.33963305 0.30181635 112 111 0.1% 0.71 0.391.1291 Rosado 1997 (2) -0.27010424 0.17803183 151 155 0.4% 0.78 0.654.1.081 Lind 2003 (2) -0.07145866 0.09311961 170 170 1.4% 0.98 0.601.91.1.181 Richard 2006 (2) 0.0849308 0.05540904 162 165 4.0% 1.09 1.091 Sodi 2013 0.03774033 0.02283562 23 865 1.71% 1.04 0.99 1.091 Heterogeneity: Chi ² = 37.33, df = 9 (P < 0.0001); I ² = 76% 7243 2056 28.4% 1.00 [0.96, 1.05] Subtoal (95% CD) 0.27357422 0.36843806 201 0.1% 0.76 [0.37, 1.56] 1.14 Heterogeneity: Chi ² = 37.33, df = 9 (P < 0.0001); I ² = 76% 755 2243 2056 2.84 1.00 [0.61, 1.66] 1.014 Heterogeneity: Chi ² = 37.32, 20.262944 0.28 0.28 0.46 [0.47, 1.05] 1.14 <td< td=""><td>Cole 2012</td><td></td><td></td><td></td><td></td><td>-</td><td></td><td></td></td<>	Cole 2012					-		
Alarcon 2004 -0.33963305 0.30181636 112 111 0.1% 0.71 [0.39, 1.29] Rosado 1997 (2) -0.27010424 0.17803183 151 155 0.4% 0.76 [0.54, 1.08] Lind 2003 (2) -0.2714586 0.09311961 170 170 1.4% 0.39 [0.78, 1.12] Chang 2010 (2) -0.25350318 0.0794688 400 201 2.0% 0.78 [0.66, 0.91] Richard 2006 (2) 0.03619335 0.06581383 210 208 2.9% 1.04 [0.91, 1.18] Baqui 2003 (2) 0.03619335 0.02689522 833 865 17.1% 1.04 [0.98, 1.22] Sond 2013 0.03774033 0.02689522 833 865 17.1% 1.04 [0.98, 1.22] Sond 2013 0.03774033 0.02689522 833 865 17.1% 1.04 [0.98, 1.09] Heterogeneity: Ch ² 37.33, df = 9 (P < 0.0001); f ² 76% Test for overall effect: Z = 0.20 (P = 0.84) 3.92 No iron co-intervention Chang 2010 (2) -0.27537422 0.36843806 201 201 0.1% 0.76 [0.37, 1.56] Chang 2010 -0.5897851 0.31349677 198 201 0.1% 0.75 [0.29, 1.06] Han 2002 (2) -0.75662302 0.28075433 33 22 0.2% 0.47 [0.27, 0.51] Heterogeneity: Ch ² 37.33, df = 9 (P < 0.0201); f ² 76% Test for overall effect: Z = 0.220 (P = 0.84) 3.92 No iron co-intervention Chang 2010 (2) -0.27537422 0.36843806 201 201 0.1% 0.76 [0.37, 1.56] Chang 2010 -0.5897851 0.3214967 198 201 0.1% 0.76 [0.37, 1.56] Han 2002 (2) -0.17923468 0.27919905 24 26 0.2% 0.44 [0.48, 1.44] Meeks Gardner 1998 0.00421645 0.25610818 31 30 0.2% 1.00 [0.61, 1.66] Han 2002 (2) -0.1778304 0.02202024 4 56 0.3% 0.67 (0.48, 1.44] Meeks Gardner 1998 0.00421645 0.25610818 31 30 0.2% 0.41 [0.26, 0.48] Hume 2001 -0.2342699 0.19743482 153 153 0.3% 0.40 [0.54, 1.18] Penny 2004 -0.11778304 0.10486269 0.79 1.1% 0.88 [0.72, 1.09] Ruel 1997 -0.25131443 0.10417938 55 53 1.1% 0.78 [0.63, 0.95] Gupta 2007 -0.14606247 0.097381 854 858 1.3% 0.48 [0.61, 0.89] Lind 2003 -0.028318108 0.02731507 110 1.5% 1.07 [0.68, 0.93] Mulie 2001 -0.1335180 0.057397021 161 137% 0.48 [0.63, 0.95] Humat 2001 -0.1335139 0.057397021 170 1155 1.07 (0.50, 8.63] Humat 2001 -0.1335139 0.057397021 170 1151 8.3% 0.78 [0.68, 0.93] Humat 2001 -0.1335139 0.057397021 170 151 8.3% 0.78 [0.98, 1.30] Humat 2001 -0.1335139 0.057397021 161 137, % 0.8	Alarcon 2004 -0.3366305 0.30181636 112 111 0.1% 0.71 [0.39, 1.29] Rosade 1997 (2) -0.27010424 0.17803183 151 155 0.4% 0.59 [0.41, 0.86] Veenemars 2011 (2) -0.27010424 0.17803183 151 155 0.4% 0.76 [0.54, 1.08] Lind 2003 (2) -0.07145896 0.09311961 170 170 1.4% 0.93 [0.78, 1.12] Richard 2006 (2) 0.03619935 0.00551383 210 208 2.9% 1.04 [0.98, 1.22] Soofi 2013 0.03774033 0.02689526 853 865 17.1% 1.04 [0.99, 1.09] Subtotal (95% C) Heterogeneity: Ch ² = 37.33, df = 9 (< 0.0001); l ² = 76% Test for overall effect: Z = 0.20 (P = 0.84) 3.2.2 No ion co-intervention Chang 2010 (2) -0.27537422 0.36843806 201 201 0.1% 0.76 [0.37, 1.56] Chang 2010 (2) -0.27537422 0.36843806 201 201 0.1% 0.76 [0.37, 1.56] Heterogeneity: Ch ² = 37.33, df = 9 (< 0.0001); l ² = 76% Test for overall effect: Z = 0.20 (P = 0.84) 3.2.2 No ion co-intervention Chang 2010 (2) -0.27537422 0.36843806 201 201 0.1% 0.76 [0.37, 1.56] Han 2002 -0.75662302 0.28075433 33 22 0.2% 0.47 [0.27, 0.81] Han 2002 -0.7517038 0.23234928 100 100 0.2% 0.46 [0.29, 0.72] Cupta 2003 -0.8381788 0.22473329 186 94 0.2% 0.44 [0.48, 1.44] Meeks Cardner 1998 0.0421645 0.22473329 186 94 0.2% 0.46 [0.29, 0.72] Cupta 2003 -0.8381788 0.22473329 186 94 0.2% 0.46 [0.29, 0.72] Cupta 2003 -0.8381788 0.22473329 186 94 0.2% 0.46 [0.29, 0.72] Cupta 2003 -0.8381788 0.22473329 186 94 0.2% 0.46 [0.29, 0.72] Cupta 2003 -0.6381788 0.22473329 186 94 0.2% 0.41 [0.26, 0.64] Rosado 1997 -0.2318148 0.01973482 153 153 0.33% 0.86 [0.74, 1.18] Penny 2004 -0.11778304 0.10486269 80 79 1.1% 0.89 [0.54, 1.18] Penny 2004 -0.11778304 0.10486269 100 0.2% 0.46 [0.29, 0.72] Cupta 2007 -0.41660347 0.097381 854 858 1.3% 0.86 [0.71, 1.05] Cupta 2007 -0.41660347 0.097381 854 858 1.3% 0.86 [0.71, 1.05] Cupta 2007 -0.23181480 0.08123116 176 177 1.9% 0.77 [0.65, 0.89] Cupta 2007 -0.2416469 0.0707551 12 2.3% 0.75 [0.66, 0.87] Chagan 2009 -0.04913269 0.07335707 104 105 2.3% 0.75 [0.66, 0.87] Chagan 2009 -0.04913269 0.07335707 104 105 2.3% 0.95 [0.84, 1.107] Rahman 2001 (2) -0.2581048 1.								•
Bosdo 1997 (2) -0.5204108 0.18680745 55 54 0.4% 0.59 [0.41, 0.86] Venemans 2011 (2) -0.2710424 0.17803183 151 155 0.4% 0.76 [0.54, 1.08] Ind 2003 (2) -0.273530318 0.0794688 400 210 2.0% 0.78 [0.564, 0.91] Chang 2010 (2) -0.25350318 0.05540904 162 165 4.0% 1.09 [0.98, 1.22] Soofi 2013 0.08849308 0.05540904 162 165 4.0% 1.09 [0.98, 1.22] Subtotal (95% C) 0.08774033 0.02689526 283 865 1.711* 1.04 [0.96, 1.05] Heterogeneity: Chi ⁺ = 37.33, df = 9 (P < 0.0001); h ⁺ = 76% 786 786 786 786 Test for overall effect: Z = 0.20 (P = 0.84) 3.92 0.2% 0.40 [0.37, 1.56] -0.480 (0.27, 0.81] -0.1% 0.76 [0.37, 1.56] Han 2002 (2) -0.75623202 0.28075433 33 22 0.2% 0.41 [0.26, 0.64] -0.480 (0.48, 1.44] Meeks Gardner 1998 0.00421645 0.2280294 56 0.3% 0.67 [0.54, 1.18] -0.78 [0.63, 0.57] -0.18 (0.48, 1.44] -0.78 [0.63, 0.57] -0.18 (0.48, 1.44] -0.78 [0.63, 0.57] -0.18 (0.18, 0.50] -0.28 (0.48, 0.71, 0.5]	Bosado 1997 (2) -0.52044108 0.18680745 55 54 0.4% 0.59 0.4% 0.59 0.4% 0.59 0.4% 0.59 0.4% 0.59 0.4% 0.59 0.4% 0.59 0.4% 0.59 0.4% 0.54 1.08 1.142 0.0716124 0.17803183 151 155 0.4% 0.76 0.54, 1.18 1.121 1.142 0.0716126 0.051126 0.0716126 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>								
Veenemans 2011 (2) -0.27014624 0.07803183 151 155 0.4% 0.76 [0.54, 1.08] Lind 2003 (2) -0.07145896 0.09311961 170 170 170 170 Richard 2006 (2) 0.03619935 0.06581383 210 208 2.9% 1.04 [0.91, 1.18] Baqui 2003 (2) 0.08849308 0.05540904 [62 165 4.0% 1.09 [0.98, 1.22] Sobiotal (95% CD) 0.03774033 0.02689526 853 865 17.1% 1.04 [0.99, 1.09] Subtotal (95% CD) -0.27537422 0.36843806 201 201 0.1% 0.76 [0.37, 1.56] Test for overall effect: Z = 0.20 (P = 0.84) -0.75662302 0.28075433 33 22 0.2% 0.47 [0.27, 0.81] Han 2002 (2) -0.7562302 0.28075433 33 22 0.2% 0.46 [0.29, 0.72] -0.4188729 0.02280294 54 56 0.3% 0.67 [0.45, 1.08] Han 2002 (2) -0.78317826 0.22473329 186 94 0.2% 0.46 [0.29, 0.72] -0.4188729 0.2280294 54 56 0.3% 0.67 [0.45, 1.18] Meeks Cardner 1998 0.0243645 0.0919743482 153 1.33 0.38 (0.67 [0.45, 1.18] -0.2731443 0.10417938 55 3.314967 71 1.76 [0.53, 0.95] Cupta 2003 -0.2813443 0.10417938 55 3.314 867 71 1.9% 0.78 [0.63, 0.95] -0.41867034 0.0973811 854 <td>Veenemans 2011 (2) -0.27014240 0.7803183 151 155 0.4% 0.76 [0.54, 1.06] Chang 2010 (2) -0.02145896 0.09311961 170 170 170 1.0% 0.38 [0.67, 0.91] </td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>	Veenemans 2011 (2) -0.27014240 0.7803183 151 155 0.4% 0.76 [0.54, 1.06] Chang 2010 (2) -0.02145896 0.09311961 170 170 170 1.0% 0.38 [0.67, 0.91]								
Lind 2003 (2) -0.0714896 0.09311961 170 170 1.4% 0.93 (0.78, 1.12) Chang 2010 (2) -0.25350318 0.0794688 400 201 2.0% 0.78 (0.66, 0.91) Richard 2006 (2) 0.0849308 0.05540904 162 165 4.0% 1.09 [0.98, 1.22] Subtoal (95% C) 2243 2056 28.4% 1.00 [0.96, 1.05] Heterogeneity: Ch ² = 37.33, df = 9 (P < 0.0001); f ² = 76% Test for overall effect: Z = 0.20 (P = 0.84) 3.2 No iron co-intervention Chang 2010 (2) -0.27537422 0.36843806 201 201 0.1% 0.76 [0.37, 1.56] Chang 2010 (2) -0.27537422 0.36843806 201 201 0.1% 0.75 [0.37, 1.56] Chang 2010 (2) -0.27537422 0.36843806 201 201 0.1% 0.55 [0.29, 1.06] Han 2002 (2) -0.17923468 0.27919905 24 26 0.2% 0.4% (0.48, 1.44] Meeks Cardner 1998 0.00421645 0.25610818 31 30 0.2% 0.4% (0.48, 1.44] Meeks Cardner 1998 0.00421645 0.25610818 31 30 0.2% 0.4% (0.29, 0.72] Cupta 2003 -0.89381788 0.22473329 186 94 0.2% 0.41 [0.26, 0.64] Wenemans 2011 -0.22342699 0.1974482 153 153 0.3% 0.80 [0.54, 1.18] Penny 2004 -0.11778304 0.10486268 80 79 1.1% 0.89 [0.72, 1.09] Kuel 1997 -0.25131443 0.10417938 55 53 1.1% 0.78 [0.63, 0.95] Cupta 2007 -0.14660347 0.0997381 854 858 1.3% 0.86 [0.71, 1.05] Weenemans 2011 -0.22342699 0.1974382 153 153 0.3% 0.80 [0.54, 1.18] Penny 2004 -0.11778304 0.0412938 55 53 1.1% 0.78 [0.63, 0.95] Cupta 2007 -0.14660347 0.09961332 33 116 1.3% 0.77 [0.63, 0.95] Cupta 2007 -0.14660347 0.09961332 33 116 1.3% 0.77 [0.63, 0.93] Muler 2001 -0.1477255 0.07559502 342 344 2.1% 0.87 [0.57, 0.18] Lind 2003 -0.06899287 0.09061527 170 1.5% 1.07 [0.68, 0.87] Lind 2006 -0.22318180 0.06123116 176 177 1.9% 0.77 [0.68, 0.87] Muler 2001 -0.1477255 0.07559502 342 344 2.1% 0.87 [0.57, 0.88] Heterogeneity: Ch ² = 196.27, df = 25 (P < 0.00001); f ² = 87% Test for overall effect: Z = 14.48 (P < 0.00001); Total (95% C1) 8093 7550 100.0% 0.87 [0.85, 0.89] Heterogeneity: Ch ² = 298.70, df = 35 (P < 0.00001); f ² = 87% Test for subgroup differences: Ch ² = 65.11, df = 1 (P < 0.00001); f ² = 98.5%	Lind 2003 (2) -0.07148896 0.09311961 170 1.7% 1.4% 0.93 [0.78, 1.12]								
Chang 2010 (2) -0.2535018 0.0794688 400 201 2.0% 0.78 (0.66, 0.91) Richard 2006 (2) 0.0361935 0.06581383 210 208 2.9% 1.04 (0.91, 1.18) Bagu 2003 (2) 0.03774033 0.02689562 853 865 17.1% 1.04 (0.99, 1.09) Subtoal 05% (1) -0.37734722 0.36843806 201 201 0.1% 0.76 (0.37, 1.56) Heterogeneity: Chi ² = 37.33, df = 9 (P < 0.0001); t ² = 76% Test for overall effect: Z = 0.20 (P = 0.84) 3.92 No inon co-intervention Chang 2010 - 0.27537422 0.36843806 201 201 0.1% 0.76 (0.37, 1.56) Han 2002 (2) -0.17923468 0.27919005 24 26 0.2% 0.4% (0.48, 1.44) Meeks Cardner 1998 0.00421645 0.25610818 31 30 0.2% 1.00 [0.61, 1.66] Han 2002 (2) -0.71823468 0.22473329 186 94 0.2% 0.44 (0.48, 1.44) Meeks Cardner 1998 0.00421645 0.25610818 31 30 0.2% 1.00 [0.61, 1.66] Umeta 2000 -0.78170058 0.23234928 100 100 0.2% 0.46 (0.29, 0.72] Cupta 2003 -0.89381788 0.242473329 186 94 0.2% 0.44 (0.24, 0.44) Rosado 1997 -0.40188729 0.0280294 54 56 0.3% 0.67 (0.45, 1.00] Veenemas 2011 -0.22342699 0.0973818 55 53 1.1% 0.78 (0.53, 0.95] Cupta 2007 -0.14660347 0.097381 854 858 1.3% 0.86 (0.71, 1.18] Penny 2004 -0.11778304 0.10482629 80 79 1.1% 0.89 (0.24, 1.18] Penny 2004 -0.11778304 0.1047255 0.0759502 342 334 4 2.1% 0.87 (0.57, 1.09] Wuehler 2008 -0.3010459 0.09601332 353 1116 1.3% 0.74 (0.61, 0.89] Lind 2003 -0.6889287 0.09605827 170 170 1.5% 1.07 (0.90, 1.28] Larson 2010 -0.23381808 0.08123116 176 177 1.9% 0.79 (0.68, 0.93] Hidler 2001 -0.14077255 0.07735910 342 344 2.1% 0.87 (0.57, 1.01] Chagan 2009 -0.04313269 0.07359701 140 155 2.3% 0.95 (0.84, 1.07] Rahman 2001 (2) -0.26510498 0.07359701 24 152 2.5% 0.75 (0.66, 0.87] Long 2006 (2) -0.26510498 0.07359701 24 152 2.5% 0.75 (0.66, 0.87] Long 2006 (2) -0.26510498 0.07359701 24 152 2.5% 0.75 (0.66, 0.87] Long 2006 (2) -0.26510498 0.07359701 24 157 3.8% 0.98 (0.87, 1.09] Sazawal 1996 -0.04811676 1.07 1.5% 1.07 (0.67, 0.88] Rahman 2001 (2) -0.05301355 0.0201358 134 124 14.5% 0.61 (0.58, 0.65] Bhaduat 2002 -0.0353535 0.0201358 134 124 14.5% 0.61 (0.58, 0.65] Bhaduat 2002 -0.0353	Chang 2010 (2) -0.25350318 0.0794688 400 201 2.0% 0.78 [0.66, 0.91] Richard 2006 (2) 0.0361935 0.06581338 210 208 2.9% 1.04 [0.91, 1.18] Subtotal (95% CI) 0.03774033 0.02689562 853 865 17.1% 1.04 [0.99, 1.09] Subtotal (95% CI) 2.027537422 0.36843806 201 201 0.1% 0.76 [0.37, 1.56] Test for overall effect: Z = 0.20 (P = 0.84) 3.9.2 No iron co-intervention Chang 2010 (2) -0.27537422 0.36843806 201 201 0.1% 0.76 [0.37, 1.56] Chang 2010 (2) -0.27537422 0.36843806 201 201 0.1% 0.76 [0.37, 1.56] Han 2002 -0.75662302 0.28075433 33 22 0.2% 0.47 [0.27, 0.81] Han 2002 (2) -0.17923468 0.27919905 24 26 0.2% 0.48 [0.48, 1.44] Meeks Gardner 1998 0.0421645 0.25610818 31 30 0.2% 1.00 [0.61, 1.66] Umeta 2000 -0.78170058 0.223234928 100 100 0.2% 0.46 [0.29, 0.72] Gupta 2003 -0.89381788 0.22473329 186 94 0.2% 0.41 [0.26, 0.64] Weekemans 2011 -0.22342699 0.19743482 153 153 0.3% 0.60 [0.45, 1.00] Veenemans 2011 -0.22342699 0.19743482 153 153 0.3% 0.60 [0.45, 1.00] Weekemans 2011 -0.22342699 0.19743482 153 1153 0.3% 0.80 [0.54, 1.18] Penny 2004 -0.11778304 0.10486269 80 79 1.1% 0.58 [0.77, 1.09] Ruel 1997 -0.41680347 0.0905527 170 170 1.5% 1.07 [0.90, 1.28] Larson 2010 -0.2381808 0.0813216 176 177 1.9% 0.79 [0.68, 0.93] Muller 2001 -0.2466042 0.070382170 170 15% 1.07 [0.90, 1.28] Larson 2010 -0.2381808 0.0812316 176 177 1.9% 0.79 [0.68, 0.83] Muller 2001 -0.246642 0.07038217 102 115 2.5% 0.75 [0.66, 0.87] Larson 2010 -0.2381808 0.0812316 176 177 1.9% 0.79 [0.68, 0.83] Muller 2001 -0.24913450 0.07335707 104 105 2.3% 0.95 [0.82, 1.10] Richard 2006 -0.2810649 0.0763157 112 209 215 2.5% 0.75 [0.66, 0.87] Larson 2010 -0.2184849 0.07631570 170 145 2.1% 0.97 [0.68, 0.88] Muller 2001 -0.249145 0.05739701 161 157 3.8% 0.98 [0.78, 0.98] Hatmariz 2002 -0.0561342 1128 1128 128 128 128 0.26% 0.77 [0.67, 0.88] Bauhuai 2002 -0.058155 0.02613341 129 180 2.6% 0.77 [0.67, 0.68] Bauhuai 2002 -0.0581645 0.04515217 286 293 6.1% 0.92 [0.84, 1.09] Baarwai 1996 -0.048461665 0.04515217 286 293 6.1% 0.92 [0.84, 1.09] Baarwai 200								_
Richard 2006 (2) 0.03619935 0.06581383 210 208 2.9% 1.04 [0.9] 1.18] Baqui 2003 (2) 0.08849308 0.05540904 162 165 4.0% 1.09 [0.98, 1.22] Subtotal (9% C) 0.03774033 0.02689562 853 865 17.1% 1.04 [0.99, 1.09] Subtotal (9% C) 0.03774033 0.02689562 853 865 17.1% 1.04 [0.99, 1.09] Subtotal (9% C) 0.27374023 0.02689562 853 201 0.1% 0.76 [0.37, 1.56] Charg 2010 (2) -0.75867320 0.28075433 33 22 0.2% 0.47 [0.27, 0.81] Han 2002 (2) -0.75867302 0.28075433 33 22 0.2% 0.47 [0.27, 0.81] Han 2002 (2) -0.78170058 0.23234928 100 100 0.2% 0.46 [0.29, 0.72] Umeta 2003 -0.78170058 0.23234928 100 100 0.2% 0.46 [0.29, 0.72] Gupta 2003 -0.83931788 0.24243329 186 94 0.2% 0.41 [0.26, 0.64] Resad 1997 -0.2131443 0.1048126 80 79 -11% 0.46 [0.62, 0.64] Resad 1997 -0.2131443 0.10417938 55 53 1.1% 0.78 [0.63, 0.95] 11% 0.78 [0.63, 0.95] Gupta 2007 -0.24669347 0.097381 854 858 1.3% 0.86 [0.71, 1.05] 114 Watelier 2008 -0.3010459 0.0960132 353 118 1.3% 0.74 [0.61, 0.59] 11 Larson 2010 -0.23381808 0.08123116 176 17 1.9% 0.79 [0.66, 0.87] 114 Larson 2010 -0.23381808 0.08123116 176 177 1.9% 0.95 [0.84, 1.07] <td< td=""><td>Richard 2006 (2) 0.03619935 0.065849308 0.05540904 162 165 4.00 1.09 0.98, 1.22 Sodi 2013 0.03774033 0.02689562 853 865 17.1% 1.04 [0.99, 1.09] Subtoal (95% CI) 0.03774033 0.02689562 853 865 17.1% 1.04 [0.99, 1.09] Subtoal (95% CI) 0.27537422 0.36843806 201 201 0.1% 0.76 [0.37, 1.56] Chang 2010 -0.58978851 0.33149677 198 201 0.1% 0.55 [0.29, 1.06] [0.41, 1.44] Meeks Cardner 1998 0.00421645 0.23619333 22 0.2% 0.47 [0.27, 0.81] [0.41, 1.66] Immat 2002 -0.75662302 0.23807433 3 22 0.2% 0.41 [0.26, 0.64] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46]</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td<>	Richard 2006 (2) 0.03619935 0.065849308 0.05540904 162 165 4.00 1.09 0.98, 1.22 Sodi 2013 0.03774033 0.02689562 853 865 17.1% 1.04 [0.99, 1.09] Subtoal (95% CI) 0.03774033 0.02689562 853 865 17.1% 1.04 [0.99, 1.09] Subtoal (95% CI) 0.27537422 0.36843806 201 201 0.1% 0.76 [0.37, 1.56] Chang 2010 -0.58978851 0.33149677 198 201 0.1% 0.55 [0.29, 1.06] [0.41, 1.44] Meeks Cardner 1998 0.00421645 0.23619333 22 0.2% 0.47 [0.27, 0.81] [0.41, 1.66] Immat 2002 -0.75662302 0.23807433 3 22 0.2% 0.41 [0.26, 0.64] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46] [0.27, 0.46]								
Baqui 2003 (2) 0.08849308 0.05540904 162 165 4.0% 1.09 (0.98, 1.22) Soft 2013 0.03774033 0.02689562 853 855 17.1% 1.04 (0.99, 1.09) Subtotal (95% CI) 2243 2056 28.4% 1.00 (0.96, 1.05) Heterogeneity: Ch ² = 37.33, df = 9 (P < 0.0001); l ² = 76% 76% 76% 76% Test for overall effect: Z = 0.20 (P = 0.84) 3314967 201 0.1% 0.76 [0.37, 1.56] 6.037, 1.56] Chang 2010 -0.25737422 0.36843806 201 0.1% 0.55 [0.29, 1.06] 164 Han 2002 -0.75662302 0.28075433 33 22 0.2% 0.47 [0.27, 0.81] Han 2002 -0.75662302 0.28075433 33 0.2% 0.46 [0.29, 0.72] 0.012 (A, 1.00) 1.00 [0.61, 1.66] Umeta 2000 -0.78170058 0.23234928 100 100 0.2% 0.46 [0.29, 0.72] 0.012 (A, 1.02) 1.01 Venemans 2011 -0.22434629 0.27 (0.41 [0.26, 0.64] 0.838 [0.78, 0.2373379] 168 1.3% 0.67 [0.45, 1.00] 1.4% (A, 1.02) 1.09 1.1% (A, 1.02) 1.09 1.1% (A, 1.02) 1.01 1.05 1.00 1.05 1.00 1.	Baqui 2003 (2) 0.08849308 0.05540904 162 165 4.0% 1.09 [0.98, 1.22] Sofd 2013 0.03774033 0.02689562 2833 865 17.1% 1.04 [0.99, 1.09] Subtotal (95% CD) 2243 2056 28.4% 1.00 [0.96, 1.05] Heterogeneity: Chi ² = 37.33, df = 9 (P < 0.0001); l ² = 76% 76% 76% 766 Test for overall effect: Z = 0.20 (P = 0.84) 9.055 [0.29, 1.06] 9.05 9.05 SJ2.2 No iron co-intervention 0.1% 0.55 [0.29, 1.06] 9.04 9.04 9.05 (0.47, 1.56] Chang 2010 -0.55878851 0.33149677 198 201 0.1% 0.55 [0.29, 1.06] 9.04 Han 2002 -0.75662302 0.28075433 33 22 0.2% 0.47 [0.27, 0.81] 9.04 Han 2002 -0.75817825 0.2813292 120 1.0% 0.55 [0.29, 1.06] 9.04 Ureta 2000 -0.7817058 0.22324282 100 100 0.2% 0.44 [0.26, 0.64] 9.02 Cupta 2003 -0.49381784 0.247329 133 0.33 0.80 [0.54, 1.06] 9.09 Veenemans 2011 -0.22342699 0.10417938								+
Subtrail (95% CI) 2243 2056 28.4% 1.00 [0.96, 1.05] Heterogeneity: Chi ² = 37.33, df = 9 (P < 0.0001); l ² = 76% Test for overall effect: Z = 0.20 (P = 0.84) 3.9.2 No iron co-intervention Chang 2010 (2) -0.27537422 0.36843806 201 0.1% 0.76 [0.37, 1.56] Chang 2010 -0.58978851 0.33149677 198 201 0.1% 0.55 [0.29, 1.06] Han 2002 -0.75662302 0.28075433 33 22 0.2% 0.47 [0.27, 0.81] Han 2002 (2) -0.17923468 0.27919905 24 26 0.2% 0.46 [0.29, 0.72] Gupta 2003 -0.89381788 0.22473329 186 94 0.2% 0.46 [0.29, 0.72] Cupta 2003 -0.89381788 0.22473329 186 94 0.2% 0.46 [0.29, 0.72] Veenemas 2011 -0.2178304 0.10486269 80 79 1.1% 0.89 [0.72, 1.09] Ruel 1997 -0.217178304 0.10486269 80 79 1.1% 0.78 [0.63, 0.35] Gupta 2007 -0.14660347 0.097381 854 854 1.3% 0.74 [0.61, 0.58] Lind 2003 -0.06899287 0.0795062 120 1.5% 0.75 [0.60, 0.7] <tr< td=""><td>Subtrail (95% C1) 2243 2056 28.4% 1.00 (0.96, 1.05) Heterogeneity: Chi² = 37.33, df = 9 (P < 0.0001); l² = 76% Test for overall effect: Z = 0.20 (P = 0.84) 3.9.2 No iron co-intervention Chang 2010 (2) -0.27537422 0.36843806 201 0.1% 0.75 (0.37, 1.56) Han 2002 -0.75662302 0.28075831 33 22 0.2% 0.47 (0.27, 0.81) Han 2002 (2) -0.75862302 0.28075433 33 2.2 0.2% 0.47 (10.27, 0.81) Meeks Cardner 1998 0.0421645 0.25610188 31 30 0.2% 0.44 (10.26, 0.64) Gupta 2003 -0.783178058 0.22324928 100 100 0.2% 0.44 (10.26, 0.64) Rosado 1997 -0.40188729 0.20280294 54 56 0.3% 0.89 (0.72, 1.00) Ruel 1997 -0.2318143 0.10417938 55 53 1.1% 0.74 (0.61, 0.5) Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.86 (0.71, 1.05] Wuehler 2001 -0.23381808 0.0980132<td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>•</td></td></tr<>	Subtrail (95% C1) 2243 2056 28.4% 1.00 (0.96, 1.05) Heterogeneity: Chi ² = 37.33, df = 9 (P < 0.0001); l ² = 76% Test for overall effect: Z = 0.20 (P = 0.84) 3.9.2 No iron co-intervention Chang 2010 (2) -0.27537422 0.36843806 201 0.1% 0.75 (0.37, 1.56) Han 2002 -0.75662302 0.28075831 33 22 0.2% 0.47 (0.27, 0.81) Han 2002 (2) -0.75862302 0.28075433 33 2.2 0.2% 0.47 (10.27, 0.81) Meeks Cardner 1998 0.0421645 0.25610188 31 30 0.2% 0.44 (10.26, 0.64) Gupta 2003 -0.783178058 0.22324928 100 100 0.2% 0.44 (10.26, 0.64) Rosado 1997 -0.40188729 0.20280294 54 56 0.3% 0.89 (0.72, 1.00) Ruel 1997 -0.2318143 0.10417938 55 53 1.1% 0.74 (0.61, 0.5) Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.86 (0.71, 1.05] Wuehler 2001 -0.23381808 0.0980132 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>•</td>								•
Heterogeneity: $Chi^2 = 37.33$, $df = 9$ ($P < 0.0001$); $l^2 = 76\%$ Test for overall effect: $Z = 0.20$ ($P = 0.84$) 3.9.2 No iron co-intervention Chang 2010 (2) -0.27537422 0.36843806 201 201 0.1% 0.76 [0.37, 1.56] Han 2002 -0.75662302 0.28075433 33 22 0.2% 0.47 [0.29, 1.06] Han 2002 (2) -0.17923468 0.27919905 24 26 0.2% 0.47 [0.27, 0.81] Han 2002 (2) -0.78170058 0.25234282 100 100 0.2% 0.44 [0.26, 0.64] Rosado 1997 -0.40188729 0.20280294 54 56 0.3% 0.67 [0.45, 1.06] Veenemans 2011 -0.22342699 0.19743482 153 153 0.3% 0.80 [0.54, 1.18] Penny 2004 -0.11778304 0.104480269 80 79 1.1% 0.78 [0.63, 0.95] Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.78 [0.63, 0.95] Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.76 [0.68, 0.93] Larson 2010 -0.23381808 0.08123116 176 177 1.9% 0.79 [0.68, 0.93] Larson 2010 -0.24304287 0.07966527 170 170 1.5% 1.07 [0.90, 1.28] Larson 2010 -0.2430428 0.07335707 104 105 2.3% 0.95 [0.82, 1.10] Richard 2006 -0.1218449 0.07061765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 (2) -0.2614098 0.0688881 192 180 2.6% 0.77 [0.67, 0.88] Long 2006 -0.12218449 0.07061765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 (2) -0.2614098 0.06888881 192 180 2.6% 0.77 [0.67, 0.88] Hatman 2001 -0.1335139 0.0579042 170 161 3.7% 0.88 [0.87, 1.09] Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.95 [0.84, 1.07] Rahman 2001 -0.13353139 0.05790142 170 161 3.7% 0.88 [0.87, 1.09] Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 [0.84, 1.00] Malk 2013 -0.02439145 0.05739701 161 157 3.8% 0.98 [0.87, 1.09] Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 [0.84, 1.00] Malk 2013 -0.04891545 0.02513581 384 1.24 14.5% 0.61 [0.58, 0.65] Heterogeneity: Chi ² = 196.27, df = 25 ($P < 0.00001$); $P = 88\%$ Test for overall effect: Z = 12.4.5 ($P < 0.00001$); $P = 88\%$ Test for overall effect: Z = 12.4.5 ($P < 0.00001$); $P = 88\%$ Test for overall effect: Z = 12.4.5 ($P < 0.00001$); $P = 88\%$	Heterogeneity: $Chi^2 = 37.33$, $df = 9$ ($P < 0.0001$); $l^2 = 76\%$ Test for overall effect $Z = 0.20$ ($P = 0.84$) 3.9.2 No iron co-intervention Chang 2010 (2) -0.27537422 0.36843806 201 201 0.1% 0.76 [0.37, 1.56] Han 2002 -0.75662302 0.28075433 33 22 0.2% 0.47 [0.27, 0.81] Han 2002 (2) -0.17923468 0.27919905 24 26 0.2% 0.84 [0.48, 1.44] Meeks Gardner 1998 0.00421645 0.25610818 31 30 0.2% 1.00 [0.61, 1.66] Umeta 2000 -0.78170058 0.23234928 100 100 0.2% 0.46 [0.29, 0.72] Gupta 2003 -0.89381788 0.22473329 186 94 0.2% 0.41 [0.26, 0.64] Rosado 1997 -0.40188729 0.0262029 186 94 0.2% 0.41 [0.26, 0.64] Rosado 1997 -0.40188729 0.0262029 186 94 0.2% 0.41 [0.26, 0.64] Rosado 1997 -0.25131443 0.10417938 55 31 1.1% 0.78 [0.63, 0.95] Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.86 [0.71, 1.05] Wuehler 2008 -0.3010459 0.09605627 170 170 1.5% 1.07 [0.90, 1.28] Larson 2010 -0.2381808 0.08123116 176 177 1.9% 0.79 [0.68, 0.93] Hull 2003 0.06899287 0.09605627 170 170 1.5% 1.07 [0.90, 1.28] Larson 2010 -0.24307255 0.07595902 342 344 2.1% 0.87 [0.75, 1.01] Chagan 2009 -0.04913269 0.07835707 104 105 2.3% 0.95 [0.68, 0.83] Muller 2001 -0.14077255 0.07595902 342 244 2.1% 0.87 [0.75, 1.01] Chagan 2006 0.12218449 0.07061765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 (2) -0.26510098 0.0688881 192 180 2.6% 0.77 [0.67, 0.88] Ashman 2001 (2) -0.05501042 0.06642171 175 160 3.4% 0.95 [0.54, 1.07] Heterogeneity: Chi ² = 196.27, df = 25 ($P < 0.00001$); $f^2 = 88\%$ Test for overall effect: Z = 14.83 ($P < 0.00001$); $f^2 = 88\%$ Test for subgroup differences: Chi ² = 65.11, df = 1 ($P < 0.00001$), $f^2 = 98.5\%$	Soofi 2013			853	865	17.1%	1.04 [0.99, 1.09]	•
Test for overall effect: Z = 0.20 (P = 0.84) 3.9.2 No iron co-intervention Chang 2010 (2) -0.27537422 0.36843806 201 201 0.1% 0.76 [0.37, 1.56] Han 2002 -0.75662302 0.28075433 33 22 0.2% 0.47 [0.27, 0.81] Han 2002 (2) -0.17923468 0.27919905 24 26 0.2% 0.84 [0.48, 1.44] Meeks Gardner 1998 0.00421645 0.25610818 31 30 0.2% 1.00 [0.61, 1.66] Umeta 2000 -0.78170058 0.23234928 100 100 0.2% 0.46 [0.29, 0.72] Gupta 2003 -0.89381788 0.2247329 186 94 0.2% 0.41 [0.26, 0.64] Penny 2004 -0.11778304 0.10486269 80 79 1.1% 0.88 [0.72, 1.09] Ruel 1997 -0.25131443 0.10447938 55 53 1.1% 0.78 [0.63, 0.95] Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.76 [0.63, 0.95] Gupta 2003 -0.36989287 0.090601332 353 116 1.3% 0.74 [0.61, 0.68] Lind 2003 0.06899287 0.090605627 170 170 1.5% 1.07 [0.90, 1.28] Lind 2003 0.06899287 0.090605627 170 170 1.5% 1.07 [0.90, 1.28] Lind 2003 0.06899287 0.090605627 170 170 1.5% 1.07 [0.90, 1.28] Lind 2003 0.06899287 0.09065627 170 170 1.5% 1.09] Muller 2001 -0.14381808 0.08123116 176 1.77 1.9% 0.79 [0.68, 0.93] Muller 2001 -0.23381808 0.08123116 176 177 1.9% 0.79 [0.68, 0.93] Muller 2001 -0.14218449 0.07075270 104 105 2.3% 0.95 [0.82, 1.10] Richard 2006 0.21218449 0.07078211 209 215 2.5% 0.75 [0.66, 0.87] Long 2006 (2) -0.26514098 0.0684881 192 180 2.6% 0.77 [0.67, 0.88] Rahman 2001 -0.13353139 0.05739701 161 157 3.8% 0.98 [0.84, 1.07] Rahman 2001 -0.13635159 0.0261358 134 124 14.5% 0.61 [0.58, 0.65] Handari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 [0.85, 0.89] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); t ² = 87% Test for overall effect: Z = 12.4.83 (P < 0.00001); t ² = 87% Test for subgroup differences: Chi ² = 65.11, df = 1 (P < 0.00001), t ² = 98.5%	Test for overall effect: $Z = 0.20$ ($P = 0.84$) 3.9.2 No iron co-intervention Chang 2010 (2) -0.27537422 0.36843806 201 201 0.1% 0.76 [0.37, 1.56] Han 2002 -0.75662302 0.28075433 33 22 0.2% 0.47 [0.27, 0.81] Han 2002 (2) -0.17923468 0.27919905 24 26 0.2% 0.44 [0.48, 1.44] Meeks Gardner 1998 0.00421645 0.25610818 31 30 0.2% 0.46 [0.28, 0.72] Gupta 2000 -0.78170058 0.23234928 100 100 0.2% 0.46 [0.29, 0.72] Gupta 2003 -0.89381788 0.22473329 186 94 0.2% 0.41 [0.26, 0.64] Rosado 1997 -0.40188729 0.20280294 54 56 0.3% 0.67 [0.45, 1.00] Veenmans 2011 -0.22342699 0.19743482 153 153 0.3% 0.80 [0.54, 1.18] Penny 2004 -0.11778304 0.10486269 80 79 1.1% 0.89 [0.72, 1.09] Ruel 1997 -0.25131443 0.10417338 55 53 1.1% 0.78 [0.63, 0.95] Gupta 2007 -0.25131443 0.10417338 55 53 1.1% 0.78 [0.63, 0.95] Gupta 2007 -0.26381808 0.08123116 176 177 1.9% 0.79 [0.68, 0.93] Lind 2003 0.06899287 0.09061532 353 116 1.3% 0.74 [0.61, 0.89] Lind 2003 0.06899287 0.09065627 170 170 1.5% 1.07 [0.09, 1.28] Larson 2010 -0.2381868 0.08123116 176 177 1.9% 0.79 [0.68, 0.93] Muller 2001 -0.14077255 0.07595902 342 344 2.1% 0.87 [0.75, 1.01] Chhagan 2009 -0.04913269 0.0735707 104 105 2.3% 0.95 [0.84, 1.07] Richard 2006 -0.22106642 0.07078211 209 215 2.5% 0.75 [0.66, 0.87] Long 2006 (2) -0.25110498 0.0668881 192 180 2.6% 0.77 [0.67, 0.88] Rahman 2001 -0.1335139 0.05739701 161 157 3.8% 0.98 [0.84, 1.07] Rahman 2001 (2) -0.0501042 0.06042171 175 160 3.4% 0.95 [0.84, 1.07] Rahman 2001 -0.1335139 0.05739701 161 157 3.8% 0.98 [0.84, 0.98] Baqui 2003 -0.02439145 0.057379701 161 157 3.8% 0.98 [0.84, 1.07] Rahman 2001 (2) -0.0581655 0.02613411 1228 1236 18.1% 0.90 [0.85, 0.95] Baqui 2003 -0.02439145 0.057379701 161 157 3.8% 0.98 [0.87, 1.09] Heterogeneity: Chi ² = 196.27, df = 25 ($P < 0.00001$); $P = 87\%$ Test for overall effect: $Z = 12.45$ ($P < 0.00001$); $P = 88\%$ Test for overall effect: $Z = 12.45$ ($P < 0.00001$); $P = 88\%$ Test for subgroup differences: Chi ² = 65.11, df = 1 ($P < 0.00001$), $P = 98.5\%$	Subtotal (95% CI)			2243	2056	28.4%	1.00 [0.96, 1.05]	•
3.9.2 No iron co-intervention Chang 2010 (2) -0.27537422 0.36843806 201 201 0.1% 0.76 [0.37, 1.56] Han 2002 -0.75662302 0.28073433 33 22 0.2% 0.47 [0.27, 0.81] Han 2002 (2) -0.07923468 0.27919905 24 26 0.2% 0.44 [0.48, 1.44] Meeks Gardner 1998 0.00421645 0.25610818 31 30 0.2% 0.44 [0.27, 0.81] Han 2002 (2) -0.78170058 0.23234928 100 100 0.2% 0.44 [0.48, 1.44] Meeks Gardner 1998 0.00421645 0.2524928 100 100 0.2% 0.44 [0.26, 0.64] Meta 2000 -0.78170058 0.23234928 100 100 0.2% 0.41 [0.56, 0.64] Mess Gardner 1997 -0.40188729 0.292473329 186 94 0.2% 0.41 [0.54, 1.18] Penny 2004 -0.11778304 0.1048269 80 79 1.1% 0.89 [0.72, 1.09] Kuel 1997 -0.25131443 0.10471738 55 31 1.1% 0.78 [0.65, 0.59] Gupta 2007 -0.14660347	3.9.2 No iron co-intervention Chang 2010 (2) -0.27537422 0.36843806 201 201 0.1% 0.76 [0.37, 1.56] Han 2002 -0.75662302 0.28075433 33 22 0.2% 0.44 [0.48, 1.44] Meeks Gardner 1998 0.00421645 0.25610818 31 30 0.2% 0.44 [0.48, 1.44] Meeks Gardner 1998 0.00421645 0.25610818 31 30 0.2% 0.46 [0.29, 0.72] Gupta 2003 -0.89381788 0.22473329 186 94 0.2% 0.44 [0.26, 0.64] Rosado 1997 -0.40188729 0.20280294 54 56 0.3% 0.67 [0.45, 1.00] Veenemans 2011 -0.22342699 0.19743482 153 153 0.3% 0.80 [0.54, 1.18] Penny 2004 -0.11778304 0.10447938 55 3 1.1% 0.89 [0.72, 1.09] Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.86 [0.71, 1.05] Wuehler 2008 -0.3010459 0.09061332 353 116 1.3% 0.78 [0.66, 0.87] Gupta 2007 -0.14660347				76%				
Chang 2010 (2) -0.27537422 0.36843806 201 201 0.1% 0.76 [0.37, 1.56] Chang 2010 -0.58978851 0.33149677 198 201 0.1% 0.576 [0.37, 1.56] Han 2002 -0.75662302 0.28075433 33 22 0.2% 0.47 [0.27, 0.81] Han 2002 (2) -0.17923468 0.27919905 24 26 0.2% 0.84 [0.48, 1.44] Meeks Gardner 1998 0.00421645 0.25610818 31 30 0.2% 1.00 [0.61, 1.66] Umeta 2000 -0.78170058 0.23234928 100 100 0.2% 0.46 [0.29, 0.72] Gupta 2003 -0.89381788 0.22473329 186 94 0.2% 0.41 [0.26, 0.64] Rosado 1997 -0.40188729 0.20220294 54 56 0.3% 0.67 [0.45, 1.00] Veenemans 2011 -0.22342699 0.19743482 153 153 0.3% 0.80 [0.54, 1.18] Penny 2004 -0.11778304 0.10486269 80 79 1.1% 0.89 [0.72, 1.09] Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.86 [0.71, 1.05] Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.74 [0.61, 0.89] Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.74 [0.61, 0.89] Gupta 2003 0.06899287 0.09065627 170 170 1.5% 1.07 [0.90, 1.28] Larson 2010 -0.23381808 0.08123116 176 177 1.9% 0.79 [0.68, 0.93] Huller 2003 -0.04913269 0.07335707 104 105 2.3% 0.95 [0.82, 1.10] Chhagan 2009 -0.04913269 0.07335707 104 105 2.3% 0.95 [0.62, 1.10] Chhagan 2009 -0.04913269 0.07078211 209 215 2.5% 0.75 [0.66, 0.87] Largo 2006 (.12218449 0.07076755 181 183 2.5% 1.31 [0.98 [0.87, 1.09] Chagan 2001 -0.13353139 0.0579042 170 161 3.7% 0.88 [0.78, 0.98] Rahman 2001 -0.13353139 0.0579042 170 161 3.7% 0.88 [0.78, 0.98] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); l ² = 87% Test for overall effect: Z = 12.45 (P < 0.00001); l ² = 88% Test for overall effect: Z = 12.45 (P < 0.00001); l ² = 88% Test for overall effect: Z = 12.45 (P < 0.00001); l ² = 98.5%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $			4)					
Chang 2010 -0.58978851 0.33149677 198 201 0.1% 0.55 0.29 1.06 Han 2002 -0.75662302 0.28075433 33 22 0.2% 0.84 0.48 1.06 Han 2002 (2) -0.78170058 0.2324928 100 0.2% 0.46 0.29 0.772 Gupta 2003 -0.89381788 0.22473329 186 94 0.2% 0.41 0.26 0.64 Weenemas 2011 -0.22342699 0.19743422 153 0.3% 0.89 0.72, 1.09 Hardian 2007 -0.41867029 0.2743422 153 0.3% 0.89 0.72, 1.09 Hardian 2007 -0.14660347 0.097381 854 858 1.3% 0.86 (0.71, 1.05 Hardian 2007 -0.14660347 0.097381 854 858 1.3% 0.79 (0.61, 0.89) Hardian 2007 -0.14660347 0.09735052 342 344 2.1% 0.87 (0.71, 0.05) Hardian 2007 -0.14660347 0.09735050 333 116 1.3% 0.74 (0.61, 0.89) Hardian 2001 -0.14067255 0.8735707 104 105 2.3% 0.95 (0.82, 1.10) Hardian 2006	Chang 2010 -0.58978851 0.33149677 198 201 0.1% 0.55 0.29, 1.06 Han 2002 -0.75662302 0.28075433 33 22 0.2% 0.47 0.27, 0.81 Han 2002 (2) -0.75662302 0.28075433 33 22 0.2% 0.47 0.27, 0.81 Meeks Gardner 1998 0.00421645 0.23234928 100 100 0.2% 0.46 0.29, 0.72 Gupta 2003 -0.8381788 0.2237329 186 94 0.2% 0.41 0.26, 0.64 Rosado 1997 -0.40188729 0.20280294 54 56 0.3% 0.67 0.45, 1.00 Veenemans 2011 -0.22342699 0.1974482 153 0.3% 0.80 0.67, 1.05 Gupta 2007 -0.216160347 0.097381 854 858 1.3% 0.76 0.61, 0.89 Gupta 2007 -0.245181488 0.0812116 170 1.5% 1.70 1.90 0.79 0.68, 0.83 -0.23481808 0.812116 177 1.9% 0.79 0.68, 0.83 -0.23481808 0.812116 177 1.9% 0.79 0.68, 0.83 -0.24391808 0.80332777 104			0.26042006	201	201	0.10/	0.75 (0.07.1.55)	
Han 2002 -0.75662302 0.28075433 33 22 0.2% 0.47 [0.27, 0.81] Han 2002 (2) -0.17923468 0.27919905 24 26 0.2% 0.47 [0.27, 0.81] Han 2002 (2) -0.78170058 0.27919905 24 26 0.2% 0.48 [0.48, 1.44] Meeks Gardner 1998 0.00421645 0.25610818 31 30 0.2% 1.00 [0.61, 1.66] Umeta 2000 -0.78170058 0.23234928 100 100 0.2% 0.46 [0.29, 0.72] Gupta 2003 -0.89381788 0.22473329 186 94 0.2% 0.41 [0.26, 0.64] Rosado 1997 -0.40188729 0.20280294 54 56 0.3% 0.67 [0.45, 1.00] Veenemans 2011 -0.22342699 0.19743482 153 1153 0.3% 0.80 [0.54, 1.18] Penny 2004 -0.11778304 0.10486269 80 79 1.1% 0.89 [0.72, 1.09] Ruel 1997 -0.25131443 0.10417938 55 53 1.1% 0.78 [0.63, 0.95] Gupta 2007 -0.14660347 0.097031 854 858 81.3% 0.66 [0.71, 1.05] Wuehler 2008 -0.30010459 0.09601332 353 116 1.3% 0.78 [0.63, 0.95] Lind 2003 0.06899287 0.09065627 170 170 1.5% 1.07 [0.90, 1.28] Larson 2010 -0.23381808 0.08123116 176 177 1.9% 0.79 [0.66, 0.83] Hulle 2001 -0.14077255 0.07595902 342 344 2.1% 0.87 [0.75, 1.01] Chhagan 2009 -0.04913269 0.07335707 104 105 2.3% 0.75 [0.66, 0.87] Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 0.12218449 0.0761765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 0.12218449 0.0761765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 0.12218449 0.0761765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 0.12218449 0.0761765 181 183 2.5% 1.13 [0.98, 1.60] Hamman 2001 -0.1335139 0.0579042 170 151 3.7% 0.88 [0.78, 0.98] Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 [0.87, 1.09] Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 [0.84, 1.00] Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); I ² = 87% Test for overall effect: Z = 14.83 (P < 0.00001); Test for subgroup differences: Chi ² = 65.11, df = 1 (P < 0.00001), I ² = 98.5% Test for overall effect: Z = 12.45 (P < 0.00001); Test for subgroup differences	Han 2002 -0.75662302 0.28075433 33 22 0.2% 0.47 [0.27, 0.81] Han 2002 -0.17923468 0.27919905 24 26 0.2% 0.84 [0.48, 1.44] Meeks Cardner 1998 0.00421645 0.25610818 31 30 0.2% 1.00 [0.61, 1.66] Umeta 2000 -0.78170058 0.23234928 100 100 0.2% 0.46 [0.29, 0.72] Gupta 2003 -0.89381788 0.22473329 186 94 0.2% 0.41 [0.26, 0.64] Rosado 1997 -0.40188729 0.20280294 54 56 0.3% 0.67 [0.45, 1.00] Veenemans 2011 -0.22342699 0.19743482 153 153 0.3% 0.80 [0.54, 1.18] Penny 2004 -0.11778304 0.10448269 80 79 1.1% 0.89 [0.72, 1.09] Ruel 1997 -0.25131443 0.10417938 55 53 1.1% 0.78 [0.63, 0.95] Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.68 [0.71, 1.05] Wuehier 2008 -0.30010459 0.09601332 353 116 1.3% 0.74 [0.61, 0.89] Lind 2003 0.06899287 0.09665627 170 170 1.5% 1.07 [0.90, 1.28] Larson 2010 -0.23381808 0.08123116 176 177 1.9% 0.79 [0.68, 0.93] Huller 2001 -0.14077255 0.07595902 342 344 2.1% 0.87 [0.75, 1.01] Ghagan 2009 -0.04913269 0.07335707 104 105 2.3% 0.75 [0.66, 0.87] Long 2006 0.12218449 0.0761765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 (2) -0.26514098 0.0688881 192 180 2.6% 0.77 [0.67, 0.88] Rahman 2001 -0.1335139 0.0579042 170 161 3.7% 0.88 [0.78, 0.98] Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 [0.87, 1.09] Sazawal 1996 -0.08461665 0.04515217 266 293 61.% 0.92 [0.84, 1.07] Rahman 2001 -0.13535139 0.0579042 170 161 3.7% 0.88 [0.78, 0.98] Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 [0.87, 1.09] Sazawal 1996 -0.08461665 0.04515217 286 293 61.% 0.92 [0.84, 1.00] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); P ² = 88% Test for overall effect: Z = 12.45 (P < 0.00001); P ² = 87% Test for overall effect: Z = 12.45 (P < 0.00001); P ² = 87% Test for overall effect: Z = 12.45 (P < 0.00001); P ² = 88% Test for overall effect: Z = 12.45 (P < 0.00001); P ² = 88% Test for overall effect: Z = 12.45 (P < 0.00001); P ² = 88% Test for overall effect: Z = 12.45 (P < 0.00001); P ² = 88%								
Han 2002 (2) $-0.17923468 0.27919905 24 26 0.2% 0.84 [0.4%, 1.44]$ Meeks Gardner 1998 0.00421645 0.25610818 31 30 0.2% 1.00 [0.61, 1.66] Umeta 2000 $-0.78170058 0.23234928 100 100 0.2% 0.46 [0.29, 0.72]$ Gupta 2003 $-0.89381788 0.22473329 186 94 0.2% 0.41 [0.26, 0.64]$ Rosado 1997 $-0.40188729 0.20280294 54 56 0.3% 0.67 [0.45, 1.00]$ Veenemans 2011 $-0.22342699 0.19743482 153 153 0.3% 0.80 [0.54, 1.18]$ Penny 2004 $-0.11778304 0.10486269 80 79 1.1% 0.78 [0.63, 0.95]$ Gupta 2007 $-0.25131443 0.10417938 55 53 1.1% 0.78 [0.63, 0.95]$ Gupta 2007 $-0.14660347 0.097381 854 858 1.3% 0.88 [0.71, 1.05]$ Wuehler 2008 $-0.30010459 0.09601332 353 116 1.3% 0.74 [0.61, 0.89]$ Lind 2003 $0.06899287 0.0906527 170 170 1.5% 1.07 [0.09, 1.28]$ Larson 2010 $-0.23381808 0.08123116 176 177 1.9% 0.79 [0.68, 0.93]$ Muller 2001 $-0.14077255 0.07595902 342 344 2.1% 0.87 [0.75, 1.01]$ Richard 2006 $-0.28106642 0.07078211 209 215 2.5% 0.75 [0.66, 0.87]$ Long 2006 $(0.12218449 0.07061765 181 183 2.5% 1.13 [0.98, 1.30]$ Long 2006 (2) $-0.6501042 0.06042171 175 160 3.4% 0.95 [0.84, 1.07]$ Rahman 2001 $-0.13353139 0.05739701 161 157 3.8% 0.98 [0.87, 1.09]$ Sazawal 1996 $-0.08461665 0.04515217 286 293 6.1% 0.92 [0.84, 1.00]$ Hatorog 0.06 (1) $-0.2431445 0.05739701 161 157 3.8% 0.98 [0.87, 1.09]$ Sazawal 1996 $-0.08461665 0.0421517 286 293 6.1% 0.92 [0.84, 1.00]$ Malk 2013 $-0.48917615 0.02918358 134 124 14.5% 0.610 (0.58, 0.65]$ Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); l ² = 88% Test for overall effect: Z = 12.45 (P < 0.00001); l ² = 88% Test for overall effect: Z = 12.45 (P < 0.00001); l ² = 98.5%	Han 2002 (2) -0.17923468 0.27919905 24 26 0.2% 0.84 [0.48, 1.44] Meeks Gardner 1998 0.00421645 0.25610818 31 30 0.2% 0.46 [0.29, 0.72] Gupta 2003 -0.89381788 0.22473329 186 94 0.2% 0.41 [0.26, 0.64] Rosado 1997 -0.40188729 0.20280294 54 56 0.3% 0.67 [0.45, 1.00] Veenemans 2011 -0.22342699 0.19743482 153 153 0.3% 0.80 [0.54, 1.18] Penny 2004 -0.11778304 0.10486269 80 79 1.1% 0.89 [0.72, 1.09] Ruel 1997 -0.25131443 0.10417938 55 53 1.1% 0.78 [0.63, 0.95] Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.86 [0.71, 1.05] Wuehler 2008 -0.30010459 0.09605627 170 170 1.5% 1.07 [0.90, 1.28] Lind 2003 0.06899287 0.09065627 170 170 1.5% 1.07 [0.90, 1.28] Larson 2010 -0.23381808 0.08123116 176 177 1.9% 0.79 [0.68, 0.93] Muller 2001 -0.14077255 0.07595902 342 344 2.1% 0.87 [0.75, 1.01] Chhagan 2009 -0.0491369 0.07385707 104 105 2.3% 0.95 [0.82, 1.10] Richard 2006 -0.28106642 0.07078211 209 215 2.5% 0.75 [0.66, 0.87] Long 2006 (0) 1.2218449 0.07061765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 (2) -0.26510498 0.0688881 192 180 2.6% 0.77 [0.67, 0.88] Rahman 2001 -0.1335139 0.0579042 170 161 3.7% 0.88 [0.78, 0.98] Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 [0.87, 1.09] Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 [0.84, 1.07] Rahman 2001 -0.1355139 0.0579042 170 161 3.7% 0.68 [0.78, 0.98] Bhandari 2002 -0.058555 0.02513411 1228 1236 18.1% 0.90 [0.85, 0.95] Subtotal (95% CI) 8093 7550 100.0% 0.87 [0.85, 0.89] Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); I ² = 88% Test for overall effect: Z = 12.45 (P < 0.00001); I ² = 88% Test for overall effect: Z = 12.45 (P < 0.00001); I ² = 88% Test for overall effect: Z = 14.83 (P < 0.00001); I ² = 88% Test for overall effect: Z = 14.83 (P < 0.00001); I ² = 88% Test for overall effect: Z = 14.83 (P < 0.00001); I ² = 88% Test for overall effect: Z = 14.83 (P < 0.00001); I ² = 88%								
Meeks Gardner 1998 0.00421645 0.25610818 31 30 0.2% 1.00 1.06 1.166 Umeta 2000 -0.78170058 0.23234928 100 100 0.2% 0.46 [0.29, 0.72] Gupta 2003 -0.40188729 0.2020294 54 56 0.3% 0.67 [0.45, 1.00] Veenemans 2011 -0.22342699 0.19734342 153 153 0.3% 0.68 [0.57, 1.00] Penny 2004 -0.11778304 0.10486269 80 79 1.1% 0.88 [0.71, 1.05] Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.76 [0.61, 0.89] Lind 2003 0.06899287 0.09065627 170 170 1.5% 1.07 [0.90, 1.28] Larson 2010 -0.23381808 0.8123116 176 177 1.9% 0.75 [0.66, 0.87] Muller 2006 -0.248106642 0.07078211 2.92 2.5% 0.75 [0.66, 0.87] - Chagan 2009 -0.04913269 0.0735707 104 105 2.3% 0.58 [0.87, 1.09] - Rahma 2001 (2) -0.26514098 0.06888	Meeks Gardner 1998 0.00421645 0.25610818 31 30 0.2% 1.00 0.61 1.66 Umeta 2000 -0.78170058 0.22234928 100 100 0.2% 0.46 0.29 0.72 Gupta 2003 -0.87381788 0.22473329 186 94 0.2% 0.41026 0.64 Rosado 1997 -0.40188729 0.20280294 54 56 0.3% 0.67 0.45 1.00 Veenemans 2011 -0.22342699 0.19743482 153 0.3% 0.80 0.54 1.18 Penny 2004 -0.11773304 0.10486269 80 79 1.1% 0.89 0.72 1.09 Ruel 1997 -0.25131443 0.10417938 55 53 1.1% 0.78 10.63 0.95 Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.86 0.71 1.05 Wuehler 2008 -0.30010459 0.0960527 170 170 1.5% 1.07 0.90 1.28 Larson 2010 -0.23381808 0.08123116 176 177 1.9% 0.775 1.075 Chagan 2009 -0.04913269 0.07335707 104 105 2.3% 0.95 0.82 1.03 Chagan 2006 -0.22106424 0.07078211 209 2.5% 0.77 0.66 0.87 Long 2006 (2.216449) 0.07061765 181 183 2.5% 1.31 0.98 1.06 Long 2006 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
Umeta 2000 -0.78170058 0.23234928 100 100 0.2% 0.46 $(0.29, 0.72]$ Gupta 2003 -0.89381788 0.22473329 186 94 0.2% 0.41 $(0.26, 0.64)$ Rosado 1997 -0.40188729 0.22080294 54 56 0.3% 0.67 $(0.45, 1.00)$ Veenemans 2011 -0.22342699 0.19743482 153 153 0.3% 0.80 $(0.54, 1.10)$ Penny 2004 -0.11778304 0.10486269 80 79 1.1% 0.89 $(0.72, 1.09)$ Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.86 $(0.71, 1.05)$ Gupta 2008 -0.30010459 0.09061332 353 116 1.3% 0.74 $(0.61, 0.89)$ Larson 2010 -0.23381808 0.08123116 176 177 1.9% 0.79 $(0.68, 0.93)$ Muller 2001 -0.14077255 0.07595902 342 344 2.1% 0.87 $(0.75, 1.01)$ Chagan 2009 -0.4913269 0.076375707 104 105 2.3% 0.95 $(0.8, 1.07)$ Rahman 2001 -0.28106642 0.07078211 209 2.52 2.5% 0.75 $(0.66, 0.87)$ Long 2006 0.1221849 0.06848881 192 180 0.76 0.88 -77 Rahman 2001 -0.13353139 0.0579042 170 161 3.7% 0.88 0.78 0.98 -77 Rahman 2001 -0.08461665	Umeta 2000 -0.78170058 0.23234928 100100 0.2% 0.46 $(0.29, 0.72)$ Gupta 2003 -0.89381788 0.22473329 18694 0.2% 0.41 $(0.26, 0.64)$ Rosado 1997 -0.40188729 0.22080294 54 56 0.3% 0.57 $(0.45, 1.00)$ Veenemans 2011 -0.22342699 0.19743482 153 153 0.3% 0.87 $(0.45, 1.16)$ Penny 2004 -0.11778304 0.10486269 80 79 1.1% 0.89 $(0.72, 1.09)$ Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.78 $(0.63, 0.95)$ Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.78 $(0.61, 0.89)$ Und 2003 0.06899287 0.09065627 170 1.7% 0.79 $(0.68, 0.93)$ Muller 2001 -0.14077255 0.07359202 342 344 2.1% 0.75 1.07 Muller 2001 -0.14077255 0.07357071 104 105 2.3% 0.75 $(0.65, 0.87)$ Long 2006 0.12218499 0.07061765 181 183 2.5% 0.75 $(0.66, 0.87)$ Long 2006 0.12218499 0.06042171 175 160 3.4% 0.55 0.88 Rahman 2001 -0.1333139 0.05739701 161 3.7% 0.88 0.78 1.09 Sazwal 1996 -0.048461665 0.04515217 286 293 6.1%								
Gupta 2003 -0.89381788 0.22473329 186 94 0.2% 0.41 $(0.26, 0.64)$ Rosado 1997 -0.40188729 0.20280294 54 56 0.3% 0.67 $(0.45, 1.10)$ Veenemans 2011 -0.22342699 0.19743482 153 153 0.3% 0.80 $(0.54, 1.18)$ Penny 2004 -0.11778304 0.10486269 80 79 1.1% 0.89 $(0.54, 1.18)$ Gupta 2007 -0.25131443 0.10417938 55 53 1.1% 0.78 $(0.63, 0.95)$ Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.74 $(0.61, 0.89)$ Und 2003 0.06689287 0.09061332 353 116 1.3% 0.74 $(0.61, 0.89)$ Larson 2010 -0.23318108 0.08123116 176 177 1.9% 0.79 $0.68, 0.93$ Muller 2001 -0.14077255 0.07595902 342 344 2.1% 0.87 $0.68, 0.87$ Long 2006 -0.2816642 0.0778211 209 215 2.5% 0.75 $0.66, 0.87$ Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 $(0.98, 0.88)$ Rahman 2001 -0.23351319 0.0579042 170 161 3.7% 0.88 0.78 Rahman 2001 -0.13353139 0.05739701 161 3.7% 0.88 0.87 0.92 $0.84, 1.00$ Malik 2013 -0.24817615 0.02918358	Gupta 2003 -0.89381788 0.22473329 186 94 0.2% 0.411 0.26 0.641 Rosado 1997 -0.40188729 0.20280294 54 56 0.3% 0.67 0.45 1.001 Veenemans 2011 -0.22342699 0.19743482 153 153 0.3% 0.80 0.54 1.18 Penny 2004 -0.11778304 0.10486269 80 79 1.1% 0.89 0.72 1.091 Ruel 1997 -0.25131443 0.10417938 55 53 1.1% 0.78 $0.668, 0.951$ Gupta 2007 -0.24660347 0.097381 854 858 1.3% 0.74 0.61 0.891 Wuehler 2008 -0.30010459 0.09601332 353 116 1.3% 0.77 $0.68, 0.931$ Larson 2010 -0.2381808 0.08123116 176 177 1.9% 0.79 $0.68, 0.931$ Larson 2010 -0.2431808 0.06812311 176 177 1.9% 0.77 $0.68, 0.931$ Richard 2006 -0.22810642 0.07078211 209 215 2.5% 0.75 $0.66, 0.871$ Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 0.98 0.6888881 192 180 2.6% 0.77 0.68 Rohman 2001 -0.05801042 0.06842171 175 166 3.4% 0.95 0.84 0.71 0.83 0.98 0.84 0.687 Rahman 2001 <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>								
Rosado 1997 -0.40188729 0.20280294 54 56 0.3% 0.67 $[0.45, 1.00]$ Veenemans 2011 -0.22342699 0.19743482 153 153 0.3% 0.80 $[0.54, 1.18]$ Penny 2004 -0.11778304 0.10486269 80 79 1.1% 0.89 $[0.72, 1.09]$ Ruel 1997 -0.25131443 0.10447038 55 53 1.1% 0.78 $[0.63, 0.95]$ Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.86 $[0.71, 1.05]$ Wuehler 2008 -0.30010459 0.09601332 353 116 1.3% 0.78 $[0.75, 1.01]$ Lind 2003 0.06899287 0.0965627 170 170 1.5% 1.07 $[0.86, 0.93]$ Muller 2001 -0.14077255 0.077595902 342 344 2.1% 0.75 $[0.75, 1.01]$ Chhagan 2009 -0.24316642 0.07078211 209 215 2.5% 0.75 $[0.88, 1.30]$ Long 2006 -0.2218449 0.0761765 181 183 2.5% 1.33 0.38 1.30 Long 2006 -0.1218449 0.0761765 181 183 2.5% 1.77 160.34% 0.98 81.107 Rahman 2001 -0.13353139 0.0579042 170 161 3.7% 0.88 0.87 1.09 Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.98 0.87 0.85 0.87 <tr< td=""><td>Rosado 1997-0.401887290.2028029454560.3%0.670.45, 1.00Veenemans 2011-0.223426990.197434821531530.3%0.80[0.54, 1.18]Penny 2004-0.117783040.1048626980791.1%0.89[0.72, 1.09]Ruel 1997-0.251314430.1041793855531.1%0.78[0.63, 0.95]Gupta 2007-0.146603470.0973818548581.3%0.86[0.71, 1.05]Wuehler 2008-0.300104590.096013323531161.3%0.74[0.61, 0.89]Lind 20030.068992870.090656271701701.5%1.07[0.90, 1.28]Larson 2010-0.233818080.81231161761771.9%0.79[0.68, 0.93]Muller 2001-0.140772550.075959023423442.1%0.87[0.75, 1.01]Chagan 2009-0.0449132690.0703357071041052.3%0.95[0.82, 1.10]Richard 2006-0.281066420.070782112092152.5%0.75[0.66, 0.87]Long 2006 (2)-0.265140980.068888811921802.6%0.77[0.67, 0.88]Long 2006 (2)-0.050010420.060421711751603.4%0.95[0.84, 1.07]Sazawal 1996-0.024391450.057397011611373.8%0.88[0.78, 0.98]Baqui 2003-0.024391450.057397011611573.8%<td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></td></tr<>	Rosado 1997-0.401887290.2028029454560.3%0.670.45, 1.00Veenemans 2011-0.223426990.197434821531530.3%0.80[0.54, 1.18]Penny 2004-0.117783040.1048626980791.1%0.89[0.72, 1.09]Ruel 1997-0.251314430.1041793855531.1%0.78[0.63, 0.95]Gupta 2007-0.146603470.0973818548581.3%0.86[0.71, 1.05]Wuehler 2008-0.300104590.096013323531161.3%0.74[0.61, 0.89]Lind 20030.068992870.090656271701701.5%1.07[0.90, 1.28]Larson 2010-0.233818080.81231161761771.9%0.79[0.68, 0.93]Muller 2001-0.140772550.075959023423442.1%0.87[0.75, 1.01]Chagan 2009-0.0449132690.0703357071041052.3%0.95[0.82, 1.10]Richard 2006-0.281066420.070782112092152.5%0.75[0.66, 0.87]Long 2006 (2)-0.265140980.068888811921802.6%0.77[0.67, 0.88]Long 2006 (2)-0.050010420.060421711751603.4%0.95[0.84, 1.07]Sazawal 1996-0.024391450.057397011611373.8%0.88[0.78, 0.98]Baqui 2003-0.024391450.057397011611573.8% <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
Veenemans 2011 -0.22342699 0.19743482 153 153 0.3% 0.80 [0.54, 1.18] Penny 2004 -0.11778304 0.10486269 80 79 1.1% 0.89 [0.72, 1.09] Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.86 [0.71, 1.05] Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.86 [0.71, 1.05] Wuehler 2008 -0.30010459 0.0960532 353 116 1.3% 0.74 [0.61, 0.89] Lind 2003 0.06899287 0.09065627 170 170 1.5% 1.07 [0.90, 1.28] Larson 2010 -0.23381808 0.08123116 176 177 1.9% 0.79 [0.68, 0.93] Muller 2001 -0.14077255 0.07595902 342 344 2.1% 0.87 [0.75, 1.01] Chhagan 2009 -0.04913269 0.07355707 104 105 2.3% 0.95 [0.82, 1.10] Richard 2006 -0.28106642 0.07078211 209 215 2.5% 0.75 [0.66, 0.87] Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 (2) -0.26514098 0.0688881 192 180 2.6% 0.77 [0.67, 0.88] Rahman 2001 -0.13353139 0.0579042 170 161 3.7% 0.88 [0.78, 0.98] Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 [0.87, 1.09] Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 [0.84, 1.00] Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 [0.58, 0.65] Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 [0.85, 0.95] Subtotal (95% CI) S02918358 134 124 14.5% 0.61 [0.58, 0.65] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); l ² = 87% Test for overall effect: Z = 12.45 (P < 0.00001); l ² = 87% Test for overall effect: Z = 12.45 (P < 0.00001); l ² = 88% Test for overall effect: Z = 12.45 (P < 0.00001); l ² = 98.5%	Veenemans 2011 -0.22342699 0.19743482 153 153 0.3% 0.80 $[0.54, 1.18]$ Penny 2004 -0.11778304 0.10486269 80 79 1.1% 0.89 $[0.72, 1.09]$ Gupta 2007 -0.25131443 0.10417938 55 53 1.1% 0.89 $[0.72, 1.09]$ Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.86 $[0.71, 1.05]$ Wuehler 2008 -0.30010459 0.09605627 170 1.5% 1.70 $[0.68, 0.93]$ Lind 2003 0.0689287 0.09065627 170 1.5% 1.07 $[0.9\%, 0.79]$ $[0.68, 0.93]$ Larson 2010 -0.23381808 0.8123116 176 177 1.9% 0.79 $[0.68, 0.93]$ Chhagan 2009 -0.04913269 0.07335707 104 105 2.3% 0.95 $[0.82, 1.10]$ Chhagan 2009 -0.28106642 0.07035707 104 105 2.3% 0.75 $[0.66, 0.87]$ Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 $[0.98, 1.30]$ Long 2006 0.12218449 0.07061765 181 183 2.5% $1.16, 0.6, 0.87]$ Long 2006 0.12218449 0.07061765 181 183 2.5% 1.09 1.071 Long 2006 0.12218449 0.070379701 161 3.7% 0.88 $[0.78, 0.98]$ Baqui 2003 -0.02439145 0.05739701 161 157 3.6%								
Penny 2004 -0.11778304 0.10486269 80 79 1.1% 0.89 [0.72, 1.09] Ruel 1997 -0.25131443 0.10417938 55 53 1.1% 0.78 [0.63, 0.95] Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.86 [0.71, 1.05] Wuehler 2008 -0.30010459 0.09601332 353 116 1.3% 0.74 [0.61, 0.89] Lind 2003 0.06899287 0.09065627 170 170 1.5% 1.07 [0.90, 1.28] Larson 2010 -0.23381808 0.08123116 176 177 1.9% 0.79 [0.68, 0.93] Muller 2001 -0.14077255 0.07555902 342 344 2.1% 0.87 [0.75, 1.01] Chhagan 2009 -0.04913269 0.07335707 104 105 2.3% 0.95 [0.82, 1.10] Richard 2006 -0.12218449 0.07061765 181 183 2.5% 0.75 [0.66, 0.87] Long 2006 0.12218449 0.07061765 181 183 2.5% 0.75 [0.66, 0.87] Long 2006 0.12218449 0.07061765 181 183 2.5% 0.75 [0.68, 1.07] Rahman 2001 -0.13353139 0.0579042 170 161 3.7% 0.88 [0.78, 0.98] Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 [0.87, 1.09] Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 [0.84, 1.00] Malik 2013 -0.048917615 0.02918358 134 124 14.5% 0.61 [0.58, 0.65] Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.99 [0.85, 0.95] Subtotal (95% CI) 8093 7550 100.0% 0.87 [0.85, 0.89] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); l ² = 87% Test for overall effect: Z = 14.83 (P < 0.00001) Total (95% CI) 8093 7550 100.0% 0.87 [0.85, 0.89] Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); l ² = 88% Test for overall effect: Z = 12.45 (P < 0.00001) Test for subgroup differences: Chi ² = 65.11, df = 1 (P < 0.00001), l ² = 98.5%	Penny 2004 -0.11778304 0.10486269 80 79 1.1% 0.89 [0.72, 1.09] Ruel 1997 -0.25131443 0.10417938 55 53 1.1% 0.78 [0.63, 0.95] Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.86 [0.71, 1.05] Wuehler 2008 -0.30010459 0.09601332 353 116 1.3% 0.74 [0.61, 0.89] Lind 2003 0.06899287 0.09065627 170 170 1.5% 1.07 [0.90, 1.28] Larson 2010 -0.23381808 0.08123116 176 177 1.9% 0.79 [0.68, 0.93] Muller 2001 -0.14077255 0.07595902 342 344 2.1% 0.87 [0.75, 1.01] Chhagan 2009 -0.04913269 0.07335707 104 105 2.3% 0.95 [0.82, 1.10] Richard 2006 -0.12218449 0.07061765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 0.12218449 0.07061765 181 183 2.5% 0.75 [0.66, 0.87] Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 (2) -0.26514098 0.06888881 192 180 2.6% 0.77 [0.67, 0.88] 								
Ruel 1997 -0.25131443 0.10417938 55 53 1.1% 0.78 $[0.63, 0.95]$ Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.86 $[0.71, 1.05]$ Wuehler 2008 -0.30010459 0.09601332 353 116 1.3% 0.74 $[0.61, 0.89]$ Lind 2003 0.0689287 0.09065627 170 1.5% 1.07 $[0.90, 1.28]$ Larson 2010 -0.23381808 0.08123116 176 177 1.9% 0.79 $[0.68, 0.93]$ Muller 2001 -0.14077255 0.07595902 342 344 2.1% 0.87 $[0.75, 1.01]$ Chhagan 2009 -0.04913269 0.07335707 104 105 2.3% 0.95 $[0.82, 1.10]$ Richard 2006 -0.228106642 0.07078211 209 215 2.5% 0.75 $[0.66, 0.87]$ Long 2006 0.12218449 0.07061765 181 183 2.5% 1.30 0.84 Long 2006 0.12218498 0.06848811 192 180 2.6% 0.77 $[0.67, 0.88]$ Long 2006 0.12218499 0.0579042 170 161 3.7% 0.88 $[0.87, 1.09]$ Rahman 2001 -0.13353139 0.0579042 170 161 3.7% 0.88 $[0.87, 1.09]$ Sazwal 1996 -0.08461665 0.4515217 286 293 6.1% 0.65 $0.56.0.65$ Bhandari 2002 -0.10583655 0.02613411 1228 123	Ruel 1997 -0.25131443 0.10417938 55 53 1.1% 0.78 $[0.63, 0.95]$ Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.78 $[0.61, 0.89]$ Wuehler 2008 -0.30010459 0.09061332 353 116 1.3% 0.74 $[0.61, 0.89]$ Lind 2003 0.06899287 0.09065627 170 1.5% 1.07 $[0.90, 1.28]$ Larson 2010 -0.23381808 0.08123116 176 177 1.9% 0.79 $[0.68, 0.93]$ Muller 2001 -0.14077255 0.07595902 342 344 2.1% 0.87 $[0.75, 1.01]$ Chhagan 2009 -0.04913269 0.07335707 104 105 2.3% 0.95 0.821 1.01 Richard 2006 -0.28106642 0.07078211 209 2.5% 0.75 $[0.66, 0.87]$ -160020622 Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 $(0.88, 1.07)$ Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 $(0.88, 1.07)$ Long 2006 1.2218449 0.07061765 181 183 2.5% 1.13 $(0.88, 1.07)$ Rahman 2001 -0.13353139 0.0579042 170 161 3.7% 0.88 $(0.87, 1.09]$ Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.82 $(0.80, 0.84]$ Malik 2013 -0.48917615 0.02918358 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>								
Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.86 $[0.71, 1.05]$ Wuehler 2008 -0.30010459 0.0960527 170 1.5% 1.07 $[0.50, 0.89]$ Lind 2003 0.06899287 0.0906527 170 177 1.9% 0.79 $[0.68, 0.93]$ Larson 2010 -0.23381808 0.08123116 176 177 1.9% 0.79 $[0.68, 0.93]$ Muller 2001 -0.14077255 0.07595902 342 344 2.1% 0.87 $[0.75, 1.01]$ Chhagan 2009 -0.04913269 0.0735707 104 105 2.3% 0.95 $0.52, 1.10]$ Indig 2006 -0.28106642 0.07061765 181 183 2.5% 0.75 0.56 0.87 Long 2006 0.12218449 0.07061765 181 183 2.5% 0.75 0.88 1.30 Long 2006 0.12218449 0.07061765 181 183 2.5% 0.75 0.88 1.30 Long 2006 0.12218449 0.07061765 181 183 2.5% 0.77 0.67 0.88 Rahman 2001 -0.13353139 0.5739701 161 3.7% 0.88 0.87 0.95 Rahman 2001 -0.08461665 0.04515217 286 293 6.1% 0.92 0.84 1.00 Malik 2013 -0.484017615 0.02918358 134 124 14.5% 0.61 0.58 0.55 Subtotal (95\% CI)S093 <t< td=""><td>Gupta 2007$-0.14660347$$0.097381$$854$$858$$1.3\%$$0.86$$[0.71, 1.05]$Wuehler 2008$-0.30010459$$0.09601322$$353$$116$$1.3\%$$0.74$$[0.61, 0.89]$Lind 2003$0.06899287$$0.09065627$$170$$170$$1.5\%$$1.07$$[0.90, 1.28]$Larson 2010$-0.23381808$$0.08123116$$176$$177$$1.9\%$$0.79$$[0.68, 0.93]$Muller 2001$-0.14077255$$0.07595902$$342$$344$$2.1\%$$0.87$$[0.75, 1.01]$Chhagan 2009$-0.04913269$$0.07335707$$104$$105$$2.3\%$$0.95$$[0.82, 1.10]$Richard 2006$-0.228106642$$0.07078211$$209$$215$$2.5\%$$0.75$$[0.66, 0.87]$Long 2006$0.12218449$$0.07061765$$181$$183$$2.5\%$$1.13$$[0.98, 1.30]$Long 2006$0.12218449$$0.07061765$$181$$183$$2.5\%$$0.75$$0.66$$0.87$Rahman 2001$-0.13353139$$0.05799742$$170$$161$$3.7\%$$0.88$$[0.87, 1.09]$Rahman 2001$-0.13353139$$0.05739701$$161$$157$$3.8\%$$0.98$$[0.87, 1.09]$Sazawal 1996$-0.08461665$$0.02813851$$124$$14.5\%$$0.61$$0.58$$0.65$Malik 2013$-0.48917615$$0.02913858$$184$$124$$14.5\%$$0.61$$0.58$$0.55$Subtotal (95\% Cl)S893</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	Gupta 2007 -0.14660347 0.097381 854 858 1.3% 0.86 $[0.71, 1.05]$ Wuehler 2008 -0.30010459 0.09601322 353 116 1.3% 0.74 $[0.61, 0.89]$ Lind 2003 0.06899287 0.09065627 170 170 1.5% 1.07 $[0.90, 1.28]$ Larson 2010 -0.23381808 0.08123116 176 177 1.9% 0.79 $[0.68, 0.93]$ Muller 2001 -0.14077255 0.07595902 342 344 2.1% 0.87 $[0.75, 1.01]$ Chhagan 2009 -0.04913269 0.07335707 104 105 2.3% 0.95 $[0.82, 1.10]$ Richard 2006 -0.228106642 0.07078211 209 215 2.5% 0.75 $[0.66, 0.87]$ Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 $[0.98, 1.30]$ Long 2006 0.12218449 0.07061765 181 183 2.5% 0.75 0.66 0.87 Rahman 2001 -0.13353139 0.05799742 170 161 3.7% 0.88 $[0.87, 1.09]$ Rahman 2001 -0.13353139 0.05739701 161 157 3.8% 0.98 $[0.87, 1.09]$ Sazawal 1996 -0.08461665 0.02813851 124 14.5% 0.61 0.58 0.65 Malik 2013 -0.48917615 0.02913858 184 124 14.5% 0.61 0.58 0.55 Subtotal (95\% Cl)S893								
Wuehler 2008 -0.30010459 0.09601332 353 116 1.3% 0.74 $[0.61, 0.89]$ Lind 2003 0.06899287 0.09065627 170 170 1.5% 1.07 $[0.90, 1.28]$ Larson 2010 -0.23381808 0.08123116 176 177 1.9% 0.79 $[0.68, 0.93]$ Muller 2001 -0.14077255 0.07595902 342 344 2.1% 0.87 $[0.75, 1.01]$ Chhagan 2009 -0.04913269 0.07335707 104 105 2.3% 0.95 $[0.82, 1.10]$ Richard 2006 -0.28106642 0.07078211 209 215 2.5% 0.75 $[0.66, 0.87]$ Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 $[0.88, 1.30]$ Long 2006 0.12218449 0.07061765 181 183 2.5% 0.77 $[0.67, 0.88]$ Rahman 2001 -0.13353139 0.057397042 170 161 3.7% 0.88 $[0.78, 0.98]$ Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 $0.87, 1.09]$ Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 $0.84, 1.00]$ Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 $0.58, 0.89]$ Subtotal (95% CI)80937550100.0\% 0.87 $0.88, 0.88]$ $0.50.7$ 1 Heterogeneity: Chi ² = 196.27, df = 35 (P < 0.00001);	Wuehler 2008-0.300104590.096013323531161.3%0.74[0.61, 0.89]Lind 2003.0.668992870.090656271701701.5%1.07[0.90, 1.28]Larson 2010-0.233818080.081231161761771.9%0.79[0.68, 0.93]Muller 2001-0.140772550.075959023423442.1%0.87[0.75, 1.01]Chhagan 2009-0.049132690.073357071041052.3%0.95[0.82, 1.10]Richard 2006-0.281066420.070617651811832.5%0.75[0.67, 0.88]Long 20060.122184490.070617651811832.5%0.75[0.67, 0.88]Long 20060.122184490.070617651811832.5%0.77[0.67, 0.88]Rahman 2001 (2)-0.050010420.060421711751603.4%0.95[0.84, 1.07]Rahman 2001-0.133331390.057397011611573.8%0.98[0.87, 1.09]Sazawal 1996-0.084616650.045152172862936.1%0.92[0.84, 1.00]Malik 2013-0.489176150.0291835813412414.5%0.61[0.58, 0.65]Bhandari 2002-0.105836550.026134111228123618.1%0.90[0.85, 0.95]Subtotal (95% CI)80937550100.0%0.87[0.85, 0.89]4Heterogeneity: Chi² = 298.70, df = 35 (P < 0.00001); l² = 87%								
Larson 2010 -0.23381808 0.08123116 176 177 1.9% 0.79 [0.68, 0.93] Muller 2001 -0.14077255 0.07595902 342 344 2.1% 0.87 [0.75, 1.01] Chhagan 2009 -0.04913269 0.07335707 104 105 2.3% 0.95 [0.82, 1.10] Richard 2006 -0.28106642 0.07078211 209 215 2.5% 0.75 [0.66, 0.87] Long 2006 (2) -0.26514098 0.06888881 192 180 2.6% 0.77 [0.67, 0.88] Rahman 2001 (2) -0.05001042 0.06042171 175 160 3.4% 0.95 [0.84, 1.07] Rahman 2001 -0.13353139 0.0579042 170 161 3.7% 0.88 [0.78, 0.98] Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 [0.87, 1.09] Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 [0.84, 1.00] Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 [0.58, 0.65] Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 [0.85, 0.95] Subtotal (95% CI) S850 5494 71.6% 0.82 [0.80, 0.84] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); H ² = 87% Test for overall effect: Z = 12.45 (P < 0.00001) Total (95% CI) 8093 7550 100.0% 0.87 [0.85, 0.89] Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); H ² = 88% Test for subgroup differences: Chi ² = 65.11, df = 1 (P < 0.00001), H ² = 98.5%	Larson 2010 -0.23381808 0.08123116 176 177 1.9% 0.79 [0.68, 0.93] Muller 2001 -0.14077255 0.07595902 342 344 2.1% 0.87 [0.75, 1.01] Chhagan 2009 -0.04913269 0.07335707 104 105 2.3% 0.95 [0.82, 1.10] Richard 2006 -0.28106642 0.07078211 209 215 2.5% 0.75 [0.66, 0.87] Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 (2) -0.26514098 0.06688881 192 180 2.6% 0.77 [0.67, 0.88] Rahman 2001 (2) -0.05001042 0.06042171 175 160 3.4% 0.95 [0.84, 1.07] Rahman 2001 -0.13353139 0.0579942 170 161 3.7% 0.88 [0.78, 0.98] Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 [0.87, 1.09] Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 [0.84, 1.00] Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 [0.58, 0.65] Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 [0.85, 0.95] Subtotal (95% CI) S850 5494 71.6% 0.82 [0.80, 0.84] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); l ² = 87% Test for overall effect: Z = 12.45 (P < 0.00001); l ² = 88% Test for overall effect: Z = 12.45 (P < 0.00001); l ² = 98.5%								
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Lind 2003			170	170			+-
Chhagan 2009 -0.04913269 0.07335707 104 105 2.3% 0.95 [0.82, 1.10] Richard 2006 -0.28106642 0.07078211 209 215 2.5% 0.75 [0.66, 0.87] Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 (2) -0.26514098 0.06888881 192 180 2.6% 0.77 [0.67, 0.88] Rahman 2001 (2) -0.05001042 0.06042171 175 160 3.4% 0.95 [0.84, 1.07] Rahman 2001 -0.13353139 0.05739704 170 161 3.7% 0.88 [0.78, 0.98] Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 [0.87, 1.09] Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 [0.84, 1.00] Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 [0.58, 0.65] Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 [0.85, 0.95] Subtotal (95% CI) Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); I ² = 87% Test for overall effect: Z = 14.83 (P < 0.00001) Total (95% CI) Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); I ² = 88% Test for overall effect: Z = 12.45 (P < 0.00001); I ² = 88% Test for subgroup differences: Chi ² = 65.11, df = 1 (P < 0.00001), I ² = 98.5%	$\begin{array}{c c c c c c c c c c c c c c c c c c c $								
Richard 2006 -0.28106642 0.07078211 209 215 2.5% 0.75 $[0.66, 0.87]$ Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 $[0.98, 1.30]$ Long 2006 (2) -0.26514098 0.06888881 192 180 2.6% 0.77 $[0.67, 0.88]$ Rahman 2001 (2) -0.05001042 0.06042171 175 160 3.4% 0.95 $[0.84, 1.07]$ Rahman 2001 -0.13353139 0.0579042 170 161 3.7% 0.88 $[0.77, 0.88]$ Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 $[0.87, 1.09]$ Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 $[0.84, 1.00]$ Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 $[0.58, 0.65]$ Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 0.85 0.95 Subtotal (95% CI)S850S494 71.6% 0.82 $(0.80, 0.84)$ 4.165 Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); H ² = 88% 7550 100.0% 0.87 $(0.85, 0.89)$ Test for overall effect: Z = 12.45 (P < 0.00001); H ² = 88% $0.5 0.7 1$ $Favours Zinc F$ Test for subgroup differences: Chi ² = 65.11, df = 1 (P < 0.00001); H ² = 98.5\% $0.5 0.7 1$ $Favours Zinc F$	Richard 2006 -0.28106642 0.07078211 209 215 2.5% 0.75 $[0.66, 0.87]$ Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 $[0.98, 1.30]$ Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 $[0.98, 1.30]$ Long 2006 (2) -0.26514098 0.06888881 192 180 2.6% 0.77 $[0.67, 0.88]$ Rahman 2001 -0.05001042 0.06042171 175 160 3.4% 0.95 $[0.84, 1.07]$ Rahman 2001 -0.13353139 0.0579042 170 161 3.7% 0.88 $[0.78, 0.98]$ Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 $(0.87, 1.09]$ Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 $(0.84, 1.00]$ Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 $(0.58, 0.65]$ Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 $(0.82, 0.80, 0.84]$ Heterogeneity: Chi² = 196.27, df = 25 $(P < 0.00001)$; $P = 88\%$ $P = 85\%$ $0.50, 7.1$ Test for overall effect: Z = 12.45 $(P < 0.00001)$; $P = 88\%$ $0.50, 0.87$ $0.50, 7.1$ Favours ZincTest for subgroup differences: Chi² = 65.11, df = 1 $(P < 0.00001), P = 98.5\%$ $P = 98.5\%$	Muller 2001	-0.14077255	0.07595902	342	344	2.1%	0.87 [0.75, 1.01]	
Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 (2) -0.26514098 0.0688881 192 180 2.6% 0.77 [0.57, 0.88] Rahman 2001 (2) -0.05001042 0.06042171 175 160 3.4% 0.95 [0.84, 1.07] Rahman 2001 -0.13353139 0.0579042 170 161 3.7% 0.88 [0.78, 0.98] Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 [0.87, 1.09] Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 [0.84, 1.00] Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 [0.58, 0.65] Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 [0.85, 0.95] Subtotal (95% CI) 5850 5494 71.6% 0.82 [0.80, 0.84] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); I ² = 87% Test for overall effect: Z = 12.45 (P < 0.00001); I ² = 88% Test for overall effect: Z = 12.45 (P < 0.00001); I ² = 88% Test for subgroup differences: Chi ² = 65.11, df = 1 (P < 0.00001), I ² = 98.5%	Long 2006 0.12218449 0.07061765 181 183 2.5% 1.13 [0.98, 1.30] Long 2006 (2) -0.26514098 0.06888881 192 180 2.6% 0.77 [0.67, 0.88] Rahman 2001 (2) -0.05001042 0.06042171 175 160 3.4% 0.95 [0.84, 1.07] Rahman 2001 -0.13353139 0.0579042 170 161 3.7% 0.88 [0.78, 0.98] Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 [0.87, 1.09] Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 [0.84, 1.00] Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 [0.58, 0.65] Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 [0.85, 0.95] Subtotal (95% CI) S850 5494 71.6% 0.82 [0.80, 0.84] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); l ² = 87% Test for overall effect: Z = 12.45 (P < 0.00001) Total (95% CI) 8093 7550 100.0% 0.87 [0.85, 0.89] Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); l ² = 88% Test for subgroup differences: Chi ² = 65.11, df = 1 (P < 0.00001), l ² = 98.5%								-
Long 2006 (2) -0.26514098 0.06888881 192 180 2.6% 0.77 [0.67, 0.88] Rahman 2001 (2) -0.05001042 0.06042171 175 160 3.4% 0.95 [0.84, 1.07] Rahman 2001 -0.13353139 0.0579042 170 161 3.7% 0.88 [0.78, 0.98] Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 [0.87, 1.09] Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 [0.84, 1.00] Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 [0.58, 0.65] Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 [0.85, 0.95] Subtotal (95% CI) S8093 7550 100.0% 0.87 [0.85, 0.89] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); I ² = 87% Test for overall effect: Z = 14.83 (P < 0.00001) Total (95% CI) 8093 7550 100.0% 0.87 [0.85, 0.89] Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); I ² = 88% Test for subgroup differences: Chi ² = 65.11, df = 1 (P < 0.00001), I ² = 98.5%	Long 2006 (2) -0.26514098 0.06888881 192 180 2.6% 0.77 [0.67, 0.88] Rahman 2001 (2) -0.05001042 0.06042171 175 160 3.4% 0.95 [0.84, 1.07] Rahman 2001 -0.13353139 0.0579042 170 161 3.7% 0.88 [0.78, 0.98] Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 [0.87, 1.09] Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 [0.84, 1.00] Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 [0.58, 0.65] Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 [0.85, 0.95] Subtotal (95% CI) S850 5494 71.6% 0.82 [0.80, 0.84] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); l ² = 87% Test for overall effect: Z = 14.83 (P < 0.00001) Total (95% CI) 8093 7550 100.0% 0.87 [0.85, 0.89] Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); l ² = 88% Test for subgroup differences: Chi ² = 65.11, df = 1 (P < 0.00001), l ² = 98.5%								
Rahman 2001 (2) -0.05001042 0.06042171 175 160 3.4% 0.95 [0.84 , 1.07] Rahman 2001 -0.13353139 0.0579042 170 161 3.7% 0.88 [0.78 , 0.98] Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 [0.84 , 1.00] Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 [0.84 , 1.00] Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 [0.58 , 0.65] Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 [0.85 , 0.95] Subtotal (95% CI) Sobo 5494 71.6% 0.82 [0.80 , 0.84] 1.64 Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); $I2 = 87\%$ Test for overall effect: Z = 14.83 (P < 0.00001); $I2 = 88\%$ 7550 100.0% 0.87 [0.85 , 0.89] 0.5 0.7 1 Featogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); $I2 = 88\%$ 7550 100.0% 0.87 [0.85, 0.89] 0.5 0.7 1 Fator overall effect: Z = 12.45 (P < 0.00001) Test for subgroup differences: Ch	Rahman 2001 (2) -0.05001042 0.06042171 175 160 3.4% 0.95 [0.84, 1.07] Rahman 2001 -0.13333139 0.0579042 170 161 3.7% 0.88 [0.78, 0.98] Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 [0.84, 1.00] Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 [0.84, 1.00] Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 [0.58, 0.65] Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 [0.85, 0.95] Subtotal (95% CI) Subtotal (95% CI) 8093 7550 100.0% 0.87 [0.85, 0.89] 4 Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); l ² = 87% Test for overall effect: Z = 12.45 (P < 0.00001); l ² = 88% 7550 100.0% 0.87 [0.85, 0.89] 4 Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); l ² = 88% 7550 100.0% 0.87 [0.5 0.7] Favours Zinc Test for subgroup differences: Chi ² = 65.11, df = 1 (P < 0.00001								-
Rahman 2001 -0.13353139 0.0579042 170 161 3.7% 0.88 $(0.78, 0.98)$ Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 $(0.87, 1.09)$ Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 $(0.84, 1.00)$ Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 $(0.85, 0.65)$ Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 $(0.85, 0.95)$ Subtotal (95% CI) S850 5494 71.6% 0.82 $(0.80, 0.84)$ Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001) S850 5494 71.6% 0.87 0.85 0.85 0.86 Total (95% CI) 8093 7550 100.0% 0.87 0.85 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5	Rahman 2001 -0.13353139 0.0579042 170 161 3.7% 0.88 $[0.78, 0.98]$ Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 $[0.87, 1.09]$ Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 $[0.84, 1.00]$ Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 $[0.58, 0.65]$ Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 $[0.85, 0.95]$ Subtotal (95% CI) S850 5494 71.6% 0.82 $[0.80, 0.84]$ Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); $1^2 = 87\%$ Test for overall effect: Z = 14.83 (P < 0.00001) Total (95% CI) 0.87 0.87 0.87 0.85 0.89 $0.5 0.7$ 1570 0.87 0.85 0.85 $0.5 0.7$ 1570 100.0% 0.87 0.85 $0.5 0.7$ 1570 100.0% 0.87 $0.5 0.7$ 1570 $128000000000000000000000000000000000000$								
Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 [0.87 , 1.09] Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 [0.84 , 1.00] Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 [0.58 , 0.65] Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 [0.85 , 0.95] Subtotal (95% CI) 5850 5494 71.6% 0.82 [0.80 , 0.84] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); 1^2 = 87% Test for overall effect: Z = 14.83 (P < 0.00001) Total (95% CI) 8093 7550 100.0% 0.87 [0.85 , 0.89] Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); 1^2 = 88% $0.5 0.7 1$ Favours Zinc F Test for overall effect: Z = 12.45 (P < 0.00001) Test for subgroup differences: Chi ² = 65.11, df = 1 (P < 0.00001), 1^2 = 98.5% $10.5 0.7 1$ Favours Zinc F	Baqui 2003 -0.02439145 0.05739701 161 157 3.8% 0.98 [0.87, 1.09] Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 [0.84, 1.00] Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.616 [0.58, 0.65] Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 [0.85, 0.95] Subtotal (95% CI) 5850 5494 71.6% 0.82 [0.80, 0.84] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); l ² = 87% Test for overall effect: Z = 14.83 (P < 0.00001) Total (95% CI) 8093 7550 100.0% 0.87 [0.85, 0.89] Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); l ² = 88% Test for overall effect: Z = 12.45 (P < 0.00001) Test for subgroup differences: Chi ² = 65.11, df = 1 (P < 0.00001), l ² = 98.5%								-
Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 [0.84, 1.00] Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 [0.58, 0.65] Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 [0.85, 0.95] Subtotal (95% CI) S809 71.6% 0.82 [0.80, 0.84] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); $I^2 = 87\%$ Test for overall effect: Z = 14.83 (P < 0.00001) Total (95% CI) 8093 7550 100.0% 0.87 [0.85, 0.89] Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); $I^2 = 88\%$ Test for overall effect: Z = 12.45 (P < 0.00001) Test for subgroup differences: Chi ² = 65.11, df = 1 (P < 0.00001), $I^2 = 98.5\%$	Sazawal 1996 -0.08461665 0.04515217 286 293 6.1% 0.92 $[0.84, 1.00]$ Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 $[0.58, 0.65]$ Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 $(0.85, 0.95]$ Subtotal (95% CI) S850 5494 71.6% 0.82 $(0.80, 0.84]$ Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); l ² = 87% Test for overall effect: Z = 14.83 (P < 0.00001) 7550 100.0% 0.87 $(0.85, 0.89]$ Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); l ² = 88% $0.5 0.7$ 10.00% 0.87 $0.85, 0.89$ Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001) 1^2 = 88% $0.5 0.7$ $10.5 0.7$ </td <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td>								-
Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 [0.58, 0.65] Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 [0.85, 0.95] Subtotal (95% CI) 580 5494 71.6% 0.82 [0.80, 0.84] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); I ² = 87% 7550 100.0% 0.87 [0.85, 0.89] Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); I ² = 88% 7550 100.0% 0.87 [0.5 0.7 1 Fest for overall effect: Z = 12.45 (P < 0.00001)	Malik 2013 -0.48917615 0.02918358 134 124 14.5% 0.61 [0.58, 0.65] Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 [0.85, 0.95] Subtotal (95% CI) -0.10583655 0.020101); l ² 87% 71.6% 0.82 [0.80, 0.84] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); l ² = 87% 7550 100.0% 0.87 [0.85, 0.89] - Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); l ² = 88% 7550 100.0% 0.87 [0.85, 0.89] - Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); l ² = 88% 7550 100.0% 0.87 [0.85, 0.89] - Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); l ² = 88% 7550 100.0% 0.87 [0.5 0.7] Favours Zinc Test for subgroup differences: Chi ² = 65.11, df = 1 (P < 0.00001), l ² = 98.5% -								
Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 [0.85, 0.95] Subtotal (95% CI) 5850 5494 71.6% 0.82 [0.80, 0.84] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001);	Bhandari 2002 -0.10583655 0.02613411 1228 1236 18.1% 0.90 [0.85, 0.95] Subtotal (95% CI) S850 5494 71.6% 0.82 [0.80, 0.84] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); l ² = 87% Test for overall effect: Z = 14.83 (P < 0.00001)								
Subtotal (95% Cl) 5850 5494 71.6% 0.82 [0.80, 0.84] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); l ² = 87% Test for overall effect: Z = 14.83 (P < 0.00001)	Subtotal (95% CI) 5850 5494 71.6% 0.82 [0.80, 0.84] Heterogeneity: Chi ² = 196.27, df = 25 (P < 0.00001); l ² = 87% Test for overall effect: Z = 14.83 (P < 0.00001)								
Heterogeneity: $Chi^2 = 196.27$, $df = 25$ (P < 0.00001); $I^2 = 87\%$ Test for overall effect: Z = 14.83 (P < 0.00001) Total (95% Cl) 8093 7550 100.0% 0.87 [0.85, 0.89] Heterogeneity: $Chi^2 = 298.70$, $df = 35$ (P < 0.00001); $I^2 = 88\%$ Test for overall effect: Z = 12.45 (P < 0.00001) Test for subgroup differences: $Chi^2 = 65.11$, $df = 1$ (P < 0.00001), $I^2 = 98.5\%$ Favours Zinc F	Heterogeneity: $\text{Chi}^2 = 196.27$, $\text{df} = 25$ (P < 0.00001); $\text{I}^2 = 87\%$ Test for overall effect: Z = 14.83 (P < 0.00001) Total (95% Cl) 8093 7550 100.0% 0.87 [0.85, 0.89] Heterogeneity: $\text{Chi}^2 = 298.70$, $\text{df} = 35$ (P < 0.00001); $\text{I}^2 = 88\%$ Test for overall effect: Z = 12.45 (P < 0.00001) Test for subgroup differences: $\text{Chi}^2 = 65.11$, $\text{df} = 1$ (P < 0.00001), $\text{I}^2 = 98.5\%$ Favours Zinc		0.10909099	0.02013411					•
Total (95% CI) 8093 7550 100.0% 0.87 [0.85, 0.89] Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); l ² = 88% 0.5 0.7 1 Test for overall effect: Z = 12.45 (P < 0.00001)	Total (95% CI) 8093 7550 100.0% 0.87 [0.85, 0.89] Heterogeneity: Chi ² = 298.70, df = 35 (P < 0.00001); l ² = 88% $0.5 0.7$ $0.5 0.7$ Test for overall effect: Z = 12.45 (P < 0.00001)				$l^2 = 87\%$				
Heterogeneity: $Chi^2 = 298.70$, $df = 35 (P < 0.00001)$; $I^2 = 88\%$ Test for overall effect: $Z = 12.45 (P < 0.00001)$ Test for subgroup differences: $Chi^2 = 65.11$, $df = 1 (P < 0.00001)$, $I^2 = 98.5\%$	Heterogeneity: $Chi^2 = 298.70$, df = 35 (P < 0.00001); l ² = 88% Test for overall effect: Z = 12.45 (P < 0.00001) Test for subgroup differences: $Chi^2 = 65.11$, df = 1 (P < 0.00001), l ² = 98.5%	Test for overall effect:	Z = 14.83 (P < 0.0)	00001)					
Test for overall effect: Z = 12.45 (P < 0.00001) Test for subgroup differences: Chi ² = 65.11, df = 1 (P < 0.00001), I ² = 98.5%	Test for overall effect: Z = 12.45 (P < 0.00001) Test for subgroup differences: Chi ² = 65.11, df = 1 (P < 0.00001), I ² = 98.5%						100.0%	0.87 [0.85, 0.89]	
Test for subgroup differences: $Chi^2 = 65.11$, $df = 1$ (P < 0.00001), $I^2 = 98.5\%$	Test for subgroup differences: $Chi^2 = 65.11$, $df = 1$ (P < 0.00001), $I^2 = 98.5\%$				$l^2 = 88\%$				0.5 0.7 1
					< 0.0000	(1), $ ^2 =$	98.5%		Favours Zinc F
						-//			

Figure	5:	Heigh
--------	----	-------

BMJ Open							
Figure 5: Height			No Zinc	Zinc		Std. Mean Difference	Std. Mean I
Study or Subgroup Sayeg Porto 2000	Std. Mean Difference 0.46637519	SE 0.45563575	Total 9		Weight 0.1%	IV, Fixed, 95% CI 0.47 [-0.43, 1.36]	IV, Fixed
Nakamura 1993 Smith 1999	0.96009475	0.44484717 0.43412761	11	10	0.2%	0.96 [0.09, 1.83] 0.73 [-0.13, 1.58]	-
Ince 1995	0.45028253	0.40793136	9	16	0.2%	0.45 [-0.35, 1.25]	+
Garcia 1998 Castillo-Duran 1994	0.10584806 0.35835025	0.34006946 0.313	17 21		0.3% 0.3%	0.11 [-0.56, 0.77] 0.36 [-0.26, 0.97]	-
Walravens 1983	0.3564118	0.31249613	20	20	0.3%	0.36 [-0.26, 0.97]	+
Dehbozorgi 2007 Clark 1999	-0.49205024	0.31209312 0.295419	30 21	30 25	0.3% 0.3%	-1.97 [-2.59, -1.36] -0.49 [-1.07, 0.09]	
Sempertegui 1996 Walravens 1989		0.28450141 0.27941182	25 25	23 25	0.4%	-0.13 [-0.69, 0.43] 0.24 [-0.31, 0.79]	
Han 2002	0.97763178	0.26685037	28	34	0.4%	0.98 [0.45, 1.50]	
Meeks Gardner 1998 Han 2002 (2)		0.26252076 0.26134196	26 29		0.4% 0.4%	0.12 [-0.40, 0.63] -0.04 [-0.55, 0.47]	-
Silva 2006 Gibson 1989		0.25926942 0.25493989	30 30	28 30	0.5% 0.5%	-0.05 [-0.55, 0.46] 0.08 [-0.42, 0.58]	-
Hambidge 1978	0.31355858	0.24369413	31	36	0.5%	0.31 [-0.16, 0.79]	+-
Hettiarachchi 2008 (2) Tupe 2009		0.23580261 0.22908102	30 40		0.5% 0.6%	0.14 [-0.32, 0.60] 0.06 [-0.39, 0.51]	
Mozaffari-Khosravi 2009 Sazawal 2006		0.22577077 0.22312277	45 58	40 44	0.6% 0.6%	0.88 [0.44, 1.33] -0.31 [-0.74, 0.13]	-
Hettiarachchi 2008	0.43865049	0.21702312	40	99	0.6%	0.44 [0.01, 0.86]	-
Sazawal 2006 (2) Ruel 1997	0.05883983	0.21183638 0.21022626	54 44	56 45	0.7% 0.7%	-0.08 [-0.49, 0.34] 0.06 [-0.35, 0.47]	-
Rosado 1997 Ruz 1997	0.07813202	0.20362659	47	48	0.7%	0.08 [-0.32, 0.48]	+
Fonseca 2002	-0.16854426	0.20129773 0.19990018	49 48		0.7% 0.8%	0.26 [-0.14, 0.65] -0.17 [-0.56, 0.22]	-
Rosado 1997 (2) Kikafunda 1998		0.19963612 0.18705861	50 54	49 59	0.8%	0.12 [-0.27, 0.51] -0.02 [-0.39, 0.35]	+
Meeks Gardner 2005	-0.23589118	0.18682894	59	55	0.9%	-0.24 [-0.60, 0.13]	-
Hong 1982 Ninh 1996		0.18644996 0.16590035	67 73	64 73	0.9% 1.1%	1.09 [0.73, 1.46] 0.35 [0.02, 0.67]	-
Penny 2004 Cavan 1993		0.16491512 0.15976556	75 80	71 76	1.1% 1.2%	0.14 [-0.19, 0.46] -0.19 [-0.50, 0.12]	+
Brown 2007	0.02831727	0.15073647	92	83	1.3%	0.03 [-0.27, 0.32]	+
Chen 2012 Umeta 2000	0.15227332 0.33222629	0.1483077 0.14785133	93 92	88 92	1.4% 1.4%	0.15 [-0.14, 0.44] 0.33 [0.04, 0.62]	-
Akramuzzaman 1994	0	0.14216714	104	93	1.5%	0.00 [-0.28, 0.28]	+
Shankar 2000 Alarcon 2004		0.13696712 0.13685249	109 104		1.6% 1.6%	0.07 [-0.20, 0.34] 0.18 [-0.09, 0.44]	T-
Gracia 2005 Friis 1997		0.13144479 0.12009587	115 135	115 141	1.8% 2.1%	-0.02 [-0.28, 0.24] 0.04 [-0.20, 0.27]	1
Baqui 2003	-0.03690719	0.11899992	140	141	2.1%	-0.04 [-0.27, 0.20]	+
Baqui 2003 (2) Long 2006	-0.03759149 0.1584015	0.11833 0.11813857	150 142		2.2% 2.2%	-0.04 [-0.27, 0.19] 0.16 [-0.07, 0.39]	+
Long 2006 (2) Wuehler 2008		0.11663237 0.11140371	144 108		2.2% 2.4%	-0.10 [-0.33, 0.13] -0.03 [-0.25, 0.19]	-
Lind 2003 (2)	-0.26456209	0.11134035	163	161	2.4%	-0.26 [-0.48, -0.05]	-
Rahman 2001 Rahman 2001 (2)		0.11069586 0.11056287	160 157		2.5% 2.5%	-0.01 [-0.23, 0.21] -0.20 [-0.42, 0.01]	-
Lind 2003	0.04482357	0.11052917 0.10286111	164	162	2.5%	0.04 [-0.17, 0.26]	t
Richard 2006 (2) Richard 2006		0.10288111	182 189		2.9% 2.9%	0.01 [-0.19, 0.21] 0.12 [-0.08, 0.33]	F
Mazariegos 2010 Muller 2001		0.10189635 0.07775177	196 329		2.9% 5.0%	-0.04 [-0.24, 0.16] 0.10 [-0.05, 0.25]	1
Ebrahimi 2006	1.2611452	0.07721922	418	386	5.1%	1.26 [1.11, 1.41]	
DiGirolamo 2010 Bhandari 2007	-0.09680936 0.14273438	0.07476273 0.0697166		360 448			
Bhandari 2002	-0.04596797	0.04238854	1133	1093	16.9%		
Total (95% CI)			6687	6982	100.0%	0.09 [0.06, 0.13])
Heterogeneity: Chi ² = 407. Test for overall effect: Z =		01); 1° = 86%					-4 -2 0 Favours No Zinc Fa
16							
	er review only	y - http:/	//bmjc	oper	n.bmj	.com/site/ab	out/guideli



Outcomes	Illustrative comparat	ive risks* (95% CI)	Relative effect	No of	Quality of the
	Assumed risk	Corresponding risk	(95% CI)	Participants	evidence
	Control	Zinc		(studies)	(GRADE)
All-cause mortality	Low		RR 0.95	138,302	$\oplus \oplus \oplus \oplus$
Follow-up: 17 to 72 weeks	2,400 per 1,000,000	2,280 per 1,000,000 (2,064 to 2,520)	(0.86 to 1.05)	(13 studies)	high
	High				
	34,900 per 1,000,000	33,155 per 1,000,000 (30,014 to 36,645)			
Mortality due to	Low		RR .95	132,321	$\oplus \oplus \oplus \ominus$
all-cause diarrhoea Follow-up: 52 to	800 per 1,000,000	760 per 1,000,000 (552 to 1,048)	(0.69 to 1.31)	(4 studies)	moderate ¹
69 weeks	High				
	3,000 per 1,000,000	2,850 per 1,000,000 (2,070 to 3,930)			
Mortality due to	Low		RR 0.86	132,063	$\oplus \oplus \oplus \ominus$
LRTI Follow-up: 52 to 69 weeks	1,200 per 1,000,000	1,032 per 1,000,000 (768 to 1,380)	(0.64 to 1.15)	(3 studies)	moderate ¹
	High				
	3,000 per 1,000,000	2,580 per 1,000,000 (1,920 to 3,450)			
Mortality due to	Low		RR 0.90	42,818	$\oplus \oplus \oplus \ominus$
malaria Follow-up: 46 to 69 weeks	7,400 per 1,000,000	6,660 per 1,000,000 (5,698 to 7,844)	(0.77 to 1.06)	(2 study)	moderate ¹
	High				
	14,200 per 1,000,000	12,780 per 1,000,000 (10,934 to 15,052)			
Incidence of all-	Low		RR 0.87	15,042	$\oplus \oplus \ominus \ominus$
cause diarrhoea Follow-up: 12 to	20,000 per	17,400 per 1,000,000	(0.85 to 0.89)	(35 studies)	low ^{2,3}
72 weeks	1,000,000	(17,000 to 17,800)			
	High				
	1,770,000 per 1,000,000	1,539,900 per 1,000,000 (1,504,500 to			
		1,575,300)			
Incidence of LRTI Follow-up: 12 to			RR 1.00 (0.94 to 1.07)	9,610 (12 studies)	⊕⊕⊕⊕ high
52 weeks	30,000 per 1,000,000	30,000 per 1,000,000 (28,200 to 32,100)	(0.94 to 1.07)	(12 studies)	iligii
	High	(,)			
	370,000 per 1,000,000	370,000 per 1,000,000 (347,800 to 395,900)			
Incidence of	Low		RR 1.05	2,407	$\oplus \oplus \oplus \ominus$
malaria Follow-up: 24 to 47 weeks	140,000 per 1,000,000	147,000 per 1,000,000 (133,000 to 161,000)	(0.95 to 1.15)	(4 studies)	moderate ⁴
	High				
	2,950,000 per 1,000,000	3,097,500 per 1,000,000 (2,802,500 to 3,392,500)			
Height	The mean height in	The mean height in the	SMD 0.09	13,669	⊕⊕⊕⊝
Follow-up: 10 to	the control groups	intervention groups	(0.06 to 0.13)	(51 studies)	moderate ⁵
60 weeks	was -1 HAZ	was 0.1 HAZ better (0 to 0.2 better)			
Participants with 1	Low	· · ·	RR 1.29	35,192	$\oplus \oplus \oplus \oplus$
vomiting episode Follow-up: 24 to	17,500 per 1,000,000	22,575 per 1,000,000 (19,950 to 25,550)	(1.14 to 1.46)	(4 studies)	high
52 weeks	High				
	300,600 per 1,000,000	387,774 per 1,000,000 (342,684 to 438,876)			

*The basis for the assumed risk (e.g. the median control group risk across studies) is provided in footnotes. The corresponding risk (and its 95% confidence interval) is based on the assumed risk in the comparison group and the relative effect of the intervention (and its 95% CI).

CI: Confidence interval; RR: Risk ratio; SMD: Standardised Mean Difference

GRADE Working Group grades of evidence

Very low quality: We are very uncertain about the estimate.

may change the estimate.

Footnotes

 2 I²=88%

⁴ I²=44%

⁵ I²=86%

is likely to change the estimate.

¹ Few deaths observed overall.

1

2

High quality: Further research is very unlikely to change our confidence in the estimate of effect.

³ Trim and fill analysis suggests the effect may be overestimated due to publication bias.

Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and

Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and

3	
4	
5	
5 6 7	
1	
8	
9	
10	
11	
12	
13	
14	
15	
8 9 10 11 12 13 14 15 16 17	
17	
18	
19	
20	
21	
22	
23	
24	
24 25	
19 20 21 22 23 24 25 26 27	
26 27	
11	
28 29 30	
29	
30	
31	
32	
33	
34	
35	
36	
37	
38	
39	
31 32 33 34 35 36 37 38 39 40	
41	
42	
43	
44	
45	
46	
47	
48	
40	
49 50	
50 51	
51 52	
53	
54	
55	
56	
57	
58	
59	

60

to been telien only

Table 2: Zinc	compared	with no	zinc (all	outcomes)

Outcomes	Trials	People	ES (95% CI), fixed effects	Heterogeneity I ² ; Chi ² (p value)
ZINC VERSUS NO ZINC				T, Chi (p value)
Mortality				
	13 (16%)	138302 (67%)	Risk=0.95 (0.86 to 1.05)	0%; 10.57 (p=0.65)
Due to diarrhoea		132321 (64%)	Risk=0.95 (0.69 to 1.31)	0%; 0.82 (p=0.84)
Due to LRTI		132063 (64%)	Risk=0.86 (0.64 to 1.15)	0%; 0.07 (p=0.96)
Due to malaria		42818 (21%)	Risk=0.90 (0.77 to 1.06)	0%; 0.01 (p=0.94)
Hospitalisation				
All-cause	7 (9%)	92872 (45%)	Risk=1.04 (0.97 to 1.11)	44%; 14.41 (p=0.07)
Due to diarrhoea		74039 (36%)	Risk=1.03 (0.87 to 1.22)	42%; 6.91 (p=0.14)
Due to LRTI	3 (4%)	74743 (36%)	Risk=1.10 (0.93 to 1.30)	0%; 0.35 (p=0.95)
Diarrhoea				
Incidence (all cause)		15042 (7%)	Risk=0.87 (0.85 to 0.89)	88%; 295.56 (p<0.00001)
Prevalence (all cause)		8519 (4%) 4982 (2%)	Rate=0.88 (0.86 to 0.90) Risk=0.89 (0.84 to 0.95)	88%; 118.88 (p<0.00001) 56%; 13.54 (p=0.04)
Incidence (severe) Incidence (persistent)		4982 (2%) 6216 (3%)	Risk=0.73 (0.62 to 0.85)	61%; 20.47 (p=0.009)
Prevalence (persistent)		666 (0%)	Risk= $0.73 (0.62 \text{ to } 0.83)$ Rate= $0.70 (0.64 \text{ to } 0.76)$	91%; 11.76 (p=0.0006)
Lower respiratory tract infe		000 (070)	Rate 0.70 (0.04 to 0.70)	9170, 11.70 (p. 0.0000)
	12 (15%)	9610 (5%)	Risk=1.00 (0.94 to 1.07)	1%; 17.16 (p=0.44)
Prevalence		1955 (1%)	Rate= $1.20 (1.10 \text{ to } 1.30)$	97%; 89.87 (p<0.0001)
Malaria	5 (1/0)	1900 (170)	1.20 (1.10 to 1.50)	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,
Incidence	4 (5%)	2407 (1%)	Risk=1.05 (0.95 to 1.15)	0%; 2.04 (p=0.84)
Prevalence		661 (0%)	Rate=0.88 (0.47 to 1.64)	Not applicable
Growth				
6	51 (64%)	13669 (7%)	SMD=0.09 (0.06 to 0.13)	86%; 407.92 (p<0.00001)
	44 (55%)	12305 (6%)	SMD=0.10 (0.07 to 0.14)	76%; 216.64 (p<0.00001)
Weight-to-height ratio		7901 (4%)	SMD=0.05 (0.01 to 0.10)	20%; 34.96 (p=0.17)
Prevalence of stunting	6 (8%)	3838 (2%)	Risk=0. 94 (0.86 to 1.02)	59%; 19.43 (p=0.01)
Adverse events	0 (20/)	0.50 (00()		00/ 0.40 / 0.70
Participants with 1 AE		850 (0%)	SMD=1.13 (1.00 to 1.27)	0%; 0.49 (p=0.78)
Study withdrawal Vomiting (incidence)		4263 (2%) 4095 (2%)	Risk=1.75 (0.93 to 3.32) Risk=1.68 (1.61 to 1.75)	21%; 5.07 (p=0.28) 85%; 34.28 (p<0.00001)
Vomiting (prevalence)		35192 (17%)	Rate= $1.29 (1.14 \text{ to } 1.46)$	37%; 6.31 (p=0.18)
Biological indicators	4 (570)	55172 (1770)	Rute 1.29 (1.14 to 1.40)	5770, 0.51 (p 0.10)
Zn concentration	46 (58%)	9810 (5%)	SMD=0.62 (0.58 to 0.67)	91%; 582.45 (p<0.00001)
Zn deficiency (prevalence)		5434 (3%)	Risk=0.49 (0.45 to 0.53)	86%; 144.77 (p<0.00001)
Haemoglobin concentration		6024 (3%)	SMD=-0.05 (-0.10 to 0.00)	45%; 63.96 (p=0.002)
Anemia (prevalence)		4287 (2%)	Risk=1.00 (0.95 to 1.06)	37%; 28.52 (p=0.05)
Fe concentration	19 (24%)	4474 (2%)	SMD=0.07 (0.00 to 0.13)	95%; 480.50 (p<0.00001)
Fe deficiency (prevalence)	10 (13%)	3149 (2%)	Risk=0.99 (0.89 to 1.10)	15%; 16.44 (p=0.29)
Cu concentration		3071 (1%)	SMD=-0.22 (-0.29 to 0.14)	68%; 37.47 (p=0.0002)
Cu deficiency (prevalence)	3 (4%)	1337 (1%)	Risk=2.64 (1.28 to 5.42)	59%; 4.94 (p=0.08)

Table 3: Zinc with iron com	pared with zinc alone (all outcomes)
-----------------------------	-------------------------	---------------

Outcomes	Trials	People	ES (95% CI), fixed effects	Heterogeneity I ² ; Chi ² (p value)
All cause mortality	1 (13%)	323 (17%)	Risk=0.33 (0.01 to 8.31)	Not applicable
Hospitalisation				
All-cause	1 (13%)	399 (21%)	Risk=0.92 (0.45 to 1.89)	Not applicable
Due to diarrhoea	1 (13%)	399 (21%)	Risk=0.99 (0.25 to 3.88)	Not applicable
Diarrhoea				
Incidence (all cause)	5 (63%)	1530 (81%)	Risk=1.10 (1.03 to 1.18)	76%; 16.92 (p=0.002)
Prevalence (all cause)	1 (13%)	399 (21%)	Rate=0.90 (0.79 to 1.06)	Not applicable
Incidence (severe)	1 (13%)	323 (17%)	Rate=0.78 (0.59 to 1.04)	Not applicable
Lower respiratory tract infe	ection			
Incidence	3 (38%)	1065 (56%)	Risk=0.93 (0.83 to 1.04)	21%; 2.52 (p=0.28)
Malaria				
Incidence	1 (13%)	410 (22%)	Rate=0.86 (0.59 to 1.24)	Not applicable
Growth				
Height	5 (63%)	1517 (80%)	SMD=0.06 (-0.04 to 0.16)	0%; 3.54 (p=0.47)
Weight	4 (50%)	910 (48%)	SMD=0.12 (-0.01 to 0.25)	0%; 2.29 (p=0.51)
Weight-to-height ratio	4 (50%)	514 (27%)	SMD=-0.06 (-0.07 to 0.19)	0%; 1.36 (p=0.71)
Prevalence of stunting	2 (25%)	462 (24%)	Risk=0.92 (0.85 to 0.99)	45%; 1.82 (p=0.18)
Adverse events				
Study withdrawal	2 (25%)	557 (29%)	Risk=1.41 (0.91 to 2.18)	0%; 0.08 (p=0.78)
Biological indicators				
Zn concentration	8 (100%)	1337 (70%)	SMD=0.16 (0.05 to 0.27)	61%; 17.84 (p=0.01)
Zn deficiency (prevalence)	3 (38%)	350 (18%)	Risk =1.42 (0.75 to 2.68)	5%; 2.10 (p=0.35)
Haemoglobin concentration	8 (100%)	1341 (71%)	SMD=-0.23 (-0.34 to -0.12)	79%; 33.53 (p<0.0001)
Anemia (prevalence)	3 (38%)	482 (25%)	Risk=0.78 (0.67 to 0.92)	0%; 1.25 (p=0.54)
Fe concentration	6 (75%)	945 (50%)	SMD=-1.79 (-1.99 to -1.56)	99%; 927.92 (p<0.00001)
Fe deficiency (prevalence)	2 (25%)	248 (13%)	Risk =0.12 (0.04 to 0.32)	87%; 8.00 (p=0.005)
Cu concentration	2 (25%)	353 (19%)	SMD=-0.06 (-0.27 to 0.15)	0%; 0.11 (p=0.74)

Rate ratio (Rate); Risk ratio (Risk); Odds Ratio (Odds); Standardised Mean Difference (SMD)

Zinc (Zn); Iron (Fe); Copper (Cu).

Effects favour intervention (i.e. zinc rather than iron; zinc plus iron rather than zinc alone) when the relative risk is reduced (RR<1) or the standardised difference is positive (SMD>0).

Table 4: Subgroup a Subgroup	nalyses Trials	People	Risk Ratio (95% CI), fixed	I ² ; Chi ² (p value)
Mortality	13	138302	0.95 (0.86 to 1.05)	0%; 10.57 (p=0.65)
Iron co-supplementation () with iron	ı 4	99242	0.99 (0.86 to 1.15)	0%; 0.76 (p=0.86)
without iron Age (I ² =59.8%; Chi ² =2.48		64985	0.89 (0.79 to 1.00)	0%; 9.99 (p=0.44)
6m to 1y 1y to 5y		29879 125903	1.06 (0.88 to 1.27) 0.89 (0.80 to 0.99)	0%; 2.56 (p=0.77) 12%; 10.28 (p=0.33)
Dose (I ² =0%; Chi ² =2.64, p	= 0.45)			
0mg to 5mg 5mg to 10mg		717 274	0.72 (0.08 to 6.47) 3.04 (0.32 to 28.90)	29%; 1.41 (p=0.23) Not applicable
10mg to 15mg 20mg or more		152062 2464	0.93 (0.84 to 1.02) 0.14 (0.01 to 2.78)	0%; 8.16 (p=0.61) Not applicable
Duration (I ² =0%; Chi ² =1.2	20, p=0.55))		**
0m to 6m 6m to 12n		2817 3898	0.59 (0.07 to 5.15) 0.68 (0.37 to 1.25)	47%; 1.88. (p=0.17.) 4%; 6.23 (p=0.40)
<i>12m or more</i> Formulation (I ² =0%; Chi ² =		148802	0.93 (0.85 to 1.03)	0%; 2.91 (p=0.71)
Solution	1 5	3639	0.99 (0.25 to 3.91)	15%; 4.68 (p=0.32)
Pill/ table Capsule		149854 306	0.93 (0.85 to 1.02) 0.51 (0.05 to 5.60)	0%; 6.99 (p=0.43) Not applicable
Powder	r 1	1718	0.71 (0.27 to 1.86)	Not applicable
Incidence of diarrhoea	35	15042	0.87 (0.85 to 0.89)	88%; 295.56 (p<0.00001)
Iron co-supplementation (with iron	· /	2hi²=65.11, p• 4299	<0.00001) 1.00 (0.96 to 1.05)	76%; 37.33 (p<0.00001)
without iron Age (I ² =0%; Chi ² =0.32, p		11344	0.82 (0.80 to 0.84)	87%; 196.27 (p<0.00001)
6m to ly	10	5576	0.88 (0.85 to 0.90)	95%; 252.46 (p<0.00001)
1y to 5y 5y to 13y	1	8370 842	0.87 (0.84 to 0.90) 0.90 (0.81 to 0.98)	43%; 31.48 (p=0.03) Not applicable
Dose (l ² =98%; Chi ² =195. Omg to 5mg		001) 1784	0.95 (0.89 to 1.01)	73%; 22.46 (p=0.001)
5mg to 10mg	6	2630	0.73 (0.64 to 0.83)	67%; 15.32 (p=0.009)
10mg to 15mg 15mg to 20mg		5452 477	0.96 (0.92 to 0.99) 0.61 (0.58 to 0.65)	69%; 38.39 (p=0.0001) 0%; 0.21 (p<0.0001)
20mg or more Duration (I ² =0%; Chi ² =1.		4931	0.90 (0.87 to 0.94)	75%; 28.17 (p<0.00001)
0m to 6m 6m to 12m	7	4190 8971	0.89 (0.85 to 0.93) 0.86 (0.84 to 0.89)	57%; 16.42 (p=0.02) 93%; 250.92 (p<0.00001)
12m or more	5	1881	0.88 (0.82 to 0.95)	93%; 250.92 (p<0.00001) 73%; 29.82 (p=0.0002)
Formulation (I ² =94%; Ch Solution	/ 1	0<0.00001) 10768	0.84 (0.82 to 0.86)	90%; 236.48 (p<0.00001)
Pill/ tablet Capsule	3	1696 612	0.90 (0.81 to 0.99) 0.78 (0.60 to 1.01)	5%; 3.15 (p=0.37) Not applicable
Powder		1861	1.04 (0.98 to 1.09)	0%; 0.65 (p=0.42)
20				
22 For poor l	oviow	only ht	tp://bmjopen.bmj.com	leitolahoutlouidelin

1	Appendix 1: Electronic searches
2	MEDLINE
3	1 zinc/ or zinc compounds/ or zinc oxide/ or zinc sulfate/ or zinc acetate/
4	2 (zinc or Zn).tw.
5	3 1 or 2
6	4 exp infant/ or exp child/ or adolescent/
7	5 (newborn\$ or neonat\$ or neo-nat\$ or infan\$ or baby or babies or toddler\$ or preschool\$ or pre-
8	school\$ or pediatric\$ or paediatric\$ or child\$ or girl\$ or boy\$ or preteen\$ or pre-teen\$ or teen\$ or preadolescen\$ or pre-adolescen\$ or adolescen\$ or prepubert\$ or pre-pubert\$ or pubert\$).tw.
9	6 4 or 5
10	7 randomized controlled trial.pt.
11	8 controlled clinical trial.pt.
12	9 randomized.ab.
13	10 placebo.ab.
14	11 drug therapy.fs.
15	12 randomly.ab.
16	13 trial.ab.
17	14 groups.ab.
18	15 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14
19	16 exp animals/ not humans.sh.
20	17 15 not 16
21	18 3 and 6 and 17
22	Cochrane Central Register of Controlled Trials (CENTRAL)
23	1 MeSH descriptor Zinc explode all trees
24	2 MeSH descriptor Zinc Compounds explode all trees
25	3 MeSH descriptor Zinc Oxide explode all trees
26	4 MeSH descriptor Zinc Sulfate explode all trees
27	5 MeSH descriptor Zinc Acetate explode all trees
28	6 (zinc):ti,ab,kw
29	7 (Zn):ti,ab,kw
30	8 (#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7)
31	9 MeSH descriptor Infant explode all trees
32	10 MeSH descriptor Child explode all trees
33	11 MeSH descriptor Adolescent explode all trees
34	12 (newborn* or neonat* or (neo next nat*) or infan* or baby* or babies or toddler* or preschool* or
35	(pre next school*) or pediatric* or paediatric* or child* or girl* or boy* or preteen* or (pre next teen*) or teen* or preadolescen* or (pre next adolescen*) or adolescen* or prepubert* or (pre next
36	pubert*) or pubert*):ti,ab,kw
37	13 (#9 OR #10 OR #11 OR #12)
38	14 (#8 AND #13)
39	
40	MEDLINE In-Process & Other Non-Indexed Citations
41	1 (zinc or Zn).tw.
42	2 (newborn\$ or neonat\$ or neo-nat\$ or infan\$ or baby or babies or toddler\$ or preschool\$ or pre-
43	school\$ or pediatric\$ or paediatric\$ or child\$ or girl\$ or boy\$ or preteen\$ or pre-teen\$ or teen\$ or
44	preadolescen\$ or pre-adolescen\$ or adolescen\$ or prepubert\$ or pre-pubert\$ or pubert\$).tw.
45	3 randomized controlled trial.pt.
46	4 controlled clinical trial.pt. 5 randomized.ab.
47	6 placebo.ab.
48	7 drug therapy.fs.
49	8 randomly.ab.
50	9 trial.ab.
51	10 groups.ab.
52	11 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10
53	12 exp animals/ not humans.sh.
54	13 11 not 12
55	14 1 and 2 and 13
56	
57	EMBASE
58	1 zinc/ or zinc derivative/ or zinc oxide/ or zinc sulfate/ or zinc acetate/
59	2 (zinc or Zn).tw.
60	1

BMJ Open

3 1 or 2

1

2

3

4

5

6

7

8

9

10

11

12

13

14 15

16

17

18

19

20

21

22

23

24

25

26

27

28

29 30

31 32

33

34

35

36

37

38

39

40

41 42

43 44

45

46

47

48 49

50

51 52

53

54

55

56

57

58

59 60 4 exp infant/ or exp child/ or exp adolescent/

5 (newborn\$ or neonat\$ or neo-nat\$ or infan\$ or baby or babies or toddler\$ or preschool\$ or preschool\$ or pediatric\$ or paediatric\$ or child\$ or girl\$ or boy\$ or preteen\$ or pre-teen\$ or preadolescen\$ or pre-adolescen\$ or adolescen\$ or prepubert\$ or pre-pubert\$ or pubert\$).tw. 6 4 or 5

7 exp crossover-procedure/ or exp double-blind procedure/ or exp randomized controlled trial/ or exp single-blind procedure/

8 (random\$ or factorial\$ or crossover\$ or cross-over\$ or placebo\$ or (doubl\$ adj blind\$) or (singl\$ adj blind\$) or assign\$ or allocat\$ or volunteer\$).tw.

9 7 or 8

10 3 and 6 and 9

The terms in lines seven through eight are the same as those used by the UK Cochrane Centre to identify randomised controlled trials.

African Index Medicus

zinc or Zn [Key Word] or zinc or Zn [Title] or zinc or Zn [Descriptor]

Global Health

1 zinc/ or zinc sulfate/ or zinc oxide/

2 (zinc or Zn).tw.

3 1 or 2

4 exp infants/ or exp children/ or exp adolescents/

5 (newborn\$ or neonat\$ or neo-nat\$ or infan\$ or baby or babies or toddler\$ or preschool\$ or preschool\$ or pediatric\$ or paediatric\$ or child\$ or girl\$ or boy\$ or preteen\$ or pre-teen\$ or prepreadolescen\$ or pre-adolescen\$ or adolescen\$ or prepubert\$ or pre-pubert\$ or pubert\$).tw. 6 4 or 5

7 (random\$ or control\$ or clinic\$ or trial\$ or placebo\$ or drug therap\$ or group\$ or crossover\$ or cross-over\$ or double\$-blind\$ or single\$-blind\$ or factorial\$ or assign\$ or allocat\$ or volunteer\$).af. 8 3 and 6 and 7

IndMED zinc or Zn [Title] OR zinc or Zn [Keywords]

Latin American Caribbean Health Sciences Literature (LILACS)

(MH Infant OR MH Child OR MH Adolescent) OR (Tw newborn\$ OR Tw neonat\$ OR Tw neo-nat\$ OR Tw infan\$ OR Tw baby\$ OR Tw babies OR Tw toddler\$ OR Tw preschool\$ OR Tw pre-school\$ OR Tw pediatric\$ OR Tw paediatric\$ OR Tw child\$ OR Tw girl\$ OR Tw boy\$ OR Tw pre-school\$ OR Tw pre-teen\$ OR Tw teen\$ OR Tw preadolescen\$ OR Tw pre-adolescen\$ OR Tw adolescen\$ OR Tw pre-gubert\$ OR Tw pre-pubert\$ OR Tw pubert\$ OR Tw niño\$ OR Tw niña\$ OR Tw bebé\$ OR Tw pre-scolar\$ OR TW pre

WHO Library & Information Networks for Knowledge Database (WHOLIS) zinc or Zn [All indexes] [All sources]

metaRegister of Controlled Trials

(Zinc or Zn) AND (infant or infants or baby or babies or toddler or toddlers or pre-school or preschool or pediatric or paediatric or child or children or girl or girls or boy or boys or pre-teen or preadolescent or adolescent or pre-pubertal)

WHO International Clinical Trials Registry Platform (ICTRP) zinc or Zn [in the Intervention]

Conference Proceedings Citation Index (formerly known as ISI Proceedings)

TS=(zinc or Zn) AND TS=(newborn* or neonat* or neo-nat* or (neo nat*) or infan* or baby or babies or toddler* or preschool* or pre-school* or (pre school*) or pediatric* or paediatric* or child* or girl* or boy* or preteen* or pre-teen* or (pre teen*) or teen* or preadolescen* or pre-adolescen* or (pre adolescen*) or adolescen* or prepubert* or pre-pubert* or (pre pubert*) or pubert*) AND TS=(random* or control* or clinic* or trial* or placebo* or (drug therap*) or group* or crossover* or cross-over* or (cross over*) or double*-blind* or (double* blind*) or single*-blind* or (single* blind*) or factorial* or assign* or allocat* or volunteer*)

BMJ Open

ProQuest Dissertations & Theses Database (zinc or Zn) AND (newborn* or neonat* or neo-nat* or infan* or baby or babies or toddler* or preschool* or pre-school* or pediatric* or paediatric* or child* or girl* or boy* or preteen* or preteen* or teen* or pre-adolescen* or adolescen* or prepubert* or pre-pubert* or pubert*)

to beer terien only

Brooks 20057Ineligible ageCampos 20048Non-RCTCuevas 20029No eligible comparisonDuggan 200310FortificationFahmida 200711Ineligible ageHashemipour 20091214Children were obeseHeinig 20061516Ineligible ageHess 201117Acceptability study randomizing order of administrationInnamoglu 200518Non-RCTKordas 2005 ¹⁹⁻²¹ Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196936Ineligible ageRoxas 198038Non-RCTShingwekar 197959Non-RCTShirayatava 199330Non-RCTWalravens 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200814No eligible comparison	Bates 1993 ² Non-RCTBehrens 1990 ³ Therapeutic supplementationBerger 2006 ⁴⁶ Ineligible ageBrooks 2005 ⁷ Ineligible ageCampos 2004 ⁸ Non-RCTCuevas 2002 ⁹ No eligible comparisonDuggan 2003 ¹⁰ FortificationFahmida 2007 ¹¹ Ineligible ageHashemipour 2009 ^{12:14} Children were obeseHeinig 2006 ^{15:16} Ineligible ageHashemipour 2009 ^{12:14} Children were obeseHeinig 2006 ^{15:16} Ineligible ageHords 2005 ¹⁸ Non-RCTKordas 2005 ^{19:21} Therapeutic supplementationNCT01472211 ²² Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002 ²³ Ineligible agePayne-Robinson 1991 ²⁴ Severe protein-energy malnutritionPerrone 1999 ²⁵ No eligible comparisonRonaghy 1969 ²⁶ Ineligible ageRoxas 1980 ²⁵⁸ Non-RCTShingwekar 1979 ²⁹⁰ Non-RCTShirivastava 1993 ³⁰⁰ Non-RCTShirivastava 1993 ³⁰¹ Ineligible ageWalravens 1992 ³¹¹ Ineligible ageWasantwisut 2006 ³²¹ Ineligible ageWasantwisut 2006 ³²¹ Ineligible ageWasantwisut 2006 ³²¹ Ineligible ageYanfeng 1997 ³³ No eligible comparisonZeba 2008 ⁴⁴ No eligible comparison	Bates 1993 ² Non-RCTBehrens 1990 ³ Therapeutic supplementationBerger 2006 ^{4.6} Ineligible ageBrooks 2005 ⁷ Ineligible ageCampos 2004 ⁸ Non-RCTCuevas 2002 ⁹ No eligible comparisonDuggan 2003 ¹⁰ FortificationFahmida 2007 ¹¹ Ineligible ageHashemipour 2009 ^{12,140} Children were obeseHeinig 2006 ^{15,16} Ineligible ageHess 2011 ¹⁷ Acceptability study randomizing order of administrationInmamoglu 2005 ¹⁸⁵ Non-RCTKordas 2005 ^{19,21} Therapeutic supplementationNCT01472211 ²² Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002 ²³ Ineligible agePayne-Robinson 1991 ²⁴ Severe protein-energy malnutritionRonaghy 1969 ²⁶ Ineligible ageRonaghy 1974 ⁷⁷ Ineligible ageRonaghy 1974 ⁷² Ineligible ageRoxas 1980 ²⁸ Non-RCTShirgwekar 1979 ²⁹ Non-RCTShirgwekar 1979 ²⁹ Non-RCTShirgwekar 1979 ²⁹ Ineligible ageWasantwisut 2006 ¹²¹ Ineligible ageWasantwisut 2006 ¹²² Ineligible ageWasantwisut 2006 ¹²³ Ineligible ageWasantwisut 2006 ¹²⁴ Non-RCTShirgwekar 1979 ²³⁰ Non-RCTShirgwekar 1979 ²³¹ Ineligible ageWasantwisut 2006 ¹²² Ineligible ageYanfeng 1997 ³³ No eligible comparison	Study	Reason for exclusion	
Behrens 1990 ³ Therapeutic supplementationBerger 2006 ^{4.4} Incligible ageBrooks 2005 ⁷ Incligible ageCampos 2004 ⁸ Non-RCTCuevas 2002 ⁹ No eligible comparisonDuggan 2003 ¹⁰ FortificationFahmida 2007 ¹¹ Incligible ageHashemipour 2009 ^{12,14} Children were obeseHeing 2006 ^{15,16} Incligible ageHess 2011 ¹⁷ Acceptability study randomizing order of administrationImamoglu 2005 ¹⁸ Non-RCTKordas 2005 ^{18,21} Therapeutic supplementationNCT01472211 ²² Intervention not eligible (LifeStraw with or without zinc)Dsendarp 2002 ²³ Incligible agePayne-Robinson 1991 ²⁴ Severe protein-energy malnutritionPerrone 1999 ²⁵ No eligible comparisonRonaghy 1969 ²⁶ Incligible ageRoxas 1980 ²⁸¹ Non-RCTShrivastava 1993 ³⁰⁰ Non-RCTShrivastava 1993 ³¹¹ Incligible ageWaantwisut 2006 ⁶²² Incligible ageWaantwisut 2006 ⁶²³ Incligible ageWaantwisut 2006 ⁶²⁴ Incligible ageWaantwisut 2006 ⁶²³ Incligible ageWaantwisut 2006 ⁶²⁴ No eligible comparisonZeba 2008 ⁴⁴ No eligible comparison	Behrens 1990 ³ Therapeutic supplementationBerger 2006 ^{4.4} Incligible ageBrooks 2005 ⁷ Incligible ageCampos 2004 ⁸ Non-RCTCuevas 2002 ⁹ No eligible comparisonDuggan 2003 ¹⁰ FortificationFahmida 2007 ¹¹ Incligible ageHashemipour 2009 ^{12,14} Children were obeseHeing 2006 ^{15,16} Incligible ageHess 2011 ¹⁷ Acceptability study randomizing order of administrationImamoglu 2005 ¹⁸ Non-RCTKordas 2005 ^{18,211} Therapeutic supplementationNCT01472211 ²² Intervention not eligible (LifeStraw with or without zinc)Dsendarp 2002 ²³ Incligible agePayne-Robinson 1991 ²⁴ Severe protein-energy malnutritionPerrone 1999 ²⁵ No eligible comparisonRonaghy 1969 ²⁶ Incligible ageRoxas 1980 ²⁸¹ Non-RCTShrivastava 1993 ³⁰⁰ Non-RCTShrivastava 1993 ³¹¹ Incligible ageWaantwisut 2006 ³²¹ Incligible ageWaantwisut 2006 ³²	Behrens 1990 ³ Therapeutic supplementationBerger 2006 ^{4.6} Ineligible ageBrooks 2005 ⁷ Ineligible ageCampos 2004 ⁸ Non-RCTCuevas 2002 ⁹ No eligible comparisonDuggan 2003 ¹⁰ FortificationFahmida 2007 ¹¹ Ineligible ageHashemipour 2009 ^{12,140} Children were obeseHeing 2006 ^{15,160} Ineligible ageHess 2011 ¹⁷ Acceptability study randomizing order of administrationImamoglu 2005 ¹⁸⁰ Non-RCTKordas 2005 ^{18,211} Therapeutic supplementationNCT01472211 ¹²² Intervention not eligible (LifeStraw with or without zinc)Dendarp 2002 ²²³ Ineligible agePayne-Robinson 1991 ²⁴⁴ Severe protein-energy malnutritionPerrone 1999 ²⁵⁵ No eligible comparisonRonaghy 1969 ²⁶⁶ Ineligible ageRosas 1980 ²⁸⁶ Non-RCTShrivastava 1993 ³⁰⁹ Non-RCTShrivastava 1993 ³⁰⁹ Non-RCTShrivastava 1993 ³⁰¹ Ineligible ageWaantwisut 2006 ¹²¹ Ineligible ageWaantwisut 2006 ¹	Ahmed 2009 ¹	Non-RCT	
Berger 2006 ^{4.4} Ineligible ageBrooks 2003 ⁷ Ineligible ageCampos 2004 ⁴ Non-RCTCuevas 2002 ⁹ No eligible comparisonDuggan 2003 ¹⁰ FortificationFahmida 2007 ¹¹ Ineligible ageHashemipour 2009 ^{12,14} Children were obeseHeinig 2006 ^{15,16} Ineligible ageHess 2011 ¹⁷ Acceptability study randomizing order of administrationImamoglu 2005 ¹⁸ Non-RCTKordas 2005 ^{19,211} Therapeutic supplementationNCT01472211 ²² Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002 ²³ Ineligible agePayne-Robinson 1991 ²⁴ Severe protein-energy malnutritionPerrone 1999 ²⁵ No eligible comparisonRonaghy 1969 ²⁶ Ineligible ageRosas 1980 ²⁸ Non-RCTShrivastava 1993 ³⁰ Non-RCTShrivastava 1993 ³¹ Ineligible ageWaarnens 1992 ²¹¹ Ineligible ageWaarnens 1992 ³¹¹ Ineligible ageWaarnens 1992 ³¹³ No eligible comparisonZeba 2008 ⁴⁴ No eligible comparison	Berger 2006 ^{4.6} Ineligible ageBrooks 2003 ⁷ Ineligible ageCampos 2004 ⁴ Non-RCTCuevas 2002 ⁹ No eligible comparisonDuggan 2003 ¹⁰ FortificationFahmida 2007 ¹¹ Ineligible ageHashemipour 2009 ^{12,14} Children were obeseHeinig 2006 ^{15,16} Ineligible ageHess 2011 ¹⁷ Acceptability study randomizing order of administrationImamoglu 2005 ¹⁸ Non-RCTKordas 2005 ^{18,21} Therapeutic supplementationNCT01472211 ²² Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002 ²³ Ineligible agePayne-Robinson 1991 ²⁴ Severe protein-energy malnutritionPerrone 1999 ²⁵ No eligible comparisonRonaghy 1969 ²⁶ Ineligible ageRosas 1980 ²⁸ Non-RCTShrivastava 1993 ³⁰ Non-RCTShrivastava 1993 ³¹ Ineligible ageWaarntwisut 2006 ¹²¹ Ineligible ageWaarnens 1992 ²¹³ Ineligible ageXanfeng 1997 ³³ No eligible comparisonZeba 2008 ⁴⁴ No eligible comparison	Berger 2006 ^{4.6} Ineligible ageBrooks 2003 ⁷ Ineligible ageCampos 2004 ⁸ Non-RCTCuevas 2002 ⁹ No eligible comparisonDuggan 2003 ¹⁰ FortificationFahmida 2007 ¹¹ Ineligible ageHashemipour 2009 ^{12,14} Children were obeseHeinig 2006 ^{15,16} Ineligible ageHess 2011 ¹⁷ Acceptability study randomizing order of administrationImamoglu 2005 ¹⁸ Non-RCTKordas 2005 ^{18,211} Therapeutic supplementationNCT01472211 ²² Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002 ²³ Ineligible agePayne-Robinson 1991 ²⁴ Severe protein-energy malnutritionPerrone 1999 ²⁵ No eligible comparisonRonaghy 1969 ²⁶ Ineligible ageRoxas 1980 ²⁸ Non-RCTShrivastava 1993 ³⁰ Non-RCTShrivastava 1993 ³¹ Ineligible ageWaarntwisut 2006 ⁵²¹ Ineligible ageYanfeng 1997 ³³ No eligible comparisonZeba 2008 ³⁴ No eligible comparison	Bates 1993 ²	Non-RCT	
Brooks 20057Ineligible ageCampos 20048Non-RCTCuevas 20029No eligible comparisonDuggan 200310FortificationFahmida 200711Ineligible ageHashemipour 200912:14Children were obeseHeinig 200615:16Ineligible ageHess 201117Acceptability study randomizing order of administrationImamoglu 200518Non-RCTKordas 200519:21Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 197477Ineligible ageRoxas 198038Non-RCTShirawatava 199330Non-RCTShirawatava 199331Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Brooks 20057Ineligible ageCampos 20048Non-RCTCuevas 20029No eligible comparisonDuggan 200310FortificationFahmida 200711Ineligible ageHashemipour 200912:14Children were obeseHeinig 200615:16Ineligible ageHess 20117Acceptability study randomizing order of administrationInmamoglu 200518Non-RCTKordas 2005 ¹⁹⁻²¹ Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionRonaghy 196936Ineligible ageRonaghy 197477Ineligible ageRoxas 198038Non-RCTShrivastava 199330Non-RCTShrivastava 199331Ineligible ageWasantwisut 2006 ¹²⁴ Ineligible ageYanfeng 199733No eligible comparisonZeba 2008 ¹⁴ No eligible comparison	Brooks 20057Ineligible ageCampos 20048Non-RCTCuevas 20029No eligible comparisonDuggan 200310FortificationFahmida 200711Ineligible ageHashemipour 20091214Children were obeseHeinig 20061516Ineligible ageHess 20117Acceptability study randomizing order of administrationImamoglu 200518Non-RCTKordas 2005 ¹⁹⁻²¹ Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionRonaghy 196936Ineligible ageRonaghy 196938Non-RCTShirawastava 199330Non-RCTShirawastava 199331Ineligible ageWaaravens 199231Ineligible ageWasantwisut 2006132Ineligible ageYanfeng 199733No eligible comparisonZeba 200814No eligible comparison	Behrens 1990 ³	Therapeutic supplementation	
Campos 2004 ⁸ Non-RCTCuevas 2002 ⁹ No eligible comparisonDuggan 2003 ¹⁰ FortificationFahmida 2007 ¹¹ Ineligible ageHashemipour 2009 ^{12,14} Children were obeseHeinig 2006 ^{15,16} Ineligible ageHess 2011 ¹⁷ Acceptability study randomizing order of administrationImamoglu 2005 ¹⁸ Non-RCTKordas 2005 ^{19,21} Therapeutic supplementationNCT01472211 ²² Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002 ²³ Ineligible agePayne-Robinson 1991 ²⁴ Severe protein-energy malnutritionRonaghy 1969 ²⁵ No eligible comparisonRonaghy 1974 ³⁷ Ineligible ageRoxas 1980 ³⁸ Non-RCTShrivastava 1993 ³⁰ Non-RCTShrivastava 1993 ³¹ Ineligible ageWaaravens 1992 ³³¹ Ineligible ageYanfeng 1997 ³³ No eligible comparisonZeba 2008 ³⁴ No eligible comparison	Campos 2004 ⁸ Non-RCTCuevas 2002 ⁹ No eligible comparisonDuggan 2003 ¹⁰ FortificationFahmida 2007 ¹¹ Ineligible ageHashemipour 2009 ^{12,14} Children were obeseHeinig 2006 ^{15,16} Ineligible ageHess 2011 ¹⁷ Acceptability study randomizing order of administrationImamoglu 2005 ¹⁸ Non-RCTKordas 2005 ^{19,21} Therapeutic supplementationNCT01472211 ²² Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002 ²³ Ineligible agePayne-Robinson 1991 ²⁴ Severe protein-energy malnutritionRonaghy 1969 ²⁵ No eligible comparisonRonaghy 1974 ²⁷ Ineligible ageRoxas 1980 ²⁸ Non-RCTShrivastava 1993 ³⁰ Non-RCTShrivastava 1993 ³¹ Ineligible ageWaaravens 1992 ³¹ Ineligible ageYanfeng 1997 ³³ No eligible comparisonZeba 2008 ⁴⁴ No eligible comparison	Campos 2004*Non-RCTCuevas 2002*/tilNo eligible comparisonDuggan 200310FortificationFahmida 200711Ineligible ageHashemipour 200912:14Children were obeseHeinig 200615:16Ineligible ageHess 201117Acceptability study randomizing order of administrationImamoglu 200518Non-RCTKordas 200519:21Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionRonaghy 196935No eligible comparisonRonaghy 197427Ineligible ageRoxas 198028Non-RCTShirawatava 199330Non-RCTShirawatava 199231Ineligible ageWasantwisut 200632Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Berger 2006 ⁴⁻⁶	Ineligible age	
Cuevas 2002°No eligible comparisonDuggan 2003 ¹⁰ FortificationFahmida 2007 ¹¹ Ineligible ageHashemipour 2009 ¹²⁻¹⁴ Children were obeseHeinig 2006 ^{15,16} Ineligible ageHess 2011 ¹⁷ Acceptability study randomizing order of administrationImamoglu 2005 ¹⁸ Non-RCTKordas 2005 ¹⁹⁻²¹ Therapeutic supplementationNCT01472211 ²² Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002 ²³ Ineligible agePayne-Robinson 1991 ²⁴ Severe protein-energy malnutritionPerrone 1999 ²⁵ No eligible comparisonRonaghy 1969 ²⁶⁶ Ineligible ageRoxas 1980 ²⁸⁸ Non-RCTShingwekar 1979 ²⁹ Non-RCTShirvastava 1993 ³⁰ Non-RCTShirvastava 1993 ³¹ Ineligible ageWasantwisut 2006 ³² Ineligible ageYanfeng 1997 ³³ No eligible comparisonZeba 2008 ³⁴ No eligible comparison	Cuevas 2002°No eligible comparisonDuggan 2003 ¹⁰ FortificationFahmida 2007 ¹¹ Ineligible ageHashemipour 2009 ^{12:14} Children were obeseHeinig 2006 ^{15,16} Ineligible ageHess 2011 ¹⁷ Acceptability study randomizing order of administrationImamoglu 2005 ¹⁸ Non-RCTKordas 2005 ¹⁹⁻²¹ Therapeutic supplementationNCT01472211 ²² Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002 ²³ Ineligible agePayne-Robinson 1991 ²⁴ Severe protein-energy malnutritionPerrone 1999 ²⁵ No eligible comparisonRonaghy 1969 ³⁶ Ineligible ageRoxas 1980 ²⁸ Non-RCTShingwekar 1979 ²⁹ Non-RCTShirvastava 1993 ³⁰ Non-RCTShirvastava 1993 ²¹¹ Ineligible ageWasantwisut 2006 ³² Ineligible ageYanfeng 1997 ³³ No eligible comparisonZeba 2008 ³⁴ No eligible comparison	Cuevas 2002°No eligible comparisonDuggan 2003 ¹⁰ FortificationFahmida 2007 ¹¹ Ineligible ageHashemipour 2009 ^{12,14} Children were obeseHeinig 2006 ^{15,16} Ineligible ageHess 2011 ¹⁷ Acceptability study randomizing order of administrationImamoglu 2005 ¹⁸ Non-RCTKordas 2005 ^{19,21} Therapeutic supplementationNCT01472211 ²² Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002 ²³ Ineligible agePayne-Robinson 1991 ²⁴ Severe protein-energy malnutritionPerrone 1999 ²⁵ No eligible comparisonRonaghy 1969 ³⁶ Ineligible ageRosas 1980 ²³ Non-RCTShrivastava 1993 ³⁰ Non-RCTShrivastava 1992 ³¹ Ineligible ageWasantwisut 2006 ³² Ineligible ageYanfeng 1997 ³³ No eligible comparisonZeba 2008 ³⁴ No eligible comparison	Brooks 2005 ⁷	Ineligible age	
Duggan 200310FortificationFahmida 200711Ineligible ageHashemipour 20091214Children were obeseHeinig 20061516Ineligible ageHess 201117Acceptability study randomizing order of administrationImamoglu 200518Non-RCTKordas 200519-21Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShrivastava 199330Non-RCTShrivastava 199331Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Duggan 200310FortificationFahmida 200711Ineligible ageHashemipour 20091214Children were obeseHeinig 20061516Ineligible ageHess 201117Acceptability study randomizing order of administrationImamoglu 200518Non-RCTKordas 200519-21Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShrivastava 199330Non-RCTShrivastava 199331Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Duggan 200310FortificationFahmida 200711Ineligible ageHashemipour 20091214Children were obeseHeinig 20061516Ineligible ageHess 201117Acceptability study randomizing order of administrationImamoglu 200518Non-RCTKordas 200519-21Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198038Non-RCTShrivastava 199330Non-RCTShrivastava 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Campos 2004 ⁸	Non-RCT	
Fahmida 2007 ¹¹ Ineligible ageHashemipour 2009 ^{12,14} Children were obeseHeinig 2006 ^{15,16} Ineligible ageHess 2011 ¹⁷ Acceptability study randomizing order of administrationImamoglu 2005 ¹⁸ Non-RCTKordas 2005 ¹⁹⁻²¹ Therapeutic supplementationNCT01472211 ²² Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002 ²³ Ineligible agePayne-Robinson 1991 ²⁴ Severe protein-energy malnutritionPerrone 1999 ²⁵ No eligible comparisonRonaghy 1969 ²⁶ Ineligible ageRonaghy 1974 ²⁷ Ineligible ageRoxas 1980 ²⁸ Non-RCTShirvastava 1993 ³⁰ Non-RCTShrivastava 1993 ³¹ Ineligible ageWasantwisut 2006 ³² Ineligible ageYanfeng 1997 ³³ No eligible comparisonZeba 2008 ³⁴ No eligible comparison	Fahmida 2007 ¹¹ Ineligible ageHashemipour 2009 ^{12,14} Children were obeseHeinig 2006 ^{15,16} Ineligible ageHess 2011 ¹⁷ Acceptability study randomizing order of administrationImamoglu 2005 ¹⁸ Non-RCTKordas 2005 ¹⁹⁻²¹ Therapeutic supplementationNCT01472211 ²² Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002 ²³ Ineligible agePayne-Robinson 1991 ²⁴ Severe protein-energy malnutritionPerrone 1999 ²⁵ No eligible comparisonRonaghy 1969 ²⁶ Ineligible ageRonaghy 1974 ²⁷ Ineligible ageRoxas 1980 ²⁸ Non-RCTShirvastava 1993 ³⁰ Non-RCTShrivastava 1993 ³¹ Ineligible ageWasantwisut 2006 ³² Ineligible ageYanfeng 1997 ³³ No eligible comparisonZeba 2008 ³⁴ No eligible comparison	Fahmida 2007 ¹¹ Ineligible ageHashemipour 2009 ^{12,14} Children were obeseHeinig 2006 ^{15,16} Ineligible ageHess 2011 ¹⁷ Acceptability study randomizing order of administrationImamoglu 2005 ¹⁸ Non-RCTKordas 2005 ^{19,21} Therapeutic supplementationNCT01472211 ²² Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002 ²³ Ineligible agePayne-Robinson 1991 ²⁴ Severe protein-energy malnutritionPerrone 1999 ²⁵ No eligible comparisonRonaghy 1969 ²⁶ Ineligible ageRonaghy 1974 ²⁷ Ineligible ageRoxas 1980 ³⁸ Non-RCTShrivastava 1993 ³⁰ Non-RCTShrivastava 1993 ³¹ Ineligible ageWasantwisut 2006 ³² Ineligible ageYanfeng 1997 ³³ No eligible comparisonZeba 2008 ³⁴ No eligible comparison	Cuevas 2002 ⁹	No eligible comparison	
Hashemipour 2009Children were obeseHeinig 2006Ineligible ageHess 2011Ineligible ageHess 2011Acceptability study randomizing order of administrationImamoglu 2005Non-RCTKordas 2005Therapeutic supplementationNCT01472211Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002Severe protein-energy malnutritionPerrone 1999Severe protein-energy malnutritionPerrone 1999Ineligible ageRonaghy 1969Ineligible ageRoxas 1980Non-RCTShiryastava 1993Non-RCTShiryastava 1992Ineligible ageWasantwisut 2006Ineligible ageYanfeng 1997No eligible comparisonZeba 2008No eligible comparison	Hashemipour 2009Children were obeseHeinig 2006Ineligible ageHess 2011Ineligible ageHess 2011Acceptability study randomizing order of administrationImamoglu 2005Non-RCTKordas 2005Therapeutic supplementationNCT01472211Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002Severe protein-energy malnutritionPerrone 1999Severe protein-energy malnutritionPerrone 1999Ineligible ageRonaghy 1969Ineligible ageRoxas 1980Non-RCTShiryastava 1993Non-RCTShiryastava 1992Ineligible ageWasantwisut 2006Ineligible ageYanfeng 1997No eligible comparisonZeba 2008No eligible comparison	Hashemipour 2009Children were obeseHeinig 2006Ineligible ageHess 2011Acceptability study randomizing order of administrationImamoglu 2005Non-RCTKordas 2005Therapeutic supplementationNCT01472211Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002Ineligible agePayne-Robinson 1991Severe protein-energy malnutritionPerrone 1999No eligible comparisonRonaghy 1969Ineligible ageRonaghy 1974Non-RCTShingwekar 1979Non-RCTShirvastava 1993Non-RCTShirvastava 1992Ineligible ageWasantwisut 2006Ineligible ageYanfeng 1997No eligible comparisonZeba 2008No eligible comparison	Duggan 2003 ¹⁰	Fortification	
Heinig 200615.16Ineligible ageHess 201117Acceptability study randomizing order of administrationImamoglu 200518Non-RCTKordas 200519-21Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRoxas 198028Non-RCTShirvastava 199330Non-RCTShirvastava 199331Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Heinig 200615.16Ineligible ageHess 201117Acceptability study randomizing order of administrationImamoglu 200518Non-RCTKordas 200519-21Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRoxas 198028Non-RCTShirvastava 199330Non-RCTShirvastava 199331Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Heinig 200615.16Ineligible ageHess 201117Acceptability study randomizing order of administrationImamoglu 200518Non-RCTKordas 200519-21Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRoxas 198028Non-RCTShirvastava 199330Non-RCTShirvastava 199331Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Fahmida 2007 ¹¹	Ineligible age	
Hess 201117Acceptability study randomizing order of administrationImamoglu 200518Non-RCTKordas 2005 ¹⁹⁻²¹ Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002233Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 196928Non-RCTShingwekar 197929Non-RCTShiryastava 199330Non-RCTWalravens 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Hess 201117Acceptability study randomizing order of administrationImamoglu 200518Non-RCTKordas 2005 ¹⁹⁻²¹ Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002233Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 196928Non-RCTShingwekar 197929Non-RCTShiryastava 199330Non-RCTWalravens 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Hess 201117Acceptability study randomizing order of administrationImamoglu 200518Non-RCTKordas 2005 ¹⁹⁻²¹ Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002233Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 196928Non-RCTShingwekar 197929Non-RCTShiryastava 199330Non-RCTWalravens 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Hashemipour 2009 ¹²⁻¹⁴	Children were obese	
Imamoglu 200518Non-RCTKordas 2005 ¹⁹⁻²¹ Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShirwastava 199330Non-RCTShrivastava 199331Ineligible ageWalaravens 199231Ineligible ageYanfeng 199733No eligible comparisonZeba 200844No eligible comparison	Imamoglu 200518Non-RCTKordas 2005 ¹⁹⁻²¹ Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShirwastava 199330Non-RCTShrivastava 199331Ineligible ageWalaravens 199231Ineligible ageYanfeng 199733No eligible comparisonZeba 200844No eligible comparison	Imamoglu 200518Non-RCTKordas 2005 ¹⁹⁻²¹ Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShirwastava 199330Non-RCTShrivastava 199331Ineligible ageWalaravens 199231Ineligible ageYanfeng 199733No eligible comparisonZeba 200844No eligible comparison	Heinig 2006 ^{15,16}	Ineligible age	
Kordas 2005Therapeutic supplementationNCT01472211Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002Ineligible agePayne-Robinson 1991Severe protein-energy malnutritionPerrone 1999No eligible comparisonRonaghy 1969Ineligible ageRonaghy 1969Ineligible ageRoxas 1980Non-RCTShingwekar 1979Non-RCTShivastava 1993Non-RCTWalravens 1992Ineligible ageWasantwisut 2006Ineligible ageYanfeng 1997No eligible comparisonZeba 2008No eligible comparison	Kordas 2005Therapeutic supplementationNCT01472211Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002Ineligible agePayne-Robinson 1991Severe protein-energy malnutritionPerrone 1999No eligible comparisonRonaghy 1969Ineligible ageRonaghy 1969Ineligible ageRoxas 1980Non-RCTShingwekar 1979Non-RCTShivastava 1993Non-RCTWalravens 1992Ineligible ageWasantwisut 2006Ineligible ageYanfeng 1997No eligible comparisonZeba 2008No eligible comparison	Kordas 2005Therapeutic supplementationNCT01472211Intervention not eligible (LifeStraw with or without zinc)Osendarp 2002Ineligible agePayne-Robinson 1991Severe protein-energy malnutritionPerrone 1999No eligible comparisonRonaghy 1969Ineligible ageRonaghy 1969Ineligible ageRoxas 1980Non-RCTShingwekar 1979Non-RCTShivastava 1993Non-RCTWalravens 1992Ineligible ageWasantwisut 2006Ineligible ageYanfeng 1997No eligible comparisonZeba 2008No eligible comparison	Hess 2011 ¹⁷	Acceptability study randomizing order of administration	
Kordas 200519-21Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShrivastava 199330Non-RCTShrivastava 199331Ineligible ageWalravens 199231Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Kordas 200519-21Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShrivastava 199330Non-RCTShrivastava 199331Ineligible ageWalravens 199231Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Kordas 200519-21Therapeutic supplementationNCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShrivastava 199330Non-RCTShrivastava 199331Ineligible ageWalravens 199231Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	mamoglu 2005 ¹⁸	Non-RCT	
NCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShingwekar 197929Non-RCTShirvastava 199330Non-RCTWalravens 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	NCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShingwekar 197929Non-RCTShirvastava 199330Non-RCTWalravens 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	NCT0147221122Intervention not eligible (LifeStraw with or without zinc)Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShingwekar 197929Non-RCTShirvastava 199330Non-RCTWalravens 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Kordas 2005 ¹⁹⁻²¹	Therapeutic supplementation	
Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShingwekar 197929Non-RCTShrivastava 199330Non-RCTWalravens 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShingwekar 197929Non-RCTShrivastava 199330Non-RCTWalravens 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Osendarp 200223Ineligible agePayne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShingwekar 197929Non-RCTShrivastava 199330Non-RCTWalravens 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison			
Payne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShingwekar 197929Non-RCTShrivastava 199330Non-RCTWalravens 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Payne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShingwekar 197929Non-RCTShrivastava 199330Non-RCTWalravens 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Payne-Robinson 199124Severe protein-energy malnutritionPerrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShingwekar 197929Non-RCTShrivastava 199330Non-RCTWalravens 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison			
Perrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShingwekar 197929Non-RCTShrivastava 199330Non-RCTWalravens 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Perrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShingwekar 197929Non-RCTShrivastava 199330Non-RCTWalravens 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Perrone 199925No eligible comparisonRonaghy 196926Ineligible ageRonaghy 197427Ineligible ageRoxas 198028Non-RCTShingwekar 197929Non-RCTShrivastava 199330Non-RCTWalravens 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	-		
Ronaghy 1969 ²⁶ Ineligible ageRonaghy 1974 ²⁷ Ineligible ageRoxas 1980 ²⁸ Non-RCTShingwekar 1979 ²⁹ Non-RCTShrivastava 1993 ³⁰ Non-RCTWalravens 1992 ³¹ Ineligible ageWasantwisut 2006 ³² Ineligible ageYanfeng 1997 ³³ No eligible comparisonZeba 2008 ³⁴ No eligible comparison	Ronaghy 1969 ²⁶ Ineligible ageRonaghy 1974 ²⁷ Ineligible ageRoxas 1980 ²⁸ Non-RCTShingwekar 1979 ²⁹ Non-RCTShrivastava 1993 ³⁰ Non-RCTWalravens 1992 ³¹ Ineligible ageWasantwisut 2006 ³² Ineligible ageYanfeng 1997 ³³ No eligible comparisonZeba 2008 ³⁴ No eligible comparison	Ronaghy 1969 ²⁶ Ineligible ageRonaghy 1974 ²⁷ Ineligible ageRoxas 1980 ²⁸ Non-RCTShingwekar 1979 ²⁹ Non-RCTShrivastava 1993 ³⁰ Non-RCTWalravens 1992 ³¹ Ineligible ageWasantwisut 2006 ³² Ineligible ageYanfeng 1997 ³³ No eligible comparisonZeba 2008 ³⁴ No eligible comparison			
Ronaghy 197427Ineligible ageRoxas 198028Non-RCTShingwekar 197929Non-RCTShrivastava 199330Non-RCTWalravens 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Ronaghy 197427Ineligible ageRoxas 198028Non-RCTShingwekar 197929Non-RCTShrivastava 199330Non-RCTWalravens 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Ronaghy 197427Ineligible ageRoxas 198028Non-RCTShingwekar 197929Non-RCTShrivastava 199330Non-RCTWalravens 199231Ineligible ageWasantwisut 200632Ineligible ageYanfeng 199733No eligible comparisonZeba 200834No eligible comparison	Ronaghy 1969 ²⁶		
Roxas 1980 ²⁸ Non-RCT Shingwekar 1979 ²⁹ Non-RCT Shrivastava 1993 ³⁰ Non-RCT Walravens 1992 ³¹ Ineligible age Wasantwisut 2006 ³² Ineligible age Yanfeng 1997 ³³ No eligible comparison Zeba 2008 ³⁴ No eligible comparison	Roxas 1980 ²⁸ Non-RCT Shingwekar 1979 ²⁹ Non-RCT Shrivastava 1993 ³⁰ Non-RCT Walravens 1992 ³¹ Ineligible age Wasantwisut 2006 ³² Ineligible age Yanfeng 1997 ³³ No eligible comparison Zeba 2008 ³⁴ No eligible comparison	Roxas 1980 ²⁸ Non-RCT Shingwekar 1979 ²⁹ Non-RCT Shrivastava 1993 ³⁰ Non-RCT Walravens 1992 ³¹ Ineligible age Wasantwisut 2006 ³² Ineligible age Yanfeng 1997 ³³ No eligible comparison Zeba 2008 ³⁴ No eligible comparison			
Shingwekar 1979 ²⁹ Non-RCTShrivastava 1993 ³⁰ Non-RCTWalravens 1992 ³¹ Ineligible ageWasantwisut 2006 ³² Ineligible ageYanfeng 1997 ³³ No eligible comparisonZeba 2008 ³⁴ No eligible comparison	Shingwekar 1979 ²⁹ Non-RCTShrivastava 1993 ³⁰ Non-RCTWalravens 1992 ³¹ Ineligible ageWasantwisut 2006 ³² Ineligible ageYanfeng 1997 ³³ No eligible comparisonZeba 2008 ³⁴ No eligible comparison	Shingwekar 1979 ²⁹ Non-RCTShrivastava 1993 ³⁰ Non-RCTWalravens 1992 ³¹ Ineligible ageWasantwisut 2006 ³² Ineligible ageYanfeng 1997 ³³ No eligible comparisonZeba 2008 ³⁴ No eligible comparison			
Shrivastava 1993 ³⁰ Non-RCT Walravens 1992 ³¹ Ineligible age Wasantwisut 2006 ³² Ineligible age Yanfeng 1997 ³³ No eligible comparison Zeba 2008 ³⁴ No eligible comparison	Shrivastava 1993 ³⁰ Non-RCT Walravens 1992 ³¹ Ineligible age Wasantwisut 2006 ³² Ineligible age Yanfeng 1997 ³³ No eligible comparison Zeba 2008 ³⁴ No eligible comparison	Shrivastava 1993 ³⁰ Non-RCT Walravens 1992 ³¹ Ineligible age Wasantwisut 2006 ³² Ineligible age Yanfeng 1997 ³³ No eligible comparison Zeba 2008 ³⁴ No eligible comparison			
Walravens 1992 ³¹ Ineligible age Wasantwisut 2006 ³² Ineligible age Yanfeng 1997 ³³ No eligible comparison Zeba 2008 ³⁴ No eligible comparison	Walravens 1992 ³¹ Ineligible age Wasantwisut 2006 ³² Ineligible age Yanfeng 1997 ³³ No eligible comparison Zeba 2008 ³⁴ No eligible comparison	Walravens 1992 ³¹ Ineligible age Wasantwisut 2006 ³² Ineligible age Yanfeng 1997 ³³ No eligible comparison Zeba 2008 ³⁴ No eligible comparison			
Wasantwisut 2006 ³² Ineligible age Yanfeng 1997 ³³ No eligible comparison Zeba 2008 ³⁴ No eligible comparison	Wasantwisut 2006 ³² Ineligible age Yanfeng 1997 ³³ No eligible comparison Zeba 2008 ³⁴ No eligible comparison	Wasantwisut 2006 ³² Ineligible age Yanfeng 1997 ³³ No eligible comparison Zeba 2008 ³⁴ No eligible comparison			
Yanfeng 1997 ³³ No eligible comparison Zeba 2008 ³⁴ No eligible comparison	Yanfeng 1997 ³³ No eligible comparison Zeba 2008 ³⁴ No eligible comparison	Yanfeng 1997 ³³ No eligible comparison Zeba 2008 ³⁴ No eligible comparison			
Zeba 2008 ³⁴ No eligible comparison	Zeba 2008 ³⁴ No eligible comparison	Zeba 2008 ³⁴ No eligible comparison			
2	2	2		· · ·	

Appendix 2: Excluded studies

1
2
3
4
5
6 7
7
8
q
10
10
11
9 10 11 12 13 14 15 16 17
13
14
15
16
17
18
19
20
20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39
21
22
23
24
25
26
27
28
29
30
31
32
22
33
34
35
36
37
38
39
40
41
42
43
44
44 45
45
46
47
48
49
50
51
52
53
53 54
54 55
56
57
58
59

60

Appendix 3: On-going	studies
Study	Reason for exclusion
Arabaci 2010 ³⁵	Awaiting classification
Chicourel 2001 ³⁶	Awaiting classification
CTRI/2010/091/00141737	On-going
Jimenez 2000 ³⁸	Awaiting classification
Mitter 2009 ³⁹	Awaiting classification
NCT00133406 ⁴⁰	On-going
NCT00228254 ⁴¹	On-going
NCT00374023 ⁴²	On-going
NCT00421668 ⁴³	On-going
NCT0058926444	On-going
NCT0094435945	On-going
NCT0096755146	On-going
NCT0098042147	On-going
NCT01306097 ⁴⁸	On-going
NCT01616693 ⁴⁹	On-going
Smith 1985 ⁵⁰	Awaiting classification

Appendix 4: Included studies

Study	Country	Ν	Age	Dose	Duration	Form	Height	Co-intervention
Ahmed 2009 ⁵¹	BD	40	10 to 18	20mg daily	1.5	Solution	Not reported	Cholera vaccine
Akramuzzaman 1994 ⁵²	BD	256	mean=35	20mg daily	15	Solution	Stunted and non-stunted	Vitamins A, C, D
Alarcon 2004 ⁵³	PE	223	6 to 35	3mg/kg 6d/wk	4.5	Solution	HAZ=-1.04	Iron
Albert 2003 ^{54, 55}	BD	256	24 to 60	20mg daily	1.5	Solution	Not reported	Cholera vaccine
Ba Lo 2011 ⁵⁶	SN	97	9 to 17	6mg daily	0.5	Solution	Non-stunted only; HAZ=-0.44	Micronutrients
Baqui 2003 ⁵⁷⁻⁶⁰	BD	645	6 to 6	20mg weekly	6	Solution	Stunted and non-stunted; HAZ=-1.2	Vitamin B
Bhandari 2002 ⁶¹⁻⁶⁷	IN	2482	6 to 30	10mg <1y; 20mg >1y daily	4	Solution	Stunted and non-stunted; HAZ=-1.82	Vitamin A
Bhandari 2007 ^{68, 69}	IN	72,438	6 to 23	10mg daily	12	Tablet	Stunted and non-stunted; HAZ=-1.95	Iron and folic acid
Brown 2007 ⁷⁰⁻⁷³	PE	200	6 to 8	3mg daily	6	Solution	Stunted and non-stunted; HAZ=-1.19	Micronutrients
Castillo-Duran 1994 ⁷⁴	CL	114	72 to 168	10mg daily	12	Capsule	Stunted only	None
*Castillo-Duran 2002 ⁷⁵	CL	42	17 to 19	5mg daily	12	Solution	Non-stunted only	None
Cavan 1993 ⁷⁶⁻⁷⁸	GT	162	68 to 96	10mg 5d/wk	6.25	Tablet	Stunted and non-stunted; HAZ=-1.51	Micronutrients
Chang 2010 ⁷⁹	BD	1000	6 to 18	5mg <1y; 10mg >1y alternate days	6	Tablet	Stunted and non-stunted; HAZ=-1.3	None
Chen 2012 ⁸⁰	CN	361	36 to 72	10mg 5d/wk	6	Tablet	HAZ=-0.264585635	Vitamin A
Chhagan 2009 ⁸¹⁻⁸⁵	ZA	227	6 to 6	10mg daily	18	Tablet	Stunted and non-stunted; HAZ=-0.45	Vitamin A
Clark 1999 ⁸⁶	UK	47	mean=146	15mg daily	1.5	Unclear	Non-stunted only	None
Cole 2012 ⁸⁷	BR	143	6 to 48	5mg daily	3	Powder	Not reported	Micronutrients
Dehbozorgi 2007 ⁸⁸	IR	60	72 to 144	8mg daily	6	Solution	Not reported	None
DiGirolamo 2010 ^{89, 90}	GT	750	72 to 132	10mg 5d/wk	5.8	Tablet	Stunted and non-stunted; HAZ=-1.2	None
Ebrahimi 2006 ⁹¹	IR	804	96 to 132	10mg 6d/wk	7	Solution	Not reported	None
Fallahi 2007 ⁹²	IR	53	132 to 143	20mg 6d/wk	4	Capsule	Not reported	Iron
Fonseca 200293	BR	199	72 to 120	30mg weekly	3	Solution	Stunted and non-stunted	None
Friis 1997 ^{94, 95}	ZW	313	132 to 204	30 mg <29.5 kg; 50 mg >29.5 kg 5d/wk	12	Tablet	HAZ=-1.18	None

Garcia 1998 ⁹⁶	CL	33	66 to 159.6	20mg daily	6	Unclear	Stunted and non-stunted; HAZ=-2.6	None
Gibson 1989 ⁹⁷	CA	60	59 to 95	10mg daily	12	Solution	Stunted and non-stunted; HAZ=-1.39	None
Gracia 2005 ⁹⁸	СО	350	24 to 59	12mg daily	8	Unclear	Stunted and non-stunted; HAZ=0	Micronutrients
Gupta 2003 ⁹⁹	IN	280	6 to 41	10mg or 50mg 5d/wk or weekly	4	Solution	Not reported	None
Gupta 2007 ¹⁰⁰	IN	1,878	6 to 48	50mg weekly	6	Solution	Not reported	Vitamin B
Hambidge 1978 ^{101, 102}	US	75	38 to 61	14mg 5d/wk	6	Solution	Not reported	None
Han 2002 ^{103, 104}	CN	119	36 to 60	3.5mg 5d/wk	12	Tablet	Not reported	Vitamin A and Calciun
Hettiarachchi 2008 ¹⁰⁵	LK	341	144 to 155	14mg 5d/wk	6	Capsule	Stunted and non-stunted; HAZ=-1.16	None
Hong 1982 ¹⁰⁶	CN	158	4 to 72	Daily	2.4	Solution	Stunted and non-stunted	Vitamin B
Ince 1995 ¹⁰⁷	TR	25	25 to 76	10mg daily	12	Solution	Non-stunted only; HAZ=-1.55	None
Kartasurya 2012 ¹⁰⁸	ID	826	24 to 60	10mg daily	4	Solution	Non-stunted only; HAZ=-1.730145278	Vitamin A
Kikafunda 1998 ¹⁰⁹⁻¹¹¹	UG	155	33 to 89	10mg 5d/wk	6	Tablet	HAZ=-0.7	None
Kurugöl 2006 ¹¹²	TR	200	24 to 120	15mg daily	7	Solution	Not reported	None
Larson 2010 ^{113, 114}	BD	353	6 to 24	10mg daily	3	Solution	HAZ=-1.72	None
Lind 2003 ¹¹⁵⁻¹¹⁸	ID	680	6 to 6	10mg daily	6	Solution	Stunted and non-stunted; HAZ=-0.34	Vitamin C
Long 2006 ¹¹⁹⁻¹²²	MX	786	6 to 15	20mg daily	12	Solution	Stunted and non-stunted; HAZ=0.1	None
Mahloudji 1975 ¹²³	IR	50	72 to 144	20mg 6d/wk	16	Capsule	Not reported	Micronutrients
Malik 2013 ¹²⁴	IN	158	6 to 11	20mg daily	0.46	Solution	Not reported	None
*Marinho 1991 ¹²⁵	BR	240	36 to 84	5mg daily	1	Unclear	Stunted and non-stunted	None
Mazariegos 2010 ¹²⁶	GT	412	6 to 6	5mg daily	6	Tablet	Stunted and non-stunted; HAZ=-2.09	Low-phytate maize
Meeks Gardner 1998 ^{127, 128}	JM	61	6 to 24	5mg daily	3	Solution	Stunted only; HAZ=-2.9	Micronutrients
Meeks Gardner 2005 ¹²⁹	JM	126	9 to 30	10mg daily	6	Solution	HAZ=-1.42	Micronutrients
Mozaffari-Khosravi 2009 ^{130, 131}	IR	90	25 to 69	5mg daily	6	Solution	Stunted and non-stunted; HAZ=-1.59	None
Muller 2001 ¹³²⁻¹³⁴	BF	709	6 to 30	12.5mg 6d/wk	6	Tablet	Stunted and non-stunted; HAZ=-1.6	None
Nakamura 1993 ¹³⁵	JP	21	mean=70	5mg/kg daily	6	Unclear	Stunted only; HAZ=-2.44	None
Ninh 1996 ¹³⁶	VN	210	4 to 36	10mg daily	5	Solution	Stunted only; HAZ=-2.61	None

Penny 2004137, 138	PE	164	6 to 35	10mg daily	6	Solution	Stunted and non-stunted; HAZ=-1.56	None
Rahman 2001 ¹³⁹⁻¹⁴²	BD	800	12 to 35	20mg daily	0.5	Solution	Stunted and non-stunted; HAZ=-2.41	None
Richard 2006 ¹⁴³	PE	855	6 to 180	20mg daily	7	Solution	Stunted and non-stunted; HAZ=-2.08	None
Rosado 1997 ¹⁴⁴⁻¹⁴⁶	MX	219	18 to 36	20mg 6d/wk	12	Solution	Stunted and non-stunted; HAZ=-1.6	None
Rosales 2004 ¹⁴⁷	GT	76	96 to 132	42.5mg 5d/wk	2	Solution	Not reported	None
Ruel 1997 ¹⁴⁸⁻¹⁵⁰	GT	108	6 to 9	10mg daily	7	Solution	Stunted and non-stunted; HAZ=-2.16	None
Ruz 1997 ¹⁵¹	CL	98	27 to 50	10mg daily	14	Solution	Stunted and non-stunted; HAZ=-0.52	None
*Sandstead 1998 ^{152, 153}	CN	NR	72 to 108	20mg 6d/wk	2.5	Tablet	Not reported	Micronutrients
Sandstead 2008 ¹⁵⁴	US	54	72 to 84	20mg 5d/wk	2.5	Unclear	Not reported	Micronutrients
*Sanjur 1990 ¹⁵⁵	US	NR	12 to 24	Daily	6	Tablet	Not reported	Micronutrients
Sayeg Porto 2000156	BR	21	84 to 120	5mg/kg daily	6	Solution	Stunted only; HAZ=-2.67	None
Sazawal 1996 ¹⁵⁷⁻¹⁶⁶	IN	609	6 to 35	10mg daily	6	Solution	Stunted and non-stunted	Micronutrients
Sazawal 2006 ¹⁶⁷⁻¹⁷⁶	ΤZ	60,225	1 to 35	5mg <1y; 10mg >1y daily	16	Tablet	Stunted and non-stunted; HAZ=-1.5	Micronutrients
Schultink 1997 ¹⁷⁷	ID	85	24 to 60	15mg daily	2	Solution	Stunted and non-stunted; HAZ=-2.5	Iron
Sempertegui 1996 ^{178, 179}	EC	50	12 to 59	10mg daily	2	Solution	Stunted and non-stunted; HAZ=-2	None
*Shah 2011 ¹⁸⁰	IN	NR	6 to 59	10mg daily	2	Unclear	Not reported	None
Shankar 2000 ^{181, 182}	PG	274	6 to 60	10mg 6d/wk	11.5	Tablet	Stunted and non-stunted; HAZ=-1.9	None
Silva 2006 ¹⁸³	BR	60	12 to 59	10mg daily	4	Solution	Stunted and non-stunted; HAZ=-1.9	Iron-fortified milk
Smith 1999 ¹⁸⁴	BZ	51	Preschool	70mg weekly	6	Solution	Stunted and non-stunted	None
Soofi 2013 ¹⁸⁵	РК	1305	6 to 6	10mg daily	12	Powder	Stunted and non-stunted	Micronutrients
Tielsch 2006 ¹⁸⁶⁻¹⁹³	NP	49,205	1 to 35	5mg < 1y; 10mg >1y daily	to 36m	Tablet	Stunted and non-stunted	Iron and folic acid
Tupe 2009 ^{194, 195}	IN	88	120 to 155	16.6mg 6d/wk	2.5	Tablet	Stunted and non-stunted; HAZ=-1.3	None
Uckardes 2009 ¹⁹⁶⁻¹⁹⁸	TR	226	89 to 140	15mg 5d/wk	2.5	Solution	Not reported	None
Udomkesmalee 1992 ^{199, 200}	TH	133	72 to 156	25mg 5d/wk	6	Capsule	Stunted and non-stunted	Vitamin A
Umeta 2000 ²⁰¹⁻²⁰³	ET	200	6 to 12	10mg 6d/wk	6	Solution	Stunted and non-stunted; HAZ=-1.7	None
*Vakili 2009 ²⁰⁴	IR	200	78 to 120	10mg 6d/wk	5	Tablet	Not reported	None

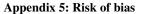
For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml

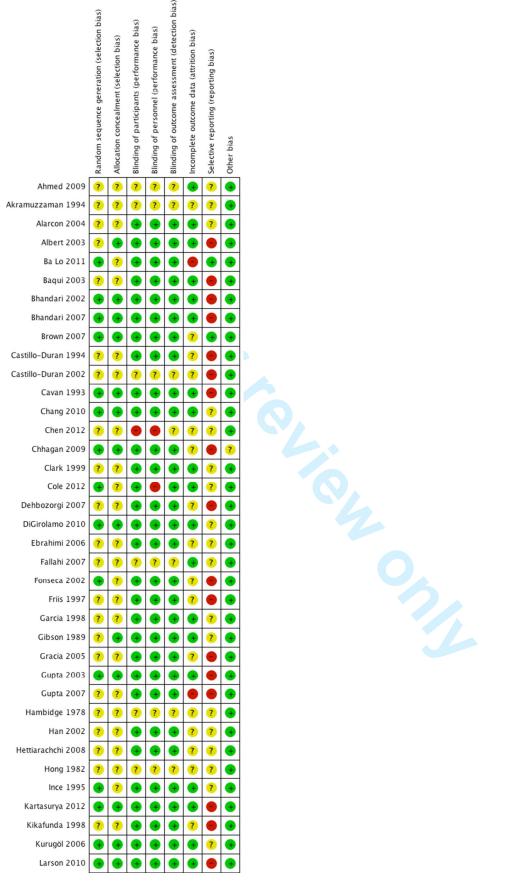
 BMJ Open

Veenemans 2011 ²⁰⁵⁻²⁰⁸	ΤZ	612	6 to 60	10mg daily	11	Capsule	Stunted and non-stunted; HAZ=-2.43	Micronutrients
Walravens 1983 ^{209, 210}	US	57	24 to 72	5mg 2x daily	12	Solution	Stunted and non-stunted; HAZ=-2.07	None
Walravens 1989 ²¹¹	US	NR	8 to 27	25mg (frequency unclear)	6	Solution	HAZ=-1.35	None
Wessells 2012 ^{212, 213}	BF	451	6 to 23	5mg daily	0.75	Solution	HAZ=-1.5	None
Wuehler 2008 ^{214, 215}	EC	503	12 to 30	3, 7, or 10mg daily	6	Solution	Stunted and non-stunted; HAZ=-2.3	None

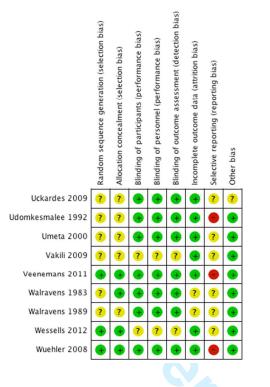
*Not included in meta-analysis; Age and duration reported in months

For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml





	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants (performance bias)	Blinding of personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Lind 2003	1					-	N N	
Long 2006							?	
Mahloudji 1975	?	?				2	-	
						•	-	
Malik 2013 Marinho 1991	•	•	•	•	•	•	-	
Marinno 1991 Mazariegos 2010	_	?	?	?	?	?	?	
Mazariegos 2010 Meeks Gardner 1998	-	•	•	•		•	•	
Meeks Gardner 1998 Meeks Gardner 2005	_	?	•	•	•	?	?	•
	_	?	•		•	•	?	?
Mozaffari-Khosravi 2009	-	•	•	•	•	•	0	•
Muller 2001 Nakamura 1993		•	•	•	•	•	?	•
		?	?	?	?	?	?	
Ninh 1996 Penny 2004	-	?	•	•		•	7	
		?	•	•	•	•	•	•
Rahman 2001		•		•	•	•	•	•
Richard 2006	_	?	•	•	•	•	0	•
Rosado 1997	?	?	•	•	•	•	?	•
Rosales 2004	-	?	•	•	•	•	?	•
Ruel 1997	?	?	•	•	•	•	?	•
Ruz 1997	?	•	•	•	•	?		•
Sandstead 2008		?	•	•	•	?	-	•
Sandstead 2008		•	•	•	•	?	?	•
Sanjur 1990		?	•	•	•	1	•	•
Sayeg Porto 2000	_	•	•	•	•	<u> </u>		•
Sazawal 1996		•	•	•	•	•	•	•
Sazawal 2006	—	•	•	•	•	•		•
Schultink 1997	-	?	•	•	•	?	1	•
Sempertegui 1996	_	?	•	•	•	•	?	•
Shah 2011		?	?	?	?	?	•	•
Shankar 2000	-	•	•	•	•	•	•	•
Silva 2006	_	?	?	?	?	•	•	•
Smith 1999	_	?	?	?	?	•	?	?
Soofi 2013		•	•	•	•	•	•	•
Tielsch 2006	-	•	•	•	•	•	?	•
Tupe 2009	Ŧ	?	?	?	•	•	?	•



BMJ Open

Appendix 6: Subgroup analyses Subgroup Trials	People	Effect size (95% CI), fixed	I ² ; Chi ² (p value)
Prevalence of diarrhoea (RR) 13	8519	0.88 (0.86 to 0.90)	88%; 118.88 (p<0.00001
Iron co-supplementation (I ² =75%; Chi ² =3.97, p			00%) 110100 (p 10100001
with iron 3	1024	0.96 (0.88 to 1.05)	96%; 46.97 (p<0.00001)
without iron 11	7495	0.88 (0.86 to 0.90)	84%; 67.94 (p<0.00001)
Age (I^2 =97%; Chi ² =30.52, p<0.00001)			
6m to 1y 7	3714	0.96 (0.93 to 1.00)	94%; 112.81 (p<0.00001)
$\frac{1y \text{ to } 5y 7}{2}$	4805	0.85 (0.83 to 0.87)	37%; 11.03 (p=0.14)
Dose ($I^2=94\%$; Chi ² =61.69, p<0.00001)	1200	1.00 (0.02 to 1.08)	$0.401 \cdot 22.41 (= -0.00001)$
Omg to 5mg 2 5mg to 10mg 1	1200 274	1.00 (0.92 to 1.08) 1.17 (0.60 to 2.28)	94%; 33.41 (p<0.00001) Not applicable
10mg to 15mg 6	3434	0.93 (0.90 to 0.96)	66%; 14.53 (p=0.01)
15mg to 20mg 1	258	0.61 (0.54 to 0.69)	Not applicable
20mg or more 3	3353	0.85 (0.82 to 0.87)	68%; 9.24 (p=0.03)
Duration (I ² =86%; Chi ² =13.98, p=0.0009)			
Om to 6m 3	3353	0.85 (0.82 to 0.87)	68%; 9.24 (p=0.03)
6m to 12m 9	4957	0.92 (0.89 to 0.95)	91%; 95.66 (p<0.00001)
<i>12m or more</i> 1	209	0.88 (0.74 to 1.03)	Not applicable
<i>Formulation</i> (I ² =86%; Chi ² =13.99, p=0.0009)			
Solution 8	4657	0.88 (0.85 to 0.90)	92%; 97.84 (p<0.00001)
Pill/tablet 4	2144	0.86 (0.81 to 0.92)	43%; 7.05 (p=0.13)
Capsule 1	1718	1.03 (0.95 to 1.12)	Not applicable
Incidence of LRTI (RR) 12	9610	1.00 (0.94 to 1.07)	1%; 17.16 (p=0.44)
<i>Iron co-supplementation</i> ($I^2=0\%$; Chi ² =0.06, p=		1.00 (0.94 to 1.07)	1 /0, 17.10 (p=0.44)
with iron 5	2896	0.99 (0.87 to 1.12)	0%; 2.92 (p=0.71)
without iron 10	6714	1.01 (0.93 to 1.08)	22%; 14.17 (p=0.22)
<i>Age</i> (I ² =0%; Chi ² =1.50, p=0.47)			
6m to 1y 5	3566	0.97 (0.88 to 1.07)	0%; 2.12 (p=0.95)
<i>1y to 5y</i> 5	4605	1.05 (0.96 to 1.16)	25%; 8.01 (p=0.24)
$\frac{5y \text{ to } 13y 1}{2}$	836	1.00 (0.72 to 1.40)	Not applicable
Dose (I ² =0%; Chi ² =0.60, p=0.74)	0.45	0.04 (0.78 to 1.12)	00.002 (m 0.02)
0mg to 5mg 3 10mg to 15mg 8	845	0.94 (0.78 to 1.13)	0%; 0.93 (p=0.63)
20mg or more 7	4045 4720	1.00 (0.91 to 1.10) 1.02 (0.92 to 1.13)	25%; 9.32 (p=0.23) 5%; 6.31 (p=0.39)
Duration (I ² =0%; Chi ² =0.79, p=0.67)	7720	1.02 (0.92 (0 1.13)	570, 0.51 (p=0.59)
Duration (1 = 0%, Cm = 0.79, p=0.07) Om to 6m = 2	3148	1.03 (0.92 to 1.14)	67%; 6.05 (p=0.05)
6m to 12m 8	5114	0.98 (0.90 to 1.06)	0%; 9.69 (p=0.47)
12m or more 2	1348	1.08 (0.83 to 1.42)	0%; 0.64 (p=0.89)
Formulation (I ² =20%; Chi ² =3.73, p=0.29)			* 1
Solution 9	7007	0.98 (0.91 to 1.05)	2%; 13.25 (p=0.43)
Pill/tablet 1	686	1.19 (0.93 to 1.51)	Not applicable
Capsule 1	612	1.12 (0.84 to 1.51)	Not applicable
Powder 1	1305	1.25 (0.75 to 2.09)	Not applicable
Height (SMD) 51	13669	0.09 (0.06 to 0.13)	86%; 407.92 (p<0.00001
Iron co-supplementation (I2=85%; Chi2=6.60, p			
with iron 12		0.01 (-0.07 to 0.08)	29%; 15.48 (p=0.16)
without iron 44	10510	0.12 (0.08 to 0.16)	88%; 385.12 (p<0.00001)
<i>Age</i> (I ² =98%; Chi ² =117.89, p<0.00001)	252.0		
6m to 1y 9	3730	-0.26 (-0.33 to 0.19)	94%; 204.70 (p<0.00001)
<i>1y to 5y</i> 24	6155	0.09 (0.04 to 0.14)	42%; 44.94 (p=0.01)
5y to 13y 16 Dose (I ² =91%; Chi ² =43.60, p<0.00001)	3449	0.25 (0.18 to 0.32)	94%; 277.24 (p<0.00001)
Dose ($\Gamma=91\%$; Chi ⁻ =43.60, p<0.00001) Omg to 5mg 5	1170	0.02 (0.10 to 0.13)	58%; 14.30 (p=0.03)
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	2978	0.02 (0.10 to 0.13) 0.29 (0.22 to 0.37)	96%; 271.49 (p<0.0001)
	4344	0.06 (0.00 to 0.12)	29%; 33.90 (p=0.09)
0 0		5.00 (0.00 10 0.12)	39%; 3.26 (p=0.20)
10mg to 15mg 22		-0.01 (-0.26 to 0.24)	
0 0	240 4675	-0.01 (-0.26 to 0.24) -0.01 (0.07 to 0.05)	11%; 11.22 (p=0.34)
10mg to 15mg 22 15mg to 20mg 2 20mg or more 3	240		
10mg to 15mg 22 15mg to 20mg 2 20mg or more 3	240		
10mg to 15mg 22 15mg to 20mg 2 20mg or more 3 Duration (l ² =91%; Chi ² =21.62, p<0.00001)	240 4675	-0.01 (0.07 to 0.05)	11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001)
10mg to 15mg 22 15mg to 20mg 2 20mg or more 3 Duration (l ² =91%; Chi ² =21.62, p<0.00001) 0m to 6m 12 6m to 12m 26 12m or more 12	240 4675 4475 6479 2715	-0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04)	11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001)
$\begin{array}{rrrr} 10mg \ to \ 15mg \ \ 22\\ 15mg \ to \ 20mg \ \ 2\\ 20mg \ or \ more \ \ 3\\ \hline Duration \ (l^2=91\%; \ Chi^2=21.62, \ p<0.00001)\\ 0mt \ of \ \ 12\\ 6mt \ \ 0 \ 12m \ \ 26\\ 12m \ or \ more \ \ 12\\ \hline Iron \ co-supplementation \ (l^2=85\%; \ Chi^2=6.60, \ p \ \ 12m \ \ \ 12m \ \ \ 12m \ \ 12m \ \ 12m \ \ \ 12m \ \ 12m \ \ 12m \ \ 12m \ \ \ 12m \ \ \ 12m \ \ \ 12m \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$	240 4675 4475 6479 2715 =0.01)	-0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17)	11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10)
$\begin{array}{rrrr} 10mg \ to \ 15mg \ \ 22\\ 15mg \ to \ 20mg \ \ 2\\ 20mg \ or \ more \ \ 3\\ \hline Duration \ (I^2=91\%; Chi^2=21.62, p<0.00001)\\ 0mt \ of \ \ 12\\ 6mt \ \ 0 \ 12m \ \ 26\\ 12m \ or \ more \ \ 12\\ \hline Iron \ co-supplementation \ (I^2=85\%; Chi^2=6.60, p\\ with \ iron \ \ 12\\ \end{array}$	240 4675 4475 6479 2715 =0.01) 2929	-0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17) 0.01 (-0.07 to 0.08)	11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10) 29%; 15.48 (p=0.16)
$\begin{array}{cccccc} 10mg \ to \ 15mg \ \ 22 \\ 15mg \ to \ 20mg \ \ 2 \\ 20mg \ or \ more \ \ 3 \\ \hline Duration \ (I^2=91\%; \ Chi^2=21.62, \ p<0.00001) \\ 0mt \ of \ m \ 12 \\ 6mt \ to \ 12m \ \ 26 \\ 12m \ or \ more \ \ 12 \\ \hline Iron \ co-supplementation \ (I^2=85\%; \ Chi^2=6.60, \ p \\ with \ iron \ \ 12 \\ without \ iron \ \ 44 \end{array}$	240 4675 4475 6479 2715 =0.01)	-0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17)	11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10) 29%; 15.48 (p=0.16)
$\begin{array}{rrrr} 10mg \ to \ 15mg \ \ 22\\ 15mg \ to \ 20mg \ \ 2\\ 20mg \ or \ more \ \ 3\\ \hline \\ Duration \ (I^2=91\%; \ Chi^2=21.62, \ p<0.00001)\\ 0m \ to \ 6m \ \ 12\\ 6m \ to \ 12m \ \ 26\\ 12m \ or \ more \ \ 12\\ \hline \\ Iron \ co-supplementation \ (I^2=85\%; \ Chi^2=6.60, \ p\\ with \ iron \ \ 12\\ \hline \\ without \ iron \ \ 44\\ \hline Formulation \ (I^2=75\%; \ Chi^2=8.03, \ p=0.02) \end{array}$	240 4675 4475 6479 2715 =0.01) 2929 10510	-0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17) 0.01 (-0.07 to 0.08) 0.12 (0.08 to 0.16)	11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10) 29%; 15.48 (p=0.16) 88%; 385.12 (p<0.00001)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	240 4675 4475 6479 2715 =0.01) 2929 10510 9030	-0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17) 0.01 (-0.07 to 0.08) 0.12 (0.08 to 0.16) 0.12 (0.07 to 0.16)	11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10) 29%; 15.48 (p=0.16) 88%; 385.12 (p<0.00001) 90%; 367.20 (p<0.00001)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	240 4675 4475 6479 2715 =0.01) 2929 10510 9030 3868	-0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17) 0.01 (-0.07 to 0.08) 0.12 (0.08 to 0.16) 0.12 (0.07 to 0.16) 0.02 (-0.04 to 0.09)	11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10) 29%; 15.48 (p=0.16) 88%; 385.12 (p<0.00001) 90%; 367.20 (p<0.00001) 9%; 12.11 (p=0.36)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	240 4675 4475 6479 2715 =0.01) 2929 10510 9030	-0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17) 0.01 (-0.07 to 0.08) 0.12 (0.08 to 0.16) 0.12 (0.07 to 0.16)	11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10) 29%; 15.48 (p=0.16) 88%; 385.12 (p<0.00001) 90%; 367.20 (p<0.00001)
$\begin{array}{rrrr} 10mg \ to \ 15mg \ \ 22 \\ 15mg \ to \ 20mg \ \ 2 \\ 20mg \ or \ more \ \ 3 \\ \hline \\ Duration \ (l^2=91\%; \ Chi^2=21.62, \ p<0.00001) \\ 0mt \ of \ mto \ \ 12 \\ 6mt \ to \ 12m \ \ 26 \\ 12m \ or \ more \ \ 12 \\ \hline \\ Iron \ co-supplementation \ (l^2=85\%; \ Chi^2=6.60, \ p \\ with \ iron \ \ 12 \\ \hline \\ without \ iron \ \ 44 \\ \hline Formulation \ (l^2=75\%; \ Chi^2=8.03, \ p=0.02) \\ Solution \ \ 32 \\ Pill/ \ tablet \ \ 11 \\ \hline \\ Capsule \ \ 2 \\ \hline \\ Weight \ (SMD) \ \ \ 44 \end{array}$	240 4675 4475 6479 2715 =0.01) 2929 10510 9030 3868 322 12305	-0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17) 0.01 (-0.07 to 0.08) 0.12 (0.08 to 0.16) 0.12 (0.07 to 0.16) 0.02 (-0.04 to 0.09)	11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10) 29%; 15.48 (p=0.16) 88%; 385.12 (p<0.00001) 90%; 367.20 (p<0.00001) 9%; 12.11 (p=0.36) 0%; 0.90 (p=0.64)
$\begin{array}{rrrr} 10mg \ to \ 15mg \ \ 22 \\ 15mg \ to \ 20mg \ \ 2 \\ 20mg \ or \ more \ \ 3 \\ \hline \\ Duration \ (l^2=91\%; \ Chi^2=21.62, \ p<0.00001) \\ 0mt \ to \ 6m \ \ 12 \\ 6mt \ to \ 12m \ \ 26 \\ 12m \ or \ more \ \ 12 \\ \hline \\ Iron \ co-supplementation \ (l^2=85\%; \ Chi^2=6.60, \ p \\ with \ iron \ \ 12 \\ \hline \\ without \ iron \ \ 44 \\ \hline Formulation \ (l^2=75\%; \ Chi^2=8.03, \ p=0.02) \\ Solution \ \ 32 \\ Pill/ \ tablet \ \ 11 \\ \hline \\ Capsule \ \ 2 \\ \hline \\$	240 4675 4475 6479 2715 =0.01) 2929 10510 9030 3868 322 12305 =0.22)	-0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17) 0.01 (-0.07 to 0.08) 0.12 (0.07 to 0.16) 0.02 (-0.04 to 0.09) 0.31 (0.03 to 0.59) 0.10 (0.07 to 0.14)	11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10) 29%; 15.48 (p=0.16) 88%; 385.12 (p<0.00001) 90%; 367.20 (p<0.00001) 9%; 12.11 (p=0.36) 0%; 0.90 (p=0.64) 76%; 216.64 (p<0.00001)
$\begin{array}{rrrr} 10mg \ to \ 15mg \ \ 22 \\ 15mg \ to \ 20mg \ \ 2 \\ 20mg \ or \ more \ \ 3 \\ \hline \\ Duration \ (l^2=91\%; \ Chi^2=21.62, \ p<0.00001) \\ 0mt \ of \ mto \ \ 12 \\ 6mt \ to \ 12m \ \ 26 \\ 12m \ or \ more \ \ 12 \\ \hline \\ Iron \ co-supplementation \ (l^2=85\%; \ Chi^2=6.60, \ p \\ with \ iron \ \ 12 \\ \hline \\ without \ iron \ \ 44 \\ \hline Formulation \ (l^2=75\%; \ Chi^2=8.03, \ p=0.02) \\ Solution \ \ 32 \\ Pill/ \ tablet \ \ 11 \\ \hline \\ Capsule \ \ 2 \\ \hline \\ Weight \ (SMD) \ \ \ 44 \end{array}$	240 4675 4475 6479 2715 =0.01) 2929 10510 9030 3868 322 12305	-0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17) 0.01 (-0.07 to 0.08) 0.12 (0.08 to 0.16) 0.12 (0.07 to 0.16) 0.02 (-0.04 to 0.09) 0.31 (0.03 to 0.59)	11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10) 29%; 15.48 (p=0.16) 88%; 385.12 (p<0.00001) 90%; 367.20 (p<0.00001) 9%; 12.11 (p=0.36)

Age (I^2 =99%; Chi ² =136.86, p<0.00001) 6m to 1y 9	3730	-0.31 (-0.38 to -0.25)	97%; 387.48 (p<0.00001)
1y to 5y 20	5565	-0.31 (-0.38 to -0.23) 0.06 (0.01 to 0.11)	43%; 38.72 (p=0.02)
5y to 13y 13	2654	0.28 (0.20 to 0.36)	89%; 117.28 (p<0.00001)
<i>Dose</i> (I^2 =89%; Chi ² =35.38, p<0.00001)	2001		0, 10, 11/120 (p (0100001)
Omg to 5mg 5	1170	0.00 (-0.11 to 0.12)	0%; 2.79 (p=0.83)
5mg to 10mg 10	2766	0.27 (0.20 to 0.35)	92%; 108.31 (p<0.00001)
10mg to 15mg 19	3969	0.11 (0.04 to 0.17)	34%; 31.75 (p=0.06)
15mg to 20mg 2	240	-0.20 (-0.45 to 0.06)	13%; 2.30 (p=0.32)
20mg or more 7	3919	0.01 (-0.05 to 0.08)	36%; 12.43 (p=0.13)
<i>Duration</i> (I ² =92%; Chi ² =23.59, p<0.00001)			
0m to 6m 11	4417	0.05 (0.00 to 0.11)	76%; 44.95 (p<0.00001)
6m to 12m 22 12m or more 11	5289 2599	0.20 (0.15 to 0.26) -0.01 (-0.07 to 0.09)	82%; 131.52 (p<0.00001) 16%; 16.58 (p=0.28)
Formulation (I ² =87%; Chi ² =15.43, p=0.0004)		-0.01 (-0.07 to 0.09)	10%, 10.38 (p=0.28)
Solution (1 = 87 %, Chi = 15.45, p=0.0004) Solution 29	8147	0.14 (0.10 to 0.19)	82%; 182.72 (p<0.00001)
Pill/tablet 10	3656	0.01 (-0.06 to 0.08]	13%; 11.51 (p=0.32)
Capsule 2	304	0.41 (0.12 to 0.71)	0%; 1.21 (p=0.55)
			* .
Weight-to-height ratio (SMD) 24	7901	0.05 (0.01 to 0.10)	20%; 34.96 (p=0.17)
Iron co-supplementation (I ² =72%; Chi ² =3.51,	* ·		
with iron 8	1409	0.14 (0.03 to 0.24)	14%; 8.10 (p=0.32)
without iron 19	6262	0.03 (-0.02 to 0.08)	16%; 22.67 (p=0.25)
Age (I ² =30%; Chi ² =11.45, p=0.18)	2550	0.02 (0.04 + 0.11)	2007.11 45 (- 0.10)
6m to 1y 7	2559	0.03 (-0.04 to 0.11) 0.02 (-0.05 to 0.08)	30%; 11.45 (p=0.18)
<i>1y to 5y</i> 12 <i>5y to 13y</i> 5	4302 857	0.02 (-0.05 to 0.08) 0.07 (-0.06 to 0.20)	7%; 13.95 (p=0.38) 0%; 3.20 (p=0.67)
$\frac{59 \text{ to } 139 \text{ 5}}{\text{Dose (I}^2 = 11\%; \text{Chi}^2 = 4.52, \text{ p} = 0.34)}$	0.57	0.07 (-0.00 10 0.20)	0%, 5.20 (p=0.07)
Dose (I =11%; Cm =4.52, p=0.34) $Omg \ to \ 5mg \ 4$	671	0.07 (-0.08 to 0.22)	0%; 1.02 (p=0.91)
5 Sing to 10 mg 6	1229	0.01 (-0.01 to 0.12)	30%; 7.16 (p=0.21)
10mg to 15mg 10	2389	0.08 (-0.01 to 0.16)	47%; 18.79 (p=0.04)
15mg to 20mg 1	194	-0.22 (-0.50 to 0.06)	Not applicable
20mg or more 4	3576	0.06 (0.00 to 0.13)	0%; 2.43 (p=0.79)
Duration (I ² =18.2%; Chi ² =2.45, p=0.29)			*
0m to 6m 5	3337	0.07 (0.00 to 0.14)	0%; 2.14 (p=0.83)
6m to 12m 15	4212	0.05 (-0.01 to 0.11)	38%; 27.40 (p=0.05)
12m or more 4	352	-0.10 (-0.31 to 0.11)	0%; 2.98 (p=0.56)
<i>Formulation</i> (I ² =49%; Chi ² =1.97, p=0.16)	69.4.9		
Solution 17	6019	0.06 (0.01 to 0.12)	0%; 20.92 (p=0.46)
Pill/tablet 6	1652	-0.01 (-0.11 to 0.08)	56%; 11.38 (p=0.04)
Plasma zinc (SMD) 46	9810	0.62 (0.58 to 0.67)	91%; 582.45 (p<0.00001)
Iron co-supplementation (I ² =96%; Chi ² =27.07			
with iron 17	3231	0.47 (0.39 to 0.54)	82%; 90.82 (p<0.00001)
without iron 37	6579	0.70 (0.65 to 0.75)	92%; 464.56 (p<0.00001)
<i>Age</i> (I ² =95%; Chi ² =40.84, p<0.00001)			
6m to 1y 8	2042	0.46 (0.37 to 0.55)	87%; 74.18 (p<0.00001)
<i>1y to 5y</i> 19	4911	0.75 (0.69 to 0.81)	93%; 309.84 (p<0.00001)
5y to 13y 17	2375	0.47 (0.38 to 0.55)	83%; 116.75 (p<0.00001)
Dose (I ² =92%; Chi ² =49.94, p<0.00001)	055	0.35(0.21 to 0.40)	26%; 6.72 (p=0.24)
0mg to 5mg 4 5mg to 10mg 8	855 1762	0.35 (0.21 to 0.49) 0.49 (0.40 to 0.59)	26%; 6.72 (p=0.24) 93%; 102.83 (p<0.00001)
10mg to 15mg 20	4596	0.49 (0.40 to 0.59) 0.62 (0.56 to 0.68)	95%; 102.85 (p<0.00001) 86%; 158.02 (p<0.00001)
15mg to 20mg 6	535	0.02 (0.58 to 0.08) 0.76 (0.58 to 0.94)	86%; 51.51 (p<0.00001)
20mg or more 6			
		0.88 (0.78 to 0.98)	95%; 161.54 (n<0.00001)
	1724	0.88 (0.78 to 0.98)	95%; 161.54 (p<0.00001)
		0.88 (0.78 to 0.98) 0.81 (0.73 to 0.88)	
Duration (I ² =94%; Chi ² =32.98, p<0.00001)	1724		94%; 285.66 (p<0.00001) 85%; 178.87 (p<0.00001)
Duration (I ² =94%; Chi ² =32.98, p<0.00001) 0m to 6m 15 6m to 12m 22 12m or more 9	1724 3079 4347 2384	0.81 (0.73 to 0.88)	94%; 285.66 (p<0.00001)
Duration ($l^2=94\%$; Chi ² =32.98, p<0.00001) 0m to 6m 15 6m to 12m 22 12m or more 9 Formulation ($l^2=98\%$; Chi ² =149.23, p<0.0000	1724 3079 4347 2384 01)	0.81 (0.73 to 0.88) 0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67)	94%; 285.66 (p<0.00001) 85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001)
$\begin{array}{c} Duration \ (l^2=94\%; \ Chi^2=32.98, \ p<0.00001) \\ 0m \ to \ 6m \ 15 \\ 6m \ to \ 12m \ 22 \\ 12m \ or \ more \ 9 \\ \hline Formulation \ (l^2=98\%; \ Chi^2=149.23, \ p<0.0000 \\ Solution \ 25 \end{array}$	1724 3079 4347 2384 01) 4741	0.81 (0.73 to 0.88) 0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84)	94%; 285.66 (p<0.00001) 85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001)
$\begin{array}{c} Duration \ (l^2=94\%; \ Chi^2=32.98, \ p<0.00001) \\ 0m \ to \ 6m \ 15 \\ 6m \ to \ 12m \ 22 \\ 12m \ or \ more \ 9 \\ \hline Formulation \ (l^2=98\%; \ Chi^2=149.23, \ p<0.0000 \\ Solution \ 25 \\ Pill/ \ tablet \ 12 \end{array}$	1724 3079 4347 2384 01) 4741 3553	0.81 (0.73 to 0.88) 0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49)	94%; 285.66 (p<0.00001) 85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001)
$\begin{array}{c} Duration \ (l^2=94\%; \ Chi^2=32.98, \ p<0.00001) \\ 0m \ to \ 6m \ 15 \\ 6m \ to \ 12m \ 22 \\ 12m \ or \ more \ 9 \\ \hline Formulation \ (l^2=98\%; \ Chi^2=149.23, \ p<0.0000 \\ Solution \ 25 \\ Pill/ \ tablet \ 12 \\ Capsule \ 5 \end{array}$	1724 3079 4347 2384 01) 4741 3553 1115	0.81 (0.73 to 0.88) 0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21)	94%; 285.66 (p<0.00001) 85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001)
$\begin{array}{c} Duration \ (l^2=94\%; \ Chi^2=32.98, \ p<0.00001) \\ 0m \ to \ 6m \ 15 \\ 6m \ to \ 12m \ 22 \\ 12m \ or \ more \ 9 \\ \hline Formulation \ (l^2=98\%; \ Chi^2=149.23, \ p<0.0000 \\ Solution \ 25 \\ Pill/ \ tablet \ 12 \end{array}$	1724 3079 4347 2384 01) 4741 3553	0.81 (0.73 to 0.88) 0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49)	94%; 285.66 (p<0.00001) 85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001)
$\begin{array}{c} Duration (l^2=94\%; {\rm Chi}^2=32.98, p<0.00001) \\ 0m \ to \ 6m \ 15 \\ 6m \ to \ 12m \ 22 \\ 12m \ or \ more \ 9 \\ \hline Formulation (l^2=98\%; {\rm Chi}^2=149.23, p<0.0000 \\ Solution \ 25 \\ Pill/ \ tablet \ 12 \\ Capsule \ 5 \\ Powder \ 1 \end{array}$	1724 3079 4347 2384 01) 4741 3553 1115 401	0.81 (0.73 to 0.88) 0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14)	94%; 285.66 (p<0.00001) 85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable
Duration ($l^2=94\%$; Chi ² =32.98, p<0.00001)	1724 3079 4347 2384 01) 4741 3553 1115 401 5434	0.81 (0.73 to 0.88) 0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21)	94%; 285.66 (p<0.00001) 85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable
Duration ($l^2=94\%$; Chi ² =32.98, p<0.00001)	1724 3079 4347 2384 01) 4741 3553 1115 401 5434	0.81 (0.73 to 0.88) 0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53)	94%; 285.66 (p<0.00001) 85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001)
Duration ($l^2=94\%$; Chi ² =32.98, p<0.00001)	1724 3079 4347 2384 2384 2384 211 4741 3553 1115 401 5434 7, p<0.00001)	0.81 (0.73 to 0.88) 0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14)	94%; 285.66 (p<0.00001) 85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001 69%; 16.19 (p=0.006)
Duration (l ² =94%; Chi ² =32.98, p<0.00001) $0m to \ 6m \ 15$ $6m to \ 12m \ 22$ $12m \ or \ mor \ 9$ Formulation (l ² =98%; Chi ² =149.23, p<0.0000	1724 3079 4347 2384 01) 4741 3553 1115 401 5434 7, p<0.00001) 1704	0.81 (0.73 to 0.88) 0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53) 0.62 (0.55 to 0.69)	94%; 285.66 (p<0.00001) 85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001)
Duration (l ² =94%; Chi ² =32.98, p<0.00001) $0m to \ 6m \ 15$ $6m to \ 12m \ 22$ $12m \ or \ mor \ 9$ Formulation (l ² =98%; Chi ² =149.23, p<0.0000	1724 3079 4347 2384 01) 4741 3553 1115 401 5434 7, p<0.00001) 1704	0.81 (0.73 to 0.88) 0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53) 0.62 (0.55 to 0.69)	94%; 285.66 (p<0.00001) 85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001 69%; 16.19 (p=0.006)
Duration (l ² =94%; Chi ² =32.98, p<0.00001) Om to 6m 15 6m to 12m 22 12m or more 9 Formulation (l ² =98%; Chi ² =149.23, p<0.0000 Solution 25 Pill/ tablet 12 Capsule 5 Powder 1 Prevalence of zinc deficiency (RR) 15 Iron co-supplementation (l ² =97%; Chi ² =34.27 with iron 6 with iron 6 with iron 6 with iron 14 Age (l ² =92%; Chi ² =24.36, p<0.00001)	1724 3079 4347 2384 01) 4741 3553 1115 401 5434 7, p<0.00001) 1704 3840	0.81 (0.73 to 0.88) 0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53) 0.62 (0.55 to 0.69) 0.37 (0.33 to 0.42)	85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001) 69%; 16.19 (p=0.006) 85%; 94.31 (p<0.00001) 0%; 0.07 (p=0.79)
$\begin{array}{c} Duration (l^2=94\%; Chi^2=32.98, p<0.00001) \\ 0m to 6m 15 \\ 6m to 12m 22 \\ 12m or more 9 \\ \hline \\ Formulation (l^2=98\%; Chi^2=149.23, p<0.0000 \\ Solution 25 \\ Pill/ tablet 12 \\ Capsule 5 \\ Powder 1 \\ \hline \\ \hline \\ Prevalence of zinc deficiency (RR) 15 \\ Iron co-supplementation (l^2=97\%; Chi^2=34.27 \\ with iron 6 \\ without iron 14 \\ Age (l^2=92\%; Chi^2=24.36, p<0.00001) \\ 6m to 1y 1 \\ \hline \end{array}$	1724 3079 4347 2384 01) 4741 3553 1115 401 5434 7, p<0.00001) 1704 3840 549	0.81 (0.73 to 0.88) 0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53) 0.62 (0.55 to 0.69) 0.37 (0.33 to 0.42) 0.62 (0.54 to 0.70)	94%; 285.66 (p<0.00001) 85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001) 69%; 16.19 (p=0.006) 85%; 94.31 (p<0.00001) 0%; 0.07 (p=0.79)
$\begin{array}{c} Duration \ (l^2=94\%; \ Chi^2=32.98, p<0.00001) \\ 0m \ to \ 6m \ 15 \\ 6m \ to \ 12m \ 22 \\ 12m \ or \ more \ 9 \\ \hline \\ Formulation \ (l^2=98\%; \ Chi^2=149.23, p<0.0000 \\ Solution \ 25 \\ Pill/ \ tablet \ 12 \\ Capsule \ 5 \\ Powder \ 1 \\ \hline \\ \hline \\ Prevalence \ of \ zinc \ deficiency \ (RR) \ 15 \\ \hline \\ Iron \ co-supplementation \ (l^2=97\%; \ Chi^2=34.27 \\ with \ iron \ 6 \\ without \ iron \ 14 \\ \hline \\ Age \ (l^2=92\%; \ Chi^2=24.36, p<0.00001) \\ 6m \ to \ 1y \ 1 \\ 1y \ to \ 5y \ 9 \\ 5y \ to \ 13y \ 5 \\ \hline \end{array}$	1724 3079 4347 2384 01) 4741 3553 1115 401 5434 7, p<0.00001) 1704 3840 549 3761	0.81 (0.73 to 0.88) 0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53) 0.62 (0.55 to 0.69) 0.37 (0.33 to 0.42) 0.62 (0.54 to 0.70) 0.41 (0.37 to 0.47)	94%; 285.66 (p<0.00001) 85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001) 69%; 16.19 (p=0.006) 85%; 94.31 (p<0.00001) 0%; 0.07 (p=0.79) 91%; 116.81 (p<0.00001)
$\begin{array}{c} Duration (l^2=94\%; Chi^2=32.98, p<0.00001) \\ 0m to 6m 15 \\ 6m to 12m 22 \\ 12m or more 9 \\ \hline \\ Formulation (l^2=98\%; Chi^2=149.23, p<0.0000 \\ Solution 25 \\ Pill/ tablet 12 \\ Capsule 5 \\ Powder 1 \\ \hline \\ \hline \\ Prevalence of zinc deficiency (RR) 15 \\ \hline \\ Iron co-supplementation (l^2=97\%; Chi^2=34.27 \\ with iron 6 \\ without iron 14 \\ \hline \\ Age (l^2=92\%; Chi^2=24.36, p<0.00001) \\ 6m to 1y 1 \\ 1y to 5y 9 \\ 5y to 13y 5 \\ \hline \\ Dose (l^2=96\%; Chi^2=74.93, p<0.00001) \\ 5mg to 10mg 3 \\ \hline \end{array}$	1724 3079 4347 2384 01) 4741 3553 1115 401 5434 7, p<0.00001)	0.81 (0.73 to 0.88) 0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53) 0.62 (0.55 to 0.69) 0.37 (0.33 to 0.42) 0.62 (0.54 to 0.70) 0.41 (0.37 to 0.47) 0.31 (0.20 to 0.49) 0.34 (0.27 to 0.44)	94%; 285.66 (p<0.00001) 85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001) 69%; 16.19 (p=0.006) 85%; 94.31 (p<0.00001) 0%; 0.07 (p=0.79) 91%; 116.81 (p<0.00001) 0%; 3.53 (p=0.74) 71%; 6.81 (p=0.03)
$\begin{array}{c} Duration (l^2=94\%; Chi^2=32.98, p<0.00001) \\ 0m to 6m 15 \\ 6m to 12m 22 \\ 12m or more 9 \\ \hline \\ Formulation (l^2=98\%; Chi^2=149.23, p<0.0000 \\ Solution 25 \\ Pill/ tablet 12 \\ Capsule 5 \\ Powder 1 \\ \hline \\ \hline \\ Prevalence of zinc deficiency (RR) 15 \\ \hline \\ Iron co-supplementation (l^2=97\%; Chi^2=34.27 \\ with iron 6 \\ without iron 14 \\ \hline \\ Age (l^2=92\%; Chi^2=24.36, p<0.00001) \\ 6m to 1y 1 \\ 1y to 5y 9 \\ 5y to 13y 5 \\ \hline \\ Dose (l^2=96\%; Chi^2=74.93, p<0.00001) \\ 5mg to 10mg 3 \\ 10mg to 15mg 7 \\ \hline \end{array}$	1724 3079 4347 2384 201) 4741 3553 1115 401 5434 7, p<0.00001) 1704 3840 549 3761 1234 1181 2890	0.81 (0.73 to 0.88) 0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53) 0.62 (0.55 to 0.69) 0.37 (0.33 to 0.42) 0.62 (0.54 to 0.70) 0.41 (0.37 to 0.47) 0.31 (0.20 to 0.49) 0.34 (0.27 to 0.44) 0.57 (0.52 to 0.63)	94%; 285.66 (p<0.00001) 85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001) 69%; 16.19 (p=0.006) 85%; 94.31 (p<0.00001) 0%; 0.07 (p=0.79) 91%; 116.81 (p<0.00001) 0%; 3.53 (p=0.74) 71%; 6.81 (p=0.03) 81%; 48.40 (p<0.00001)
$\begin{array}{c} Duration (l^2=94\%; Chi^2=32.98, p<0.00001) \\ 0m to 6m 15 \\ 6m to 12m 22 \\ 12m or more 9 \\ \hline \\ Formulation (l^2=98\%; Chi^2=149.23, p<0.0000 \\ Solution 25 \\ Pill/tablet 12 \\ Capsule 5 \\ Powder 1 \\ \hline \\ \hline \\ Prevalence of zinc deficiency (RR) 15 \\ Iron co-supplementation (l^2=97\%; Chi^2=34.27 \\ with iron 6 \\ without iron 14 \\ \hline \\ Age (l^2=92\%; Chi^2=24.36, p<0.00001) \\ 6m to 1y 1 \\ 1y to 5y 9 \\ 5y to 13y 5 \\ \hline \\ Dose (l^2=96\%; Chi^2=74.93, p<0.00001) \\ 5mg to 10mg 3 \\ \hline \end{array}$	1724 3079 4347 2384 01) 4741 3553 1115 401 5434 7, p<0.00001)	0.81 (0.73 to 0.88) 0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53) 0.62 (0.55 to 0.69) 0.37 (0.33 to 0.42) 0.62 (0.54 to 0.70) 0.41 (0.37 to 0.47) 0.31 (0.20 to 0.49) 0.34 (0.27 to 0.44)	94%; 285.66 (p<0.00001) 85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001) 69%; 16.19 (p=0.006) 85%; 94.31 (p<0.00001) 0%; 0.07 (p=0.79) 91%; 116.81 (p<0.00001) 0%; 3.53 (p=0.74) 71%; 6.81 (p=0.03)

<i>Duration</i> (I ² =97%; Chi ² =71.67, p<0.00001)			
0m to 6m 6	2554	0.22 (0.18 to 0.27)	72%; 24.89 (p=0.0008
6m to 12m 5	1043	0.59 (0.53 to 0.67)	35%; 9.19 (p=0.16)
12m or more 4	1947	0.55 (0.48 to 0.64)	87%; 39.02 (p<0.0000
Formulation (I ² =91%; Chi ² =22.12, p<0.00001))		
Solution 7	2415	0.49 (0.44 to 0.54)	89%; 87.85 (p<0.0000
Pill/tablet 7	2392	0.59 (0.50 to 0.68)	80%; 29.32 (p<0.0001
Capsule 2	883	0.29 (0.23 to 0.37)	60%; 7.43 (p=0.06)
Blood haemoglobin (SMD) 27	6024	-0.05 (-0.10 to 0.00)	45%; 63.96 (p=0.002)
Iron co-supplementation (I ² =0%; Chi ² =0.70, p=		-0.03 (-0.10 to 0.00)	45 /0, 05.90 (p=0.002)
with iron 17	3098	-0.01 (-0.08 to 0.07)	63%; 42.74 (p=0.0003
without iron 19	2913	0.04 (-0.04 to 0.11)	54%; 39.06 (p=0.003)
Age (I ² =0%; Chi ² =1.53, p=0.46)			2, 2 (F)
6m to 1y 7	2192	-0.04 (-0.12 to 0.05)	69%; 32.49 (p=0.0003
1y to 5y 12	2332	0.04 (-0.04 to 0.12)	62%; 33.89 (p=0.001)
5y to 13y 6	1286	0.01 (-0.11 to 0.13)	10%; 8.93 (p=0.35)
Dose ($I^2=0\%$; Chi ² =2.12, p=0.71)			
Omg to 5mg 4	966	0.01 (-0.12 to 0.14)	39%; 8.16 (p=0.15)
5mg to 10mg 2	306	-0.01 (-0.23 to 0.21)	0%; 0.56 (p=0.45)
10mg to 15mg 16	3452	0.01 (-0.06 to 0.08)	58%; 44.83 (p=0.0007
15mg to 20mg 4	364	-0.04 (-0.24 to 0.17)	25%; 5.31 (p=0.26)
$\frac{20mg \text{ or more } 3}{Duration (l^2=52\%; Chi^2=4.20, p=0.12)}$	1025	0.10 (-0.02 to 0.22)	83%; 23.74 (p<0.0000
Duration ($1 = 32\%$; Chi =4.20, p=0.12) Om to 6m 7	672	0.17 (0.01 to 0.33)	74%; 27.23 (p=0.0003
6m to 12m 14	3738	-0.01 (-0.08 to 0.06)	39%; 27.71 (p=0.05)
12m or more 7	1601	0.01 (-0.09 to 0.11)	61%; 23.36 (p=0.005)
<i>Formulation</i> (I ² =0%; Chi ² =1.38, p=0.71)	1001	0.01 (0.09 10 0.11)	6170; 25.50 (p=0.005)
Solution 15	2990	0.01 (-0.06 to 0.08)	64%; 52.48 (p<0.0000
Pill/tablet 8	1605	0.01 (-0.09 to 0.12)	67%; 24.34 (p=0.002)
Capsule 4	989	0.07 (-0.06 to 0.20)	0%; 4.31 (p=0.51)
Powder 1	427	-0.07 (-0.26 to 0.12)	Not applicable
	1205		
Prevalence of anaemia (RR) 13 Iron co-supplementation (I ² =0%; Chi ² =0.01, p=	<u>4287</u>	1.00 (0.95 to 1.06)	37%; 28.52 (p=0.05)
with iron 10	2755	1.00 (0.91 to 1.09)	58%; 21.20 (p=0.01)
without iron 9	1532	1.00 (0.93 to 1.08)	0%; 7.31 (p=0.50)
Age (I ² =8%; Chi ² =2.17, p=0.34)			
6m to 1y 6	1726	1.01 (0.95 to 1.08)	39%; 11.43 (p=0.12)
<i>1y to 5y</i> 6	2161	0.99 (0.88 to 1.12)	50%; 14.07 (p=0.05)
5y to 13y 2	400	0.73 (0.47 to 1.12)	0%; 0.84 (p=0.66)
Dose (I ² =68%; Chi ² =12.56, p=0.01)			
Omg to 5mg 2	616	1.01 (0.94 to 1.09)	31%; 2.91 (p=0.23)
5mg to 10mg 1	208	0.94 (0.47 to 1.87)	Not applicable
10mg to 15mg 8 15mg to 20mg 1	3069 181	1.01 (0.92 to 1.11) 0.76 (0.40 to 1.46)	15%; 13.00 (p=0.29) Not applicable
20mg or more 1	213	0.17 (0.06 to 0.46)	Not applicable
Duration (I^2 =83%; Chi ² =11.42, p=0.003)	215	0.17 (0.00 10 0.40)	
	325	0.18 (0.06 to 0.48)	
Um to 6m 2	323		0%; 0.39 (p=0.53)
0m to 6m 2 6m to 12m 7	1989	1.01 (0.94 to 1.08)	0%; 0.39 (p=0.53) 40%; 13.33 (p=0.10)
6m to 12m 7		1.01 (0.94 to 1.08) 1.00 (0.90 to 1.12)	0%; 0.39 (p=0.53) 40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85)
	1989	1.01 (0.94 to 1.08) 1.00 (0.90 to 1.12)	40%; 13.33 (p=0.10)
6m to 12m 7 12m or more 5	1989		40%; 13.33 (p=0.10)
6m to 12m 7 <u>12m or more 5</u> Formulation (I ² =7%; Chi ² =3.21, p=0.36) Solution 4 Pill/tablet 6	1989 1973 1115 1958	1.00 (0.90 to 1.12)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85)
6m to 12m 7 <u>12m or more 5</u> Formulation (I ² =7%; Chi ² =3.21, p=0.36) Solution 4 Pill/ tablet 6 Capsule 2	1989 1973 1115 1958 886	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38)
6m to 12m 7 <u>12m or more 5</u> Formulation (I ² =7%; Chi ² =3.21, p=0.36) Solution 4 Pill/tablet 6	1989 1973 1115 1958	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85)
$\begin{array}{r} 6m \ to \ 12m \ 7\\ 12m \ or \ more \ 5\\ \hline \\ Formulation \ (I^2=7\%; \ Chi^2=3.21, \ p=0.36)\\ Solution \ 4\\ Pill/ \ tablet \ 6\\ Capsule \ 2\\ Powder \ 1\\ \end{array}$	1989 1973 1115 1958 886 328	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13) 1.19 (0.81 to 1.73)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38) Not applicable
$\begin{array}{c cccc} & 6m \ to \ 12m \ 7 \\ \hline 12m \ or \ more \ 5 \\ \hline Formulation \ (l^2=7\%; \ Chi^2=3.21, \ p=0.36) \\ & Solution \ 4 \\ Pill/ \ tablet \ 6 \\ & Capsule \ 2 \\ \hline Powder \ 1 \\ \hline \end{array}$ Plasma ferritin \ (SMD) 19	1989 1973 1115 1958 886 328 4474	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38) Not applicable
$\begin{array}{rrrr} 6m \ to \ 12m \ 7\\ 12m \ or \ more \ 5\\ \hline Formulation \ (l^2=7\%; \ Chi^2=3.21, \ p=0.36)\\ Solution \ 4\\ Pill/ \ tablet \ 6\\ Capsule \ 2\\ Powder \ 1\\ \hline \hline Plasma \ ferritin \ (SMD) \ 19\\ \hline Iron \ co-supplementation \ (l^2=91\%; \ Chi^2=11.08, \ chi^2=11.$	1989 1973 1115 1958 886 328 4474 p=0.0009)	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13) 1.19 (0.81 to 1.73)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.000
$\begin{array}{c cccc} & 6m \ to \ 12m \ 7 \\ \hline 12m \ or \ more \ 5 \\ \hline Formulation \ (l^2=7\%; \ Chi^2=3.21, \ p=0.36) \\ & Solution \ 4 \\ Pill/ \ tablet \ 6 \\ & Capsule \ 2 \\ \hline Powder \ 1 \\ \hline \end{array}$ Plasma ferritin \ (SMD) 19	1989 1973 1115 1958 886 328 4474	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13) 1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.000 80%; 64.00 (p<0.0000
$\begin{array}{rrrr} 6m \ to \ 12m \ 7\\ 12m \ or \ more \ 5\\ \hline Formulation \ (l^2=7\%; \ Chi^2=3.21, \ p=0.36)\\ Solution \ 4\\ Pill/ \ tablet \ 6\\ Capsule \ 2\\ Powder \ 1\\ \hline \hline \begin{array}{rrrr} Plasma \ ferritin \ (SMD) \ 19\\ Iron \ co-supplementation \ (l^2=91\%; \ Chi^2=11.08, \\ with \ iron \ 14\\ \end{array}$	1989 1973 1115 1958 886 328 4474 p=0.0009) 2765	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13) 1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.000 80%; 64.00 (p<0.0000
$\begin{array}{c ccccc} & 6m \ to \ 12m \ 7 \\ \hline 12m \ or \ more \ 5 \\ \hline \\ Formulation \ (l^2=7\%; \ Chi^2=3.21, \ p=0.36) \\ & Solution \ 4 \\ Pill/ \ tablet \ 6 \\ Capsule \ 2 \\ \hline \\ Powder \ 1 \\ \hline \\ \hline \\ \hline \\ \hline \\ Plasma \ ferritin \ (SMD) \ 19 \\ \hline \\ Iron \ co-supplementation \ (l^2=91\%; \ Chi^2=11.08, \\ & with \ iron \ 14 \\ \hline \\ \hline \\ \hline \\ \hline \end{array}$	1989 1973 1115 1958 886 328 4474 p=0.0009) 2765	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13) 1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.000 80%; 64.00 (p<0.0000
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1989 1973 11115 1958 886 328 4474 p=0.0009) 2765 1709 1166 2716	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13) 1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.08)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.0000 97%; 389.92 (p<0.0000 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.000
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1989 1973 11115 1958 886 328 4474 p=0.0009) 2765 1709 1166	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13) 1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.0000 97%; 389.92 (p<0.0000 20%; 6.26 (p=0.28)
$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	1989 1973 11115 1958 886 328 4474 p=0.0009) 2765 1709 1166 2716 534	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13) 1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.08) -0.05 (-0.24 to 0.15)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.0000 97%; 389.92 (p<0.0000 97%; 62.6 (p=0.28) 98%; 439.66 (p<0.000 47%; 11.30 (p=0.08)
$\begin{array}{r} 6m \ to \ 12m \ 7\\ 12m \ or \ more \ 5\\ \hline \\ Formulation \ (l^2=7\%; \ Chi^2=3.21, \ p=0.36)\\ Solution \ 4\\ Pill/ \ tablet \ 6\\ Capsule \ 2\\ Powder \ 1\\ \hline \end{array}$	1989 1973 11115 1958 886 328 4474 p=0.0009) 2765 1709 1166 2716 534 371	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13) 1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.15) -0.07 (-0.28 to 0.14)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.000 95%; 64.00 (p<0.000 97%; 389.92 (p<0.000 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.000 47%; 11.30 (p=0.08) 29%; 4.21 (p=0.24)
$\begin{array}{r cccccccccccccccccccccccccccccccccccc$	1989 1973 11115 1958 886 328 4474 p=0.0009) 2765 1709 1166 2716 534 371 78	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13) 1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.08) -0.05 (-0.24 to 0.15) -0.07 (-0.28 to 0.14) -0.15 (-0.63 to 0.34)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.000 97%; 389.92 (p<0.000 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.000 47%; 11.30 (p=0.08) 29%; 4.21 (p=0.24) Not applicable
$\begin{array}{r} 6m \ to \ 12m \ 7 \\ 12m \ or \ more \ 5 \\ \hline \\ Formulation \ (l^2=7\%; \ Chi^2=3.2.1, p=0.36) \\ Solution \ 4 \\ Pill/ \ tablet \ 6 \\ Capsule \ 2 \\ Powder \ 1 \\ \hline \\ \hline \\ \hline \\ Powder \ 1 \\ \hline \\ \hline \\ \hline \\ Plasma \ ferritin \ (SMD) \ 19 \\ \hline \\ Iron \ co-supplementation \ (l^2=91\%; \ Chi^2=11.08, \\ with \ iron \ 14 \\ without \ iron \ 11 \\ \hline \\ Age \ (l^2=0\%; \ Chi^2=1.02, p=0.60) \\ 6m \ to \ 1y \ 4 \\ 1y \ to \ 5y \ 9 \\ 5y \ to \ 13y \ 5 \\ \hline \\ Dose \ (l^2=79\%; \ Chi^2=18.71, p=0.009) \\ 0mg \ to \ 5mg \ 3 \\ 5mg \ to \ 10mg \ 1 \\ 10mg \ to \ 15mg \ 11 \\ \hline \end{array}$	1989 1973 11115 1958 886 328 4474 p=0.0009) 2765 1709 1166 2716 534 371 78 3171	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13) 1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.08) -0.05 (-0.28 to 0.14) -0.07 (-0.28 to 0.14) -0.15 (-0.63 to 0.34) -0.20 (-0.28 to -0.13)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.0000 97%; 389.92 (p<0.000 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.000 47%; 11.30 (p=0.08) 29%; 4.21 (p=0.24) Not applicable 97%; 428.29 (p<0.000
$\begin{array}{r} 6m \ to \ 12m \ 7 \\ 12m \ or \ more \ 5 \\ \hline \\ Formulation \ (l^2=7\%; \ Chi^2=3.21, p=0.36) \\ Solution \ 4 \\ Pill/ \ tablet \ 6 \\ Capsule \ 2 \\ Powder \ 1 \\ \hline \end{array}$	1989 1973 11115 1958 886 328 4474 p=0.0009) 2765 1709 1166 2716 534 371 78 3171 314	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13) 1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.05 (-0.24 to 0.08) -0.07 (-0.28 to 0.14) -0.15 (-0.63 to 0.34) -0.20 (-0.28 to 0.13) -0.14 (-0.36 to 0.08)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.000 97%; 389.92 (p<0.000 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.000 47%; 11.30 (p=0.08) 29%; 4.21 (p=0.24) Not applicable 97%; 428.29 (p<0.000 0%; 2.05 (p=0.56)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	1989 1973 11115 1958 886 328 4474 p=0.0009) 2765 1709 1166 2716 534 371 78 3171	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13) 1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.08) -0.05 (-0.28 to 0.14) -0.07 (-0.28 to 0.14) -0.15 (-0.63 to 0.34) -0.20 (-0.28 to -0.13)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.0000 97%; 389.92 (p<0.000 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.000 47%; 11.30 (p=0.08) 29%; 4.21 (p=0.24) Not applicable 97%; 428.29 (p<0.000
$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	1989 1973 11115 1958 886 328 4474 p=0.0009) 2765 1709 1166 2716 534 371 78 3171 314 652	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13) 1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.05 (-0.24 to 0.08) -0.05 (-0.28 to 0.14) -0.05 (-0.28 to 0.13)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.0000 97%; 389.92 (p<0.0000 97%; 389.92 (p<0.0000 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.000 47%; 11.30 (p=0.08) 29%; 4.21 (p=0.24) Not applicable 97%; 428.29 (p<0.000 0%; 2.05 (p=0.56) 79%; 14.57 (p=0.002)
$\begin{array}{r} 6m \ to \ 12m \ 7 \\ 12m \ or \ more \ 5 \\ \hline \\ Formulation \ (l^2=7\%; \ Chi^2=3.21, \ p=0.36) \\ Solution \ 4 \\ Pill/ \ tablet \ 6 \\ Capsule \ 2 \\ Powder \ 1 \\ \hline \end{array}$	1989 1973 11115 1958 886 328 4474 p=0.0009) 2765 1709 1166 2716 534 371 78 3171 314 652 902	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13) 1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.08) -0.05 (-0.28 to 0.14) -0.15 (-0.63 to 0.34) -0.20 (-0.28 to 0.13) -0.14 (-0.36 to 0.08) 0.17 (0.02 to 0.33) 0.06 (-0.07 to 0.20)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.0000 97%; 389.92 (p<0.0000 97%; 389.92 (p<0.0000 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.0000 47%; 11.30 (p=0.08) 29%; 4.21 (p=0.24) Not applicable 97%; 428.29 (p<0.000 0%; 2.05 (p=0.56) 79%; 14.57 (p=0.002) 79%; 32.68 (p<0.0001
$\begin{array}{r} 6m \ to \ 12m \ 7 \\ 12m \ or \ more \ 5 \\ \hline \\ Formulation \ (l^2=7\%; \ Chi^2=3.21, \ p=0.36) \\ Solution \ 4 \\ Pill/ \ tablet \ 6 \\ Capsule \ 2 \\ Powder \ 1 \\ \hline \end{array}$	1989 1973 11115 1958 886 328 4474 p=0.0009) 2765 1709 1166 2716 534 371 78 3171 314 652 902 1735	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13) 1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.15 (-0.24 to 0.08) -0.05 (-0.28 to 0.14) -0.15 (-0.63 to 0.34) -0.20 (-0.28 to -0.13) -0.14 (-0.36 to 0.08) 0.17 (0.02 to 0.33) 0.06 (-0.07 to 0.20) -0.07 (-0.17 to 0.03)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.000 97%; 389.92 (p<0.000 97%; 389.92 (p<0.000 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.000 47%; 11.30 (p=0.08) 29%; 4.21 (p=0.24) Not applicable 97%; 428.29 (p<0.000 0%; 2.05 (p=0.56) 79%; 14.57 (p=0.002) 79%; 32.68 (p<0.0001 28%; 12.55 (p=0.18)
$\begin{array}{r} 6m \ to \ 12m \ 7 \\ 12m \ or \ more \ 5 \\ \hline \\ Formulation \ (l^2=7\%; \ Chi^2=3.21, \ p=0.36) \\ Solution \ 4 \\ Pill/ \ tablet \ 6 \\ Capsule \ 2 \\ Powder \ 1 \\ \hline \end{array}$	1989 1973 11115 1958 886 328 4474 p=0.0009) 2765 1709 1166 2716 534 371 78 3171 314 652 902 1735 1779	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13) 1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.08) -0.05 (-0.28 to 0.14) -0.15 (-0.63 to 0.34) -0.20 (-0.28 to 0.13) -0.14 (-0.36 to 0.08) 0.17 (0.02 to 0.33) 0.06 (-0.07 to 0.20)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.000 97%; 389.92 (p<0.000 97%; 389.92 (p<0.000 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.000 47%; 11.30 (p=0.08) 29%; 4.21 (p=0.24) Not applicable 97%; 428.29 (p<0.000 0%; 2.05 (p=0.56) 79%; 14.57 (p=0.002) 79%; 32.68 (p<0.0001 28%; 12.55 (p=0.18)
$\begin{array}{r} 6m \ to \ 12m \ 7 \\ 12m \ or \ more \ 5 \\ \hline \\ Formulation \ (l^2=7\%; \ Chi^2=3.21, p=0.36) \\ Solution \ 4 \\ Pill/ \ tablet \ 6 \\ Capsule \ 2 \\ Powder \ 1 \\ \hline \\ \begin{array}{r} \label{eq:powder 1} \\ \hline \\ \hline \\ \label{eq:powder 1} \\ \hline \\ \begin{array}{r} \label{eq:powder 1} \\ \hline \\ \label{eq:powder 1} \\ \hline \label{eq:powder 1} \\ \hline \\ \label{eq:powder 1} \\ \hline eq:powde$	1989 1973 11115 1958 886 328 4474 p=0.0009) 2765 1709 1166 2716 534 371 78 3171 314 652 902 1735 1779	1.00 (0.90 to 1.12) 0.90 (0.78 to 1.04) 1.02 (0.95 to 1.10) 1.00 (0.88 to 1.13) 1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.15 (-0.24 to 0.08) -0.05 (-0.28 to 0.14) -0.15 (-0.63 to 0.34) -0.20 (-0.28 to -0.13) -0.14 (-0.36 to 0.08) 0.17 (0.02 to 0.33) 0.06 (-0.07 to 0.20) -0.07 (-0.17 to 0.03)	40%; 13.33 (p=0.10) 0%; 3.38 (p=0.85) 73%; 18.87 (p=0.002) 0%; 3.36 (p=0.85) 3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.0000 97%; 389.92 (p<0.0000 97%; 389.92 (p<0.0000 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.0000 47%; 11.30 (p=0.08) 29%; 4.21 (p=0.24) Not applicable 97%; 428.29 (p<0.000 0%; 2.05 (p=0.56) 79%; 14.57 (p=0.002) 79%; 32.68 (p<0.0001

For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml

$ \begin{array}{l} \mbox{Trans} respin (l^2=0\%; Chi^2=0.51, p=0.48) \\ with iron 9 2301 1.02 (0.89 to 1.17) 47\%; 15.03 (p=0.06) \\ without iron 6 947 0.94 (0.79 to 1.11) 0\%; 0.90 (p=0.97) \\ \mbox{Age} (l^2=44\%; Chi^2=3.56, p=0.17) \\ \mbox{form} 0 Jy 3 905 0.92 (0.82 to 1.05) 25\%; 5.34 (p=0.25) \\ Jy to 5y 4 1992 1.16 (0.94 to 1.44) 13\%; 5.75 (p=0.33) \\ \mbox{Sy to} 13y 2 351 1.12 (0.61 to 2.04) 0\%; 1.80 (p=0.62) \\ \mbox{Dose} (l^2=49\%; Chi^2=5.86, p=0.12) \\ \mbox{Dose} (l^2=52\%; Chi^2-4.12, p=0.13) \\ \mbox{Dom to} 0m 2 276 2.16 (0.72 to 6.44) 0\%; 0.15 (p=0.93) \\ \mbox{Dorm} 0m to 0m 2 276 2.16 (0.72 to 6.44) 0\%; 0.15 (p=0.93) \\ \mbox{Dorm} 0m to 0m 2 276 2.16 (0.72 to 6.44) 0\%; 0.15 (p=0.93) \\ \mbox{Dorm} 0m to 0m 2 276 2.16 (0.72 to 6.44) 0\%; 0.15 (p=0.93) \\ \mbox{Dorm} 0m to 0m 2 276 2.16 (0.72 to 6.44) 0\%; 0.15 (p=0.93) \\ \mbox{Dorm} 0m to 12m 3 981 0.88 (0.73 to 1.05) 22\%; 5.13 (p=0.27) \\ \mbox{Dorm} 12m or more 4 1991 1.04 (0.91 to 1.18) 15\%; 7.04 (p=0.32) \\ \mbox{Formulation} (l^2=0\%; Chi^2=1.57, p=0.39) \\ \mbox{Solution 4 1163 0.90 (0.75 to 1.08) 18\%; 7.31 (p=0.29) \\ \mbox{Pill} Mober 3 1199 1.05 (0.91 to 1.20) 51\%; 6.16 (17 (p=0.10) \\ \mbox{Capsule 2 886 0.88 (0.56 to 1.37) 0\%; 1.09 (p=0.78) \\ \mbox{Pasule 2 886 0.88 (0.56 to 1.37) 0\%; 1.90 (p=0.78) \\ \mbox{Pinulation} (l^2=64.1\%; Chi^2=2.71, p=0.09) \\ without iron 9 2421 - 0.25 (0.05) 0\%; 2.45 (p=0.49) \\ without iron 9 2421 - 0.25 (0.05) 0\%; 2.45 (p=0.49) \\ without iron 9 2421 - 0.25 (0.33 to -0.17) 75\%; 33.23 (p=0.78) \\ \mbox{Dose} (l^2=90\%; Chi^2=2.92, p.000001) \\ \mbox{Dom to} 5mg 3 410 - 0.08 (0.27 to 0.12) 25\%; 4.00 (p=0.26) \\ \mbox{Dom to} 5mg 3 410 - 0.08 (0.27 to 0.12) 25\%; 4.00 (p=0.26) \\ \mbox{Dom to} 5mg 3 410 - 0.08 (0.27 to 0.12) 25\%; 4.00 (p=0.26) \\ \mbox{Dom to} 5mg 3 410 - 0.08 (0.27 to 0.12) 25\%; 3.08 (p=0.05) \\ \mbox{Dom to} 7 1310 - 0.01 (-0.12 to 0.01) 0\%; 5.40 (p=0.61) \\ \$	Powder 1 317 -0.18 (-0.40 to 0.04) Not applicable Prevalence of iron deficiency (RR) 10 3149 0.99 (0.89 to 1.10) 15%; 16.44 (p=0.29) Iron co-supplementation (l ² =0%; Chi ² =0.51, p=0.48) with iron 9 3201 1.02 (0.89 to 1.17) 47%; 15.03 (p=0.06) without iron 6 947 0.94 (0.79 to 1.11) 0%; 0.90 (p=0.97) Age (l ² =44%; Chi ² =5.56, p=0.17) 6m to 1y 3 905 0.92 (0.82 to 1.05) 25%; 5.34 (p=0.25) Jose (l ² =44%; Chi ² =5.86, p=0.12) 6m to 144 13%; 5.75 (p=0.33) 5y to 13y 2 351 1.12 (0.61 to 2.04) 0%; 1.80 (p=0.62) Dose (l ² =49%; Chi ² =5.86, p=0.12) 0mg to 5mg 1 144 0.78 (0.61 to 1.00) Not applicable Jong to 15mg 6 2634 1.03 (0.91 to 1.16) 14%; 10.42 (p=0.23) Daration (l ² =52%; Chi ² =5.18, p=0.37) 6m to 52 216 (0.72 to 6.44) 0%; 0.15 (p=0.93) Duration (l ² =52%; Chi ² =1.87, p=0.39) 50 labution 4 1163 0.90 (0.75 to 1.08) 18%; 7.31 (p=0.29) Fill/ tablet 3 1199 1.05 (0.91 to 1.20) 51%; 6.17 (p=0.002) 110 to 200 (0.75 to 1.08	Powder 1 317 -0.18 (-0.40 to 0.04) Not applicable Prevalence of iron deficiency (RR) 10 3149 0.99 (0.89 to 1.10) 15%; 16.44 (p=0.29) ron co-supplementation (1=0%; Chi ² =0.51, p=0.48) with iron 9 2301 1.02 (0.89 to 1.17) 47%; 15.03 (p=0.06) without iron 6 947 0.94 (0.79 to 1.11) 0%; 0.90 (p=0.97) lge (l ² =44%; Chi ² =3.56, p=0.12) 6m to ly 3 905 0.92 (0.82 to 1.05) 25%; 5.34 (p=0.25) ly to 5y 4 1992 1.16 (0.94 to 1.44) 13%; 5.75 (p=0.33) 5y to 13y 2 351 1.12 (0.61 to 2.04) 0%; 1.80 (p=0.62) Dose (l ² =49%; Chi ² =5.86, p=0.12) 0mg to 5mg 1 144 0.78 (0.61 to 1.00) Not applicable 10mg to 15mg 6 2634 1.03 (0.91 to 1.16) 14%; 10.42 (p=0.32) 15m to 20mg m more 2 276 2.16 (0.72 to 6.44) 0%; 0.15 (p=0.93) 6m to 12m 3 981 0.88 (0.73 to 1.05) 22%; 5.13 (p=0.27) Duration (l ² =52%; Chi ² =4.12, p=0.13) 0m to 6m 2 276 2.16 (0.72 to 6.44) 0%; 0.15 (p=0.42) Carsute 2 886		3			
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Powaer	1			
$ \begin{array}{llllllllllllllllllllllllllllllllllll$	$ \begin{array}{llllllllllllllllllllllllllllllllllll$	$ \begin{array}{c} \mbox{ron } co-supplementation (1^2=0\%; Chi^2=0.51, p=0.48) \\ \hline without iron & 9 & 2301 & 102 (0.89 to 1.17) & 47\%; 15.03 (p=0.06) \\ \hline without iron & 6 & 947 & 0.94 (0.79 to 1.11) & 0\%; 0.90 (p=0.97) \\ \hline Mge (1^2=44\%; Chi^2=3.56, p=0.17) & 0\%; 10.29 (0.82 to 1.05) & 25\%; 5.34 (p=0.25) \\ \hline Jy to 5y & 4 & 1992 & 1.16 (0.94 to 1.44) & 13\%; 5.75 (p=0.33) \\ \hline Sy to J3y & 2 & 351 & 1.12 (0.61 to 2.04) & 0\%; 138 (p=0.62) \\ \hline Doge (1^2=59\%; Chi^2=5.86, p=0.12) & 0\%; 138 (p=0.62) \\ \hline Doge (1^2=50\%; Chi^2=4.12, p=0.13) & 0.78 (0.61 to 1.00) & Not applicable \\ \hline Domg to J5mg & 6 & 2634 & 1.03 (0.91 to 1.16) & 14\%; 10.42 (p=0.32) \\ \hline J5mg to 20mg & 1 & 194 & 1.07 (0.52 to 2.18) & Not applicable \\ \hline 20mg or more & 2 & 276 & 2.16 (0.72 to 6.44) & 0\%; 0.15 (p=0.93) \\ \hline Duration (1^2=5\%; Chi^2=4.12, p=0.13) & 0\% (to 1.05) & 22\%; 5.13 (p=0.27) \\ \hline Dot to fom & 2 & 276 & 2.16 (0.72 to 6.44) & 0\%; 0.15 (p=0.93) \\ \hline fom to J2m & 3 & 981 & 0.38 (0.73 to 1.05) & 22\%; 5.13 (p=0.27) \\ \hline Duration (1^2=0\%; Chi^2=1.87, p=0.39) & 500 (0.75 to 1.08) & 18\%; 7.04 (p=0.32) \\ \hline Formulation (1^2=0\%; Chi^2=1.71, p=0.09) & Solution 4 & 1163 & 0.90 (0.75 to 1.08) & 18\%; 7.31 (p=0.29) \\ \hline Pill Utablet & 3 & 1199 & 1.05 (0.91 to 1.20) & 51\%; (1.71 (p=0.10) \\ \hline Capsule & 2 & 886 & 0.38 (0.56 to 1.37) & 0\%; 1.09 (p=0.78) \\ \hline Pasma copper (SMD) & 1 & 3071 & -0.22 (-0.29 to 0.14) & 68\%; 37.47 (p=0.0002) \\ \hline ron co-supplementation (1^2=64.1\%; Chi^2=2.71, p=0.09) & withint iron & 9 & 2421 & -0.25 (0.33 to -0.17) & 75\%; 32.34 (p<0.00001) \\ \hline without iron & 9 & 2421 & -0.25 (0.33 to -0.17) & 75\%; 32.34 (p<0.00001) \\ \hline Dave (1^2=90\%; Chi^2=29.23, p<0.000) & 0.03 (0.49 to -0.13) & 75\%; 3.98 (p=0.05) \\ \hline Domg to J5mg & 1100 & -0.08 (-0.27 to 0.12) & 25\%; 4.00 (p=-2.6) \\ \hline Davation (1^2=94\%; Chi^2=20.23, p<0.000) & 0.06 (0.27 to 0.12) & 25\%; 4.00 (p=-2.6) \\ \hline Davation (1^2=94\%; Chi^2=20.23, p<0.000) & 0.03 (-0.49 to -0.13) & 0\%; 0.17 (p=0.68) \\ \hline Davation (1^2=94\%; Chi^2=3.510 & 0.03 (0.04 to 1.03) & 0\%; 0.17 (p=0.68) \\ \hline Davation (1^2=94\%; Chi^2=3.510 $					**
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				0.99 (0.89 to 1.10)	15%; 16.44 (p=0.29)
$\begin{array}{c} Age (I^2=44\%; Chi^2=3.56, p=0.17) & 0.92 (0.82 to 1.05) & 25\%; 5.34 (p=0.25) \\ A y to 5y 4 & 1992 & 1.16 (0.94 to 1.44) & 13\%; 5.75 (p=0.33) \\ \hline Sy to 3y 2 & 351 & 1.12 (0.61 to 2.04) & 0\%; 1.30 (p=0.62) \\ \hline Dose (I^2=49\%; Chi^2=5.86, p=0.12) & 0.078 (0.61 to 1.00) & Not applicable \\ \hline Domg to 5mg 1 & 144 & 0.78 (0.61 to 1.00) & Not applicable \\ \hline Domg to 20mg 1 & 194 & 1.07 (0.52 to 2.18) & Not applicable \\ \hline Dom to 6m 2 & 2.76 & 2.16 (0.72 to 6.44) & 0\%; 0.15 (p=0.93) \\ \hline Duration (I^2=52\%; Chi^2=1.87, p=0.13) & 0.08 (0.73 to 1.05) & 22\%; 5.13 (p=0.27) \\ \hline 12m or more 4 & 1991 & 1.04 (0.91 to 1.16) & 1.18) & 15\%; 7.04 (p=0.32) \\ \hline Formulation (I^2=0\%; Chi^2=1.87, p=0.39) & S6hution 4 & 1163 & 0.90 (0.75 to 1.08) & 18\%; 7.31 (p=0.29) \\ \hline Pill/tablet 3 & 1199 & 1.05 (0.91 to 1.20) & 51\%; 6.17 (p=0.002) \\ \hline Iron co-supplementation (I^2=64.1\%; Chi^2=2.71, p=0.09) & 0.088 (0.56 to 1.37) & 0\%; 1.09 (p=0.78) \\ \hline Pasma copper (SMD) & 1 & 3071 & -0.22 (-0.29 to 0.14) & 68\%; 7.74 (p=0.0002) \\ Iron co-supplementation (I^2=64.1\%; Chi^2=2.71, p=0.09) & 0.01 (-0.25 to 0.05) & 0\%; 2.45 (p=0.49) & 0.11 (0.24 to 0.02) & 0\%; 3.274 (p=0.87) & 5y to 13y 8 & 2206 & -0.26 (-0.33 to -0.17) & 75\%; 32.34 (p=0.49) & 0.01 (-0.25 to 0.10) & 0\%; 5.40 (p=0.78) \\ \hline Dose (I^2=90\%; Chi^2=29.23, p<0.00001) & 0 & 0.06 (-0.27 to 0.12) & 25\%; 4.00 (p=0.26) & 5mg to 10mg 2 & 519 & -0.31 (-0.49 to -0.13) & 75\%; 32.34 (p=0.06) & 0 & 10 to 12 & 310 & -0.01 (-0.25 to 0.03) & 0\%; 5.40 (p=0.61) & 0mg to 35mg 7 & 1310 & -0.01 (-0.25 to 0.03) & 0\%; 5.40 (p=0.61) & 0mg to 35mg 7 & 1310 & -0.01 (-0.25 to -0.33) & 0\%; 5.40 (p=0.61) & 0mg to 35mg 7 & 1310 & -0.01 (-0.12 to 0.10) & 0\%; 5.30 (p=0.05) & 0mg to 35mg 7 & 1310 & -0.01 (-0.12 to 0.10) & 0\%; 5.30 (p=0.05) & 0mg to 35mg 7 & 1310 & -0.01 (-0.12 to 0.02) & 0\%; 5.30 (p=0.05) & 0mg 7 & 51168 & -0.08 (-0.27 to 0.12) & 25\%; 4.00 (p=0.26) & 0m to 5m 2 & 1168 & -0.08 (-0.21 to 0.24) & 7\%; 3.23 (p=0.36) & 0.17 (p=0.68) & 0.000(1) & 0.000 & 0\%; 5.3.23 (p=0.36) & 0.05 & 0.03 & 0.05 & 0\%; 5.3.23 (p=0.36) $	$\begin{array}{c} Age (l^2=44\%; Chi^2=3.56, p=0.17) & 0 & 0.92 (0.82 to 1.05) & 25\%; 5.34 (p=0.25) \\ A \ by to 5y 4 & 1992 & 1.16 (0.94 to 1.44) & 13\%; 5.75 (p=0.33) \\ \hline Sy to 13y 2 & 351 & 1.12 (0.61 to 2.04) & 0\%; 1.30 (p=0.62) \\ \hline Dose (l^2=49\%; Chi^2=5.86, p=0.12) & 0 \\ \hline Mm \ to 5mg 1 & 144 & 0.78 (0.61 to 1.00) & Not applicable \\ \hline Mm \ to 20mg 1 & 194 & 1.07 (0.52 to 2.18) & Not applicable \\ \hline Duration (l^2=52\%; Chi^2=1.2, p=0.13) & 0 \\ \hline Mm \ to 6m 2 & 276 & 2.16 (0.72 to 6.44) & 0\%; 0.15 (p=0.93) \\ \hline Duration (l^2=52\%; Chi^2=1.87, p=0.39) & 0.88 (0.73 to 1.05) & 22\%; 5.13 (p=0.27) \\ \hline L2m \ or more 4 & 1991 & 1.04 (0.91 to 1.16) & 1.5\%; 7.04 (p=0.32) \\ \hline Formulation (l^2=0\%; Chi^2=1.87, p=0.39) & 0.88 (0.75 to 1.08) & 18\%; 7.31 (p=0.29) \\ \hline Plasma copper (SMD) & 1 & 0.72 to 6.14 & 0.95 (0.15 (p=0.78) \\ \hline Plasma copper (SMD) & 1 & 0.72 to 6.14 & 0.95 (0.15 (p=0.78) \\ \hline Plasma copper (SMD) & 1 & 0.22 (-0.29 to 0.14) & 68\%; 7.74 (p=0.0002) \\ \hline Iron co-supplementation (l^2=64.1\%; Chi^2=2.71, p=0.09) \\ \hline with tron 4 & 650 & -0.10 (-0.25 to 0.05) & 0\%; 2.245 (p=0.49) \\ \hline with tron 4 & 650 & -0.25 (-0.33 to -0.17) & 75\%; 32.34 (p=0.49) \\ \hline with tron 4 & 0.50 & -0.25 (-0.35 to -0.17) & 75\%; 32.34 (p=0.0001) \\ \hline Dose (l^2=90\%; Chi^2=2.923, p<0.00001) & 0 \\ \hline Om to fm 2 & 519 & -0.31 (-0.42 to 0.02) & 0\%; 1.27 (p=0.87) \\ \hline Duration (l^2=94\%; Chi^2=3.48, p=0.000) \\ \hline Duration (l^2=94\%; Chi^2=3.05, p<0.00001) \\ \hline Duration (l^2=94\%; Chi^2=3.07, p = 0.0001) \\ \hline Duration (l^2=95\%; Chi^2=3.08, p = 0.33 + 410 & -0.08 (-0.27 to 0.12) & 25\%; 4.00 (p=0.26) \\ \hline Duration (l^2=95\%; Chi^2=3.06, p=0.0001) \\ \hline Duration (l^2=95\%; Chi^2=3.03, p = 0.0001) \\ \hline Duration (l^2=95\%; Chi^2=3.04, p=0.00001) \\ \hline Duration (l^2=95\%; Chi^2=3.07, p=0.00001) \\ \hline Duration (l^2=95\%; Chi^2=3.07, p=0.00001) \\ \hline Duration (l^2=95\%; Chi^2=3.07, p=0.00001) \\ \hline Duration (l^2=95\%; Ch$	$ \begin{array}{c} & \text{lge} (l^2=44\%; \text{Chi}^2=3.56, \text{p=0.17}) & \text{for } b \ y \ 3 & 905 \\ & \text{fy } b \ 5y \ 4 & 1992 \\ & 1.16 \ (0.94 \text{ to } 1.44) \\ & 13\%; 5.75 \ (\text{p=0.25}) \\ & \text{Jy } b \ 5y \ 4 & 1992 \\ & 1.12 \ (0.61 \text{ to } 2.04) \\ & \text{Owg} \ (1.3\%; 5.75 \ (\text{p=0.33}) \\ & \text{Owg} \ 1 \ 144 \\ & 0.78 \ (0.61 \text{ to } 1.00) \\ & \text{IOmg} \ to \ 5mg \ 1 & 144 \\ & 0.78 \ (0.61 \text{ to } 1.00) \\ & \text{IOmg} \ to \ 5mg \ 1 & 144 \\ & 0.78 \ (0.61 \text{ to } 1.00) \\ & \text{IOmg} \ to \ 5mg \ 1 & 194 \\ & 1.07 \ (0.52 \text{ to } 2.18) \\ & \text{Not applicable} \\ & \text{Owg} \ omeg \ 2 & 276 \\ & 2.16 \ (0.72 \text{ to } 6.44) \\ & \text{Owg} \ (0.15 \ (\text{p=0.93}) \\ & \text{Om to } \text{fom } 2 \ 2.76 \\ & 2.16 \ (0.72 \text{ to } 6.44) \\ & \text{Owg} \ (0.15 \ (\text{p=0.93}) \\ & \text{Om to } \text{fom } 2 \ 2.76 \\ & 2.16 \ (0.72 \text{ to } 6.44) \\ & \text{Owg} \ (0.15 \ (\text{p=0.93}) \\ & \text{Om to } \text{fom } 2 \ 2.76 \\ & 2.16 \ (0.72 \text{ to } 6.44) \\ & \text{Owg} \ (0.51 \ \text{to } 1.05) \\ & 22\%; 5.13 \ (\text{p=0.27}) \\ & \text{Iam or more} \ 4 \ 1991 \\ & 1.04 \ (0.91 \text{ to } 1.18) \\ & 15\%; 7.04 \ (\text{p=0.32}) \\ & \text{Solution} \ 4 \ 1163 \\ & 0.90 \ (0.75 \text{ to } 1.08) \\ & 18\%; 7.31 \ (\text{p=0.29}) \\ & \text{Pill/ tablet} \ 3 \ 1199 \\ & 1.05 \ (0.91 \text{ to } 1.20) \\ & \text{Solution} \ 4 \ 1650 \\ & -0.10 \ (-225 \ \text{to } 0.14) \\ & 68\%; 37.47 \ (\text{p=0.0002}) \\ & \text{vinh iron} \ 4 \ 650 \\ & -0.10 \ (-225 \ \text{to } 0.13) \\ & 0\%; 1.27 \ (\text{p=0.87}) \\ & \text{without iron} \ 9 \ 2421 \\ & -0.25 \ (-0.33 \ \text{to } 0.17) \\ & 75\%; 32.34 \ (\text{p=0.00001}) \\ & \text{Omg} \ to \ 5mg \ 7 \ 1310 \\ & -0.08 \ (-0.27 \ \text{to } 1.03) \\ & \text{Solution} \ 1 \ 3071 \\ & -0.08 \ (-0.25 \ \text{to } 0.13) \\ & 75\%; 3.24 \ (\text{p=0.00001}) \\ & \text{Omg} \ to \ 5mg \ 7 \ 1310 \\ & -0.01 \ (-0.25 \ \text{to } 0.17) \\ & 75\%; 32.34 \ (\text{p=0.00001}) \\ & \text{Omg} \ to \ 5mg \ 7 \ 1310 \\ & -0.01 \ (-0.25 \ \text{to } 0.33) \\ & \text{Ot} \ 5mg \ 75\%; 32.34 \ (\text{p=0.00001}) \\ & \text{Omg} \ to \ 5mg \ 7 \ 1310 \\ & -0.08 \ (-0.27 \ \text{to } 0.13) \\ & 75\%; 3.23 \ (\text{p=0.66}) \\ & \text{Outo} \$,	1.02 (0.89 to 1.17)	
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c} & & & & & & & & & & & & & & & & & & &$		6	947	0.94 (0.79 to 1.11)	0%; 0.90 (p=0.97)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		2	005	0.02 (0.02 - 1.05)	259 524 (0.25)
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$ \begin{array}{c cccc} Dose (l^2=49\%; Chi^2=5.86, p=0.12) & & & & & & & & & & & & & & & & & & &$	$ \begin{array}{c cccc} Dose (l^2=49\%; Chi^2=5.86, p=0.12) & & & & & & & & & & & & & & & & & & &$	$ \begin{array}{c} \hline Dose (l^2=49\%; Chi^2=5.86, p=0.12) \\ \hline Dose (l^2=49\%; Chi^2=5.86, p=0.12) \\ \hline Dose (l^2=49\%; Chi^2=1.87, p=0.13) \\ \hline Doration (l^2=52\%; Chi^2=1.87, p=0.39) \\ \hline Doration (l^2=52\%; Chi^2=1.87, p=0.39) \\ \hline Doration (l^2=0\%; Chi^2=1.71, p=0.90) \\ \hline Doration (l^2=0\%; Chi^2=2.71, p=0.09) \\ \hline Doration (l^2=0\%; Chi^2=2.71, p=0.09) \\ \hline Doration (l^2=11, log 10) \\ \hline Doration (l^2=0\%; Chi^2=2.71, p=0.09) \\ \hline Doration (l^2=0\%; Chi^2=2.71, p=0.09) \\ \hline Doration (l^2=0\%; Chi^2=2.72, p=0.00) \\ \hline Doration (l^2=0\%; Chi^2=2.72, p=0.00) \\ \hline Doration (l^2=0\%; Chi^2=2.72, p=0.00) \\ \hline Doration (l^2=0\%; Chi^2=2.73, p=0.00) \\ \hline Doration (l^2=0\%; Chi^2=2.75, p=0.0001) \\ \hline Doration (l^2=0\%; Chi^2=2.75, p=0.00001) \\ \hline Doration$					
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $			001		0,0,100 (5 0102)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Omg to 5mg	1	144	0.78 (0.61 to 1.00)	Not applicable
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $					
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c} 0m \ to \ 6m \ 2 & 276 & 2.16 \ (0.72 \ to \ 6.44) & 0\%; \ 0.15 \ (p=0.93) \\ 0m \ to \ 12m \ 3 & 981 & 0.88 \ (0.73 \ to \ 1.05) & 22\%; \ 5.13 \ (p=0.27) \\ 12m \ or \ more \ 4 & 1991 & 1.04 \ (0.91 \ to \ 1.18) & 15\%; \ 7.04 \ (p=0.32) \\ \hline \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \$			276	2.16 (0.72 to 6.44)	0%; 0.15 (p=0.93)
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			276	216(0.72 to 6.44)	0%: 0.15 (p=0.93)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\frac{12m \text{ or more } 4}{5^{\circ} \text{crmulation } (l^2=0\%; \text{Chi}^2=1.87, p=0.39)}{5^{\circ} \text{solution } 4} \\ \frac{1163}{1199} \\ \frac{100}{100} \\ \frac{111}{100} \\ \frac{111}{100} \\ \frac{100}{100} \\ \frac{111}{100} \\ \frac{100}{100} \\ \frac{111}{100} \\ \frac{100}{100} \\ \frac{110}{100} \\ \frac{110}{100} \\ \frac{110}{100} \\ \frac{100}{100} \\ \frac{110}{100} \\ \frac{110}{100} \\ \frac{100}{100} \\ \frac{110}{100} \\ \frac{100}{100} \\ \frac{110}{100} \\ \frac{100}{100} \\ \frac{100}{10} \\ \frac{100}{10} \\ \frac{100}{10} \\ \frac{100}{10} \\ $					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	<i>formulation</i> (I ² =0%; Chi ² =1.87, p=0)	.39)			
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $					
Plasma copper (SMD) 11 3071 -0.22 (-0.29 to 0.14) 68%; 37.47 (p=0.002) Iron co-supplementation ($l^2=64.1\%$; Chi ² =2.71, p=0.09) with iron 4 650 -0.10 (-0.25 to 0.05) 0%; 2.45 (p=0.49) without iron 9 2421 -0.25 (-0.33 to -0.17) 75%; 32.34 (p<0.00001)	Plasma copper (SMD) 11 3071 -0.22 (-0.29 to 0.14) 68%; 37.47 (p=0.002) Iron co-supplementation ($l^2=64.1\%$; Chi ² =2.71, p=0.09) with iron 4 650 -0.10 (-0.25 to 0.05) 0%; 2.45 (p=0.49) without iron 9 2421 -0.25 (-0.33 to -0.17) 75%; 32.34 (p<0.00001)	Plasma copper (SMD) 11 3071 -0.22 (-0.29 to 0.14) 68%; 37.47 (p=0.0002) iron co-supplementation (l ² =64.1%; Chi ² =2.71, p=0.09) with iron 4 650 -0.10 (-0.25 to 0.05) 0%; 2.45 (p=0.49) without iron 9 2421 -0.25 (-0.33 to -0.17) 75%; 32.34 (p<0.00001)					
$\begin{array}{c} ron \ co-supplementation \ (l^2=64.1\%; \ Chi^2=2.71, p=0.09) \\ with \ iron \ 4 \\ of 50 \\ without \ iron \ 9 \\ 2421 \\ -0.25 \ (-0.33 \ to -0.17) \\ 0\%; \ 2.45 \ (p=0.49) \\ 75\%; \ 32.34 \ (p<0.00001) \\ 0\%; \ 1.27 \ (p=0.87) \\ 79\%; \ 32.74 \ (p<0.00001) \\ 0mg \ to \ 5mg \ 3 \\ 100 \\ 0mg \ to \ 5mg \ 3 \\ 100 \\ 0mg \ to \ 5mg \ 3 \\ 100 \\ 0mg \ to \ 5mg \ 3 \\ 100 \\ 0.08 \ (-0.27 \ to \ 0.12) \\ 25\%; \ 4.00 \ (p=0.26) \\ 5mg \ to \ 15mg \ 7 \\ 1310 \\ -0.01 \ (-0.12 \ to \ 0.13) \\ 75\%; \ 3.98 \ (p=0.05) \\ 10mg \ to \ 15mg \ 7 \\ 1310 \\ -0.01 \ (-0.12 \ to \ 0.13) \\ 75\%; \ 3.98 \ (p=0.05) \\ 10mg \ to \ 15mg \ 7 \\ 1310 \\ -0.04 \ (-0.55 \ to \ -0.33) \\ Not \ applicable \\ \hline Duration \ (l^2=94\%; \ Chi^2=30.84, p<0.00001) \\ 0mt \ to \ mome \ 2 \\ 1355 \\ 1168 \\ -0.08 \ (-0.20 \ to \ 0.04) \\ 0\%; \ 3.23 \ (p=0.78) \\ 12m \ orm \ com \ a \\ 548 \\ 0.06 \ (-0.11 \ to \ 0.24) \\ 7\%; \ 3.23 \ (p=0.36) \\ \hline Formulation \ (l^2=95\%; \ Chi^2=20.76, p<0.00001) \\ Solution \ 9 \\ 2490 \\ -0.83 \ (-1.01 \ to \ -0.65) \\ 99\%; \ 277.02 \ (p<0.00001) \\ Pill/ \ tablet \ 3 \\ 439 \\ -0.83 \ (-1.01 \ to \ -0.65) \\ 99\%; \ 277.02 \ (p<0.00001) \\ \hline \ 20mg \ 2000001 \\ Pill/ \ tablet \ 3 \\ 20mb \ 20mb $	$\begin{array}{c} ron \ co-supplementation \ (l^2=64.1\%; \ Chi^2=2.71, p=0.09) \\ with \ iron \ 4 \\ of 50 \\ without \ iron \ 9 \\ 2421 \\ -0.25 \ (-0.33 \ to -0.17) \\ 0\%; \ 2.45 \ (p=0.49) \\ 75\%; \ 32.34 \ (p<0.00001) \\ 0\%; \ 1.27 \ (p=0.87) \\ 79\%; \ 32.74 \ (p<0.00001) \\ 0mg \ to \ 5mg \ 3 \\ 100 \\ 0mg \ to \ 5mg \ 3 \\ 100 \\ 0mg \ to \ 5mg \ 3 \\ 100 \\ 0mg \ to \ 5mg \ 3 \\ 100 \\ 0.08 \ (-0.27 \ to \ 0.12) \\ 25\%; \ 4.00 \ (p=0.26) \\ 5mg \ to \ 15mg \ 7 \\ 1310 \\ -0.01 \ (-0.12 \ to \ 0.13) \\ 75\%; \ 3.98 \ (p=0.05) \\ 10mg \ to \ 15mg \ 7 \\ 1310 \\ -0.01 \ (-0.12 \ to \ 0.13) \\ 75\%; \ 3.98 \ (p=0.05) \\ 10mg \ to \ 15mg \ 7 \\ 1310 \\ -0.04 \ (-0.55 \ to \ -0.33) \\ Not \ applicable \\ \hline Duration \ (l^2=94\%; \ Chi^2=30.84, p<0.00001) \\ 0mt \ to \ mome \ 2 \\ 1355 \\ 1168 \\ -0.08 \ (-0.20 \ to \ 0.04) \\ 0\%; \ 3.23 \ (p=0.78) \\ 12m \ orm \ com \ a \\ 548 \\ 0.06 \ (-0.11 \ to \ 0.24) \\ 7\%; \ 3.23 \ (p=0.36) \\ \hline Formulation \ (l^2=95\%; \ Chi^2=20.76, p<0.00001) \\ Solution \ 9 \\ 2490 \\ -0.83 \ (-1.01 \ to \ -0.65) \\ 99\%; \ 277.02 \ (p<0.00001) \\ Pill/ \ tablet \ 3 \\ 439 \\ -0.83 \ (-1.01 \ to \ -0.65) \\ 99\%; \ 277.02 \ (p<0.00001) \\ \hline \ 20mg \ 2000001 \\ Pill/ \ tablet \ 3 \\ 20mb \ 20mb $	$\begin{array}{c} ron \ co-supplementation \ (l^2=64.1\%; \ Chi^2=2.71, p=0.09) \\ with \ iron \ 4 \\ otherwise \ black \ bl$	Capsule	2	886	0.88 (0.56 to 1.37)	0%; 1.09 (p=0.78)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$				-0.22 (-0.29 to 0.14)	68%; 37.47 (p=0.0002)
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$			•	0.10 (0.05 (0.05)	0.7 0 45 (0 40)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$					
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$		7	2421	-0.23 (-0.33 10 -0.17)	1570, 52.54 (p<0.00001)
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\frac{5y \text{ to } 13^{'}y 8}{000001} = 2000000000000000000000000000000000000$		3	865	-0.11 (-0.24 to 0.02)	0%; 1.27 (p=0.87)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	5y to 13y	8			
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Dose (I ² =90%; Chi ² =29.23, p<0.0000	1)			
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$					75%; 3.98 (p=0.05)
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	Duration (l^2 =94%; Chi ² =30.84, p<0.00001)					
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$,,,,,		riot appreade
$\frac{12m \text{ or more } 4}{Formulation (l^2=95\%; Chi^2=20.76, p<0.00001)} \\ Solution 9 2490 -0.37 (-0.46 to -0.29) 97\%; 370.26 (p<0.00001) \\ Pill/ tablet 3 439 -0.83 (-1.01 to -0.65) 99\%; 277.02 (p<0.00001) \\ \end{array}$	$\frac{12m \text{ or more } 4}{Formulation (l^2=95\%; Chi^2=20.76, p<0.00001)} \\ Solution 9 2490 -0.37 (-0.46 to -0.29) 97\%; 370.26 (p<0.00001) \\ Pill/ tablet 3 439 -0.83 (-1.01 to -0.65) 99\%; 277.02 (p<0.00001) \\ \end{array}$	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	· · · · ·	,	1355	-0.44 (-0.55 to -0.33)	0%; 0.17 (p=0.68)
Formulation (l ² =95%; Chi ² =20.76, p<0.00001)	Formulation (l ² =95%; Chi ² =20.76, p<0.00001)	Formulation (l ² =95%; Chi ² =20.76, p<0.00001) Solution 9 2490 -0.37 (-0.46 to -0.29) 97%; 370.26 (p<0.00001) Pill/ tablet 3 439 -0.83 (-1.01 to -0.65) 99%; 277.02 (p<0.00001)					
Solution 9 2490 -0.37 (-0.46 to -0.29) 97%; 370.26 (p<0.00001) Pill/tablet 3 439 -0.83 (-1.01 to -0.65) 99%; 277.02 (p<0.00001)	Solution 9 2490 -0.37 (-0.46 to -0.29) 97%; 370.26 (p<0.00001) Pill/tablet 3 439 -0.83 (-1.01 to -0.65) 99%; 277.02 (p<0.00001)	Solution 9 2490 -0.37 (-0.46 to -0.29) 97%; 370.26 (p<0.00001) Pill/tablet 3 439 -0.83 (-1.01 to -0.65) 99%; 277.02 (p<0.00001)				0.06 (-0.11 to 0.24)	7%; 3.23 (p=0.36)
Pill/ tablet 3 439 -0.83 (-1.01 to -0.65) 99%; 277.02 (p<0.00001)	Pill/ tablet 3 439 -0.83 (-1.01 to -0.65) 99%; 277.02 (p<0.00001)	Pill/ tablet 3 439 -0.83 (-1.01 to -0.65) 99%; 277.02 (p<0.00001)		,		-0.37(0.46 to -0.29)	97%: 370 26 (p<0.0001)
		C Z					

Appendix 7: Additional forest plots

Incidence of lower respiratory tract infection

	1 2		Zinc	No Zinc		Risk Ratio	Risk Ratio
Study or Subgroup	log[Risk Ratio]	SE	Total	Total	Weight	IV, Fixed, 95% CI	IV, Fixed, 95% CI
Long 2006 (2)	-0.24816892	0.67082039	192	180	0.2%	0.78 [0.21, 2.91]	· · · · ·
Long 2006	-0.10536052	0.45946829	181	183	0.5%	0.90 [0.37, 2.21]	
Brown 2007	0.18232156	0.42839042	101	99	0.6%	1.20 [0.52, 2.78]	
Penny 2004	-0.14058195	0.29777877	80	79	1.2%	0.87 [0.48, 1.56]	
Soofi 2013	0.22314355	0.2627712	659	646	1.6%	1.25 [0.75, 2.09]	
Sazawal 1996	-0.59000642	0.25375961	297	306	1.7%	0.55 [0.34, 0.91]	
Rahman 2001	0.63062682	0.25241624	170	161	1.7%	1.88 [1.15, 3.08]	
Richard 2006 (2)	0.02032	0.25200806	210	208	1.7%	1.02 [0.62, 1.67]	
Rahman 2001 (2)	0	0.24928541	175	160	1.7%	1.00 [0.61, 1.63]	
Richard 2006	-0.01129956	0.22645541	209	209	2.1%	0.99 [0.63, 1.54]	
Veenemans 2011	0.05383699	0.2132558	153	153	2.4%	1.06 [0.69, 1.60]	
Veenemans 2011 (2)	0.17745056	0.20798032	151	155	2.5%	1.19 [0.79, 1.80]	
Baqui 2003 (2)	-0.15645218	0.14256197	162	165	5.3%	0.86 [0.65, 1.13]	
Baqui 2003	-0.00673403	0.13486419	161	157	5.9%	0.99 [0.76, 1.29]	
Muller 2001	0.17162318	0.12304944	342	344	7.1%	1.19 [0.93, 1.51]	+
Lind 2003 (2)	-0.02898754	0.08383997	170	170	15.4%	0.97 [0.82, 1.14]	-
Lind 2003	-0.02739897	0.08077837	170	170	16.6%	0.97 [0.83, 1.14]	+
Bhandari 2002	-0.00591199	0.05834957	1241	1241	31.7%	0.99 [0.89, 1.11]	+
Total (95% CI)			4824	4786	100.0%	1.00 [0.94, 1.07]	•
Heterogeneity: Chi ² =			%				0.5 0.7 1 1.5 2
Test for overall effect:	Z = 0.03 (P = 0.9)	8)					Favours Zinc Favours No Zin

Favours Zinc Favours No Zinc

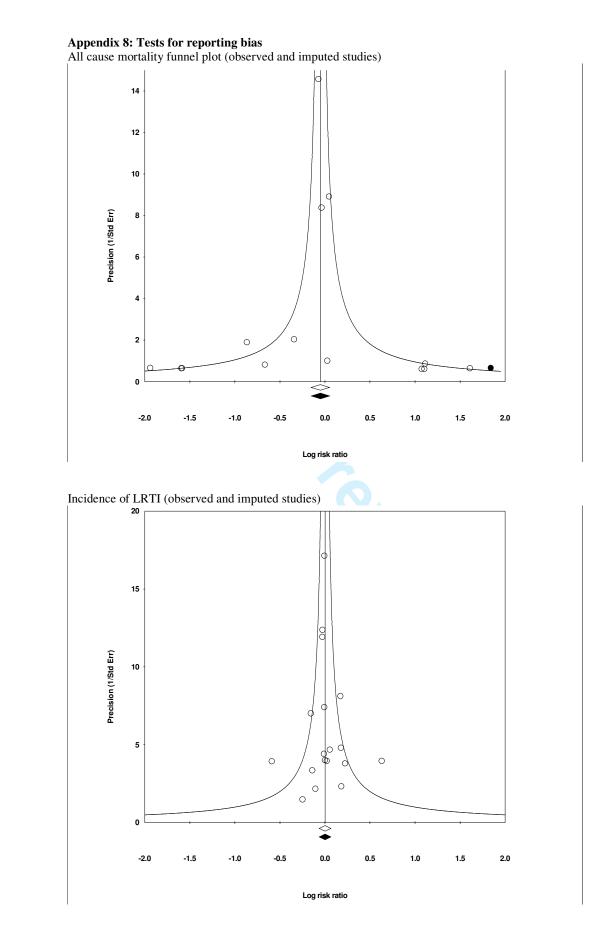
Incidence of malaria

Study or Subgroup	log[Risk Ratio]	SE	Zinc Total	No Zinc Total	Weight	Risk Ratio IV, Fixed, 95% CI	Risk Ratio IV, Fixed, 95% CI
Shankar 2000	-0.37018553		136			0.69 [0.30, 1.60]	
Richard 2006 (2)	-0.09844007	0.41742355	210			0.91 [0.40, 2.05]	
Richard 2006	-0.06536678	0.32891813	209	209	2.1%	0.94 [0.49, 1.78]	
Muller 2001	0.02817088	0.23737988	341	344	4.1%	1.03 [0.65, 1.64]	_
Veenemans 2011	0.00837462	0.0727393	153	153	43.9%	1.01 [0.87, 1.16]	+
Veenemans 2011 (2)	0.10019023	0.07006137	151	155	47.3%	1.11 [0.96, 1.27]	-
Total (95% CI)			1200	1207	100.0%	1.05 [0.95, 1.15]	•
Heterogeneity: Chi ² = 2	2.04, df = 5 (P = 1)	0.84); $I^2 = 0\%$					
Test for overall effect:							0.5 0.7 1 1.5 2 Favours Zinc Favours No Zir

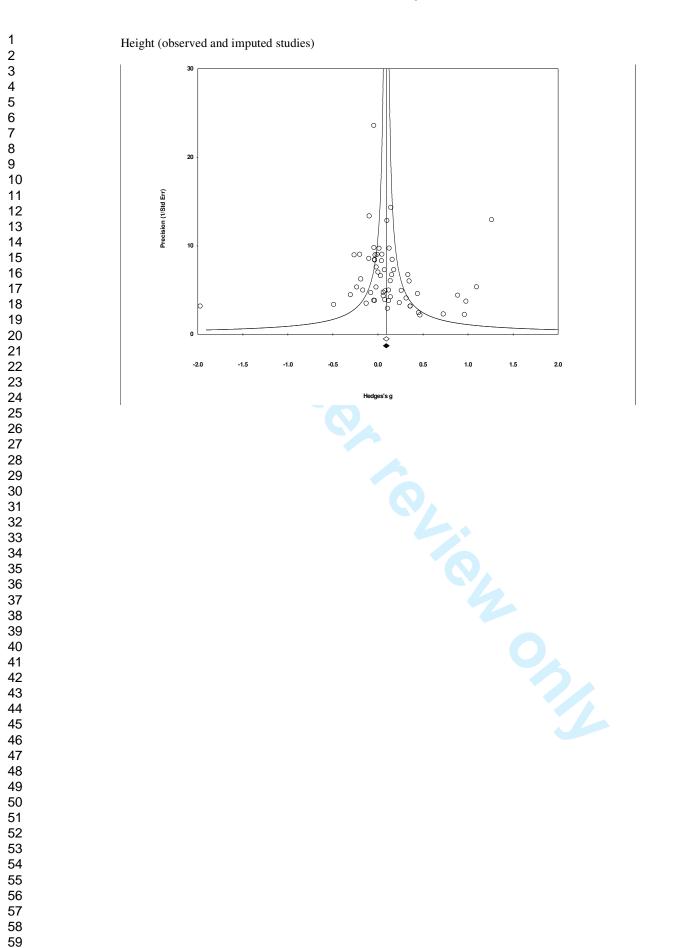
Participants with ≥ 1 vomiting episode

	e		Zinc	No Zinc		Risk Ratio	Risk Ratio
Study or Subgroup	log[Risk Ratio]	SE	Total	Total	Weight	IV, Fixed, 95% CI	IV, Fixed, 95% CI
Kurugöl 2006	0.28768207	0.75055535	100	100	0.7%	1.33 [0.31, 5.81]	
Gupta 2007	0.51549853	0.44177764	854	858	2.0%	1.67 [0.70, 3.98]	
Lind 2003	0.25343215	0.16826769	162	164	13.9%	1.29 [0.93, 1.79]	
Lind 2003 (2)	0.55134234	0.14130384	161	163	19.7%	1.74 [1.32, 2.29]	
Bhandari 2007	0.15688142	0.0785542	16289	16341	63.7%	1.17 [1.00, 1.36]	
Total (95% CI)			17566	17626	100.0%	1.29 [1.14, 1.46]	•
Heterogeneity: Chi ² =	6.31, df = 4 (P =	0.18 ; $I^2 = 37$	%				0.5 0.7 1 1.5 2
Test for overall effect	Z = 4.08 (P < 0.1)	0001)					Favours Zinc Favours No Zinc

Study or Subgroup	Std. Mean Difference	SE	No Zinc Total		Weight	Std. Mean Difference IV, Fixed, 95% CI	Std. Mean Difference IV, Fixed, 95% CI
Silva 2006	2.12757492	1.10761519	30	28	0.0%	2.13 [-0.04, 4.30]	
Nakamura 1993		0.49561271	11	10	0.2%	1.71 [0.74, 2.68]	
Sayeg Porto 2000	0.07926742	0.44915102	9	9	0.2%	0.08 [-0.80, 0.96]	
Rosales 2004	1.39772302	0.39918356	14	16	0.3%	1.40 [0.62, 2.18]	
Rosales 2004 (2)	1.59178434	0.393349	15	18	0.3%	1.59 [0.82, 2.36]	
Garcia 1998	0.61895336		17	16	0.4%	0.62 [-0.06, 1.30]	<u> </u>
Smith 1999	1.02871696		20	20	0.4%	1.03 [0.38, 1.68]	
Gibson 1989	-0.07887671		18	17	0.4%	-0.08 [-0.73, 0.57]	
Clark 1999	1.08857292		19	23	0.4%	1.09 [0.45, 1.73]	
Walravens 1989	-0.32044174	0.3159476	25	16	0.5%	-0.32 [-0.94, 0.30]	
Walravens 1983	-0.21002838		20	20	0.5%	-0.21 [-0.82, 0.40]	
Udomkesmalee 1992	2.16724629		35	33	0.5%	2.17 [1.57, 2.76]	
Sempertegui 1996	0.94195962		25	23	0.5%	0.94 [0.35, 1.53]	
Udomkesmalee 1992 (2)	1.80519359		33	32	0.5%	1.81 [1.23, 2.38]	
Tupe 2009	1.2972891	0.28675374	40	43	0.6%	1.30 [0.74, 1.86]	
Fallahi 2007	0.39627284	0.28402418	25	24	0.6%	0.40 [-0.16, 0.95]	
Mahloudji 1975	-0.165458	0.2788914	25	25	0.6%	-0.17 [-0.71, 0.38]	
Sandstead 2008	0.14492933	0.27877714	25	25	0.6%	0.14 [-0.40, 0.69]	
Ba Lo 2011	0.62542586		32	34	0.7%	0.63 [0.14, 1.11]	
Schultink 1997	0.47144486		34	33	0.8%	0.47 [-0.01, 0.95]	
Hettiarachchi 2008 (2)	0.86739385		30	114	0.8%	0.87 [0.39, 1.34]	
Ruz 1997	-0.04794779		33	36	0.8%	-0.05 [-0.52, 0.42]	-
Mazariegos 2010		0.23138369	40	35	0.9%	0.40 [-0.05, 0.85]	
Muller 2001	0.63830688	0.22576313	40	41	0.9%	0.64 [0.20, 1.08]	
Baqui 2003	0.30706347	0.22305208	38	42	0.9%	0.31 [-0.13, 0.74]	<u>+</u>
Baqui 2003 (2)		0.21750534	42	41	1.0%	0.00 [-0.43, 0.43]	+
Hettiarachchi 2008	0.51369923		41	100	1.0%	0.51 [0.09, 0.94]	
Umeta 2000	1.09640714		50	50	1.0%		
						1.10 [0.68, 1.51]	
Hong 1982	1.94421305		67	64	1.0%	1.94 [1.53, 2.36]	
Rosado 1997	0.49001387		47	48	1.1%	0.49 [0.09, 0.89]	
Rosado 1997 (2)	0.62774877	0.20438775	50	49	1.1%	0.63 [0.23, 1.03]	
Uckardes 2009	0.14435311	0.18964639	54	56	1.3%	0.14 [-0.23, 0.52]	+-
Penny 2004	0.73471063	0.17762983	69	65	1.4%	0.73 [0.39, 1.08]	
Wuehler 2008	0.70122941		49	142	1.6%	0.70 [0.37, 1.03]	
Cavan 1993	0.51245133		74	71	1.6%	0.51 [0.18, 0.84]	
			74	71			
Rahman 2001 (2)	-0.08998801				1.6%	-0.09 [-0.42, 0.24]	
Brown 2007	0.53520617		84	70	1.7%	0.54 [0.21, 0.86]	-
Rahman 2001	-0.11598147		77	74	1.7%	-0.12 [-0.43, 0.20]	-
Chang 2010	0.36204843	0.15223956	89	85	2.0%	0.36 [0.06, 0.66]	-
Richard 2006	0.67063373	0.15053466	92	93	2.0%	0.67 [0.38, 0.97]	
Chen 2012	0.43585676	0.14985294	93	88	2.0%	0.44 [0.14, 0.73]	
Richard 2006 (2)	0.27769813		90	94	2.1%	0.28 [-0.01, 0.57]	
Shankar 2000	-0.18954625		109	103	2.4%	-0.19 [-0.46, 0.08]	-
Tielsch 2006	0.35339326		146	152	2.7%	0.35 [0.10, 0.61]	-
Friis 1997	0.40647134	0.1292236	121	122	2.7%	0.41 [0.15, 0.66]	
Chang 2010 (2)	0.2481705	0.12815887	93	177	2.8%	0.25 [-0.00, 0.50]	-
Veenemans 2011	1.33657691	0.1276632	150	149	2.8%	1.34 [1.09, 1.59]	-
Lind 2003 (2)	0.7946871	0.12563884	136	136	2.9%	0.79 [0.55, 1.04]	-
Lind 2003	0.86027128		143	134	2.9%	0.86 [0.61, 1.11]	-
Veenemans 2011 (2)	1.11626145		151	148	3.0%	1.12 [0.87, 1.36]	-
Wessells 2012	1.30076381		146	279	3.7%	1.30 [1.08, 1.52]	
Soofi 2013	-0.05814114		203	198	4.6%	-0.06 [-0.25, 0.14]	T
Sazawal 1996		0.08664303	292	285	6.1%	0.83 [0.66, 1.00]	-
DiGirolamo 2010	0.18538814		318	328	7.4%	0.19 [0.03, 0.34]	-
Bhandari 2002	1.46023697	0.07309568	499	450	8.6%	1.46 [1.32, 1.60]	-
Bhandari 2007	0.49031017	0.0714016	419	438	9.0%	0.49 [0.35, 0.63]	-
Total (95% CI)			4717	5093	100.0%	0.62 [0.58, 0.67]	1
Heterogeneity: Chi ² = 582.	45 df = 55 (P < 0.000)	$(01) \cdot 1^2 = 91\%$					1 1 1 I
		(1), (1 - 51)					-4 -2 0 2
	20.16 (P < 0.00001)						
Test for overall effect: Z =	29.16 (P < 0.00001)						Favours No Zinc Favours Zinc
	29.16 (P < 0.00001)						Favours No Zinc Favours Zinc
	29.16 (P < 0.00001)						Favours No Zinc Favours Zinc
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						Favours No Zinc Favours Zinc
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						
	29.16 (P < 0.00001)						







BMJ Open

REFERENCES

1. Ahmed T, Svennerholm AM, Al Tarique A, Sultana GN, Qadri F. Enhanced immunogenicity of an oral inactivated cholera vaccine in infants in Bangladesh obtained by zinc supplementation and by temporary withholding breast-feeding. Vaccine. 2009; **27**(9): 1433-9.

2. Bates CJ, Evans PH, Dardenne M, Prentice A, Lunn PG, Northrop-Clewes CA, et al. A trial of zinc supplementation in young rural Gambian children. British Journal of Nutrition. 1993; **69**(1): 243-55.

3. Behrens RH, Tomkins AM, Roy SK. Zinc supplementation during diarrhoea, a fortification against malnutrition? Lancet. 1990; **336**(18): 442-3.

4. Berger J, Ninh NX, Khan NC, Nhien NV, Lien DK, Trung NQ, et al. Efficacy of combined iron and zinc supplementation on micronutrient status and growth in Vietnamese infants. European Journal of Clinical Nutrition. 2006; **60**(4): 443-54.

5. Dijkhuizen MA, Winichagoon P, Wieringa FT, Wasantwisut E, Utomo B, Ninh NX, et al. Zinc supplementation improved length growth only in anemic infants in a multi-country trial of iron and zinc supplementation in South-East Asia. Journal of Nutrition. 2008; **138**(10): 1969-75.

6. Wieringa FT, Berger J, Dijkhuizen MA, Hidayat A, Ninh NX, Utomo B, et al. Combined iron and zinc supplementation in infants improved iron and zinc status, but interactions reduced efficacy in a multicountry trial in Southeast Asia. Journal of Nutrition. 2007; **137**(2): 466-71.

7. Brooks WA, Santosham M, Naheed A, Goswami D, Wahed MA, Diener-West M, et al. Effect of weekly zinc supplements on incidence of pneumonia and diarrhoea in children younger than 2 years in an urban, low-income population in Bangladesh: Randomised controlled trial. Lancet. 2005; **366**(9490): 999-1004.

8. Campos Junior D, Veras Neto MC, Silva Filho VL, Leite MF, Holanda MBS, Cunha NF. Zinc supplementation may recover taste for salt meals. Jornal de Pediatria. 2004; **80**(1): 55-9.

9. Cuevas LE, Almeida LMD, Mazunder P, Paixao AC, Silva AM, Maciel L, et al. Effect of zinc on the tuberculin response of children exposed to adults with smear-positive tuberculosis. Annals of Tropical Paediatrics. 2002; **22**(4): 313-9.

10. Duggan C, Penny ME, Hibberd P, Gil A, Huapaya A, Cooper A, et al. Oligofructosesupplemented infant cereal: 2 randomized, blinded, community-based trials in Peruvian infants. The American journal of clinical nutrition. 2003; **77**(4): 937-42.

11. Fahmida U, Rumawas JSP, Utomo B, Patmonodewo S, Schultink W. Zinc-iron, but not zinc-alone supplementation, increased linear growth of stunted infants with low haemoglobin. Asia Pacific Journal of Clinical Nutrition. 2007; **16**(2): 301-9.

12. Hashemipour M, Kelishadi R, Shapouri J. Effect of zinc supplementation on insulin resistance and components of the metabolic syndrome in prepubescent obese children. Pediatric Diabetes. 2009; **10**: 94.

13. Hashemipour M, Kelishadi R, Shapouri J, Sarrafzadegan N, Amini M, Tavakoli N, et al. Effect of zinc supplementation on insulin resistance and components of the metabolic syndrome in prepubertal obese children. Hormones. 2009; **8**(4): 279-85.

14. Kelishadi R, Hashemipour M, Adeli K, Tavakoli N, Movahedian-Attar A, Shapouri J, et al. Effect of zinc supplementation on markers of insulin resistance, oxidative stress, and inflammation among prepubescent children with metabolic syndrome. Metab. 2010; **8**(6): 505-10.

15. Heinig MJ, Brown KH, Lonnerdal B, Dewey KG. Zinc supplementation does not affect growth, morbidity, or motor development of US term breastfed infants at 4-10 mo of age. American Journal of Clinical Nutrition. 2006; **84**(3): 594-601.

16. Heinig MJ, Brown KH, Lonnerdal B, Dewey KG. Zinc supplementation does not affect growth, morbidity, or motor development of U.S. breastfed infants at 4-10 mo. FASEB Journal. 1998; **12**(A970): Abstract 5617.

17. Hess SY, Bado L, Aaron GJ, Ouedraogo JB, Zeilani M, Brown KH. Acceptability of zinc-fortified, lipid-based nutrient supplements (LNS) prepared for young children in Burkina Faso. Maternal and Child Nutrition. 2011; **7**(4): 357-67.

18. Imamoglu S, Bereket A, Turan S, Taga Y, Haklar G. Effect of zinc supplementation on growth hormone secretion, IGF-I, IGFBP-3, somatomedin generation, alkaline phosphatase, osteocalcin and growth in prepubertal children with idiopathic short stature. J Pediatr Endocrinol. 2005; **18**(1): 69-74.

19. Rosado JL, Lopez P, Kordas K, Garcia-Vargas G, Ronquillo D, Alatorre J, et al. Iron and/or zinc supplementation did not reduce blood lead concentrations in children in a randomized, placebo-controlled trial. Journal of Nutrition. 2006; **136**(9): 2378-83.

20. Rico JA, Kordas K, Lopez P, Rosado JL, Garcia Vargas G, Ronquillo D, et al. Efficacy of iron and/or zinc supplementation on cognitive performance of lead-exposed Mexican schoolchildren: a randomized, placebo-controlled trial. Pediatrics. 2006; **117**(3): e518-e27.

21. Kordas K, Stoltzfus RJ, Lopez P, Alatorre Rico J, Rosado JL. Iron and zinc supplementation does not improve parent or teacher ratings of behavior in first grade Mexican children exposed to lead. Journal of Pediatrics. 2005; **147**(5): 632-9.

22. NCT01472211. Water-based Zinc Intervention Trial in Zinc Deficient Children. 2012.

23. Osendarp SJM, Santosham M, Black RE, Wahed MA, Raaij JMAv, Fuchs GJ. Effect of zinc supplementation between 1 and 6 mo of life on growth and morbidity of Bangladeshi infants in urban slums. American Journal of Clinical Nutrition. 2002; **76**(6): 1401-8.

24. Payne-Robinson HM, Golden MH, Golden BE, Simeon DT. The zinc sandwich and growth. Lancet. 1991; **337**(8746): 925-6.

25. Perrone L, Salerno M, Gialanella G, Feng SL, Moro R, Di Lascio R, et al. Long-term zinc and iron supplementation in children of short stature: effect of growth and on trace element content in tissues. Journal of Trace Elements in Medicine & Biology. 1999; **13**(1-2): 51-6.

26. Ronaghy H, Fox MR, Garnsm, Israel H, Harp A, Moe PG, et al. Controlled zinc supplementation for malnourished school boys: a pilot experiment. American Journal of Clinical Nutrition. 1969; **22**(10): 1279-89.

27. Ronaghy HA, Reinhold JG, Mahloudji M, Ghavami P, Fox MR, Halsted JA. Zinc supplementation of malnourished schoolboys in Iran: increased growth and other effects. American Journal of Clinical Nutrition. 1974; **27**(2): 112-21.

28. Roxas BV, Intengan CL, Juliano BO. Effect of zinc supplementation and high-protein rice on the growth of preschool children on a rice-based diet. Qualitas Plantarum. 1980; **30**(3/4): 213-22.

29. Shingwekar AG, Mohanram M, Reddy V. Effect of zinc supplementation on plasma levels of vitamin A and retinol-binding protein in malnourished children. Clinica Chimica Acta. 1979; **93**(1): 97-100.

30. Shrivastava SP, Roy AK, Jana UK. Zinc supplementation in protein energy malnutrition. Indian Pediatrics. 1993; **30**(6): 779-82.

31. Walravens PA, Chakar A, Mokni R, Denise J, Lemonnier D. Zinc supplements in breastfed infants. Lancet. 1992; **340**(8821): 683-5.

32. Wasantwisut E, Winichagoon P, Chitchumroonchokchai C, Yamborisut U, Boonpraderm A, Pongcharoen T, et al. Iron and zinc supplementation improved iron and zinc status, but not physical growth, of apparently healthy, breast-fed infants in rural communities of northeast Thailand. Journal of Nutrition. 2006; **136**(9): 2405-11.

33. Yanfeng X, Ling W, Jing Y, Rong Z. The effect of status of zinc, calcium on growth of children aged 3~6 years in Xi'an and analysis of effectiveness of zinc supplement. Journal of Xi'an Medical University, English Edition. 1997; **9**(1): 48-51.

34. Zeba AN, Sorgho H, Rouamba N, Zongo I, Rouamba J, Guiguemde RT, et al. Major reduction of malaria morbidity with combined vitamin A and zinc supplementation in young children in Burkina Faso: a randomized double blind trial. Nutrition Journal. 2008; **7**: 7.

35. Arabaci FI, Kaya A, Gultekin A, Icagasoglu FD, Mutlu EC. Comparison of efficacies of divalent, trivalent irons and divalent iron plus zinc preparations in paediatric patients with iron deficiency anemia. Turkiye Klinikleri Pediatri. 2010; **19**(3): 210-5.

36. Chicourel EZ. Efeito Da Suplementação No Desenvolvimento Físico E Cognitivo De Pré-Escolares. São Paulo, Brazil: Universidade de São Paulo; 2001.

37. CTRI/2010/091/001417. A clinical trial to study the effect of zinc sulfate in reducing the incidence of diarrhea, acute respiratory tract infections and in promoting growth in infants of 6-11 months of age.

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

35

36

37

38

39

40

41

42 43

44

45

46

47

48

49

50

51

52

53

54

55

56

57

58

59 60

BMJ Open

38. Jimenez R, Sagaro E, Lafita Y. How growth infants supplemented with zinc sulfate after an episode of persistent diarrhea. Journal of Pediatric Gastroenterology & Nutrition; 2000. p. S26. 39. Mitter SS, Havt A, Moore SR, Mota RM, Oria RB, Guerrant RL, et al. Zinc supplementation exposes associations between the interleukin 8 (-251 A/T) polymorphism and markers for higher intestinal inflammation in children from Northeast Brazil. American Journal of Tropical Medicine and Hygiene. 2009; 1): 23-4. NCT00133406. Long-term impact and intervention for diarrhea in Brazil. 40. NCT00228254. Vitamin A and zinc: prevention of pneumonia (VAZPOP) study. 41. 42. NCT00374023. A Study on Immunological Effect of Vitamin A and Zinc in a Placebo Controlled 4 Cell Trial. 43. NCT00421668. A Trial of Zinc and Micronutrients in Tanzanian Children. 44. NCT00589264. Zinc and biobehavioral development in early childhood. NCT00944359. Impact of preventive and therapeutic zinc supplementation programs 45. among young children. 46. NCT00967551. Micronutrient Sprinkles in a Daycare Center. NCT00980421. Safety of various mode of delivery of iron supplement on iron toxicity 47. markers in preschool children. 48. NCT01306097. Zinc Supplementation and Severe and Recurrent Diarrhea. 49. NCT01616693. Zinc and/or Probiotic Supplementation of Rotavirus and Oral Polio Virus Vaccines. Smith RM, King RA, Spargo RM, Cheek DB, Field JB, Veitch LG. Growth-retarded 50. Aboriginal children with low plasma zinc levels do not show a growth response to supplementary zinc. Lancet. 1985; i(8434): 923-4. 51. Ahmed T, Arifuzzaman M, Lebens M, Qadri F, Lundgren A. CD4+ T-cell responses to an oral inactivated cholera vaccine in young children in a cholera endemic country and the enhancing effect of zinc supplementation. Vaccine. 2009; 28(2): 422-9. Akramuzzaman SM, Mahalanabis D, Mitra AK, Rahman MM. Effect of long-term 52. supplementation of zinc in undernourished young children of a poor periurban community in Bangladesh [abstract]. J-Gastroenterol-Hepatol; 1994. p. A132. 53. Alarcon K, Kolsteren PW, Prada AM, Chian AM, Velarde RE, Pecho IL, et al. Effects of separate delivery of zinc or zinc and vitamin A on hemoglobin response, growth, and diarrhea in young Peruvian children receiving iron therapy for anemia. American Journal of Clinical Nutrition. 2004; 80(5): 1276-82. 54. Albert MJ, Oadri F, Wahed MA, Ahmed T, Rahman AS, Ahmed F, et al. Supplementation with zinc, but not vitamin A, improves seroconversion to vibriocidal antibody in children given an oral cholera vaccine. The Journal of infectious diseases; 2003. p. 909-13. 55. Qadri F, Ahmed T, Wahed MA, Ahmed F, Bhuiyan NA, Rahman AS, et al. Suppressive effect of zinc on antibody response to cholera toxin in children given the killed, B subunit-whole cell, oral cholera vaccine. Vaccine; 2004. p. 416-21. 56. Ba Lo N, Aaron GJ, Hess SY, Dossou NI, Guiro AT, Wade S, et al. Plasma zinc concentration responds to short-term zinc supplementation, but not zinc fortification, in young children in Senegal. American Journal of Clinical Nutrition. 2011; 93(6): 1348-55. 57. Baqui AH, Zaman K, Persson LA, El Arifeen S, Yunus M, Begum N, et al. Simultaneous Weekly Supplementation of Iron and Zinc Is Associated with Lower Morbidity Due to Diarrhea and Acute Lower Respiratory Infection in Bangladeshi Infants. Journal of Nutrition. 2003; 133(12): 4150-7. 58. Baqui AH, Walker CL, Zaman K, El Arifeen S, Chowdhury HR, Wahed MA, et al. Weekly iron supplementation does not block increases in serum zinc due to weekly zinc supplementation in Bangladeshi infants. The Journal of nutrition; 2005. p. 2187-91. 59. Black MM, Baqui AH, Zaman K, Ake Persson L, El Arifeen S, Le K, et al. Iron and zinc supplementation promote motor development and exploratory behavior among Bangladeshi infants. The American journal of clinical nutrition; 2004. p. 903-10. 60. Fischer Walker CL, Baqui AH, Ahmed S, Zaman K, El Arifeen S, Begum N, et al. Low-dose weekly supplementation of iron and/or zinc does not affect growth among Bangladeshi infants. European Journal of Clinical Nutrition. 2009; 63(1): 87-92.

61. Bhandari N, Bahl R, Taneja S, Strand T, Molbak K, Ulvik RJ, et al. Substantial reduction in severe diarrheal morbidity by daily zinc supplementation in young north Indian children. Pediatrics. 2002; **109**(6): e86.

62. Bhandari N, Bahl R, Taneja S, Strand T, Molbak K, Ulvik RJ, et al. Effect of routine zinc supplementation on pneumonia in children aged 6 months to 3 years: Randomised controlled trial in an urban slum. British Medical Journal. 2002; **324**(7350): 1358-61.

63. Manger MS, Strand TA, Taneja S, Refsum H, Ueland PM, Nygard O, et al. Cobalamin status modifies the effect of zinc supplementation on the incidence of prolonged diarrhea in 6- to 30-month-old North Indian children. Journal of Nutrition. 2011; **141**(6): 1108-13.

64. Manger MS, Taneja S, Strand TA, Ueland PM, Refsum H, Schneede J, et al. Poor folate status predicts persistent diarrhea in 6- to 30-month-old north Indian children. The Journal of nutrition; 2011. p. 2226-32.

65. Taneja S, Strand TA, Sommerfelt H, Rajiv B, Nita B. Zinc supplementation for four months does not affect growth in young north Indian children. Journal of Nutrition. 2010; **140**(3): 630-4.

66. Taneja S, Bhandari N, Bahl R, Bhan MK. Impact of zinc supplementation on mental and psychomotor scores of children aged 12 to 18 months: a randomized, double-blind trial. Journal of Pediatrics. 2005; **146**(4): 506-11.

67. Taneja S, Bhandari N, Strand TA, Sommerfelt H, Refsum H, Ueland PM, et al. Cobalamin and folate status in infants and young children in a low-to-middle income community in India. The American journal of clinical nutrition. 2007; **86**(5): 1302-9.

68. Bhan G, Bhandari N, Taneja S, Mazumder S, Bahl R. The effect of maternal education on gender bias in care-seeking for common childhood illnesses. Social Science & Medicine. 2005; **60**(4): 715-24.

69. Bhandari N, Taneja S, Mazumder S, Bahl R, Fontaine O, Bhan MK, et al. Adding zinc to supplemental iron and folic acid does not affect mortality and severe morbidity in young children. Journal of Nutrition. 2007; **137**(1): 112-7.

70. Arsenault JE. Dietary zinc intake of young children in Peru and the United States, and effects of supplemental zinc on energy intake, appetite, body composition, and plasma leptin, ghrelin, and insulin concentrations of Peruvian infants [3230603]. United States -- California: University of California, Davis; 2006.

71. Arsenault JE, De Romana DL, Penny ME, Van Loan MD, Brown KH. Additional zinc delivered in a liquid supplement, but not in a fortified porridge, increased fat-free mass accrual among young Peruvian children with mild-to-moderate stunting. Journal of Nutrition. 2008; **138**(1): 108-14.

72. Arsenault JE, Havel PJ, De Romana DL, Penny ME, Van Loan MD, Brown KH. Longitudinal measures of circulating leptin and ghrelin concentrations are associated with the growth of young Peruvian children but are not affected by zinc supplementation. American Journal of Clinical Nutrition. 2007; **86**(4): 1111-9.

73. Brown KH, De Romana DL, Arsenault JE, Peerson JM, Penny ME. Comparison of the effects of zinc delivered in a fortified food or a liquid supplement on the growth, morbidity, and plasma zinc concentrations of young Peruvian children. American Journal of Clinical Nutrition. 2007; **85**(2): 538-47.

74. Castillo-Duran C, Garcia H, Venegas P, Torrealba I, Panteon E, Concha N, et al. Zinc supplementation increases growth velocity of male children and adolescents with short stature. Acta Paediatrica. 1994; **83**(8): 833-7.

75. Castillo-Duran C, Hertrampf ED, Ruz MO, Torrejon CS, Salazar G. Controlled trial of zinc supplementation on growth and body composition in Chilean children from low income groups. Pediatric Research; 2002. p. 188a.

76. Cavan KR. The assessment of the zinc status of a group of school children from a periurban area of Guatemala City, Guatemala [NN70828]. Canada: University of Guelph (Canada); 1991.

77. Cavan KR, Gibson RS, Grazioso CF, Isalgue AM, Ruz M, Solomons NW. Growth and body composition of periurban Guatemalan children in relation to zinc status: a longitudinal zinc intervention trial. American Journal of Clinical Nutrition. 1993; **57**(3): 344-52.

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

31

32

33

34

35

36

37

38

39

40 41

42

43

44 45

46

47

48

49

50

51

52

53

54

55

56

57

58 59 60

BMJ Open

78. Grazioso CF, Isalgue M, de Ramirez I, Ruz M, Solomons NW. The effect of zinc supplementation on parasitic reinfestation of Guatemalan schoolchildren. American Journal of Clinical Nutrition. 1993; 57(5): 673-8. 79. Chang S, El Arifeen S, Bari S, Wahed MA, Rahman KM, Rahman MT, et al. Supplementing iron and zinc: double blind, randomized evaluation of separate or combined delivery. European Journal of Clinical Nutrition; 2010. p. 153-60. 80. Chen L, Liu Y-F, Gong M, Jiang W, Fan Z, Qu P, et al. Effects of vitamin A, vitamin A plus zinc, and multiple micronutrients on anemia in preschool children in Chongqing, China. Asia Pacific Journal of Clinical Nutrition. 2012; 21(1): 3-11. 81. Chhagan M. The effect of micronutrient supplementation on morbidity and growth in South African children [3351928]. United States -- Massachusetts: Tufts University, Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy: 2009. 82. Chhagan MK, Van den Broeck J, Luabeya K-KA, Mpontshane N, Tomkins A, Bennish ML. Effect on longitudinal growth and anemia of zinc or multiple micronutrients added to vitamin A: a randomized controlled trial in children aged 6-24 months. BMC Public Health. 2010; 10: 145. 83. Chhagan MK, Van den Broeck J, Luabeya KK, Mpontshane N, Tucker KL, Bennish ML. Effect of micronutrient supplementation on diarrhoeal disease among stunted children in rural South Africa. European Journal of Clinical Nutrition. 2009; 63(7): 850-7. Luabeya KK, Mpontshane N, Mackay M, Ward H, Elson I, Chhagan M, et al. Zinc or 84. multiple micronutrient supplementation to reduce diarrhea and respiratory disease in South African children: a randomized controlled trial. PLoS ONE [Electronic Resource]. 2007; **2**(6): e541. 85. Van den Broeck J, Mackay M, Mpontshane N, Kany Kany Luabeya A, Chhagan M, Bennish ML. Maintaining data integrity in a rural clinical trial. Clin Trials. 2007; 4(5): 572-82. Clark PJ, Eastell R, Barker ME. Zinc supplementation and bone growth in pubertal 86. girls. Lancet. 1999; 354(9177): 485. 87. Cole CR, Sampaio DLB, de Mattos ÂP, Ribeiro TCM, de O. Leite ME, Costa-Ribeiro H. Suplementação de Zinco e Outros Micronutrientes Através do Uso de "Sprinkles": Impacto na Ocorrência de Doença Diarreica e Infecções Respiratórias em Crianças Institucionalizadas. 2012. 88. Dehbozorgi P, Mohseni P, Mazloom Z. The influence of zinc sulfate supplementation on the growth of school age children in villages around Shiraz 2002, 2003. Journal of Medical Sciences. 2007; 7(4): 690-3. 89. Bui VO, Digirolamo AM, Stein AD, Ramakrishnan U, Ramirez-Zea M, Flores-Avala RC, et al. No effect of 6-month zinc supplementation on anthropometric measures in 6-11 year-old urban school children in Guatemala. The FASEB Journal. 2009; 23 (S1). 90. DiGirolamo AM, Ramirez-Zea M, Wang M, Flores-Ayala R, Martorell R, Neufeld LM, et al. Randomized trial of the effect of zinc supplementation on the mental health of school-age children in Guatemala. American Journal of Clinical Nutrition. 2010; 92(5): 1241-50. 91. Ebrahimi S, Pormahmodi A, Kamkar A. Study of zinc supplementation on growth of schoolchildren in Yasuj, Southwest of Iran. Pakistan Journal of Nutrition. 2006; 5(4): 341-2. Fallahi E, Kimiagar M, Nazari A, Hasanvand MA, Seifi M. Effect of zinc and iron 92. supplementation on indicators of iron, zinc and vitamin A status of primary school children. Pakistan Journal of Biological Sciences. 2007; 10(7): 1088-92. 93. APP. dF. Impacto antropométrico da suplementação semanal de zinco em escolares com déficit de crescimento: ensaio randomizado duplo-cego. São Paulo, Brazil: Universidade Federal de São Paulo; 2002. 94. Friis H, Ndhlovu P, Mduluza T, Kaondera K, Sandstrom B, Michaelsen KF, et al. The impact of zinc supplementation on Schistosoma mansoni reinfection rate and intensities: a randomized, controlled trial among rural Zimbabwean schoolchildren. European Journal of Clinical Nutrition. 1997; 51(1): 33-7. 95. Friis H, Ndhlovu P, Mduluza T, Kaondera K, Sandstrom B, Michaelsen KF, et al. The impact of zinc supplementation on growth and body composition: a randomized, controlled

trial among rural Zimbabwean schoolchildren. European Journal of Clinical Nutrition. 1997; **51**(1): 38-45.

96. Garcia H, Ugarte F, Henriquez C, Iniquez G, Salazar T, Pizarro F, et al. Lack of effect of zinc supplementation on growth and somatothrophic axis in children with idiopathic short stature and diminished growth velocity. [Spanish] Ausencia de efecto de la suplementacion con cinc sobre el crecimiento y el eje somatotrofico en ninos con talla baja idiopatica y velocidad de crecimiento disminuida. Endocrinologia. 1998; **45**(5): 183-7.

97. Gibson RS, Vanderkooy PD, MacDonald AC, Goldman A, Ryan BA, Berry M. A growth-limiting, mild zinc-deficiency syndrome in some southern Ontario boys with low height percentiles. American Journal of Clinical Nutrition. 1989; **49**(6): 1266-73.

98. Gracia B, Plata Cd, Rueda A, Mosquera M, Suarez MF, Pradilla A. Effect of zinc supplementation on growth velocity of pre school children. Colombia Medica. 2005; **36**(4(Suppl. 3)): 31-40.

99. Gupta DN, Mondal SK, Ghosh S, Rajendran K, Sur D, Manna B. Impact of zinc supplementation on diarrhoeal morbidity in rural children of West Bengal, India. Acta Paediatrica. 2003; **92**(5): 531-6.

100. Gupta DN, Krishnan R, Mondal SK, Subrata G, Bhattacharya SK. Operational feasibility of implementing community-based zinc supplementation: impact on childhood diarrheal morbidity. Pediatric Infectious Disease Journal. 2007; **26**(4): 306-10.

101. Hambidge KM, Chavez MN, Brown RM, Walravens PA. Zinc supplementation of low-income pre-school children. Trace element metabolism in man and animals. 1978; **3**: 296-9.

102. Hambidge KM, Krebs NF, Walravens PA. Growth velocity of young children receiving a dietary zinc supplement. Nutrition Research. 1985; 5(SUPPL. 1): S-306-S-16.
103. Han J, Yang Y, Shao X, He M, Bian L, Wang Z. Effect of micronutrient supplementation on the growth of preschool children in China. Nutritional Sciences. 2002; 5(3): 155-60.

104. Yang Y-X, Han J-H, Shao X-P, He M, Bian L-H, Wang Z, et al. Effect of micronutrient supplementation on the growth of preschool children in China. Biomed Environ Sci. 2002; **15**(3): 196-202.

105. Hettiarachchi M, Liyanage C, Wickremasinghe R, Hilmers DC, Abrams SA. The efficacy of micronutrient supplementation in reducing the prevalence of anaemia and deficiencies of zinc and iron among adolescents in Sri Lanka. European Journal of Clinical Nutrition. 2008; **62**(7): 856-65.

106. Hong ZY. [Observation on the therapeutic effect of zinc on underweight children]. Chung Hua I Hsueh Tsa Chih. 1982; **62**(7): 415-9.

107. Ince E, Kemahli S, Uysal Z, Akar N, Cin S, Arcasoy A. Mild zinc deficiency in preschool children. Journal of Trace Elements in Experimental Medicine; 1994. p. 135-41. 108. Kartasurya MI, Ahmed F, Subagio HW, Rahfiludin MZ, Marks GC. Zinc combined with vitamin A reduces upper respiratory tract infection morbidity in a randomised trial in preschool children in Indonesia. British Journal of Nutrition. 2012; **108**(12): 2251-60. 109. Kikafunda JK, Walker AF, Allan EF, Tumwine JK. Effect of zinc supplementation on growth and body composition of Ugandan preschool children: a randomized, controlled, intervention trial. American Journal of Clinical Nutrition. 1998; **68**(6): 1261-6.

110. Sandstead HH. Improving study design. AmJ ClinNutr; 1999. p. 110-1.

111. Solomons NW, Ruz M, Gibson RS. Single-nutrient interventions with zinc. The American journal of clinical nutrition. 1999; **70**(1): 111-3.

112. Kurugol Z, Akilli M, Bayram N, Koturoglu G. The prophylactic and therapeutic effectiveness of zinc sulphate on common cold in children. Acta Paediatrica. 2006; **95**(10): 1175-81.

113. Larson CP, Nasrin D, Saha A, Chowdhury MI, Qadri F. The added benefit of zinc supplementation after zinc treatment of acute childhood diarrhoea: a randomized, double-blind field trial. Trop Med Int Health. 2010; **15**(6): 754-61.

114. Sheikh A, Sohel S, Ahmad SM, Nasrin D, Setarun N, Alam MM, et al. Zinc influences innate immune responses in children with enterotoxigenic Escherichia coli induced diarrhea. Journal of Nutrition. 2010; **140**(5): 1049-56.

1	115. Lind T. Iron and zinc in infancy: Results from experimental trials in Sweden and
2	
	Indonesia [C816987]. Sweden: Umea Universitet (Sweden); 2004.
3	116. Lind T, Lonnerdal B, Stenlund H, Gamayanti IL, Ismail D, Seswandhana R, et al. A
4	
	community-based randomized controlled trial of iron and zinc supplementation in
5	Indonesian infants: effects on growth and development. American Journal of Clinical
6	Nutrition. 2004; 80 (3): 729-36.
7	
	117. Lind T, Lonnerdal B, Stenlund H, Ismail D, Seswandhana R, Ekstrom E-C, et al. A
8	community-based randomized controlled trial of iron and zinc supplementation in
9	
10	Indonesian infants: interactions between iron and zinc. American Journal of Clinical
	Nutrition. 2003; 77 (4): 883-90.
11	118. Lind T, Seswandhana R, Persson L-A, Lonnerdal B. Iron supplementation of iron-
12	
13	replete Indonesian infants is associated with reduced weight-for-age. Acta Paediatrica. 2008;
	97 (6): 770-5.
14	
15	119. Long KZ, Montoya Y, Hertzmark E, Santos JI, Rosado JL. A double-blind,
16	randomized, clinical trial of the effect of vitamin A and zinc supplementation on diarrheal
	disease and respiratory tract infections in children in Mexico City, Mexico. American
17	
18	Journal of Clinical Nutrition. 2006; 83 (3): 693-700.
19	120. Long KZ, Rosado JL, Montoya Y, de Lourdes Solano M, Hertzmark E, DuPont HL, et
	al. Effect of vitamin A and zinc supplementation on gastrointestinal parasitic infections
20	
21	among Mexican children. Pediatrics. 2007; 120 (4): e846-55.
	121. Rosado JL, Caamano MC, Montoya YA, de Lourdes Solano M, Santos JI, Long KZ.
22	
23	Interaction of zinc or vitamin A supplementation and specific parasite infections on Mexican
24	infants' growth: a randomized clinical trial. European Journal of Clinical Nutrition. 2009;
	63 (10): 1176-84.
25	
26	122. Sanchez-Hernandez JJ, Long K, Al Mamun A, Rosado JL, Del Carmen Caamano M,
27	Marks G. Nutritional status as a modifier of the effect of vitamin a or zinc supplementation
	on gastrointestinal parasite infections in Mexican children. FASEB Journal Conference:
28	
29	Experimental Biology. 2011; 20110409(20110413).
30	123. Mahloudji M, Reinhold JG, Haghshenass M, Ronaghy HA, Fox MR, Halsted JA.
	Combined zinc and iron compared with iron supplementation of diets of 6- to 12-year old
31	
32	village schoolchildren in southern Iran. American Journal of Clinical Nutrition. 1975; 28(7):
33	721-5.
34	124. Malik A, Taneja S. Report on the trial for Effect of Short Course Prophylactic Zinc
35	Supplementation of 2 weeks on diarrhea morbidity in Infants of 6-11 months of age. 2013.
36	125. Marinho HA, Shrimpton R, Giugliano R, Burini RC. Influence of enteral parasites on
37	the blood vitamin A levels in preschool children orally supplemented with retinol and/or
38	zinc. European Journal of Clinical Nutrition. 1991; 45 (11): 539-44.
39	126. Mazariegos M, Hambidge KM, Westcott JE, Solomons NW, Raboy V, Das A, et al.
40	Neither a zinc supplement nor phytate-reduced maize nor their combination enhance growth
41	of 6- to 12-month-old Guatemalan infants. Journal of Nutrition. 2010; 140 (5): 1041-8.
42	127. Meeks Gardner J, Witter M, Ramdath D. Zinc supplementation morbidity and growth
43	in stunted Jamaican children [abstract]. West Indian Medical Journal; 1998. p. 28-9.
44	128. Meeks Gardner J, Witter MM, Ramdath DD. Zinc supplementation: effects on the
45	growth and morbidity of undernourished Jamaican children. European Journal of Clinical
46	Nutrition. 1998; 52 (1): 34-9.
47	129. Meeks Gardner JM, Powell CA, Baker-Henningham H, Walker SP, Cole TJ,
48	
	Grantham-McGregor SM. Zinc supplementation and psychosocial stimulation: effects on the
49	development of undernourished Jamaican children. American Journal of Clinical Nutrition.
50	2005; 82 (2): 399-405.
51	
	130. Mozaffari-Khosravi H, Shakiba M, Eftekhari MH, Vahidi AR. Effects of zinc
52	supplementation on the physical growth of 2-5 years old children. Iranian Journal of
53	Endocrinology and Metabolism. 2008; 10 (4): Pe363-Pe71, En417.
54	
	131. Mozaffari-Khosravi H, Shakiba M, Eftekhari MH, Fatehi F. Effects of zinc
55	supplementation on physical growth in 2-5-year-old children. Biological Trace Element
56	
57	Research. 2009; 128 (2): 118-27.
58	
59	
60	

132. Garenne M, Becher H, Ye Y, Kouyate B, Muller O. Sex-specific responses to zinc supplementation in Nouna, Burkina Faso. Journal of Pediatric Gastroenterology & Nutrition. 2007; **44**(5): 619-28.

133. Muller O, Becher H, van Zweeden AB, Ye Y, Diallo DA, Konate AT, et al. Effect of zinc supplementation on malaria and other causes of morbidity in west African children: randomised double blind placebo controlled trial. BMJ. 2001; **322**(7302): 1567.

134. Muller O, Garenne M, Reitmaier P, Baltussen van Zweeden A, Kouyate B, Becher H. Effect of zinc supplementation on growth in West African children: A randomized doubleblind placebo-controlled trial in rural Burkina Faso. International Journal of Epidemiology. 2003; **32**(6): 1098-102.

135. Nakamura T, Nishiyama S, Futagoishi-Suginohara Y, Matsuda I, Higashi A. Mild to moderate zinc deficiency in short children: effect of zinc supplementation on linear growth velocity. Journal of Pediatrics. 1993; **123**(1): 65-9.

136. Ninh NX, Thissen JP, Collette L, Gerard G, Khoi HH, Ketelslegers JM. Zinc supplementation increases growth and circulating insulin-like growth factor I (IGF-I) in growth-retarded Vietnamese children. American Journal of Clinical Nutrition. 1996; **63**(4): 514-9.

137. Penny ME, Marin RM, Duran A, Peerson JM, Lanata CF, Lonnerdal B, et al. Randomized controlled trial of the effect of daily supplementation with zinc or multiple micronutrients on the morbidity, growth, and micronutrient status of young Peruvian children. American Journal of Clinical Nutrition. 2004; **79**(3): 457-65.

138. Penny ME, Peerson JM, Marin RM, Duran A, Lanata CF, Lonnerdal B, et al. Randomized, community-based trial of the effect of zinc supplementation, with and without other micronutrients, on the duration of persistent childhood diarrhea in Lima, Peru. Journal of Pediatrics. 1999; **135**(2 I): 208-17.

139. Rahman MM. Effect of simultaneous zinc and vitamin A supplementation on the biochemical indices of vitamin A nutriture, morbidity, and growth in Bangladeshi children: A randomized, double blind, placebo controlled trial [9968167]. United States -- Alabama: The University of Alabama at Birmingham School of Public Health; 1999.

140. Rahman MM, Tofail F, Wahed MA, Fuchs GJ, Baqui AH, Alvarez JO. Short-term supplementation with zinc and vitamin A has no significant effect on the growth of undernourished Bangladeshi children. American Journal of Clinical Nutrition. 2002; **75**(1): 87-91.

141. Rahman MM, Vermund SH, Wahed MA, Fuchs GJ, Baqui AH, Alvarez JO. Simultaneous zinc and vitamin A supplementation in Bangladeshi children: randomised double blind controlled trial. BMJ. 2001; **323**(7308): 314-8.

142. Rahman MM, Wahed MA, Fuchs GJ, Baqui AH, Alvarez JO. Synergistic effect of zinc and vitamin A on the biochemical indexes of vitamin A nutrition in children. American Journal of Clinical Nutrition. 2002; **75**(1): 92-8.

143. Richard SA, Zavaleta N, Caulfield LE, Black RE, Witzig RS, Shankar AH. Zinc and iron supplementation and malaria, diarrhea, and respiratory infections in children in the Peruvian Amazon. Am J Trop Med Hyg. 2006; **75**(1): 126-32.

144. Allen LH, Rosado JL, Casterline JE, Lopez P, Munoz E, Garcia OP, et al. Lack of hemoglobin response to iron supplementation in anemic mexican preschoolers with multiple micronutrient deficiencies. American Journal of Clinical Nutrition. 2000; 71(6): 1485-94.
145. Munoz EC, Rosado JL, Lopez P, Furr HC, Allen LH. Iron and zinc supplementation improves indicators of vitamin A status of Mexican preschoolers. American Journal of Clinical Nutrition. 2000; 71(3): 789-94.

146. Rosado JL, Lopez P, Munoz E, Martinez H, Allen LH. Zinc supplementation reduced morbidity, but neither zinc nor iron supplementation affected growth or body composition of Mexican preschoolers. American Journal of Clinical Nutrition. 1997; **65**(1): 13-9.

147. Rosales FJ, Kang Y, Pfeiffer B, Rau A, Romero-Abal ME, Erhardt JG, et al. Twice the recommended daily allowance of iron is associated with an increase in plasma alpha-1 antichymotrypsin concentrations in Guatemalan school-aged children. Nutrition Research. 2004; **24**(11): 875-87.

BMJ Open

	148. Bentley ME, Caulfield LE, Malathi R, Santizo MC, Hurtado E, Rivera JA, et al. Zinc
2	supplementation affects the activity patterns of rural Guatemalan infants. Journal of
3	Nutrition. 1997; 127 (7): 1333-8.
4	149. Rivera JA, Ruel MT, Santizo MC, Lonnerdal B, Brown KH. Zinc supplementation
5	improves the growth of stunted rural Guatemalan infants. Journal of Nutrition. 1998; 128 (3):
6	556-62.
7	
8	150. Ruel MT, Rivera JA, Santizo MC, Lonnerdal B, Brown KH. Impact of zinc
9	supplementation on morbidity from diarrhea and respiratory infections among rural
10	Guatemalan children. Pediatrics. 1997; 99(6): 808-13.
	151. Ruz M, Castillo-Duran C, Lara X, Codoceo J, Rebolledo A, Alalah E. A 14-mo zinc-
11	supplementation trial in apparently healthy chilean preschool children. American Journal of
12	Clinical Nutrition. 1997; 66 (6): 1406-13.
13	152. Penland JG, Sandstead HH, Alcock NW, Dayal HH, Chen XC, Li JS, et al. A
14	
15	preliminary report: effects of zinc and micronutrient repletion on growth and
16	neuropsychological function of urban Chinese children. Journal of the American College of
17	Nutrition. 1997; 16 (3): 268-72.
18	153. Sandstead HH, Penland JG, Alcock NW, Dayal HH, Chen XC, Li JS, et al. Effects of
	repletion with zinc and other micronutrients on neuropsychologic performance and growth
19	of Chinese children. American Journal of Clinical Nutrition. 1998; 68(Supplement 2): 470S-
20	5S.
21	
22	154. Sandstead HH, Prasad AS, Penland JG, Beck FWJ, Kaplan J, Egger NG, et al. Zinc
23	deficiency in Mexican American children: influence of zinc and other micronutrients on T
24	cells, cytokines, and antiinflammatory plasma proteins. American Journal of Clinical
25	Nutrition. 2008; 88 (4): 1067-73.
26	155. Sanjur D, Garcia A, Aguilar R, Furumoto R, Mort M. Dietary patterns and nutrient
	intakes of toddlers from low-income families in Denver, Colorado. Journal of the American
27	Dietetic Association. 1990; 90 (6): 823-9.
28	
29	156. Sayeg Porto MA, Oliveira HP, Cunha AJ, Miranda G, Guimarães MM, Oliveira WA,
30	et al. Linear growth and zinc supplementation in children with short stature. Journal of
31	pediatric endocrinology & metabolism : JPEM; 2000. p. 1121-8.
32	157. Chugh K. Zinc therapy in acute diarrhea. Indian Pediatrics. 1996; 33 (4): 352.
33	158. Dhingra U, Hiremath G, Menon VP, Dhingra P, Sarkar A, Sazawal S. Zinc deficiency:
34	descriptive epidemiology and morbidity among preschool children in peri-urban population
35	in Delhi, India. J Health Popul Nutr. 2009; 27 (5): 632-9.
	159. Sazawal S, Bentley M, Black RE, Dhingra P, George S, Bhan MK. Effect of zinc
36	
37	supplementation on observed activity in low socioeconomic Indian preschool children.
38	Pediatrics. 1996; 98 (6): 1132-7.
39	160. Sazawal S, Black RE, Bhan MK, Bhandari N, Sinha A, Jalla S. Zinc supplementation
40	in young children with acute diarrhea in India. New England Journal of Medicine. 1995;
41	333(13): 839-44.
42	161. Sazawal S. Effect of zinc supplementation on diarrheal morbidity among urban slum
43	
	children in India [9617598]. United States Maryland: The Johns Hopkins University;
44	1996.
45	162. Sazawal S, Black RE, Bhan MK, Jalla S, Bhandari N, Sinha A, et al. Zinc
46	supplementation reduces the incidence of persistent diarrhea and dysentery among low
47	socioeconomic children in India. Journal of Nutrition. 1996; 126 (2): 443-50.
48	163. Sazawal S, Black RE, Bhan MK, Jalla S, Sinha A, Bhandari N. Efficacy of zinc
49	supplementation in reducing the incidence and prevalence of acute diarrhea- a community-
50	based, double-blind, controlled trial. American Journal of Clinical Nutrition. 1997; 66 (2):
51	
52	413-8.
	164. Sazawal S, Black RE, Jalla S, Mazumdar S, Sinha A, Bhan MK. Zinc supplementation
53	reduces the incidence of acute lower respiratory infections in infants and preschool children:
54	A double-blind, controlled trial. Pediatrics. 1998; 102 (1 I): 1-5.
55	165. Sazawal S, Dhingra U, Deb S, Bhan MK, Menon VP, Black RE. Effect of zinc added
56	to multi-vitamin supplementation containing low-dose vitamin A on plasma retinol level in
57	childrena double-blind randomized, controlled trial. J Health Popul Nutr. 2007; 25 (1): 62-
58	
59	6.
60	
	29

166. Sazawal S, Jalla S, Mazumder S, Sinha A, Black RE, Bhan MK. Effect of zinc supplementation on cell-mediated immunity and lymphocyte subsets in preschool children. Indian Pediatrics. 1997; 34(7): 589-97. 167. Sazawal S, Black RE, Ramsan M, Chwava HM, Dutta A, Dhingra U, et al. Effect of zinc supplementation on mortality in children aged 1-48 months: a community-based randomised placebo-controlled trial. Lancet. 2007; 369(9565): 927-34. 168. Sazawal S, Black RE, Ramsan M, Chwaya HM, Stoltzfus RJ, Dutta A, et al. Effects of routine prophylactic supplementation with iron and folic acid on admission to hospital and mortality in preschool children in a high malaria transmission setting: community-based, randomised, placebo-controlled trial.[Erratum appears in Lancet. 2006 Jan 28;367(9507):302]. Lancet. 2006; 367(9505): 133-43. 169. de Benoist B, Darnton-Hill I, Lynch S, Allen L, Savioli L. Zinc and iron supplementation trials in Nepal and Tanzania. Lancet. 2006; 367(9513): 816. 170. Kordas K, Siegel EH, Olney DK, Katz J, Tielsch JM, Kariger PK, et al. The effects of iron and/or zinc supplementation on maternal reports of sleep in infants from Nepal and Zanzibar. J Dev Behav Pediatr. 2009; 30(2): 131-9. 171. Olney DK, Pollitt E, Kariger PK, Khalfan SS, Ali NS, Tielsch JM, et al. Combined iron and folic acid supplementation with or without zinc reduces time to walking unassisted among Zanzibari infants 5- to 11-mo old. Journal of Nutrition. 2006; 136(9): 2427-34. 172. Kariger PK, Stoltzfus RJ, Olney D, Sazawal S, Black R, Tielsch JM, et al. Iron deficiency and physical growth predict attainment of walking but not crawling in poorly nourished Zanzibari infants. The Journal of nutrition. 2005; 135(4): 814-9. 173. Kordas K, Siegel EH, Olney DK, Katz J, Tielsch JM, Chwaya HM, et al. Maternal reports of sleep in 6-18 month-old infants from Nepal and Zanzibar: association with iron deficiency anemia and stunting. Early Human Development. 2008; 84(6): 389-98. 174. DK. O. Modeling The Effects Of Anemia, Malaria, Growth And Micronutrient Supplementation On Development Of Young Zanzibari Children. Davis, CA: University of California, Davis; 2006. 175. Olney DK, Pollitt E, Kariger PK, Khalfan SS, Ali NS, Tielsch JM, et al. Young Zanzibari children with iron deficiency, iron deficiency anemia, stunting, or malaria have lower motor activity scores and spend less time in locomotion. The Journal of nutrition. 2007: 137(12): 2756-62. 176. Olney DK KP, Stoltzfus RJ, Khalfan SS, Ali NS, Tielsch JM, et al. Development of nutritionally at-risk young children is predicted by malaria, anemia, and stunting in Pemba, Zanzibar. Journal of Nutrition 2009; 139(4): 763-72. 177. Schultink W, Merzenich M, Gross R, Shrimpton R, Dillon D. Effects of iron-zinc supplementation on the iron, zinc, and vitamin A status of anaemic pre-school children in Indonesia. Food and Nutrition Bulletin. 1997; 18(4): 311-7. 178. Correa León E TM, Navarrete F, Aguirre L, Saa B. Deficiencia De Zinc E Inmunidad Celular. Quito, Ecuador: FCM; 1992. 179. Sempertegui F, Estrella B, Correa E, Aguirre L, Saa B, Torres M, et al. Effects of short-term zinc supplementation on cellular immunity, respiratory symptoms, and growth of malnourished Equadorian children. European Journal of Clinical Nutrition. 1996; 50(1): 42-6. 180. Shah U, Malik MA, Alam S, Shaheen A, Mohammad R, AlTannir M. The efficacy of zinc supplementation in young children with recurrent acute lower respiratory infections: A randomized double-blind placebo controlled trial. Journal of Paediatrics and Child Health. 2011; 47: 13. 181. Shankar AH, Genton B, Baisor M, Jaino P, Tamja S, Adiguma T, et al. The influence of zinc supplementation on morbidity due to Plasmodium falciparum: A randomized trial in preschool children in Papua New Guinea. American Journal of Tropical Medicine and Hygiene. 2000; 62(6): 663-9. 182. Shankar AH GB, Tamja S, Arnold S, Wu L, Baisor M, et al. Zinc supplementation can reduce malaria-related morbidity in preschool children. American Journal of Tropical Medicine and Hygiene. 1997; 57(Supplement 3): 249 (Abstract 434). 183. Silva APR, Vitolo MR, Zara LF, Castro CFS. Efeito da suplementação de zinco a crianças de 1 a 5 anos de idade. J pediatr (Rio J). 2006; 82(3): 227-31. 30

BMJ Open

184. Smith JC, Makdani D, Hegar A, Rao D, Douglass LW. Vitamin A and zinc supplementation of preschool children. Journal of the American College of Nutrition; 1999.
p. 213-22.185. Soofi S, Cousens S, Iqbal SP, Akhund T, Khan J, Ahmed I, et al. Effect of provision of
daily zinc and iron with several micronutrients on growth and morbidity among young children in Pakistan: a cluster-randomised trial. Lancet. 2013.
186. Coles CL, Sherchand JB, Khatry SK, Katz J, Leclerq SC, Mullany LC, et al. Zinc
modifies the association between nasopharyngeal Streptococcus pneumoniae carriage and risk of acute lower respiratory infection among young children in rural Nepal. Journal of
Nutrition. 2008; 138 (12): 2462-7.
187. Katz J, Khatry SK, Leclerq SC, Mullany LC, Yanik EL, Stoltzfus RJ, et al. Daily supplementation with iron plus folic acid, zinc, and their combination is not associated with younger age at first walking unassisted in malnourished preschool children from a deficient population in rural Nepal. Journal of Nutrition. 2010; 140 (7): 1317-21.
188. Murray-Kolb LE, Khatry SK, Katz J, Schaefer BA, Cole PM, Le Clerq SC, et al.
Preschool micronutrient supplementation effects on intellectual and motor function in school-aged nepalese children. Archives of Pediatrics and Adolescent Medicine. 2012; 166 (5): 404-10.
189. Siegel EH. Anemia, motor development, and cognition: A randomized trial of iron- folic acid and/or zinc supplementation in young Nepali children [3172698]. United States Maryland: The Johns Hopkins University; 2005.
190. Siegel EH, Kordas K, Stoltzfus RJ, Katz J, Khatry SK, LeClerq SC, et al. Inconsistent effects of iron-folic acid and/or zinc supplementation on the cognitive development of infants. Journal of health, population, and nutrition. 2011; 29 (6): 593-604.
191. Surkan PJ, Shankar M, Katz J, Siegel EH, Leclerq SC, Khatry SK, et al. Beneficial
effects of zinc supplementation on head circumference of Nepalese infants and toddlers: a randomized controlled trial. European Journal of Clinical Nutrition. 2012; 66 (7): 836-42.
192. Tielsch JM, Khatry SK, Stoltzfus RJ, Katz J, LeClerq SC, Adhikari R, et al. Effect of
daily zinc supplementation on child mortality in southern Nepal: a community-based, cluster randomised, placebo-controlled trial. Lancet. 2007; 370 (9594): 1230-9.
193. Tielsch JM, Khatry SK, Stoltzfus RJ, Katz J, LeClerq SC, Adhikari R, et al. Effect of routine prophylactic supplementation with iron and folic acid on preschool child mortality in
southern Nepal: community-based, cluster-randomised, placebo-controlled trial. Lancet. 2006; 367 (9505): 144-52.
194. Tupe RP, Chiplonkar SA. Zinc supplementation improved cognitive performance and taste acuity in Indian adolescent girls. Journal of the American College of Nutrition. 2009; 28 (4): 388-96.
195. Chiplonkar SA, Kawade R. Effect of zinc- and micronutrient-rich food supplements on zinc and vitamin A status of adolescent girls. Nutrition. 2012; 28 (5): 551-8.
196. Uçkarde, Y., Tekçiçek M, Ozmert EN, Yurdakök K. The effect of systemic zinc supplementation on oral health in low socioeconomic level children. The Turkish journal of pediatrics; 2009. p. 424-8.
197. Uckardes Y, Ozmert EN, Unal F, Yurdakok K. Effects of zinc supplementation on parent and teacher behaviour rating scores in low socioeconomic level Turkish primary
 school children. Acta Paediatrica. 2009; 98(4): 731-6. 198. Uckardes Y, Ozmert EN, Unal F, Yurdakok K. The effect of zinc supplementation on Hacettepe Psychological Adaptation Scale scores in low socioeconomic level primary school
children. Cocuk Saglg ve Hastalklar Dergisi. 2009; 52 (2): 53-9.
199. Kramer TR, Udomkesmalee E, Dhanamitta S, Sirisinha S, Charoenkiatkul S, Tuntipopipat S, et al. Lymphocyte responsiveness of children supplemented with vitamin A and zinc. American Journal of Clinical Nutrition. 1993; 58 (4): 566-70.
200. Udomkesmalee E, Dhanamitta S, Sirisinha S. Effect of vitamin A and zinc supplementation on the nutriture of children in northeast Thailand. American Journal of
 Clinical Nutrition. 1992; 56(1): 50-7. 201. Gibson RS. Zinc supplementation for infants. Lancet. 2000; 355(9220): 2008-9. 202. Umeta M, West CE, Haidar J. Zinc supplements increased growth more in stunted infants than in non-stunted infants. Evidence-Based Medicine. 2001; 6(2): 50.
ot.

203. Umeta M, West CE, Haidar J, Deurenberg P, Hautvast JG. Zinc supplementation and stunted infants in Ethiopia: a randomised controlled trial. Lancet. 2000; **355**(9220): 2021-6. 204. Vakili R, Vahedian M, Khodaei GH, Mahmoudi M. Effects of zinc supplementation in occurrence and duration of common cold in school aged children during cold season: A double-blind placebo-controlled Trial. Iranian Journal of Pediatrics. 2009; **19**(4): 376-80. 205. Veenemans J. Effect of preventive supplementation with zinc and other micronutrients on malaria and diarrhoeal morbidity in African children [Thesis]. Wageningen, Netherlands: Wageningen University; 2011.

206. Veenemans J, Mank T, Ottenhof M, Baidjoe A, Mbugi EV, Demir AY, et al. Protection against diarrhea associated with Giardia intestinalis Is lost with multi-nutrient supplementation: a study in Tanzanian children. PLoS neglected tropical diseases. 2011; **5**(6): e1158.

207. Veenemans J, Milligan P, Prentice AM, Schouten LR, Inja N, Heijden AC, et al. Effect of supplementation with zinc and other micronutrients on malaria in Tanzanian children: a randomised trial. PLoS medicine; 2011. p. e1001125.

208. Veenemans J, Schouten LRA, Ottenhof MJ, Mank TG, Uges DRA, Mbugi EV, et al. Effect of preventive supplementation with zinc and other micronutrients on non-malarial morbidity in Tanzanian pre-school children: a randomized trial. PLoS ONE [Electronic Resource]. 2012; **7**(8): e41630.

209. Krebs NF, Hambidge KM, Walravens PA. Increased food intake of young children receiving a zinc supplement. American Journal of Diseases of Children. 1984; **138**(3): 270-3. 210. Walravens PA, Krebs NF, Hambidge KM. Linear growth of low income preschool children receiving a zinc supplement. American Journal of Clinical Nutrition. 1983; **38**(2): 195-201.

211. Walravens PA, Hambidge KM, Koepfer DM. Zinc supplementation in infants with a nutritional pattern of failure to thrive: A double-blind, controlled study. Pediatrics. 1989; **83**(4): 532-8.

212. Wessells R OZ, Rouamba N, Hess SY, Ouedraogo JB, Brown KH. The effect of zinc supplementation, provided as either a liquid ZnSO4 solution or a dispersible tablet, on plasma zinc concentration among young Burkinabe children. FASEB Journal Conference: Experimental Biology. 2011; **25:236.1**.(236): 1.

213. Wessells KR, Ouedraogo ZP, Rouamba N, Hess SY, Ouedraogo J-B, Brown KH. Short-term zinc supplementation with dispersible tablets or zinc sulfate solution yields similar positive effects on plasma zinc concentration of young children in Burkina Faso: a randomized controlled trial. Journal of Pediatrics. 2012; **160**(1): 129-35.e3.

214. Wuehler SE, Sempertegui F, Brown KH. Dose-response trial of prophylactic zinc supplements, with or without copper, in young Ecuadorian children at risk of zinc deficiency. American Journal of Clinical Nutrition. 2008; **87**(3): 723-33.

215. Wuehler S. Estimation of the global risk of zinc deficiency and assessment of the impact of three doses of zinc supplementation, with or without copper, on markers of zinc and copper status, morbidity and growth among young Ecuadorian children [0819713]. United States -- California: University of California, Davis; 2007.

10

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT			
Structured summary	2	Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.	2
INTRODUCTION	·		
Rationale	3	Describe the rationale for the review in the context of what is already known.	3
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	3
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	3
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	3, App 1
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	App 1
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	3
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	3
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	3
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	3, 5
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	3
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I ²) for each meta-analysis. For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml	3

BMJ Open



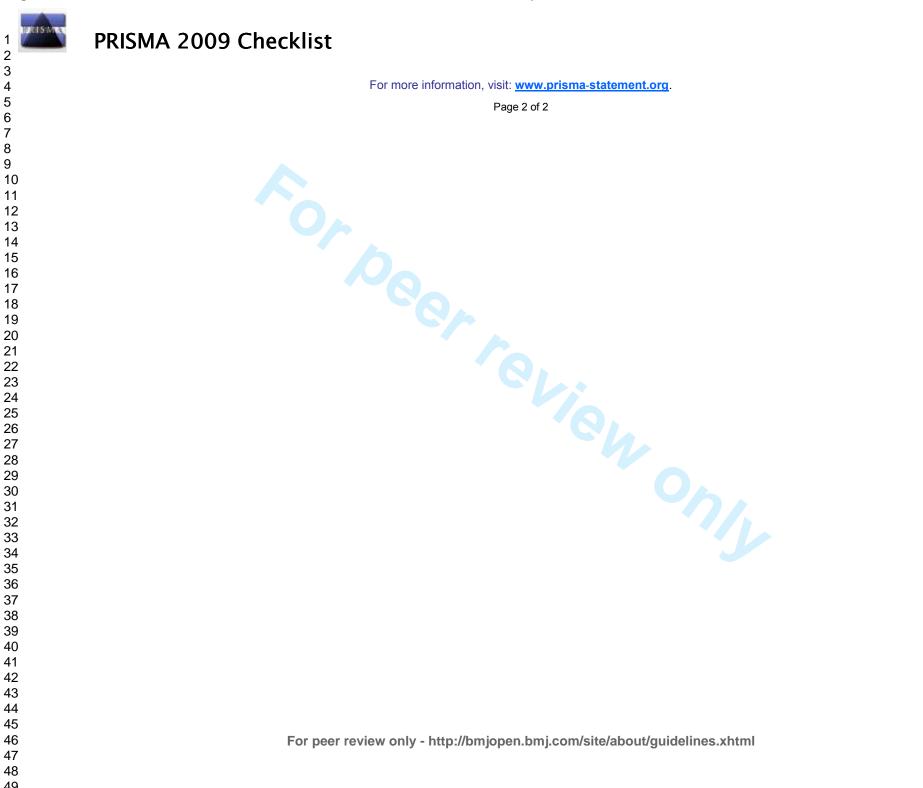
PRISMA 2009 Checklist

Pag	e 1	1 of	2

4 Page 1 of 2					
Section/topic	#	Checklist item	Reported on page #		
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).			
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.			
RESULTS					
Study selection	17	Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.	4, Fig 1		
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.			
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	App 5		
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	Fig 3 to 5, App 7		
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	4-5, Table 2-3		
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	4, Fig 2		
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	5-6, Table 4, App 6 and 8		
DISCUSSION					
Summary of evidence	24	Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).	6-7		
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	6-7		
Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	7		
FUNDING					
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	2		

46 From: Moher D, Liberati A, Tetzlaff J, Altman DG, The BRISNER Geology Profected/Bengeipe Heme for Systematic Bevieve Linde Mate Applying: The PRISMA Statement. PLoS Med 6(6): e1000097. 47 doi:10.1371/journal.pmed1000097

Page 57 of 57



BMJ Open

BMJ Open

Preventive zinc supplementation for children, and the effect of additional iron: A systematic review and meta-analysis

Journal:	BMJ Open	
Manuscript ID:	bmjopen-2013-004647.R1	
Article Type:	Research	
Date Submitted by the Author:	13-May-2014	
Complete List of Authors:	Mayo-Wilson, Evan; UCL, Clinical, Educational & Health Psychology Imdad, Aamer; SUNY Upstate Medical University, Department of Pediatrics Junior, Jean; Harvard, Medical School Dean, Sohni; Albert Einstein Medical Center, Bhutta, Zulfiqar; SickKids Center for Global Child Health,	
Primary Subject Heading :	Global health	
Secondary Subject Heading:	Nutrition and metabolism, Public health, Paediatrics	
Keywords:	PREVENTIVE MEDICINE, PUBLIC HEALTH, Clinical trials < THERAPEUTICS, Nutrition < TROPICAL MEDICINE	



1

BMJ Open

1 2 3 4 5	Preventive zinc supplementation for children, and the effect of additional iron: A systematic review and meta-analysis Evan Mayo-Wilson (DPhil), ¹ Aamer Imdad (MD), ² Jean Junior (MSc), ³ Sohni Dean (MD), ⁴ Zulfiqar A. Bhutta (PhD) ⁵
6 7 8 9 10 11 12 13	¹ Assistant Scientist Center for Clinical Trials Department of Epidemiology Johns Hopkins Bloomberg School of Public Health 615 North Wolfe Street, E6610 Baltimore, MD 21205 USA
14 15 16 17 18 19	² Pediatric Resident Department of Pediatrics SUNY Upstate Medical University Syracuse, New York USA
20 21 22 23 24 25	³ Medical Student Harvard Medical School 107 Avenue Louis Pasteur Boston, MA 02115 USA
26 27 28 29 30	 ⁴ Paediatric Resident Albert Einstein Medical Center 5501 Old York Road Philadelphia, Pennsylvania 19141 USA ⁵ Packet Harding Chainin Clabel Child Health Sind Kild Contactor for Clabel Child Health
31 32 33 34 35 36 37 38 39	⁵ Robert Harding Chair in Global Child Health, SickKids Center for Global Child Health, 555 University Avenue Toronto M5G 1X8, Canada & Founding Director Center of Excellence in Women and Child Health The Aga Khan University, Karachi, Pakistan Correspondence to: zulfiqar.bhutta@sickkids.ca
40 41 42 43 44 45 46 47	
47 48 49 50 51 52 53 54 55 56 57 58	
58 59	

ABSTRACT

Objective

Zinc deficiency is widespread, and preventive supplementation may have benefits in young children. Effects for children over 5 years of age, and effects when coadministered with other micronutrients are uncertain. These are obstacles to scale-up. This review seeks to determine if preventive supplementation reduces mortality and morbidity for children ages 6 months to 12 years.

Design

Systematic review conducted with the Cochrane Developmental, Psychosocial and Learning Problems Group. Two reviewers independently assessed studies. Meta-analyses were performed for mortality, illness, and side effects.

Data sources

We searched multiple databases, including CENTRAL and Medline in January 2013. Authors were contacted for missing information.

Eligibility criteria for selecting studies

Randomised trials of preventive zinc supplementation. Hospitalised children and children with chronic diseases were excluded.

Results

Eighty randomised trials with 205401 participants were included. There was a small but nonsignificant effect on all-cause mortality (risk ratio 0.95 [95% CI 0.86 to 1.05]). Supplementation may reduce incidence of all-cause diarrhoea (risk ratio 0.87 [0.85 to 0.89]), but there was evidence of reporting bias. There was no evidence of an effect of incidence or prevalence of respiratory infections or malaria. There was moderate quality evidence of a very small effect on linear growth (SMD 0.09 [0.06 to 0.13]) and an increase in vomiting (RR 1.29 [1.14 to 1.46]). There was no evidence of an effect on iron status. Comparing zinc with and without iron co-supplementation and direct comparisons of zinc plus iron versus zinc administered alone favoured co-intervention for some outcomes and zinc alone for other outcomes. Effects may be larger for children over one year of age, but most differences were not significant.

Conclusions

Benefits of preventive zinc supplementation may outweigh any potential adverse effects in areas where risk of zinc deficiency is high. Further research should determine optimal intervention characteristics and delivery strategies.

STRENGTHS AND LIMITATIONS OF THIS STUDY

This large review was conducted according to best practices and includes the highest quality current evidence about the effects of zinc supplementation.

We investigated several outcomes made multiple comparisons to explore the most important main effects and interactions.

The analyses in this review could not identify the best way to deliver zinc supplements to children in need.

INTRODUCTION

Regular dietary zinc intake is required because zinc cannot be produced or stored.^{1,2} In 2011, 116000 deaths in children under 5 years were attributable to zinc deficiency (1.7% of mortalities in this group).³

Previous reviews reach disparate conclusions about the benefits of zinc supplementation for young children,⁴⁻¹² and most have not examined evidence for children over 5 years of age. Zinc deficiency is prevalent in areas with other micronutrient deficiencies. Concerns about the administration of zinc with iron have been an obstacle to widespread delivery.¹³ Understanding the effects of preventive zinc supplementation alone and with iron is crucially important to the future of global health policy.

To evaluate the effects of zinc with or without iron on illness and mortality, as well as growth, we analysed direct comparisons (i.e. zinc plus iron versus zinc alone) as well as subgroups within an overall analysis.

METHODS

Selection criteria and search strategy

Following a published protocol,¹⁴ we conducted a systematic review of randomised clinical trials (RCTs) of orally administered zinc compared with placebo and non-zinc co-interventions received by both groups (e.g. vitamin A). We also compared zinc with and without iron co-supplementation. Participants were six months to 12 years of age. We excluded studies of food fortification and children who were acutely ill.

We searched African Index Medicus, CENTRAL, Conference Proceedings Citation Index, EMBASE, Global Health, ICTRP, IndMED, LILACS, MEDLINE, metaRegister of Controlled Trials, ProQuest Dissertations & Theses Database, and WHOLIS in December 2012 and January 2013 (Appendix 1). Reference lists from previous reviews and from included studies were examined, and trial authors were contacted for unpublished data. Two authors independently reviewed citations and extracted data, including participant demographics, details of the intervention, outcomes, and risk of bias.¹⁵

Data synthesis

Relative risks and 95% confidence intervals (CIs) were calculated using Mantel-Haenszel methods. Standardised mean differences (SMDs) and 95% CIs were calculated for continuous measures using Hedges *g* and combined using inverse variance methods. When studies reported data in multiple formats, we calculated the SMD and its standard error in Comprehensive Meta-Analysis (CMA) Version 2 before entering data in Review Manager (RevMan) Version 5.2. For incidence data, we combined risk ratios (events per child) and rate ratios (events per child year) because trials were relatively short and we did not anticipate interactions between the intervention and time at risk. For cluster-randomised trials, we used effects controlling for clustering, or we used a intra-cluster correlation coefficient (ICC) to estimate robust standard errors.¹⁵ We used fixed-effect methods for all meta-analyses. Effects favour intervention when the relative risk is reduced (RR<1) or the standardised difference is positive (SMD>0).

When 10 or more studies reported an outcome, we conducted subgroup analyses to explore the effects of iron co-supplementation, national income (low-income countries compared with others), stunting, age (6-12 months, more than 12 months), dose (0-5mg, 5-10mg, etc.), duration (0-6 months, 6-12 months, more than 12 months), and formulation.

Quality of the evidence

Quality of the evidence was judged independently using GRADE.¹⁶ The GRADE system rates evidence from each analysis (i.e., pooled data where possible) as "high", "moderate", "low" or "very low". A "high" rating suggests that evidence is unlikely to be affected by further studies; a "low" rating suggests that further research is required to confirm the direction and magnitude of the true effect. Ratings for meta-analyses of randomised controlled trials start at "high" and may be downgraded for threats to internal validity (i.e. within-study bias), inconsistency (i.e. heterogeneity in results across studies), indirectness (e.g. measures are proxies for the true outcome of interest), imprecision (e.g. few participants, wide confidence intervals), and reporting bias (i.e. publication bias and selective outcome reporting). Because GRADE considers several domains in addition to internal validity, confidence in overall effects may be "low" or "very low" even when all studies were conducted rigorously. The following sections include both significant and non-significant statistical results, and GRADE ratings in the text and tables provide further information about our confidence in these estimates.

RESULTS Posults of the

Results of the search

From 6384 records, 80 studies were included (Figure 1). Seventy-five studies were published in English, two each in Spanish and Portuguese, one in Chinese. Reasons for excluding 27 studies were enumerated (Appendix 2); additionally, 11 on-going studies were identified, and 5 studies could not be obtained. Seven included studies did not contribute to any meta-analysis because they did not report sufficient data (Appendix 3).

Study characteristics

Included studies assigned 205923 eligible participants (Appendix 4). Twenty trials used factorial designs; there were 100 independent comparisons isolating zinc, and co-interventions were provided to both groups in 51 comparisons. There were 8 independent comparisons of iron with zinc versus zinc alone including 1898 eligible participants. Sample sizes ranged from 21 to 72438 eligible participants (median=200). Nine studies were cluster-randomised, including two randomising households. Three studies included 88% of participants.¹⁷⁻¹⁹ Forty-six studies reported the mean baseline plasma or serum zinc concentration of their participants; the median of these mean concentrations was 72.5 μ g/dL.

Thirty-two countries are represented; most studies were conducted in low- or middle-income countries: 37 in Asia, 26 in Latin America and the Caribbean, and 10 in sub-Saharan Africa. The median of mean age at baseline was 28 months, and 22 studies included children over 5 years of age. Both stunted and non-stunted children were included in 42 studies; 5 included only stunted children, 5 included only non-stunted children, and 28 did not specify if participants were stunted.

Studies provided zinc for less than 6 months (30), 6 to 12 months (33), and 12 months or more (16). Of those reporting frequency of zinc supplementation, 48 provided zinc daily and 11 provided zinc weekly. Where reported, daily dose was 0 to 5 mg (5), 5 to 10 mg (19), 10 to 15 mg (30), 15 to 20 mg (8), and 20 mg or more (12). Studies reporting the chemical compound of their zinc supplements provided zinc as sulfate (45), gluconate (12), acetate (six), and other compounds (8). Studies comparing zinc with iron versus zinc alone provided daily dose equivalents of 3 to 36 mg of iron. Outcomes were observed for about 26 weeks (median) after randomisation, with follow-up from 2 to 80 weeks.

Risk of bias

Randomisation and allocation concealment were adequate in 34 and 32 studies; 46 and 48 studies were unclear (Figure 2). For blinding of participants and personnel, 63 studies were at low risk of bias. For blinding of outcome assessment, 65 studies were at low risk of bias. For both types of blinding, 15 studies were unclear.

For all analyses, we attempted to include all randomised study participants; 47 studies were at low risk of bias for incomplete data, 31 were unclear, and 2 were at high risk. For selective reporting, 3 studies were at low risk of bias, 44 were at unclear risk, and 32 were at high risk (Appendix 5).

Bias may affect secondary outcomes in this review, but it does not appear to be important for the primary outcome. For example, mortality and other objective measures are not vulnerable to bias related to blinding, and many missing outcomes were biomarkers or growth related.

Effects of zinc supplementation

In addition to outcomes included in the Summary of Findings Table (Table 1), we analysed results for hospitalisation; prevalence of morbidities; additional measures of growth; as well as biological indicators of zinc, haemoglobin, iron, and copper status (Table 2). Subgroup analyses compare the effects of zinc supplementation with and without iron coadministration (Table 4, Appendix 6).

Fourteen studies including 138302 participants were analysed for all-cause mortality, though other studies included no deaths in either group (Figure 3), and there was high quality evidence of a small effect (risk ratio 0.95 [0.86 to 1.05]). There were similar effects for mortality due to diarrhoea (RR 0.95 [0.69 to 1.31]), mortality due to LRTI (RR 0.86 [0.64 to 1.15]), and mortality due to malaria (RR 0.90 [0.77 to 1.06]), and the evidence for these outcomes was moderate quality.

In 25 studies including 15042 participants, there was low quality evidence of a 13% reduction in incidence of all-cause diarrhoea (Figure 4; RR 0.87 [0.85 to 0.89]). Other measures of diarrhoea were consistent with no difference or with a small reduction in morbidity, including: prevalence of all-cause

BMJ Open

diarrhoea, hospitalisation due to all-cause diarrhoea, incidence of severe diarrhoea, prevalence of severe diarrhoea, incidence of persistent diarrhoea, and prevalence of persistent diarrhoea.

In twelve trials (9610 participants), there was high quality evidence of no effect on LRTI incidence (Appendix 7; RR 1.00 [0.94 to 1.07]). One trial reported no LRTI in either group.²⁰ Results for prevalence were consistent with no difference in respiratory morbidity.

Four trials (2407 participants) found moderate quality evidence that would be consistent with no effect or a harmful effect on malaria incidence (RR 1.04 [0.94, 1.14]). One study reported no significant effect on malaria prevalence.

Fifty studies reported height for 13669 participants (Figure 5). There was moderate quality evidence of a very small but statistically significant increase in linear growth (SMD 0.09 [0.06 to 0.13]). Results for weight, weight-to-height ratio and prevalence of stunting were consistent with no difference or a small effect on growth.

Forty-six studies reported serum zinc for 9810 participants. There was evidence of a medium effect (SMD 0.62 [0.58 to 0.67]) on zinc concentration. Results consistently favoured zinc rather than no-intervention, but they were extremely inconsistent in magnitude, possibly due to differences in participants and settings (Chi²=582.45, df=47 (P <0.00001); I²=91%). Eleven studies reported serum copper for 3071 participants (1% of participants in this review). There was very low quality evidence of a small reduction in copper (SMD -0.22 [-0.29 to 0.14]); as above, the results were inconsistent (Chi²=37.47, df=10 (P <0.0002); I²=68%). There was no evidence of an effect on haemoglobin, prevalence of anaemia, or iron status.

In five trials (35192 participants) there was high quality evidence of increased vomiting (RR 1.29 [1.14 to 1.46]). Two trials reported no adverse events in either group (i.e. supplemented or non-supplemented).^{21,22} Results for study withdrawal, participants with one or more side effects, and number of vomiting episodes indicate some short-term side effects; there was no evidence of serious adverse events.

Effects of zinc plus iron compared with zinc alone

Effects on mortality were not significantly different between subgroups with and without iron $(Chi^2=1.30, p=0.25)$; however, there was no mortality effect in groups receiving iron (RR 0.99 [0.86 to 1.15]) while the effect for groups that did not receive iron was nearly significant (RR 0.89 [0.79 to 1.00]). Effects on incidence of diarrhoea differed between groups (Figure 4; Chi^2=65.11, p<0.00001), with no benefit for the group that received iron (RR 1.00 [0.96 to 1.05]) and a significant benefit for the group that receive iron (RR 0.82 [0.80 to 0.84]). There were significant effects with and without iron co-supplementation on zinc status; these were greater in the studies without iron for serum zinc (Chi^2=27.07, p<0.00001) and prevalence of zinc deficiency (Chi^2=34.27, p<0.00001). There were also differences between these groups of studies for serum ferritin and serum copper; zinc had no effect in studies with iron co-intervention, but zinc without iron co-intervention reduced ferritin and copper. Overall effects on growth were small; there was a significant difference between subgroups for height but not weight, and the difference for weight-to-height ratio favoured the group that received iron (i.e. the opposite of other results). There were no significant effects in either subgroup for lower respiratory tract infections, serum haemoglobin, prevalence of anaemia, or prevalence of iron deficiency.

Several trials compared zinc coadministered with iron versus zinc given alone (Appendix 6). One trial reported no significant difference in all-cause mortality (323 participants; RR 0.33 [0.01 to 8.39]). In five trials (1530 participants), effects on incidence of all-cause diarrhoea favoured zinc alone (RR 1.10 [1.03 to 1.18]). In one trial (399 participants), effects on prevalence of all-cause diarrhoea favoured zinc with iron, but this was not significant (RR 0.90 [0.79 to 1.06]). Five trials (1329 participants) reported no difference in height (SMD 0.06 [-0.04 to 0.16]). There was similarly low quality evidence and mixed results for other outcomes (Table 3).

Additional subgroup analyses

Studies in high-income countries did not evaluate most outcomes, so we were unable to explore differences in effect by national income. Effects on weight and weight-to-height ratio were not statistically different, and there was no evidence of consistent differences in biological outcomes (Appendix 6).

Most studies included both stunted and non-stunted children, and it was not possible to compare effects between studies for most outcomes. Differences between groups were not significant for growth, but these would be consistent with larger effects in studies of stunted children.

Age was not significantly associated with effects on mortality or incidence diarrhoea, but results would be consistent with greater benefits in children over 1 year of age (Figure 3). Effects on weight were greatest in studies of older children, and there was a similar pattern for height, though the largest study of children over 5 years of age included only 804 participants. The effect of supplementation on zinc deficiency was greater in studies of older children, as was the negative effect on copper. There was no evidence of consistent differences in other biological outcomes.

Dose was not significantly associated with effects on mortality, incidence of LRTI, haemoglobin, or weight-to-height ratio. The pattern of results was inconsistent for incidence and prevalence of diarrhoea, height, weight, and plasma ferritin (Appendix 6). Subgroups were significantly different for serum zinc, prevalence of zinc deficiency, prevalence of iron deficiency, and plasma copper; only these results are consistent with a dose-response relationship.

Duration of supplementation was not significantly associated with effects on mortality, incidence of diarrhoea, incidence of LRTI, or weight-to-height ratio, or prevalence of iron deficiency (Appendix 6). There was a significant difference for prevalence of diarrhoea, but the magnitude of this difference may not be important. Studies of longer supplementation were associated with greater effects on height; the pattern of results was not consistent for weight. By contrast, the largest benefits for biological markers (serum zinc and prevalence of zinc deficiency) were reported in the shortest studies.

Formulation was associated with differences among subgroups, though few studies included capsules or powder. Comparing solution and tablets, differences were not significant for mortality, incidence and prevalence of diarrhoea, incidence of LRTI, blood haemoglobin, prevalence of anaemia, or prevalence of iron deficiency. There were significant differences in the effects of serum ferritin and serum copper, but only three studies of each outcome used tablets, and they were highly heterogeneous. Effects on height, weight, and serum zinc were greater in studies using solution compared with tablet, but all effects were small (Appendix 6).

Reporting bias

For outcomes included in the Summary of Findings Table with 10 or more studies, we also conducted a trim-and-fill analysis to investigate reporting bias (Appendix 8).²³ There was some evidence of small study bias—studies were trimmed for all-cause mortality (1 trimmed) and incidence of all-cause diarrhoea (13 trimmed; Figure 6). None were trimmed for incidence of LRTI, nor were any trimmed for height. The adjusted effect for mortality was not importantly different from the observed effect, but the observed effect for diarrhoea (RR 0.87 [0.85 to 0.89]) was larger than the adjusted value (RR 0.95 [0.93 to 0.97]).

DISCUSSION

Consistent with previous reviews, this review finds high quality evidence from several large, wellconducted trials.^{5,7,10} We believe that these results suggest zinc supplementation is probably associated with a small reduction in all-cause mortality for children at risk of deficiency. In interpreting these results, we considered that the results of this meta-analysis are drawn from 13 trials including almost 140,000 participants. The results of those studies are statistically consistent, the overall confidence intervals are relatively small, and the balance of probability favours zinc supplementation rather than placebo. Small reductions in cause-specific mortality were consistent with effects on illness and cause-specific mortality, and the results were biologically plausible. Benefits in any specific are may be related to level of deficiency; countries with very high levels of deficiency could expect the largest reductions in mortality as a result of supplementation.²⁴ This review also suggests that benefits may not be restricted to young children; there is some evidence of benefits on secondary outcomes in trials including children over 5 years of age, but there is a lack of evidence about effects on mortality in this group.

Results for secondary outcomes suggest modest benefits. Main results for diarrhoea morbidity were consistent with previous reviews,^{4,5,7,10} but an asymmetrical funnel plot was indicative of small-study bias. After adjustment, the effect for diarrhoea was halved, and the reduced estimate was consistent with other critical outcomes in this review. Previous reviews have also suggested beneficial effects on respiratory infections^{4,5,9-12} and malaria,¹⁰ which this review does not confirm. Previous reviews have reported variable effects on growth;^{5,6,8} this review suggests that preventive zinc supplementation

alone is unlikely to have large effects on linear growth and morbidity. Supplementation is associated with increased risk of vomiting, but there is no evidence of lasting adverse effects.

Critical outcomes included data for 2407 to 138302 participants, so further placebo-controlled trials of preventive zinc supplementation for young children may not be necessary. However, subgroup analyses did not identify an optimal supplementation strategy (i.e. dose, formulation, and frequency), and large trials comparing active interventions could inform clinical guidelines. Subgroup analyses identify some sources of observed heterogeneity; however, subgroups that were statistically different included a large amount of residual heterogeneity, which is reflected in our judgements about the quality of the evidence (Table 1). Analyses of group-level data are of limited value for identifying moderators, particularly in analyses dominated by a few large studies. Further analyses of individual patient data would be more conclusive.

Effects on biological indicators were inconsistent across studies, but large effects on these measures were not always reflected in clinical outcomes. Supplementation may increase serum zinc, but the magnitude of the effect appears to differ across populations and interventions. Effects on other micronutrients, including iron and copper, are uncertain. Researchers have suggested that iron supplementation may interfere with the absorption of zinc and, conversely, that zinc may interfere with iron and copper absorption;^{25,26} however, the relationships between these biomarkers and clinical outcomes (i.e. mortality and morbidities) have not been established.

Subgroup analyses comparing zinc with and without iron did not resolve uncertainty about the effect of co-supplementation. Only four studies with iron co-supplementation reported mortality outcomes, and evidence of outcome reporting bias for diarrhoea incidence leads to cautious interpretation of differences in this outcome. There was no evidence that larger doses or increased duration were associated with increased iron deficiency, but these comparisons are observational and could be affected by uncontrolled covariates.

Direct comparisons within trials provide the only experimental evidence about the effects of cosupplementation with iron. For rare events like mortality, effects of zinc and iron can only be detected in large studies, so studies of interaction effects will need to be very large to detect real differences. Future studies are needed to identify main effects and to explore how administration (i.e. separate or combined) affects uptake and costs.

Dietary intake and supplementation have reduced micronutrient deficiencies in Asia, but micronutrient deficiencies remain common.^{3,27} The prevalence of micronutrient deficiencies is declining in Africa, but the absolute number of deficient children is increasing.³ This review suggests that the overall benefits of preventive zinc supplementation outweigh potential harms in areas with a high risk of zinc deficiency. Further research is needed to determine if these benefits extend to children over 5 years of age. Current estimates suggest that delivering 10 evidence-based nutrition-specific interventions, including preventive zinc supplements, could reduce global mortality in children under 5 years of age by 15%.²⁸ To that end, research is needed to identify the most effective strategies for delivering zinc supplements to populations in need.²⁹



Acknowledgements

We thank the Cochrane Developmental Psychosocial and Learning Problems Group, particularly: Margaret Anderson helped develop and conduct the searches; Laura MacDonald, Joanne Wilson, and Geraldine Macdonald assisted with the preparation of the protocol and review; Geraldine Macdonald provided detailed comments on the protocol and completed review. The Cochrane Methods Group provided statistical advice and assistance. Chris Champion extracted one study in Portuguese. Evelyn S Chan, Xin Hui Chan, Jai Das, and Aneil Jaswal extracted study data.

Contributors

All authors contributed to the background. EMW and JJ were responsible for the methods. JJ executed the first literature search, and EMW and AI executed the update. JJ, EMW, AI, and EC reviewed citations for inclusion. JJ, EMW, AI, SD, XHC, and AJ extracted data. JJ and EMW entered outcome data into RevMan and analysed the data. EMW, JJ, and AI wrote the results and discussion. EMW and AI drafted the summary of findings table, which was agreed on by all authors. ZB contributed to the writing and interpretation of findings. EMW is the guarantor.

Funding

No funding bodies had any role in study design, data collection and analysis, decision to publish, or preparation of the manuscript. We received internal support from the Department of Epidemiology, Johns Hopkins Bloomberg School of Public Health (US); Centre for Outcomes Research and Effectiveness (CORE), Research Department of Clinical, Educational & Health Psychology, University College London (UK); the Centre for Evidence Based Intervention, Department of Social Policy and Intervention, University of Oxford (UK); and the Division of Women and Child Health, Aga Khan University Hospital (PK).

Competing interests

All authors have completed the ICMJE uniform disclosure form at <u>www.icmje.org/coi_disclosure.pdf</u> (available on request from the corresponding author) and declare: no support from any organisation for the submitted work; no financial relationships with any organisations that might have an interest in the submitted work in the previous three years. ZAB is an author of some of the included trials. ZAB and AI have published previous reviews about zinc.

Ethical approval

Not required.

Data sharing

Data are provided in the appendices and available from the authors upon request.

APPENDICIES

Appendix 1: Electronic searches Appendix 2: Excluded studies Appendix 3: On-going studies Appendix 4: Included studies Appendix 5: Risk of bias Appendix 6: Subgroup analyses Appendix 7: Additional forest plots Appendix 8: Tests for reporting bias

Page 9 of 51

BMJ Open

1 2 3 4 5 6 7 8	Figure legends Figure 1: PRISMA flowchart Figure 2: Risk of bias summary Figure 3: All-cause mortality by age Figure 4: Incidence of all cause diarrhoea with and without iron co-supplementation Figure 5: Height Figure 6: Incidence of diarrhoea funnel plot (trim-and-fill analysis)
9 10	
11 12	
13 14	
15	
16 17	
18	
19 20	
21	
22 23	
24 25	
25 26	
27 28	
29	
30 31	
32	
33 34	
35 36	
37	
38 39	
40	
41 42	
43	
44 45	
46 47	
48	
49 50	
51	
52 53	
54	

REFERENCES

1. Hotz C BK. International Zinc Nutrition Consultative Group (IZiNCG). Assessment of the risk of zinc deficiency in populations and options for its control. Food and Nutrition Bulletin. 2004; **25**((1 Suppl 2)): S94-203.

2. Maggini S, Wenzlaff S, Hornig D. Essential role of vitamin C and zinc in child immunity and health. The Journal of international medical research. 2010; **38**(2): 386-414.

3. Black RE, Victora CG, Walker SP, et al. Maternal and child undernutrition and overweight in low-income and middle-income countries. Lancet. 2013; **382**(9890): 427-51.

4. Aggarwal R, Sentz J, Miller MA. Role of zinc administration in prevention of childhood diarrhea and respiratory illnesses: a meta-analysis. Pediatrics. 2007; **119**(6): 1120-30.

5. Brown KH PJ, Baker SK, Hess SY. Preventive zinc supplementation among infants, preschoolers, and older prepubertal children. Food and Nutrition Bulletin. 2009; **30**(1): S12-40.

6. Imdad A, Bhutta ZA. Effect of preventive zinc supplementation on linear growth in children under 5 years of age in developing countries: a meta-analysis of studies for input to the lives saved tool. BMC Public Health. 2011; **11 Suppl 3**: S22.

7. Patel A MM, Badhoniya N, Kulkarni H. What zinc supplementation does and does not achieve in diarrhea prevention: a systematic review and meta-analysis. BMC Infectious Diseases 2011; (11): 122.

8. Ramakrishnan U, Nguyen P, Martorell R. Effects of micronutrients on growth of children under 5 y of age: meta-analyses of single and multiple nutrient interventions. American Journal of Clinical Nutrition. 2009; **89**(1): 191-203.

9. Roth DE, Richard SA, Black RE. Zinc supplementation for the prevention of acute lower respiratory infection in children in developing countries: meta-analysis and meta-regression of randomized trials. International Journal of Epidemiology. 2010; **39**(3): 795-808.

10. Yakoob MY, Theodoratou E, Jabeen A, et al. Preventive zinc supplementation in developing countries: impact on mortality and morbidity due to diarrhea, pneumonia and malaria. (Special Issue: Technical inputs, enhancements and applications of the Lives Saved Tool (LiST).). BMC Public Health. 2011; **11**(Suppl. 3): S23.

11. Bhutta ZA, Black RE, Brown KH, et al. Prevention of diarrhea and pneumonia by zinc supplementation in children in developing countries: pooled analysis of randomized controlled trials. Zinc Investigators' Collaborative Group. Journal of Pediatrics. 1999; **135**(6): 689-97.

12. Lassi ZS, Haider BA, Bhutta ZA. Zinc supplementation for the prevention of pneumonia in children aged 2 months to 59 months. Cochrane Database of Systematic Reviews. 2010; (12): CD005978.

13. Pasricha S-R, Hayes E, Kalumba K, et al. Effect of daily iron supplementation on health in children aged 4—23 months: a systematic review and meta-analysis of randomised controlled trials. The Lancet Global Health. 2013; 1(2): e77-86.

14. Junior JA, Dean S, Mayo-Wilson E, et al. Zinc supplementation for preventing mortality and morbidity, and promoting growth, in children aged 6 months to 12 years of age (Protocol). Cochrane Database of Systematic Reviews. 2011; **10**: Art. No.: CD009384. DOI: 10.1002/14651858.CD009384.

15. Higgins JP, Green S. Cochrane Handbook for Systematic Reviews of Interventions. Version 5.1.0 [updated March 2011]: The Cochrane Collaboration; 2011.

16. Balshem H, Helfand M, Schunemann HJ, et al. GRADE guidelines: 3. Rating the quality of evidence. Journal of Clinical Epidemiology. 2011; **64**(4): 401-6.

17. Bhandari N, Taneja S, Mazumder S, et al. Adding zinc to supplemental iron and folic acid does not affect mortality and severe morbidity in young children. Journal of Nutrition. 2007; **137**(1): 112-7.

18. Sazawal S, Black RE, Ramsan M, et al. Effects of routine prophylactic supplementation with iron and folic acid on admission to hospital and mortality in preschool children in a high malaria transmission setting: community-based, randomised, placebo-controlled trial.[Erratum appears in Lancet. 2006 Jan 28;367(9507):302]. Lancet. 2006; **367**(9505): 133-43.

19. Tielsch JM, Khatry SK, Stoltzfus RJ, et al. Effect of routine prophylactic supplementation with iron and folic acid on preschool child mortality in southern Nepal: community-based, cluster-randomised, placebo-controlled trial. Lancet. 2006; **367**(9505): 144-52.

20. Sempertegui F, Estrella B, Correa E, et al. Effects of short-term zinc supplementation on cellular immunity, respiratory symptoms, and growth of malnourished Equadorian children. European Journal of Clinical Nutrition. 1996; **50**(1): 42-6.

21. Alarcon K, Kolsteren PW, Prada AM, et al. Effects of separate delivery of zinc or zinc and vitamin A on hemoglobin response, growth, and diarrhea in young Peruvian children receiving iron therapy for anemia. American Journal of Clinical Nutrition. 2004; **80**(5): 1276-82.

22. Mazariegos M, Hambidge KM, Westcott JE, et al. Neither a zinc supplement nor phytate-reduced maize nor their combination enhance growth of 6- to 12-month-old Guatemalan infants. Journal of Nutrition. 2010; **140**(5): 1041-8.

23. Duval S, Tweedie R. Trim and fill: A simple funnel-plot-based method of testing and adjusting for publication bias in meta-analysis. Biometrics. 2000; **56**(2): 455-63.

24. Wessells KR, Brown KH. Estimating the global prevalence of zinc deficiency: results based on zinc availability in national food supplies and the prevalence of stunting. PLoS ONE. 2012; 7(11): e50568.

25. Maret W, Sandstead HH. Zinc requirements and the risks and benefits of zinc supplementation. J Trace Elem Med Biol. 2006; **20**(1): 3-18.

26. Sandstrom B. Micronutrient interactions: effects on absorption and bioavailability. The British journal of nutrition. 2001; **85 Suppl 2**: S181-5.

27. Ram U, Jha P, Ram F, et al. Neonatal, 1–59 month, and under-5 mortality in 597 Indian districts, 2001 to 2012: estimates from national demographic and mortality surveys. The Lancet Global Health. 2013; **Online first**.

28. Bhutta ZA, Das JK, Rizvi A, et al. Evidence-based interventions for improvement of maternal and child nutrition: what can be done and at what cost? Lancet. 2013; **382**(9890): 452-77.

29. Wazny K, Zipursky A, Black R, et al. Setting research priorities to reduce mortality and morbidity of childhood diarrhoeal disease in the next 15 years. PLoS Medicine. 2013; **10**(5): e1001446.

Outcomes	Illustrative comparat	ive risks* (95% CI)	Relative effect (95% CI)	No of Participants (studies)	Quality of the evidence (GRADE)
	Assumed risk	Corresponding risk			
	Control	Zinc			
All-cause mortality	Low		RR 0.95	138,302	$\oplus \oplus \oplus \oplus$
Follow-up: 17 to 72 weeks	2,400 per 1,000,000	2,280 per 1,000,000 (2,064 to 2,520)	(0.86 to 1.05)	(13 studies)	high
	High				
	34,900 per 1,000,000	33,155 per 1,000,000 (30,014 to 36,645)			
Mortality due to	Low		RR .95	132,321	$\oplus \oplus \oplus \ominus$ moderate ¹
all-cause diarrhoea Follow-up: 52 to 69 weeks	800 per 1,000,000	760 per 1,000,000 (552 to 1,048)	(0.69 to 1.31)	(4 studies)	
	High				
	3,000 per 1,000,000 2,850 per 1,000,000 (2,070 to 3,930)				
Mortality due to	Low		RR 0.86 (0.64 to 1.15)	132,063 (3 studies)	$\oplus \oplus \oplus \ominus$ moderate ¹
LRTI Follow-up: 52 to 69 weeks	1,200 per 1,000,000	1,032 per 1,000,000 (768 to 1,380)			
	High				
	3,000 per 1,000,000	2,580 per 1,000,000 (1,920 to 3,450)			
Mortality due to	Low		RR 0.90	42,818	$\oplus \oplus \oplus \ominus$ moderate ¹
malaria Follow-up: 46 to 69 weeks	7,400 per 1,000,000	6,660 per 1,000,000 (5,698 to 7,844)	(0.77 to 1.06)	(2 study)	
	High				
	14,200 per 1,000,000	12,780 per 1,000,000 (10,934 to 15,052)			
Incidence of all-	Low		RR 0.87	15,042 (35 studies)	$ \bigoplus \bigoplus \ominus \ominus \\ low^{2,3} $
cause diarrhoea Follow-up: 12 to 72 weeks	20,000 per 1,000,000	17,400 per 1,000,000 (17,000 to 17,800)	(0.85 to 0.89)		
72 WCCKS	High				
	1,770,000 per 1,000,000	1,539,900 per 1,000,000 (1,504,500 to			
		1,575,300)			
Incidence of LRTI Follow-up: 12 to			RR 1.00 (0.94 to 1.07)	9,610 (12 studies)	⊕⊕⊕⊕ high
52 weeks	30,000 per 1,000,000	30,000 per 1,000,000 (28,200 to 32,100)	(0.74 10 1.07)	(12 studies)	шуп
	High	270 000 1 000 000			
	370,000 per 1,000,000	370,000 per 1,000,000 (347,800 to 395,900)			
Incidence of	Low		RR 1.05	2,407	$\oplus \oplus \oplus \Theta$
malaria Follow-up: 24 to 47 weeks	140,000 per 1,000,000	147,000 per 1,000,000 (133,000 to 161,000)	(0.95 to 1.15)	(4 studies)	moderate ⁴
	High				
	2,950,000 per 1,000,000	3,097,500 per 1,000,000 (2,802,500 to 3,392,500)			
Height	The mean height in	The mean height in the	SMD 0.09	13,669	$\oplus \oplus \oplus \Theta$
Follow-up: 10 to	the control groups	intervention groups	(0.06 to 0.13)	(51 studies)	moderate ⁵
60 weeks	was -1 HAZ	was 0.1 HAZ better (0 to 0.2 better)			
Participants with 1	Low		RR 1.29	35,192	$\oplus \oplus \oplus \oplus$
vomiting episode Follow-up: 24 to 52 weeks	17,500 per 1,000,000	22,575 per 1,000,000 (19,950 to 25,550)	(1.14 to 1.46)	(4 studies)	high
	High				
	300,600 per 1,000,000	387,774 per 1,000,000 (342,684 to 438,876)			

*The basis for the assumed risk (e.g. the median control group risk across studies) is provided in footnotes. The corresponding risk (and its 95% confidence interval) is based on the assumed risk in the comparison group and the relative effect of the intervention (and its 95% CI).

CI: Confidence interval; RR: Risk ratio; SMD: Standardised Mean Difference

GRADE Working Group grades of evidence

Very low quality: We are very uncertain about the estimate.

may change the estimate.

Footnotes

 2 I²=88%

⁴ I²=44%

⁵ I²=86%

is likely to change the estimate.

¹ Few deaths observed overall.

1

2

High quality: Further research is very unlikely to change our confidence in the estimate of effect.

³ Trim and fill analysis suggests the effect may be overestimated due to publication bias.

Moderate quality: Further research is likely to have an important impact on our confidence in the estimate of effect and

Low quality: Further research is very likely to have an important impact on our confidence in the estimate of effect and

3	
4	
5	
6	
5 6 7 8	
1	
8	
۵	
10	
10	
11	
12	
12	
13	
14	
15	
40	
10	
17	
18	
9 10 11 12 13 14 15 16 17 18 19	
19	
20	
20 21	
22	
22	
23	
24	
22 23 24 25 26 27 28 29	
20	
26	
27	
28	
20	
29	
30	
31	
22	
32	
33	
34	
35	
35	
36	
37	
20	
30	
31 32 33 34 35 36 37 38 39	
40	
41	
42	
43	
44	
45	
46	
47	
48	
49	
50	
51	
52	
53	
54	
55	
56	
57	
58	
59	

60

to been tellien only

Table 2: Zinc compared with no zinc (all outcome
--

Outcomes	Trials	People	ES (95% CI), fixed effects	Heterogeneity
ZINC VERSUS NO ZINC		•	× //	I ² ; Chi ² (p value)
<u>ZINC VERSUS NO ZINC</u> Mortality				
•	13 (16%)	138302 (67%)	Risk=0.95 (0.86 to 1.05)	0%; 10.57 (p=0.65)
Due to diarrhoea		132321 (64%)	Risk=0.95 (0.69 to 1.31)	0%; 0.82 (p=0.84)
Due to LRTI		132063 (64%)	Risk=0.86 (0.64 to 1.15)	0%; 0.07 (p=0.96)
Due to malaria		42818 (21%)	Risk=0.90 (0.77 to 1.06)	0%; 0.01 (p=0.94)
Hospitalisation				
All-cause	7 (9%)	92872 (45%)	Risk=1.04 (0.97 to 1.11)	44%; 14.41 (p=0.07)
Due to diarrhoea	4 (5%)	74039 (36%)	Risk=1.03 (0.87 to 1.22)	42%; 6.91 (p=0.14)
Due to LRTI	3 (4%)	74743 (36%)	Risk=1.10 (0.93 to 1.30)	0%; 0.35 (p=0.95)
Diarrhoea				
Incidence (all cause)		15042 (7%)	Risk=0.87 (0.85 to 0.89)	88%; 295.56 (p<0.00001)
Prevalence (all cause)	· · · ·	8519 (4%)	Rate=0.88 (0.86 to 0.90)	88%; 118.88 (p<0.00001)
Incidence (severe)		4982 (2%)	Risk=0.89 (0.84 to 0.95)	56%; 13.54 (p=0.04)
Incidence (persistent)		6216 (3%)	Risk=0.73 (0.62 to 0.85)	61%; 20.47 (p=0.009)
Prevalence (persistent)		666 (0%)	Rate=0.70 (0.64 to 0.76)	91%; 11.76 (p=0.0006)
Lower respiratory tract infe	12 (15%)	0610 (5%)	$P_{isk} = 1.00 (0.94 to 1.07)$	1%; 17.16 (p=0.44)
Prevalence		9610 (5%) 1955 (1%)	Risk=1.00 (0.94 to 1.07) Rate=1.20 (1.10 to 1.30)	97%; 89.87 (p<0.00001)
Malaria	3 (4%)	1955 (1%)	Rate-1.20 (1.10 to 1.30)	97%, 89.87 (p<0.00001)
Incidence	4 (5%)	2407 (1%)	Risk=1.05 (0.95 to 1.15)	0%; 2.04 (p=0.84)
Prevalence		661 (0%)	Risk $=1.03 (0.93 \text{ to } 1.13)$ Rate $=0.88 (0.47 \text{ to } 1.64)$	Not applicable
Growth	1 (1/0)	001 (070)	101.04/	
	51 (64%)	13669 (7%)	SMD=0.09 (0.06 to 0.13)	86%; 407.92 (p<0.00001)
	44 (55%)	12305 (6%)	SMD=0.10 (0.07 to 0.14)	76%; 216.64 (p<0.00001)
Weight-to-height ratio	(· · · / /	7901 (4%)	SMD=0.05 (0.01 to 0.10)	20%; 34.96 (p=0.17)
Prevalence of stunting		3838 (2%)	Risk=0. 94 (0.86 to 1.02)	59%; 19.43 (p=0.01)
Adverse events				
Participants with 1 AE	2 (3%)	850 (0%)	SMD=1.13 (1.00 to 1.27)	0%; 0.49 (p=0.78)
Study withdrawal	6 (8%)	4263 (2%)	Risk=1.75 (0.93 to 3.32)	21%; 5.07 (p=0.28)
Vomiting (incidence)		4095 (2%)	Risk=1.68 (1.61 to 1.75)	85%; 34.28 (p<0.00001)
Vomiting (prevalence)	4 (5%)	35192 (17%)	Rate=1.29 (1.14 to 1.46)	37%; 6.31 (p=0.18)
Biological indicators				
Zn concentration		9810 (5%)	SMD=0.62 (0.58 to 0.67)	91%; 582.45 (p<0.00001)
Zn deficiency (prevalence)		5434 (3%)	Risk=0.49 (0.45 to 0.53)	86%; 144.77 (p<0.00001)
Haemoglobin concentration		6024 (3%) 4287 (2%)	SMD=-0.05 (-0.10 to 0.00)	45%; 63.96 (p=0.002)
Anemia (prevalence)		4287 (2%)	Risk=1.00 (0.95 to 1.06)	37%; 28.52 (p=0.05)
Fe concentration Fe deficiency (prevalence)		4474 (2%) 3149 (2%)	SMD=0.07 (0.00 to 0.13) Risk=0.99 (0.89 to 1.10)	95%; 480.50 (p<0.00001) 15%; 16.44 (p=0.29)
Cu concentration		3071 (1%)	SMD=-0.22 (-0.29 to 0.14)	68%; 37.47 (p=0.0002)
Cu deficiency (prevalence)		1337 (1%)	Risk=2.64 (1.28 to 5.42)	59%; 4.94 (p=0.08)
eu denerene) (prevarenee)	5 (1/0)	1007 (170)		<i>by ro</i> , <i>iii</i> (p 0.00)

Outcomes	Trials	People	ES (95% CI), fixed effects	Heterogeneity I ² ; Chi ² (p value)
All cause mortality	1 (13%)	323 (17%)	Risk=0.33 (0.01 to 8.31)	Not applicable
Hospitalisation				
All-cause	1 (13%)	399 (21%)	Risk=0.92 (0.45 to 1.89)	Not applicable
Due to diarrhoea	1 (13%)	399 (21%)	Risk=0.99 (0.25 to 3.88)	Not applicable
Diarrhoea				
Incidence (all cause)	5 (63%)	1530 (81%)	Risk=1.10 (1.03 to 1.18)	76%; 16.92 (p=0.002)
Prevalence (all cause)	1 (13%)	399 (21%)	Rate=0.90 (0.79 to 1.06)	Not applicable
Incidence (severe)	1 (13%)	323 (17%)	Rate=0.78 (0.59 to 1.04)	Not applicable
Lower respiratory tract infe	ection			
Incidence	3 (38%)	1065 (56%)	Risk=0.93 (0.83 to 1.04)	21%; 2.52 (p=0.28)
Malaria				
Incidence	1 (13%)	410 (22%)	Rate=0.86 (0.59 to 1.24)	Not applicable
Growth				
Height	5 (63%)	1517 (80%)	SMD=0.06 (-0.04 to 0.16)	0%; 3.54 (p=0.47)
Weight	4 (50%)	910 (48%)	SMD=0.12 (-0.01 to 0.25)	0%; 2.29 (p=0.51)
Weight-to-height ratio	4 (50%)	514 (27%)	SMD=-0.06 (-0.07 to 0.19)	0%; 1.36 (p=0.71)
Prevalence of stunting	2 (25%)	462 (24%)	Risk=0.92 (0.85 to 0.99)	45%; 1.82 (p=0.18)
Adverse events				
Study withdrawal	2 (25%)	557 (29%)	Risk=1.41 (0.91 to 2.18)	0%; 0.08 (p=0.78)
Biological indicators				
Zn concentration	8 (100%)	1337 (70%)	SMD=0.16 (0.05 to 0.27)	61%; 17.84 (p=0.01)
Zn deficiency (prevalence)	3 (38%)	350 (18%)	Risk =1.42 (0.75 to 2.68)	5%; 2.10 (p=0.35)
Haemoglobin concentration		1341 (71%)	SMD=-0.23 (-0.34 to -0.12)	79%; 33.53 (p<0.0001)
Anemia (prevalence)	3 (38%)	482 (25%)	Risk=0.78 (0.67 to 0.92)	0%; 1.25 (p=0.54)
Fe concentration	6 (75%)	9 <mark>45</mark> (50%)	SMD=-1.79 (-1.99 to -1.56)	99%; 927.92 (p<0.00001)
Fe deficiency (prevalence)	2 (25%)	248 (13%)	Risk =0.12 (0.04 to 0.32)	87%; 8.00 (p=0.005)
Cu concentration		353 (19%)	SMD=-0.06 (-0.27 to 0.15)	0%; 0.11 (p=0.74)

Rate ratio (Rate); Risk ratio (Risk); Odds Ratio (Odds); Standardised Mean Difference (SMD)

Zinc (Zn); Iron (Fe); Copper (Cu).

Effects favour intervention (i.e. zinc rather than iron; zinc plus iron rather than zinc alone) when the relative risk is reduced (RR<1) or the standardised difference is positive (SMD>0).

Subgroup	Trials	People	Risk Ratio (95% CI), fixed	I ² ; Chi ² (p value)
Mortality	13	138302	0.95 (0.86 to 1.05)	0%; 10.57 (p=0.65)
Iron co-supplementation (I				
with iron		99242	0.99 (0.86 to 1.15)	0%; 0.76 (p=0.86)
without iron		64985	0.89 (0.79 to 1.00)	0%; 9.99 (p=0.44)
Age (I ² =59.8%; Chi ² =2.48,		20070		00(0.5(0.77)
6m to 1y		29879 125903	1.06 (0.88 to 1.27)	0%; 2.56 (p=0.77)
$\frac{ly \text{ to } 5y}{Dose (I^2=0\%; Chi^2=2.64, p)}$		123903	0.89 (0.80 to 0.99)	12%; 10.28 (p=0.33)
0mg to 5mg	,	717	0.72 (0.08 to 6.47)	29%; 1.41 (p=0.23)
5mg to 10mg		274	3.04 (0.32 to 28.90)	Not applicable
10mg to 15mg		152062	0.93 (0.84 to 1.02)	0%; 8.16 (p=0.61)
20mg or more		2464	0.14 (0.01 to 2.78)	Not applicable
Duration (I ² =0%; Chi ² =1.2		-		The second secon
0m to 6m	· • • •	2817	0.59 (0.07 to 5.15)	47%; 1.88. (p=0.17.)
6m to 12m	7	3898	0.68 (0.37 to 1.25)	4%; 6.23 (p=0.40)
12m or more		148802	0.93 (0.85 to 1.03)	0%; 2.91 (p=0.71)
Formulation (I ² =0%; Chi ² =	· •	/		
Solution		3639	0.99 (0.25 to 3.91)	15%; 4.68 (p=0.32)
Pill/ tablet		149854	0.93 (0.85 to 1.02)	0%; 6.99 (p=0.43)
Capsule		306	0.51 (0.05 to 5.60)	Not applicable
Powder	1	1718	0.71 (0.27 to 1.86)	Not applicable
Incidence of diarrhoea	35	15042	0.87 (0.85 to 0.89)	88%; 295.56 (p<0.00001)
Iron co-supplementation (0070; 275.50 (p <0.00001)
with iron	10	4299	1.00 (0.96 to 1.05)	76%; 37.33 (p<0.00001)
without iron	22	11344	0.82 (0.80 to 0.84)	87%; 196.27 (p<0.00001)
Age (I ² =0%; Chi ² =0.32, p=	=0.85)			· · · ·
6m to 1y	10	5576	0.88 (0.85 to 0.90)	95%; 252.46 (p<0.00001)
ly to 5y	15	8370	0.87 (0.84 to 0.90)	43%; 31.48 (p=0.03)
5y to 13y	1	842	0.90 (0.81 to 0.98)	Not applicable
Dose (I ² =98%; Chi ² =195.6	1	/		
0mg to 5mg	4	1784	0.95 (0.89 to 1.01)	73%; 22.46 (p=0.001)
5mg to 10mg	6	2630	0.73 (0.64 to 0.83)	67%; 15.32 (p=0.009)
10mg to 15mg 15mg to 20mg	11 2	5452 477	0.96 (0.92 to 0.99) 0.61 (0.58 to 0.65)	69%; 38.39 (p=0.0001) 0%; 0.21 (p<0.00001)
20mg or more	6	4931	0.90 (0.87 to 0.94)	75%; 28.17 (p<0.00001)
Duration (I ² =0%; Chi ² =1.			0.90 (0.07 10 0.94)	7570, 2017 (p <0.00001)
Om to 6m	7 7	4190	0.89 (0.85 to 0.93)	57%; 16.42 (p=0.02)
6m to 12m	14	8971	0.86 (0.84 to 0.89)	93%; 250.92 (p<0.00001)
12m or more	5	1881	0.88 (0.82 to 0.95)	73%; 29.82 (p=0.0002)
Formulation (I ² =94%; Chi	² =51.34, p	< 0.00001)		, a ,
Solution	19	10768	0.84 (0.82 to 0.86)	90%; 236.48 (p<0.00001)
Pill/ tablet	3	1696	0.90 (0.81 to 0.99)	5%; 3.15 (p=0.37)
Capsule	1	612	0.78 (0.60 to 1.01)	Not applicable
Powder	2	1861	1.04 (0.98 to 1.09)	0%; 0.65 (p=0.42)

1	Annondiv 1. Electronic convehes
2	Appendix 1: Electronic searches MEDLINE
3	1 zinc/ or zinc compounds/ or zinc oxide/ or zinc sulfate/ or zinc acetate/
4	2 (zinc or Zn).tw.
5	3 1 or 2
6	4 exp infant/ or exp child/ or adolescent/
7	5 (newborn\$ or neo-nat\$ or infan\$ or baby or babies or toddler\$ or preschool\$ or pre-
8	school\$ or pediatric\$ or paediatric\$ or child\$ or girl\$ or boy\$ or preteen\$ or pre-teen\$ or teen\$ or
9	preadolescen\$ or pre-adolescen\$ or adolescen\$ or prepubert\$ or pre-pubert\$ or pubert\$).tw.
10	64 or 5
11	7 randomized controlled trial.pt.
12	8 controlled clinical trial.pt.
13	9 randomized.ab.
14	10 placebo.ab.
15	11 drug therapy.fs.
16	12 randomly.ab.
17	13 trial.ab.
18	14 groups.ab.
19	15 7 or 8 or 9 or 10 or 11 or 12 or 13 or 14
20	16 exp animals/ not humans.sh.
21 22	17 15 not 16
22	18 3 and 6 and 17
23	
25	Cochrane Central Register of Controlled Trials (CENTRAL)
26	1 MeSH descriptor Zinc explode all trees
27	2 MeSH descriptor Zinc Compounds explode all trees 3 MeSH descriptor Zinc Oxide explode all trees
28	4 MeSH descriptor Zinc Sulfate explode all trees
29	5 MeSH descriptor Zinc Acetate explode all trees
30	6 (zinc):ti,ab,kw
31	7 (Zn):ti,ab,kw
32	8 (#1 OR #2 OR #3 OR #4 OR #5 OR #6 OR #7)
33	9 MeSH descriptor Infant explode all trees
34	10 MeSH descriptor Child explode all trees
35	11 MeSH descriptor Adolescent explode all trees
36	12 (newborn* or neonat* or (neo next nat*) or infan* or baby* or babies or toddler* or preschool* or
37	(pre next school*) or pediatric* or paediatric* or child* or girl* or boy* or preteen* or (pre next
38	teen*) or teen* or preadolescen* or (pre next adolescen*) or adolescen* or prepubert* or (pre next
39	pubert*) or pubert*):ti,ab,kw
40	13 (#9 OR #10 OR #11 OR #12)
41	14 (#8 AND #13)
42	
43	MEDLINE In-Process & Other Non-Indexed Citations
44	1 (zinc or Zn).tw.
45	2 (newborn\$ or neonat\$ or neo-nat\$ or infan\$ or baby or babies or toddler\$ or preschool\$ or pre-
46	school\$ or pediatric\$ or paediatric\$ or child\$ or girl\$ or boy\$ or preteen\$ or pre-teen\$ or teen\$ or
47	preadolescen\$ or pre-adolescen\$ or adolescen\$ or prepubert\$ or pre-pubert\$ or pubert\$).tw.
48	3 randomized controlled trial.pt.
49	4 controlled clinical trial.pt.
50	5 randomized.ab.
51	6 placebo.ab.
52	7 drug therapy.fs. 8 randomly.ab.
53	9 trial.ab.
54 55	10 groups.ab.
55 56	11 3 or 4 or 5 or 6 or 7 or 8 or 9 or 10
56 57	12 exp animals/ not humans.sh.
57 58	13 11 not 12
58 59	14 1 and 2 and 13
59 60	
00	EMBASE
	1 zinc/ or zinc derivative/ or zinc oxide/ or zinc sulfate/ or zinc acetate/
	2 (zinc or Zn) tw

2 (zinc or Zn).tw.

1

3 1 or 2

4 exp infant/ or exp child/ or exp adolescent/

5 (newborn\$ or neonat\$ or neo-nat\$ or infan\$ or baby or babies or toddler\$ or preschool\$ or preschool\$ or pediatric\$ or paediatric\$ or child\$ or girl\$ or boy\$ or preteen\$ or pre-teen\$ or teen\$ or preadolescen\$ or pre-adolescen\$ or adolescen\$ or prepubert\$ or pre-pubert\$ or pubert\$).tw. 6 4 or 5

7 exp crossover-procedure/ or exp double-blind procedure/ or exp randomized controlled trial/ or exp single-blind procedure/

8 (random\$ or factorial\$ or crossover\$ or cross-over\$ or placebo\$ or (doubl\$ adj blind\$) or (singl\$ adj blind\$) or assign\$ or allocat\$ or volunteer\$).tw.

9 7 or 8

10 3 and 6 and 9

The terms in lines seven through eight are the same as those used by the UK Cochrane Centre to identify randomised controlled trials.

African Index Medicus

zinc or Zn [Key Word] or zinc or Zn [Title] or zinc or Zn [Descriptor]

Global Health

1 zinc/ or zinc sulfate/ or zinc oxide/

2 (zinc or Zn).tw.

3 1 or 2

4 exp infants/ or exp children/ or exp adolescents/

5 (newborn\$ or neonat\$ or neo-nat\$ or infan\$ or baby or babies or toddler\$ or preschool\$ or preschool\$ or pediatric\$ or paediatric\$ or child\$ or girl\$ or boy\$ or preteen\$ or pre-teen\$ or teen\$ or preadolescen\$ or pre-adolescen\$ or prepubert\$ or pre-pubert\$ or pubert\$).tw. 6 4 or 5

7 (random\$ or control\$ or clinic\$ or trial\$ or placebo\$ or drug therap\$ or group\$ or crossover\$ or cross-over\$ or double\$-blind\$ or single\$-blind\$ or factorial\$ or assign\$ or allocat\$ or volunteer\$).af. 8 3 and 6 and 7

IndMED zinc or Zn [Title] OR zinc or Zn [Keywords]



Latin American Caribbean Health Sciences Literature (LILACS)

(MH Infant OR MH Child OR MH Adolescent) OR (Tw newborn\$ OR Tw neonat\$ OR Tw neo-nat\$ OR Tw infan\$ OR Tw baby\$ OR Tw babies OR Tw toddler\$ OR Tw preschool\$ OR Tw pre-school\$ OR Tw pediatric\$ OR Tw paediatric\$ OR Tw child\$ OR Tw girl\$ OR Tw boy\$ OR Tw pre-school\$ OR Tw pre-teen\$ OR Tw teen\$ OR Tw preadolescen\$ OR Tw pre-adolescen\$ OR Tw adolescen\$ OR Tw pre-pubert\$ OR Tw pre-schols OR Tw niño\$ OR Tw niño\$ OR Tw bebé\$ OR Tw preescolar\$ OR Tw pre-scolar\$ OR TW

WHO Library & Information Networks for Knowledge Database (WHOLIS) zinc or Zn [All indexes] [All sources]

metaRegister of Controlled Trials

(Zinc or Zn) AND (infant or infants or baby or babies or toddler or toddlers or pre-school or preschool or pediatric or paediatric or child or children or girl or girls or boy or boys or pre-teen or preadolescent or adolescent or pre-pubertal)

WHO International Clinical Trials Registry Platform (ICTRP) zinc or Zn [in the Intervention]

Conference Proceedings Citation Index (formerly known as ISI Proceedings)

TS=(zinc or Zn) AND TS=(newborn* or neonat* or neo-nat* or (neo nat*) or infan* or baby or babies or toddler* or preschool* or pre-school* or (pre school*) or pediatric* or paediatric* or child* or girl* or boy* or preteen* or pre-teen* or (pre teen*) or teen* or preadolescen* or pre-adolescen* or (pre adolescen*) or adolescen* or prepubert* or pre-pubert* or (pre pubert*) or pubert*) AND TS=(random* or control* or clinic* or trial* or placebo* or (drug therap*) or group* or crossover* or cross-over* or (cross over*) or double*-blind* or (double* blind*) or single*-blind* or (single* blind*) or factorial* or assign* or allocat* or volunteer*)

BMJ Open

ProQuest Dissertations & Theses Database

(zinc or Zn) AND (newborn* or neo-nat* or neo-nat* or infan* or baby or babies or toddler* or preschool* or pre-school* or pediatric* or paediatric* or child* or girl* or boy* or preteen* or preteen* or teen* or preadolescen* or pre-adolescen* or adolescen* or prepubert* or pre-pubert* or pubert*)

r," ατα c.can^a or adole.

Appendix 2: Excluded stud	lies
---------------------------	------

hmed 20091Non-RCTates 19932Non-RCTehrens 19903Therapeutic supplementationerger 200646Ineligible agearooks 20057Ineligible ageampos 20048Non-RCTuevas 20029No eligible comparisonuggan 200310Fortificationahmida 200711Ineligible ageashemipour 200912-14Children were obeseeinig 200615.16Ineligible ageess 201117Acceptability study randomizing order of administrationnamoglu 200519-21Therapeutic supplementationCT0147221122Intervention not eligible (LifeStraw with or without zinc)sendarp 2002233Ineligible ageayne-Robinson 199124Severe protein-energy malnutritionerrone 199925No eligible comparisononaghy 197427Ineligible ageoxas 198038Non-RCThingwekar 197929Non-RCThingwekar 197929Non-RCThingwekar 1999310Non-RCTAlarvens 1992311Ineligible ageantwisut 2006322Ineligible ageantwisut 2006323Ineligible ageanterne 199234No eligible comparisoneta 200834No eligible comparison
ehrens 19903Therapeutic supplementationerger 200646Ineligible agerooks 20057Ineligible ageampos 20048Non-RCTuevas 20029No eligible comparisonuggan 200310Fortificationahmida 200711Ineligible ageashemipour 200912:14Children were obeseeinig 200615:16Ineligible ageess 20117Acceptability study randomizing order of administrationnamoglu 200518Non-RCTordas 200519:21Therapeutic supplementationCT0147221122Intervention not eligible (LifeStraw with or without zinc)sendarp 200223Ineligible ageayne-Robinson 199124Severe protein-energy malnutritionerrone 199925No eligible comparisononaghy 196926Ineligible ageoxas 198028Non-RCThingwekar 197929Non-RCThingwekar 197929Non-RCT/alravens 199231Ineligible age/alravens 199231Ineligible age/asantwisut 200632Ineligible age/asantwisut 200633No eligible comparison
erger 2006 ⁴⁻⁶ Ineligible agerooks 2005 ⁷ Ineligible ageampos 2004 ⁸ Non-RCTuevas 2002 ⁹ No eligible comparisonuegan 2003 ¹⁰ Fortificationahmida 2007 ¹¹ Ineligible ageashemipour 2009 ¹²⁻¹⁴ Children were obeseeinig 2006 ^{15.16} Ineligible ageexes 2011 ¹⁷ Acceptability study randomizing order of administrationnamoglu 2005 ¹⁸ Non-RCTordas 2005 ¹⁹⁻²¹ Therapeutic supplementationCT01472211 ²² Intervention not eligible (LifeStraw with or without zinc)sendarp 2002 ²³ Ineligible ageayne-Robinson 1991 ²⁴ Severe protein-energy malnutritionordas 1980 ²⁸ Non-RCTonaghy 1974 ²⁷ Ineligible ageoxas 1980 ²⁸ Non-RCThingwekar 1979 ²⁹ Non-RCThingwekar 1979 ²⁹ Non-RCT/alravens 1992 ³¹ Ineligible age/asantwisut 2006 ³² Ineligible age/asantwisut 2006 ³² Ineligible age/asantwisut 2006 ³³ No eligible comparison
rooks 2005 ⁷ Ineligible age ampos 2004 ⁸ Non-RCT uevas 2002 ⁹ No eligible comparison uggan 2003 ¹⁰ Fortification ahmida 2007 ¹¹ Ineligible age ashemipour 2009 ¹²⁻¹⁴ Children were obese teinig 2006 ^{15,16} Ineligible age eess 2011 ¹⁷ Acceptability study randomizing order of administration namoglu 2005 ¹⁸ Non-RCT ordas 2005 ¹⁹⁻²¹ Therapeutic supplementation CT01472211 ²² Intervention not eligible (LifeStraw with or without zinc) sendarp 2002 ²³ Ineligible age ayne-Robinson 1991 ²⁴ Severe protein-energy malnutrition errone 1999 ²⁵ No eligible comparison onaghy 1969 ²⁶ Ineligible age oxas 1980 ²⁸ Non-RCT hingwekar 1979 ²⁹ Non-RCT hingwekar 1979 ²⁹ Non-RCT /alravens 1992 ³¹ Ineligible age /asantwisut 2006 ³² Ineligible age /asantwisut 2006 ³² Ineligible age
ampos 2004 ⁸ Non-RCT uevas 2002 ⁹ No eligible comparison uggan 2003 ¹⁰ Fortification ahmida 2007 ¹¹ Ineligible age ashemipour 2009 ¹²⁻¹⁴ Children were obese einig 2006 ^{15,16} Ineligible age eess 2011 ¹⁷ Acceptability study randomizing order of administration namoglu 2005 ¹⁸ Non-RCT ordas 2005 ¹⁹⁻²¹ Therapeutic supplementation CT01472211 ²² Intervention not eligible (LifeStraw with or without zinc) sendarp 2002 ²³ Ineligible age ayne-Robinson 1991 ²⁴ Severe protein-energy malnutrition errone 1999 ²⁵ No eligible comparison onaghy 1969 ²⁶ Ineligible age oxas 1980 ²⁸ Non-RCT hingwekar 1979 ²⁹ Non-RCT hirivastava 1993 ³⁰ Non-RCT /alravens 1992 ³¹ Ineligible age /asantwisut 2006 ³² Ineligible age /asantwisut 2006 ³² Ineligible age
uevas 20029No eligible comparisonuggan 200310Fortificationahmida 200711Ineligible ageashemipour 200912.14Children were obeseeinig 200615.16Ineligible ageess 201117Acceptability study randomizing order of administrationnamoglu 200518Non-RCTordas 2005 ¹⁹⁻²¹ Therapeutic supplementationCT0147221122Intervention not eligible (LifeStraw with or without zinc)sendarp 200223Ineligible ageayne-Robinson 199124Severe protein-energy malnutritionerrone 199925No eligible comparisononaghy 196926Ineligible ageoxas 198028Non-RCThingwekar 197929Non-RCThirivastava 199330Non-RCT/alravens 199231Ineligible age/alravens 199231Ineligible age/asantwisut 200632Ineligible age/alravens 199733No eligible comparison
uggan 200310Fortificationahmida 200711Ineligible ageashemipour 200912-14Children were obeseeinig 200615.16Ineligible ageeess 201117Acceptability study randomizing order of administrationnamoglu 200518Non-RCTordas 200519-21Therapeutic supplementationCT0147221122Intervention not eligible (LifeStraw with or without zinc)sendarp 200223Ineligible ageayne-Robinson 199124Severe protein-energy malnutritiononaghy 196926Ineligible ageonaghy 1974277Ineligible ageonaghy 1974271Ineligible ageoxas 198028Non-RCThingwekar 197929Non-RCThirivastava 199330Non-RCT/alravens 199231Ineligible age/alravens 199231Ineligible age/asantwisut 200632Ineligible age/asantwisut 200632Ineligible age/asantwisut 200632Ineligible age/asantwisut 200632Ineligible age
ahmida 2007 ¹¹ Ineligible ageashemipour 2009 ¹²⁻¹⁴ Children were obeseeinig 2006 ^{15,16} Ineligible ageess 2011 ¹⁷ Acceptability study randomizing order of administrationnamoglu 2005 ¹⁸ Non-RCTordas 2005 ¹⁹⁻²¹ Therapeutic supplementationCT01472211 ²² Intervention not eligible (LifeStraw with or without zinc)sendarp 2002 ²³ Ineligible ageayne-Robinson 1991 ²⁴ Severe protein-energy malnutritionordas 1980 ²⁶ Ineligible ageonaghy 1969 ²⁶ Ineligible ageoxas 1980 ²⁸ Non-RCThingwekar 1979 ²⁹ Non-RCThingwekar 1979 ²⁹ Non-RCT/alravens 1992 ³¹ Ineligible age/asantwisut 2006 ³² Ineligible age/asantwisut 2006 ³² Ineligible age/anfeng 1997 ³³ No eligible comparison
ashemipour 200912-14Children were obeseteinig 200615.16Ineligible ageteess 201117Acceptability study randomizing order of administrationnamoglu 200518Non-RCTtordas 200519-21Therapeutic supplementationCT0147221122Intervention not eligible (LifeStraw with or without zinc)sendarp 200223Ineligible ageayne-Robinson 199124Severe protein-energy malnutritionerrone 199925No eligible comparisononaghy 196926Ineligible ageoxas 198028Non-RCThingwekar 197929Non-RCThingwekar 199330Non-RCT/alravens 199231Ineligible age/asantwisut 200632Ineligible age/asantwisut 200632Ineligible age/asantwisut 200632Ineligible age
teinig 2006Ineligible agetess 2011Acceptability study randomizing order of administrationnamoglu 2005Non-RCTtordas 2005Therapeutic supplementationCT01472211Intervention not eligible (LifeStraw with or without zinc)sendarp 2002Ineligible ageayne-Robinson 1991Severe protein-energy malnutritionerrone 1999No eligible comparisononaghy 1969Ineligible ageoxas 1980Non-RCThingwekar 1979Non-RCThingwekar 1979Non-RCT/alravens 1992Ineligible age/asantwisut 2006Ineligible age/asantwisut 2006Ineligible age/anfeng 1997No eligible comparison
ess 201117Acceptability study randomizing order of administrationnamoglu 200518Non-RCTordas 200519-21Therapeutic supplementationCT0147221122Intervention not eligible (LifeStraw with or without zinc)sendarp 200223Ineligible ageayne-Robinson 199124Severe protein-energy malnutritionerrone 199925No eligible comparisononaghy 196926Ineligible ageonaghy 197427Ineligible ageoxas 198028Non-RCThingwekar 197929Non-RCThingwekar 199330Non-RCT/alravens 199231Ineligible age/asantwisut 200632Ineligible ageanfeng 199733No eligible comparison
namoglu 200518Non-RCTordas 200519-21Therapeutic supplementationCT0147221122Intervention not eligible (LifeStraw with or without zinc)sendarp 200223Ineligible ageayne-Robinson 199124Severe protein-energy malnutritionerrone 199925No eligible comparisononaghy 196926Ineligible ageonaghy 197427Ineligible ageoxas 198028Non-RCThingwekar 197929Non-RCThingwekar 199330Non-RCT/alravens 199231Ineligible age/asantwisut 200632Ineligible ageanfeng 199733No eligible comparison
ordas 200519-21Therapeutic supplementationCT0147221122Intervention not eligible (LifeStraw with or without zinc)sendarp 200223Ineligible ageayne-Robinson 199124Severe protein-energy malnutritionerrone 199925No eligible comparisononaghy 196926Ineligible ageonaghy 197427Ineligible ageoxas 198028Non-RCThingwekar 197929Non-RCThingwekar 199330Non-RCT/alravens 199231Ineligible age/asantwisut 200632Ineligible ageanfeng 199733No eligible comparison
CT0147221122Intervention not eligible (LifeStraw with or without zinc)sendarp 200223Ineligible ageayne-Robinson 199124Severe protein-energy malnutritionerrone 199925No eligible comparisononaghy 196926Ineligible ageonaghy 197427Ineligible ageoxas 198028Non-RCThingwekar 197929Non-RCThingwekar 199330Non-RCT/alravens 199231Ineligible age/asantwisut 200632Ineligible ageanfeng 199733No eligible comparison
Ineligible ageayne-Robinson 199124Severe protein-energy malnutritionerrone 199925No eligible comparisononaghy 196926Ineligible ageonaghy 197427Ineligible ageoxas 198028Non-RCThingwekar 197929Non-RCThrivastava 199330Non-RCT/alravens 199231Ineligible age/asantwisut 200632Ineligible ageanfeng 199733No eligible comparison
ayne-Robinson 1991 ²⁴ Severe protein-energy malnutrition errone 1999 ²⁵ No eligible comparison onaghy 1969 ²⁶ Ineligible age onaghy 1974 ²⁷ Ineligible age oxas 1980 ²⁸ Non-RCT hingwekar 1979 ²⁹ Non-RCT hrivastava 1993 ³⁰ Non-RCT /alravens 1992 ³¹ Ineligible age /asantwisut 2006 ³² Ineligible age anfeng 1997 ³³ No eligible comparison
ayne-Robinson 1991 ²⁴ Severe protein-energy malnutrition errone 1999 ²⁵ No eligible comparison onaghy 1969 ²⁶ Ineligible age onaghy 1974 ²⁷ Ineligible age oxas 1980 ²⁸ Non-RCT hingwekar 1979 ²⁹ Non-RCT hrivastava 1993 ³⁰ Non-RCT /alravens 1992 ³¹ Ineligible age /asantwisut 2006 ³² Ineligible age anfeng 1997 ³³ No eligible comparison
errone 1999 ²⁵ No eligible comparison onaghy 1969 ²⁶ Ineligible age onaghy 1974 ²⁷ Ineligible age oxas 1980 ²⁸ Non-RCT hingwekar 1979 ²⁹ Non-RCT hrivastava 1993 ³⁰ Non-RCT /alravens 1992 ³¹ Ineligible age /asantwisut 2006 ³² Ineligible age 'anfeng 1997 ³³ No eligible comparison
onaghy 1974 ²⁷ Ineligible age oxas 1980 ²⁸ Non-RCT hingwekar 1979 ²⁹ Non-RCT hrivastava 1993 ³⁰ Non-RCT /alravens 1992 ³¹ Ineligible age /asantwisut 2006 ³² Ineligible age anfeng 1997 ³³ No eligible comparison
onaghy 1974 ²⁷ Ineligible age oxas 1980 ²⁸ Non-RCT hingwekar 1979 ²⁹ Non-RCT hrivastava 1993 ³⁰ Non-RCT /alravens 1992 ³¹ Ineligible age /asantwisut 2006 ³² Ineligible age anfeng 1997 ³³ No eligible comparison
oxas 1980 ²⁸ Non-RCT hingwekar 1979 ²⁹ Non-RCT hrivastava 1993 ³⁰ Non-RCT /alravens 1992 ³¹ Ineligible age /asantwisut 2006 ³² Ineligible age anfeng 1997 ³³ No eligible comparison
hingwekar 1979 ²⁹ Non-RCThrivastava 1993 ³⁰ Non-RCT//alravens 1992 ³¹ Ineligible age//asantwisut 2006 ³² Ineligible age/anfeng 1997 ³³ No eligible comparison
hrivastava 1993 ³⁰ Non-RCT /alravens 1992 ³¹ Ineligible age /asantwisut 2006 ³² Ineligible age anfeng 1997 ³³ No eligible comparison
Valravens 1992 ³¹ Ineligible age Vasantwisut 2006 ³² Ineligible age ranfeng 1997 ³³ No eligible comparison
7asantwisut 2006 ³² Ineligible age ranfeng 1997 ³³ No eligible comparison
anfeng 1997 ³³ No eligible comparison

3
Δ
3 4 5 6 7 8
5
6
7
1
8
9
10
10
11
12
12
13
14
15
10
16
17
10
10
19
20
21
21
22
23
20
24
25
26
20
27
28
20
29
30
31
22
3Z
33
33 34
33 34
33 34 35
33 34 35 36
33 34 35 36 37
33 34 35 36 37
33 34 35 36 37 38
 33 34 35 36 37 38 39
 33 34 35 36 37 38 39 40
 33 34 35 36 37 38 39 40
$8 \\ 9 \\ 10 \\ 11 \\ 23 \\ 14 \\ 15 \\ 16 \\ 17 \\ 18 \\ 19 \\ 21 \\ 22 \\ 22 \\ 24 \\ 25 \\ 27 \\ 28 \\ 29 \\ 31 \\ 32 \\ 33 \\ 34 \\ 35 \\ 6 \\ 37 \\ 89 \\ 41 \\ 41 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10 \\ 10$
41
41 42
41 42 43
41 42
41 42 43 44
41 42 43 44 45
41 42 43 44 45 46
41 42 43 44 45
41 42 43 44 45 46 47
41 42 43 44 45 46 47 48
41 42 43 44 45 46 47 48 49
41 42 43 44 45 46 47 48 49
41 42 43 44 45 46 47 48 49 50
41 42 43 44 45 46 47 48 49 50 51
41 42 43 44 45 46 47 48 49 50
41 42 43 44 45 46 47 48 49 50 51 52
41 42 43 44 45 46 47 48 49 50 51 52 53
41 42 43 44 45 46 47 48 49 50 51 52 53 54
41 42 43 44 45 46 47 48 49 50 51 52 53 55
41 42 43 44 45 46 47 48 49 50 51 52 53 55
41 42 43 44 45 46 47 48 950 51 52 53 455 56
41 42 43 44 45 46 47 48 95 51 52 53 55 55 57
41 42 43 44 45 46 47 48 950 51 52 53 455 56

Appendix 3: On-going studies						
Study	Reason for exclusion					
Arabaci 2010 ³⁵	Awaiting classification					
Chicourel 2001 ³⁶	Awaiting classification					
CTRI/2010/091/00141737	On-going					
Jimenez 2000 ³⁸	Awaiting classification					
Mitter 2009 ³⁹	Awaiting classification					
NCT00133406 ⁴⁰	On-going					
NCT00228254 ⁴¹	On-going					
NCT0037402342	On-going					
NCT0042166843	On-going					
NCT0058926444	On-going					
NCT0094435945	On-going					
NCT0096755146	On-going					
NCT0098042147	On-going					
NCT0130609748	On-going					
NCT0161669349	On-going					
Smith 1985 ⁵⁰	Awaiting classification					

Appendix 4: Included studies

Study	Country	Ν	Age	Dose	Duration	Form	Height	Co-intervention
Ahmed 2009 ⁵¹	BD	40	10 to 18	20mg daily	1.5	Solution	Not reported	Cholera vaccine
Akramuzzaman 1994 ⁵²	BD	256	mean=35	20mg daily	15	Solution	Stunted and non-stunted	Vitamins A, C, D
Alarcon 2004 ⁵³	PE	223	6 to 35	3mg/kg 6d/wk	4.5	Solution	HAZ=-1.04	Iron
Albert 2003 ^{54, 55}	BD	256	24 to 60	20mg daily	1.5	Solution	Not reported	Cholera vaccine
Ba Lo 2011 ⁵⁶	SN	97	9 to 17	6mg daily	0.5	Solution	Non-stunted only; HAZ=-0.44	Micronutrients
Baqui 2003 ⁵⁷⁻⁶⁰	BD	645	6 to 6	20mg weekly	6	Solution	Stunted and non-stunted; HAZ=-1.2	Vitamin B
Bhandari 2002 ⁶¹⁻⁶⁷	IN	2482	6 to 30	10mg <1y; 20mg >1y daily	4	Solution	Stunted and non-stunted; HAZ=-1.82	Vitamin A
Bhandari 2007 ^{68, 69}	IN	72,438	6 to 23	10mg daily	12	Tablet	Stunted and non-stunted; HAZ=-1.95	Iron and folic acid
Brown 2007 ⁷⁰⁻⁷³	PE	200	6 to 8	3mg daily	6	Solution	Stunted and non-stunted; HAZ=-1.19	Micronutrients
Castillo-Duran 1994 ⁷⁴	CL	114	72 to 168	10mg daily	12	Capsule	Stunted only	None
*Castillo-Duran 2002 ⁷⁵	CL	42	17 to 19	5mg daily	12	Solution	Non-stunted only	None
Cavan 1993 ⁷⁶⁻⁷⁸	GT	162	68 to 96	10mg 5d/wk	6.25	Tablet	Stunted and non-stunted; HAZ=-1.51	Micronutrients
Chang 2010 ⁷⁹	BD	1000	6 to 18	5mg <1y; 10mg >1y alternate days	6	Tablet	Stunted and non-stunted; HAZ=-1.3	None
Chen 2012 ⁸⁰	CN	361	36 to 72	10mg 5d/wk	6	Tablet	HAZ=-0.264585635	Vitamin A
Chhagan 2009 ⁸¹⁻⁸⁵	ZA	227	6 to 6	10mg daily	18	Tablet	Stunted and non-stunted; HAZ=-0.45	Vitamin A
Clark 1999 ⁸⁶	UK	47	mean=146	15mg daily	1.5	Unclear	Non-stunted only	None
Cole 2012 ⁸⁷	BR	143	6 to 48	5mg daily	3	Powder	Not reported	Micronutrients
Dehbozorgi 2007 ⁸⁸	IR	60	72 to 144	8mg daily	6	Solution	Not reported	None
DiGirolamo 2010 ^{89, 90}	GT	750	72 to 132	10mg 5d/wk	5.8	Tablet	Stunted and non-stunted; HAZ=-1.2	None
Ebrahimi 2006 ⁹¹	IR	804	96 to 132	10mg 6d/wk	7	Solution	Not reported	None
Fallahi 2007 ⁹²	IR	53	132 to 143	20mg 6d/wk	4	Capsule	Not reported	Iron
Fonseca 200293	BR	199	72 to 120	30mg weekly	3	Solution	Stunted and non-stunted	None
Friis 1997 ^{94, 95}	ZW	313	132 to 204	30 mg <29.5 kg; 50 mg >29.5 kg 5d/wk	12	Tablet	HAZ=-1.18	None

Garcia 1998 ⁹⁶	CL	33	66 to 159.6	20mg daily	6	Unclear	Stunted and non-stunted; HAZ=-2.6	None
Gibson 1989 ⁹⁷	CA	60	59 to 95	10mg daily	12	Solution	Stunted and non-stunted; HAZ=-1.39	None
Gracia 2005 ⁹⁸	CO	350	24 to 59	12mg daily	8	Unclear	Stunted and non-stunted; HAZ=0	Micronutrients
Gupta 2003 ⁹⁹	IN	280	6 to 41	10mg or 50mg 5d/wk or weekly	4	Solution	Not reported	None
Gupta 2007 ¹⁰⁰	IN	1,878	6 to 48	50mg weekly	6	Solution	Not reported	Vitamin B
Hambidge 1978 ^{101, 102}	US	75	38 to 61	14mg 5d/wk	6	Solution	Not reported	None
Han 2002 ^{103, 104}	CN	119	36 to 60	3.5mg 5d/wk	12	Tablet	Not reported	Vitamin A and Calciur
Hettiarachchi 2008 ¹⁰⁵	LK	341	144 to 155	14mg 5d/wk	6	Capsule	Stunted and non-stunted; HAZ=-1.16	None
Hong 1982 ¹⁰⁶	CN	158	4 to 72	Daily	2.4	Solution	Stunted and non-stunted	Vitamin B
Ince 1995 ¹⁰⁷	TR	25	25 to 76	10mg daily	12	Solution	Non-stunted only; HAZ=-1.55	None
Kartasurya 2012 ¹⁰⁸	ID	826	24 to 60	10mg daily	4	Solution	Non-stunted only; HAZ=-1.730145278	Vitamin A
Kikafunda 1998 ¹⁰⁹⁻¹¹¹	UG	155	33 to 89	10mg 5d/wk	6	Tablet	HAZ=-0.7	None
Kurugöl 2006 ¹¹²	TR	200	24 to 120	15mg daily	7	Solution	Not reported	None
Larson 2010 ^{113, 114}	BD	353	6 to 24	10mg daily	3	Solution	HAZ=-1.72	None
Lind 2003 ¹¹⁵⁻¹¹⁸	ID	680	6 to 6	10mg daily	6	Solution	Stunted and non-stunted; HAZ=-0.34	Vitamin C
Long 2006 ¹¹⁹⁻¹²²	MX	786	6 to 15	20mg daily	12	Solution	Stunted and non-stunted; HAZ=0.1	None
Mahloudji 1975 ¹²³	IR	50	72 to 144	20mg 6d/wk	16	Capsule	Not reported	Micronutrients
Malik 2013 ¹²⁴	IN	158	6 to 11	20mg daily	0.46	Solution	Not reported	None
*Marinho 1991 ¹²⁵	BR	240	36 to 84	5mg daily	1	Unclear	Stunted and non-stunted	None
Mazariegos 2010 ¹²⁶	GT	412	6 to 6	5mg daily	6	Tablet	Stunted and non-stunted; HAZ=-2.09	Low-phytate maize
Meeks Gardner 1998 ^{127, 128}	JM	61	6 to 24	5mg daily	3	Solution	Stunted only; HAZ=-2.9	Micronutrients
Meeks Gardner 2005 ¹²⁹	JM	126	9 to 30	10mg daily	6	Solution	HAZ=-1.42	Micronutrients
Mozaffari-Khosravi 2009 ^{130, 131}	IR	90	25 to 69	5mg daily	6	Solution	Stunted and non-stunted; HAZ=-1.59	None
Muller 2001 ¹³²⁻¹³⁴	BF	709	6 to 30	12.5mg 6d/wk	6	Tablet	Stunted and non-stunted; HAZ=-1.6	None
Nakamura 1993 ¹³⁵	JP	21	mean=70	5mg/kg daily	6	Unclear	Stunted only; HAZ=-2.44	None
Ninh 1996 ¹³⁶	VN	210	4 to 36	10mg daily	5	Solution	Stunted only; HAZ=-2.61	None

Penny 2004 ^{137, 138}	PE	164	6 to 35	10mg daily	6	Solution	Stunted and non-stunted; HAZ=-1.56	None
Rahman 2001 ¹³⁹⁻¹⁴²	BD	800	12 to 35	20mg daily	0.5	Solution	Stunted and non-stunted; HAZ=-2.41	None
Richard 2006 ¹⁴³	PE	855	6 to 180	20mg daily	7	Solution	Stunted and non-stunted; HAZ=-2.08	None
Rosado 1997 ¹⁴⁴⁻¹⁴⁶	MX	219	18 to 36	20mg 6d/wk	12	Solution	Stunted and non-stunted; HAZ=-1.6	None
Rosales 2004 ¹⁴⁷	GT	76	96 to 132	42.5mg 5d/wk	2	Solution	Not reported	None
Ruel 1997 ¹⁴⁸⁻¹⁵⁰	GT	108	6 to 9	10mg daily	7	Solution	Stunted and non-stunted; HAZ=-2.16	None
Ruz 1997 ¹⁵¹	CL	98	27 to 50	10mg daily	14	Solution	Stunted and non-stunted; HAZ=-0.52	None
*Sandstead 1998 ^{152, 153}	CN	NR	72 to 108	20mg 6d/wk	2.5	Tablet	Not reported	Micronutrients
Sandstead 2008 ¹⁵⁴	US	54	72 to 84	20mg 5d/wk	2.5	Unclear	Not reported	Micronutrients
*Sanjur 1990 ¹⁵⁵	US	NR	12 to 24	Daily	6	Tablet	Not reported	Micronutrients
Sayeg Porto 2000 ¹⁵⁶	BR	21	84 to 120	5mg/kg daily	6	Solution	Stunted only; HAZ=-2.67	None
Sazawal 1996 ¹⁵⁷⁻¹⁶⁶	IN	609	6 to 35	10mg daily	6	Solution	Stunted and non-stunted	Micronutrients
Sazawal 2006 ¹⁶⁷⁻¹⁷⁶	TZ	60,225	1 to 35	5mg <1y; 10mg >1y daily	16	Tablet	Stunted and non-stunted; HAZ=-1.5	Micronutrients
Schultink 1997 ¹⁷⁷	ID	85	24 to 60	15mg daily	2	Solution	Stunted and non-stunted; HAZ=-2.5	Iron
Sempertegui 1996 ^{178, 179}	EC	50	12 to 59	10mg daily	2	Solution	Stunted and non-stunted; HAZ=-2	None
*Shah 2011 ¹⁸⁰	IN	NR	6 to 59	10mg daily	2	Unclear	Not reported	None
Shankar 2000 ^{181, 182}	PG	274	6 to 60	10mg 6d/wk	11.5	Tablet	Stunted and non-stunted; HAZ=-1.9	None
Silva 2006 ¹⁸³	BR	60	12 to 59	10mg daily	4	Solution	Stunted and non-stunted; HAZ=-1.9	Iron-fortified milk
Smith 1999 ¹⁸⁴	BZ	51	Preschool	70mg weekly	6	Solution	Stunted and non-stunted	None
Soofi 2013 ¹⁸⁵	РК	1305	6 to 6	10mg daily	12	Powder	Stunted and non-stunted	Micronutrients
Tielsch 2006 ¹⁸⁶⁻¹⁹³	NP	49,205	1 to 35	5mg < 1y; 10mg >1y daily	to 36m	Tablet	Stunted and non-stunted	Iron and folic acid
Tupe 2009 ^{194, 195}	IN	88	120 to 155	16.6mg 6d/wk	2.5	Tablet	Stunted and non-stunted; HAZ=-1.3	None
Uckardes 2009 ¹⁹⁶⁻¹⁹⁸	TR	226	89 to 140	15mg 5d/wk	2.5	Solution	Not reported	None
Udomkesmalee 1992 ^{199, 200}	TH	133	72 to 156	25mg 5d/wk	6	Capsule	Stunted and non-stunted	Vitamin A
Umeta 2000 ²⁰¹⁻²⁰³	ET	200	6 to 12	10mg 6d/wk	6	Solution	Stunted and non-stunted; HAZ=-1.7	None
*Vakili 2009 ²⁰⁴	IR	200	78 to 120	10mg 6d/wk	5	Tablet	Not reported	None

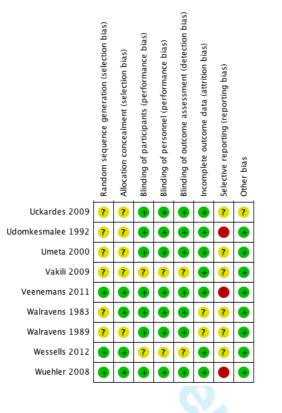
 BMJ Open

Watareens 1983 ^{398,210} US 57 24 to 72 sing 2x daily 12 Solution Stanted and non-stunted; HAZ=-2.07 None Watareens 1989 ³¹¹ US NR 8 to 27 25mg (frequency unclear) 6 Solution HAZ=-1.35 None Weeselts 2012 ^{12,210} BF 451 6 to 23 5mg daily 0.75 Solution HAZ=-1.5 None Weekelt 2008 ^{214,215} EC 503 12 to 30 3,7, or 10mg daily 6 Solution Stunted and non-stunted; HAZ=-2.3 None Weekler 2008 ^{214,215} EC 503 12 to 30 3,7, or 10mg daily 6 Solution Stunted and non-stunted; HAZ=-2.3 None *Not included in meta-analysis; Age and duration reported in months None Solution Stunted and non-stunted; HAZ=-2.3 None	Veenemans 2011 ²⁰⁵⁻²⁰⁸	ΤZ	612	6 to 60	10mg daily	11	Capsule	Stunted and non-stunted; HAZ=-2.43	Micronutrients
Wessells 2012 ^{212,213} BF 451 6 to 23 5mg daily 0.75 Solution HAZ=-1.5 None		US	57	24 to 72	5mg 2x daily	12	-		None
	Walravens 1989 ²¹¹	US	NR	8 to 27	25mg (frequency unclear)	6	Solution	HAZ=-1.35	None
Wether 2008 ^{714, 123} EC 53 1 2 to 3 3, 7, or 10mg daily 6 Solution Stunted and non-stunted; HAZ=-2.3 Note Not included in meta-analysis; Age and duration reported in months	Wessells 2012 ^{212, 213}	BF	451	6 to 23	5mg daily	0.75	Solution	HAZ=-1.5	None
Not included in meta-analysis; Age and duration reported in months	Wuehler 2008 ^{214, 215}	EC	503	12 to 30	3, 7, or 10mg daily	6	Solution	Stunted and non-stunted; HAZ=-2.3	None

For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml

	Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants (performance bias)	Blinding of personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias
Ahmed 2009	?	?	?	?	?	+	?	•
Akramuzzaman 1994	?	?	?	?	?	?	?	•
Alarcon 2004	?	?	+	+	+	+	?	•
Albert 2003	?	•	÷	÷	÷	÷	•	•
Ba Lo 2011	•	?	•	•	•		•	•
Baqui 2003	?	?	÷	÷	÷	÷	•	•
Bhandari 2002	Ŧ	÷	ŧ	ŧ	ŧ	ŧ		Ŧ
Bhandari 2007	•	+	ŧ	Ŧ	ŧ	ŧ		•
Brown 2007	•	+	ŧ	ŧ	ŧ	?	ŧ	•
Castillo-Duran 1994	?	?	ŧ	ŧ	ŧ	?		•
Castillo-Duran 2002	?	?	?	?	?	?		•
Cavan 1993	•	+	+	+	+	+		•
Chang 2010	•	•	€	€	€	€	?	•
Chen 2012	?	?			?	?	?	•
Chhagan 2009	•	Ŧ	Ŧ	Ŧ	Ŧ	?	•	?
Clark 1999	?	?	Ŧ	Ŧ	Ŧ	Ŧ	?	Ŧ
Cole 2012	•	?	Ŧ		Ŧ	Ŧ	?	Ŧ
Dehbozorgi 2007	?	?	€	€	€	?		•
DiGirolamo 2010	•	Ŧ	Ŧ	Ŧ	Ŧ	Ŧ	?	Ŧ
Ebrahimi 2006	?	?	Ŧ	Ŧ	Ŧ	?	?	Ŧ
Fallahi 2007	?	?	?	?	?	Ŧ	?	Ŧ
Fonseca 2002	•	?	Ŧ	Ŧ	Ŧ	?		•
Friis 1997	?	?	ŧ	ŧ	Ð	?		•
Garcia 1998	?	?	Ŧ	ŧ	Ð	Ð	?	•
Gibson 1989	?	Ŧ	Ŧ	÷	Ŧ	Ŧ	?	Ŧ
Gracia 2005	?	?	÷	÷	Ŧ	?	•	Ŧ
Gupta 2003	•	Ŧ	÷	÷	÷	Ŧ	•	Ŧ
Gupta 2007	?	?	Ŧ	Ŧ	ŧ	•	•	Ŧ
Hambidge 1978	?	?	?	?	?	?	?	Ŧ
Han 2002	?	?	ŧ	ŧ	ŧ	?	?	•
Hettiarachchi 2008	?	?	+	Ŧ	Ŧ	?	?	•
Hong 1982	?	?	?	?	?	?	?	•
Ince 1995	•	?	+	+	+	+	?	•
Kartasurya 2012	•	Ŧ	+	+	+	+	•	•
Kikafunda 1998	?	?	+	+	+	?	•	•
Kurugöl 2006	•	Ŧ	Ŧ	Ŧ	Ŧ	Ŧ	?	•
Larson 2010	Ŧ	Ŧ	+	+	÷	Ŧ	•	•
								. '

Lind 2003 0		Random sequence generation (selection bias)	Allocation concealment (selection bias)	Blinding of participants (performance bias)	Blinding of personnel (performance bias)	Blinding of outcome assessment (detection bias)	Incomplete outcome data (attrition bias)	Selective reporting (reporting bias)	Other bias	
Long 2004 0	Lind 2003	_		•	—	•		•	•	
Mahloudji 1975 0		•	•	•	•	•	-	?	•	1
Mainko 1019 0 <td< td=""><td></td><td>?</td><td>?</td><td>-</td><td>•</td><td>•</td><td>-</td><td>•</td><td>•</td><th>-</th></td<>		?	?	-	•	•	-	•	•	-
Mazartegos 2010 Image: Construction of the construction of t		-		-	•	•	-	•	•	
1 1 1 1 1 1 1 1 1 Meeks Gardner 2005 2 1 2 1 2 1 1 1 Muezstari-Khosravi 2009 2 1 2 2 2 2 2 2 2 1 1 Muler 2001 2	Marinho 1991	?	?	?	?	?	?	?	•	1
Meeks Cardner 2005 I <thi< th=""> <thi< th=""> <thi< th=""></thi<></thi<></thi<>	Mazariegos 2010	+	Ŧ	•	•	•	•	•	•	1
Mozzaffari-khosravi 2009 Image: Solution of the second	Meeks Gardner 1998	?	?	•	•	Ŧ	?	?	•	1
w w	Meeks Gardner 2005	?	?	•	•	•	•	?	?	1
Nakamura 19193 ? <	Mozaffari-Khosravi 2009	+	Ŧ	•	•	•	?	?	•]
Ninh 1995 ?	Muller 2001	÷	Ŧ	+	•	Ŧ	•	?	Ŧ]
Penny 2004 Image: Constraint of the co	Nakamura 1993	?	?	?	?	?	?	?	•]
Rahman 2001 I <td< td=""><td>Ninh 1996</td><td>?</td><td>?</td><td>Ŧ</td><td>•</td><td>Ŧ</td><td>?</td><td>•</td><td>+</td><th>]</th></td<>	Ninh 1996	?	?	Ŧ	•	Ŧ	?	•	+]
Richard 2006 Rosado 1997 R R Rosado 1997 R R R Rosado 1997 R <td>Penny 2004</td> <td>+</td> <td>?</td> <td>Ŧ</td> <td>•</td> <td>•</td> <td>+</td> <td>?</td> <td>+</td> <th></th>	Penny 2004	+	?	Ŧ	•	•	+	?	+	
Rosado 1997 ? <td< td=""><td>Rahman 2001</td><td>+</td><td>Ŧ</td><td>•</td><td>•</td><td>•</td><td>•</td><td>•</td><td>•</td><th></th></td<>	Rahman 2001	+	Ŧ	•	•	•	•	•	•	
Nosales 2004 Image: Constraint of the	Richard 2006	÷	?	•	•	•	•	?	•	
Ruel 1997 ?	Rosado 1997	?	?	•	•	Ŧ	•	?	•	
Ruz 1997 7 0 0 0 0 0 Sandstead 1998 7 0 0 0 0 0 0 Sandstead 2008 7 0 0 0 7 0 0 Sandstead 2008 7 0 0 0 7 0 0 Sandstead 2008 7 0 0 0 7 0 0 Sandstead 2008 7 0 0 0 0 0 0 0 Sangstead 2008 7 0 0 0 0 0 0 0 0 Sazawal 2006 0 0 0 0 0 0 0 0 0 0 Schuttink 1997 7 7 0 </td <td>Rosales 2004</td> <td>Ŧ</td> <td>?</td> <td>•</td> <td>•</td> <td>Ŧ</td> <td>Ŧ</td> <td>?</td> <td>•</td> <th></th>	Rosales 2004	Ŧ	?	•	•	Ŧ	Ŧ	?	•	
Sandstead 1998 ?		_	?	•	•	•	•	?	•	
Sandstead 2008 7 0 0 7 0 Sandytead 2008 7 0 0 7 0 0 Sanyur 1990 7 0 0 0 0 0 0 Sayeg Porto 2000 7 0 0 0 0 0 0 0 Sayag Porto 2000 7 0 0 0 0 0 0 0 Sazawal 1996 0 0 0 0 0 0 0 0 Sazawal 2006 0 0 0 0 0 0 0 0 Schultink 1997 7 7 0 0 0 0 0 0 Shankar 2000 0 0 0 0 0 0 0 0 Silva 2006 7 7 7 0 0 0 0 0 Silva 2006 7 7 7 0 0 0 0 0 Sonfi 2013 0 0 0 0 0		?	•	•	•	•	?	•	•	
Sanjur 1990 ? ? ? ? ? ? ? ? Sayeg Porto 2000 ? ? ? ? ? ? ? ? ? Sayeg Porto 2000 ? ? ? ? ? ? ? ? ? Sazawal 1996 ? ? ? ? ? ? ? ? Sazawal 2006 ? ? ? ? ? ? ? ? Schultink 1997 ? ? ? ? ? ? ? ? ? Sempertegui 1996 ? ? ? ? ? ? ? ? ? Shah 2011 ? ? ? ? ? ? ? ? ? ? Shah 2011 ? ? ? ? ? ? ? ? ? ? Silva 2006 ? ? ? ? ? ? ? ? ? ? ? ?		<u> </u>	?	•	•	•	_	•	•	
Sayeg Porto 2000 ? I		_	-	-	•	•	_		•	
Sazawal 1996 Image: Color		_		-	•	-	_	?	•	
Shah 2011 ?		-		-	•	-	-		•	
Shah 2011 ?		-	-	-		-	-		•	
Shah 2011 ?		<u> </u>	-	-	-	-	_	•	•	
Shah 2011 ?		-	_	-	•	-			•	
Shankar 2000 Image: Constraint of the		<u> </u>	_	-	•	-	_		•	
Silva 2006 ?		-				-			•	-
Smith 1999 ? ? ? ? ? ? ? ? Soofi 2013 3 4 4 4 9 9 3 4 Tielsch 2006 4 4 4 9 9 ? ? 3		<u> </u>	-	-	-	-	-		•	-
Soofi 2013 •		_				_	-	2	•	-
Tielsch 2006 🕂 🕂 🕂 🕂 🕂 😯 🖓		-		-	•		-	•	•	-
		-					-	- -		-
	Tupe 2009	-	?	• ?	•		•	?		-



Subgroup	Trials	People	Effect size (95% CI), fixed	I ² ; Chi ² (p value)
Prevalence of diarrhoea (RR)	13	8519	0.88 (0.86 to 0.90)	88%; 118.88 (p<0.00001
Iron co-supplementation (I ² =75%; Chi	-			(
with iron	3	1024	0.96 (0.88 to 1.05)	96%; 46.97 (p<0.00001)
without iron		7495	0.88 (0.86 to 0.90)	84%; 67.94 (p<0.00001)
<i>Age</i> (I ² =97%; Chi ² =30.52, p<0.00001)				
6 <i>m to 1y</i>		3714	0.96 (0.93 to 1.00)	94%; 112.81 (p<0.00001)
$\frac{1 y \text{ to } 5 y}{2 0.00000000000000000000000000000000000$		4805	0.85 (0.83 to 0.87)	37%; 11.03 (p=0.14)
Dose (I ² =94%; Chi ² =61.69, p<0.00001 Omg to 5mg		1200	1.00(0.02 to 1.08)	0.40/, 22, 41 (m < 0.00001)
5 Smg to 10 mg		1200 274	1.00 (0.92 to 1.08) 1.17 (0.60 to 2.28)	94%; 33.41 (p<0.00001) Not applicable
10mg to 15mg		3434	0.93 (0.90 to 0.96)	66%; 14.53 (p=0.01)
15mg to 20mg		258	0.61 (0.54 to 0.69)	Not applicable
20mg or more		3353	0.85 (0.82 to 0.87)	68%; 9.24 (p=0.03)
Duration (I ² =86%; Chi ² =13.98, p=0.00				
0m to 6m		3353	0.85 (0.82 to 0.87)	68%; 9.24 (p=0.03)
6m to 12m	9	4957	0.92 (0.89 to 0.95)	91%; 95.66 (p<0.00001)
12m or more	1	209	0.88 (0.74 to 1.03)	Not applicable
Formulation (I ² =86%; Chi ² =13.99, p=	0.0009)			
Solution		4657	0.88 (0.85 to 0.90)	92%; 97.84 (p<0.00001)
Pill/ tablet	4	2144	0.86 (0.81 to 0.92)	43%; 7.05 (p=0.13)
Capsule	1	1718	1.03 (0.95 to 1.12)	Not applicable
Incidence of I DTI (DD)	12	0/10	1.00 (0.044- 1.07)	10/.1716 (- 044)
Incidence of LRTI (RR) Iron co-supplementation (I ² =0%; Chi ²	12 =0.06 p=	9610	1.00 (0.94 to 1.07)	1%; 17.16 (p=0.44)
with iron		2896	0.99 (0.87 to 1.12)	0%; 2.92 (p=0.71)
with iton		6714	1.01 (0.93 to 1.08)	22%; 14.17 (p=0.22)
Age ($I^2=0\%$; Chi ² =1.50, p=0.47)				, , , , , , , , , , , , , , , , , , ,
6m to 1y	5	3566	0.97 (0.88 to 1.07)	0%; 2.12 (p=0.95)
<i>1y to 5y</i>		4605	1.05 (0.96 to 1.16)	25%; 8.01 (p=0.24)
5y to 13y	1	836	1.00 (0.72 to 1.40)	Not applicable
<i>Dose</i> (I ² =0%; Chi ² =0.60, p=0.74)				
0mg to 5mg		845	0.94 (0.78 to 1.13)	0%; 0.93 (p=0.63)
10mg to 15mg		4045	1.00 (0.91 to 1.10)	25%; 9.32 (p=0.23)
20mg or more	7	4720	1.02 (0.92 to 1.13)	5%; 6.31 (p=0.39)
Duration ($I^2=0\%$; Chi ² =0.79, p=0.67)		21.12		
Om to 6m		3148	1.03 (0.92 to 1.14)	67%; 6.05 (p=0.05)
6m to 12m		5114	0.98 (0.90 to 1.06)	0%; 9.69 (p=0.47)
$\frac{12m \text{ or more}}{\text{Formulation } (l^2 - 20\% \cdot \text{Chi}^2 - 3.73 \text{ p} - 0.63 \text{ p})}$		1348	1.08 (0.83 to 1.42)	0%; 0.64 (p=0.89)
Formulation (I ² =20%; Chi ² =3.73, p=0 Solution		7007	0.98 (0.91 to 1.05)	2%; 13.25 (p=0.43)
Pill/ tablet	·	686	1.19 (0.93 to 1.51)	Not applicable
Capsule		612	1.19(0.93 to 1.51) 1.12(0.84 to 1.51)	Not applicable
Powder		1305	1.12 (0.04 to 1.01) 1.25 (0.75 to 2.09)	Not applicable
		4.4.1.1-		
Height (SMD) Iron co-supplementation (I ² =85%; Chi	$\frac{51}{i^2-6.60}$ n	13669	0.09 (0.06 to 0.13)	86%; 407.92 (p<0.00001)
<i>iron co-supplementation</i> (1=85%; Chi with iron		2929	0.01 (-0.07 to 0.08)	29%; 15.48 (p=0.16)
with from without iron		10510	0.01 (-0.07 to 0.08) 0.12 (0.08 to 0.16)	88%; 385.12 (p<0.0001)
Age (I^2 =98%; Chi ² =117.89, p<0.0000		10010	0.12 (0.00 to 0.10)	5070, 505.12 (p<0.00001)
6m to 1y	,	3730	-0.26 (-0.33 to 0.19)	94%; 204.70 (p<0.00001)
1y to 5y		6155	0.09 (0.04 to 0.14)	42%; 44.94 (p=0.01)
5y to 13y		3449	0.25 (0.18 to 0.32)	94%; 277.24 (p<0.00001)
Dose (I ² =91%; Chi ² =43.60, p<0.00001	1)			
Omg to 5mg		1170	0.02 (0.10 to 0.13)	58%; 14.30 (p=0.03)
Umg iD Smg				0.00/ 071 40 (.0.00001)
5mg to 10mg	8	2978	0.29 (0.22 to 0.37)	
5mg to 10mg 10mg to 15mg	8 22	2978 4344	0.29 (0.22 to 0.37) 0.06 (0.00 to 0.12)	96%; 271.49 (p<0.00001) 29%; 33.90 (p=0.09)
5mg to 10mg 10mg to 15mg 15mg to 20mg	8 22 2	2978 4344 240	0.29 (0.22 to 0.37) 0.06 (0.00 to 0.12) -0.01 (-0.26 to 0.24)	29%; 33.90 (p=0.09) 39%; 3.26 (p=0.20)
5mg to 10mg 10mg to 15mg 15mg to 20mg 20mg or more	8 22 2 3	2978 4344	0.29 (0.22 to 0.37) 0.06 (0.00 to 0.12)	29%; 33.90 (p=0.09)
5mg to 10mg 10mg to 15mg 15mg to 20mg 20mg or more Duration (I ² =91%; Chi ² =21.62, p<0.00	8 22 2 3 0001)	2978 4344 240 4675	0.29 (0.22 to 0.37) 0.06 (0.00 to 0.12) -0.01 (-0.26 to 0.24) -0.01 (0.07 to 0.05)	29%; 33.90 (p=0.09) 39%; 3.26 (p=0.20) 11%; 11.22 (p=0.34)
5mg to 10mg 10mg to 15mg 15mg to 20mg 20mg or more Duration (I ² =91%; Chi ² =21.62, p<0.00 0m to 6m	8 22 2 3 0001) 12	2978 4344 240 4675 4475	0.29 (0.22 to 0.37) 0.06 (0.00 to 0.12) -0.01 (-0.26 to 0.24) -0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04)	29%; 33.90 (p=0.09) 39%; 3.26 (p=0.20) 11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001)
5mg to 10mg 10mg to 15mg 15mg to 20mg 20mg or more Duration (I ² =91%; Chi ² =21.62, p<0.00 0m to 6m 6m to 12m	8 22 2 3 0001) 12 26	2978 4344 240 4675 4475 6479	0.29 (0.22 to 0.37) 0.06 (0.00 to 0.12) -0.01 (-0.26 to 0.24) -0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22)	29%; 33.90 (p=0.09) 39%; 3.26 (p=0.20) 11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001)
5mg to 10mg 10mg to 15mg 15mg to 20mg 20mg or more Duration (I ² =91%; Chi ² =21.62, p<0.00 0m to 6m 6m to 12m 12m or more	8 22 3 00001) 12 26 12	2978 4344 240 4675 4475 6479 2715	0.29 (0.22 to 0.37) 0.06 (0.00 to 0.12) -0.01 (-0.26 to 0.24) -0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04)	29%; 33.90 (p=0.09) 39%; 3.26 (p=0.20) 11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001)
$5mg \ to \ 10mg \\ 10mg \ to \ 15mg \\ 15mg \ to \ 20mg \\ 20mg \ or \ more \\ 20mg \ or \ more \\ 0mt \ to \ 6m \\ 6m \ to \ 12m \\ 12m \ or \ more \\ 12m \ or \ more \\ 17m \ co-supplementation \ (l^2=85\%; \ Chi$	8 22 3 0001) 12 26 12 i ² =6.60, p	2978 4344 240 4675 4475 6479 2715 >=0.01)	0.29 (0.22 to 0.37) 0.06 (0.00 to 0.12) -0.01 (-0.26 to 0.24) -0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17)	29%; 33.90 (p=0.09) 39%; 3.26 (p=0.20) 11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10)
$5mg \text{ to } 10mg \\ 10mg \text{ to } 15mg \\ 15mg \text{ to } 20mg \\ 20mg \text{ or more} \\ 20mg \text{ or more} \\ 15mg \text{ to } 20mg \\ 20mg \text{ or more} \\ 15mg \text{ to } 20mg \\ 0m \text{ to } 6m \\ 0m \text{ to } 6m \\ 6m \text{ to } 12m \\ 12m \text{ or more} \\ 17mn \text{ co-supplementation} (l^2=85\%; \text{Chi} \\ with \text{ iron} \\ 12m \text{ or more} \\ 12m or mo$	8 22 3 0001) 12 26 12 i ² =6.60, p 12	2978 4344 240 4675 4475 6479 2715 ==0.01) 2929	0.29 (0.22 to 0.37) 0.06 (0.00 to 0.12) -0.01 (-0.26 to 0.24) -0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17) 0.01 (-0.07 to 0.08)	29%; 33.90 (p=0.09) 39%; 3.26 (p=0.20) 11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10) 29%; 15.48 (p=0.16)
5mg to $10mg10mg$ to $15mg15mg$ to $20mg20mg$ or more Duration (l ² =91%; Chi ² =21.62, p<0.00 0m to $6m6m$ to $12m12m$ or more Iron co-supplementation (l ² =85%; Chi with iron without iron	8 22 3 0001) 12 26 12 i ² =6.60, p 12 44	2978 4344 240 4675 4475 6479 2715 >=0.01)	0.29 (0.22 to 0.37) 0.06 (0.00 to 0.12) -0.01 (-0.26 to 0.24) -0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17)	29%; 33.90 (p=0.09) 39%; 3.26 (p=0.20) 11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10)
$\begin{array}{c} 5mg \ to \ 10mg \\ 10mg \ to \ 15mg \\ 10mg \ to \ 15mg \\ 15mg \ to \ 20mg \\ 20mg \ or \ more \\ 20mg \ or \ more \\ 0m \ to \ 6m \\ 0m \ to \ 6m \\ 12m \ or \ more \ more \ more \ more \\ 12m \ or \ more \ m$		2978 4344 240 4675 4475 6479 2715 =0.01) 2929 10510	0.29 (0.22 to 0.37) 0.06 (0.00 to 0.12) -0.01 (-0.26 to 0.24) -0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17) 0.01 (-0.07 to 0.08) 0.12 (0.08 to 0.16)	29%; 33.90 (p=0.09) 39%; 3.26 (p=0.20) 11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10) 29%; 15.48 (p=0.16) 88%; 385.12 (p<0.00001)
$5mg \ to \ 10mg \\ 10mg \ to \ 15mg \\ 10mg \ to \ 15mg \\ 15mg \ to \ 20mg \\ 20mg \ or \ more \\ 20mg \ or \ more \\ 0m \ to \ 20mg \\ 0m \ to \ 5mg \\ 0m \ to \ 5mg \\ 12m \ or \ more \ more \ more \\ 12m \ or \ more \ $	$ \begin{array}{c} 8\\ 22\\ 2\\ 3\\ \hline 00001)\\ 12\\ 26\\ 12\\ 12\\ 12\\ 44\\ \hline .02)\\ 32\\ \end{array} $	2978 4344 240 4675 4475 6479 2715 =0.01) 2929 10510 9030	0.29 (0.22 to 0.37) 0.06 (0.00 to 0.12) -0.01 (-0.26 to 0.24) -0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17) 0.01 (-0.07 to 0.08) 0.12 (0.08 to 0.16) 0.12 (0.07 to 0.16)	29%; 33.90 (p=0.09) 39%; 3.26 (p=0.20) 11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10) 29%; 15.48 (p=0.16) 88%; 385.12 (p<0.00001) 90%; 367.20 (p<0.00001)
$5mg \ to \ 10mg \\ 10mg \ to \ 15mg \\ 10mg \ to \ 15mg \\ 15mg \ to \ 20mg \\ 20mg \ or \ more \\ 20mg \ or \ more \\ 0m \ to \ 6m \\ 0m \ to \ 6m \\ 12m \ or \ more \ more \ more \\ 12m \ or \ more \ m$	8 22 2 3 0001) 12 26 12 12 2 ² =6.60, p 12 44 .02) 32 11	2978 4344 240 4675 4475 6479 2715 =0.01) 2929 10510	0.29 (0.22 to 0.37) 0.06 (0.00 to 0.12) -0.01 (-0.26 to 0.24) -0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17) 0.01 (-0.07 to 0.08) 0.12 (0.08 to 0.16)	29%; 33.90 (p=0.09) 39%; 3.26 (p=0.20) 11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10) 29%; 15.48 (p=0.16) 88%; 385.12 (p<0.00001) 90%; 367.20 (p<0.00001) 9%; 12.11 (p=0.36)
$5mg \ to \ 10mg \\ 10mg \ to \ 15mg \\ 10mg \ to \ 15mg \\ 15mg \ to \ 20mg \\ 20mg \ or \ more \\ 20mg \ or \ more \\ 0m \ to \ 20mg \\ 0m \ to \ 5mg \\ 0m \ to \ 5mg \\ 12m \ or \ more \ more \ more \\ 12m \ or \ more \ $	8 22 2 3 0001) 12 26 12 12 2 ² =6.60, p 12 44 .02) 32 11	2978 4344 240 4675 4475 6479 2715 ==0.01) 2929 10510 9030 3868	0.29 (0.22 to 0.37) 0.06 (0.00 to 0.12) -0.01 (-0.26 to 0.24) -0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17) 0.01 (-0.07 to 0.08) 0.12 (0.08 to 0.16) 0.12 (0.07 to 0.16) 0.02 (-0.04 to 0.09) 0.31 (0.03 to 0.59)	29%; 33.90 (p=0.09) 39%; 3.26 (p=0.20) 11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10) 29%; 15.48 (p=0.16) 88%; 385.12 (p<0.00001) 90%; 367.20 (p<0.00001)
$5mg \text{ to } 10mg \\ 10mg \text{ to } 15mg \\ 15mg \text{ to } 20mg \\ 20mg \text{ or more} \\ 20mg \text{ or more} \\ 0m \text{ to } 6m \\ 0m \text{ to } 6m \\ 0m \text{ to } 12m \\ 12m \text{ or more} \\ 12m o$	8 22 3 00001) 12 26 12 12 2 ² =6.60, p 12 44 .02) 32 11 2 44 44	2978 4344 240 4675 4475 6479 2715 5=0.01) 2929 10510 9030 3868 322 12305	0.29 (0.22 to 0.37) 0.06 (0.00 to 0.12) -0.01 (-0.26 to 0.24) -0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17) 0.01 (-0.07 to 0.08) 0.12 (0.08 to 0.16) 0.12 (0.07 to 0.16) 0.02 (-0.04 to 0.09)	29%; 33.90 (p=0.09) 39%; 3.26 (p=0.20) 11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10) 29%; 15.48 (p=0.16) 88%; 385.12 (p<0.00001) 90%; 367.20 (p<0.00001) 9%; 12.11 (p=0.36) 0%; 0.90 (p=0.64)
$5mg \text{ to } 10mg \\ 10mg \text{ to } 15mg \\ 10mg \text{ to } 15mg \\ 15mg \text{ to } 20mg \\ 20mg \text{ or more} \\ 20mg \text{ or more} \\ 0m \text{ to } 6m \\ 6m \text{ to } 12m \\ 12m \text{ or more} \\ 12m $	$ \begin{array}{c} 8 \\ 22 \\ 2 \\ 3 \\ 0001) \\ 12 \\ 26 \\ 12 \\ 12 \\ 2^{2}=6.60, p \\ 12 \\ 44 \\ 0.02) \\ 32 \\ 11 \\ 2 \\ 44 \\ 2^{2}=1.50, p \\ \end{array} $	2978 4344 240 4675 4475 6479 2715 5=0.01) 2929 10510 9030 3868 322 12305 p=0.22)	0.29 (0.22 to 0.37) 0.06 (0.00 to 0.12) -0.01 (-0.26 to 0.24) -0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17) 0.01 (-0.07 to 0.08) 0.12 (0.08 to 0.16) 0.12 (0.07 to 0.16) 0.02 (-0.04 to 0.09) 0.31 (0.03 to 0.59) 0.10 (0.07 to 0.14)	29%; 33.90 (p=0.09) 39%; 3.26 (p=0.20) 11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10) 29%; 15.48 (p=0.16) 88%; 385.12 (p<0.00001) 90%; 367.20 (p<0.00001) 9%; 12.11 (p=0.36) 0%; 0.90 (p=0.64) 76%; 216.64 (p<0.00001)
$5mg \text{ to } 10mg \\ 10mg \text{ to } 15mg \\ 15mg \text{ to } 20mg \\ 20mg \text{ or more} \\ 20mg \text{ or more} \\ 0m \text{ to } 6m \\ 0m \text{ to } 6m \\ 0m \text{ to } 12m \\ 12m \text{ or more} \\ 12m o$	$ \begin{array}{c} 8\\22\\2\\3\\0001)\\12\\26\\12\\12\\12\\44\\.02)\\32\\11\\2\\\end{array} $ 44 44 44 1022	2978 4344 240 4675 4475 6479 2715 5=0.01) 2929 10510 9030 3868 322 12305	0.29 (0.22 to 0.37) 0.06 (0.00 to 0.12) -0.01 (-0.26 to 0.24) -0.01 (0.07 to 0.05) -0.01 (-0.07 to 0.04) 0.17 (0.12 to 0.22) 0.10 (0.02 to 0.17) 0.01 (-0.07 to 0.08) 0.12 (0.08 to 0.16) 0.12 (0.07 to 0.16) 0.02 (-0.04 to 0.09) 0.31 (0.03 to 0.59)	29%; 33.90 (p=0.09) 39%; 3.26 (p=0.20) 11%; 11.22 (p=0.34) 76%; 50.43 (p<0.00001) 91%; 313.67 (p<0.00001) 32%; 22.21 (p=0.10) 29%; 15.48 (p=0.16) 88%; 385.12 (p<0.00001) 90%; 367.20 (p<0.00001) 9%; 12.11 (p=0.36) 0%; 0.90 (p=0.64)

Age ($I^2=99\%$; Chi ² =136.86, p<0.00001)	3730	-0.31 (-0.38 to -0.25)	97% . 287 18 (0 00001)
6m to 1y 9 1y to 5y 20	3730 5565	-0.31 (-0.38 to -0.25) 0.06 (0.01 to 0.11)	97%; 387.48 (p<0.00001) 43%; 38.72 (p=0.02)
<i>1y to 3y</i> 20 <i>5y to 13y</i> 13	2654	0.08 (0.01 to 0.11) 0.28 (0.20 to 0.36)	45%; 58.72 (p=0.02) 89%; 117.28 (p<0.00001)
<i>Dose</i> (I^2 =89%; Chi ² =35.38, p<0.00001)	2034	0.20 (0.20 to 0.30)	67%, 117.28 (p<0.00001)
Dose (1 - 6) %, Chi - 55.56, p<0.00001) Omg to 5mg 5	1170	0.00 (-0.11 to 0.12)	0%; 2.79 (p=0.83)
5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5 5	2766	0.27 (0.20 to 0.35)	92%; 108.31 (p<0.0001)
10mg to 15mg 19	3969	0.11 (0.04 to 0.17)	34%; 31.75 (p=0.06)
15mg to 20mg 2	240	-0.20 (-0.45 to 0.06)	13%; 2.30 (p=0.32)
20mg or more 7	3919	0.01 (-0.05 to 0.08)	36%; 12.43 (p=0.13)
<i>Duration</i> (I ² =92%; Chi ² =23.59, p<0.00001)		(
0m to 6m 11	4417	0.05 (0.00 to 0.11)	76%; 44.95 (p<0.00001)
6m to 12m 22	5289	0.20 (0.15 to 0.26)	82%; 131.52 (p<0.00001)
12m or more 11	2599	-0.01 (-0.07 to 0.09)	16%; 16.58 (p=0.28)
Formulation (I ² =87%; Chi ² =15.43, p=0.0004))		· • •
Solution 29	8147	0.14 (0.10 to 0.19)	82%; 182.72 (p<0.00001)
Pill/tablet 10	3656	0.01 (-0.06 to 0.08]	13%; 11.51 (p=0.32)
Capsule 2	304	0.41 (0.12 to 0.71)	0%; 1.21 (p=0.55)
			* · · · ·
Weight-to-height ratio (SMD) 24	7901	0.05 (0.01 to 0.10)	20%; 34.96 (p=0.17)
Iron co-supplementation (I ² =72%; Chi ² =3.51,	, p=0.06)		
with iron 8	1409	0.14 (0.03 to 0.24)	14%; 8.10 (p=0.32)
without iron 19	6262	0.03 (-0.02 to 0.08)	16%; 22.67 (p=0.25)
<i>Age</i> (I ² =30%; Chi ² =11.45, p=0.18)			
6m to 1y 7	2559	0.03 (-0.04 to 0.11)	30%; 11.45 (p=0.18)
<i>1y to 5y</i> 12	4302	0.02 (-0.05 to 0.08)	7%; 13.95 (p=0.38)
5y to 13y 5	857	0.07 (-0.06 to 0.20)	0%; 3.20 (p=0.67)
Dose (I ² =11%; Chi ² =4.52, p=0.34)			
Omg to 5mg 4	671	0.07 (-0.08 to 0.22)	0%; 1.02 (p=0.91)
5mg to 10mg 6	1229	0.01 (-0.01 to 0.12)	30%; 7.16 (p=0.21)
10mg to 15mg 10	2389	0.08 (-0.01 to 0.16)	47%; 18.79 (p=0.04)
15mg to 20mg 1	194	-0.22 (-0.50 to 0.06)	Not applicable
20mg or more 4	3576	0.06 (0.00 to 0.13)	0%; 2.43 (p=0.79)
Duration (I ² =18.2%; Chi ² =2.45, p=0.29)	2227	0.07 (0.00 + 0.14)	00/- 2 14/- 0 02
$\begin{array}{c} 0m \ to \ 6m \ 5 \\ 6m \ to \ 12m \ 15 \end{array}$	3337	0.07 (0.00 to 0.14) 0.05 (0.01 to 0.11)	0%; 2.14 (p=0.83) 28% : 27.40 (p=0.05)
6m to 12m 15	4212	0.05 (-0.01 to 0.11) 0.10 (0.21 to 0.11)	38%; 27.40 (p=0.05)
$\frac{12m \text{ or more } 4}{E_{\text{commutation}} \left(\frac{2}{2} - 400^{\circ} \right) \cdot \text{Ch}^{2} - 107 \text{ m} - 0.16}$	352	-0.10 (-0.31 to 0.11)	0%; 2.98 (p=0.56)
Formulation (I^2 =49%; Chi ² =1.97, p=0.16)	6019	0.06 (0.01 to 0.12)	0%, 20.02 (n=0.46)
Solution 17 Pill/ tablet 6		-0.01 (-0.11 to 0.12)	0%; 20.92 (p=0.46) 56%: 11.38 (p=0.04)
r III/ Iablet 0	1652	-0.01 (-0.11 to 0.06)	56%; 11.38 (p=0.04)
Plasma zinc (SMD) 46	9810	0.62 (0.58 to 0.67)	91%; 582.45 (p<0.00001)
<i>Iron co-supplementation</i> ($I^2=96\%$; Chi ² =27.0°			(P \0.00001
with iron 17	3231	0.47 (0.39 to 0.54)	82%; 90.82 (p<0.00001)
without iron 37	6579	0.70 (0.65 to 0.75)	92%; 464.56 (p<0.00001)
Age ($I^2=95\%$; Chi ² =40.84, p<0.00001)			
6m to 1y 8	2042	0.46 (0.37 to 0.55)	87%; 74.18 (p<0.00001)
<i>Iy to 5y</i> 19	4911	0.75 (0.69 to 0.81)	93%; 309.84 (p<0.00001)
5y to 13y 17	2375	0.47 (0.38 to 0.55)	83%; 116.75 (p<0.00001)
Dose (I ² =92%; Chi ² =49.94, p<0.00001)			¥ ,
Omg to 5mg 4	855	0.35 (0.21 to 0.49)	26%; 6.72 (p=0.24)
5mg to 10mg 8	1762	0.49 (0.40 to 0.59)	93%; 102.83 (p<0.00001)
10mg to 15mg 20	4596	0.62 (0.56 to 0.68)	86%; 158.02 (p<0.00001)
15mg to 20mg 6	535	0.76 (0.58 to 0.94)	86%; 51.51 (p<0.00001)
20mg or more 6	1724	0.88 (0.78 to 0.98)	95%; 161.54 (p<0.00001)
<i>Duration</i> (I ² =94%; Chi ² =32.98, p<0.00001)			
0m to 6m 15			
	3079	0.81 (0.73 to 0.88)	
6m to 12m 22	4347	0.52 (0.46 to 0.58)	85%; 178.87 (p<0.00001)
12m or more 9	4347 2384	· · · · · · · · · · · · · · · · · · ·	
<i>12m or more</i> 9 <i>Formulation</i> (l ² =98%; Chi ² =149.23, p<0.000	4347 2384 01)	0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67)	85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001)
<u>12m or more</u> 9 Formulation (I ² =98%; Chi ² =149.23, p<0.0000 Solution 25	4347 2384 01) 4741	0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84)	85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001)
<u>12m or more</u> 9 Formulation (I ² =98%; Chi ² =149.23, p<0.0000 Solution 25 Pill/ tablet 12	4347 2384 01) 4741 3553	0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49)	85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001)
12m or more 9 Formulation (I ² =98%; Chi ² =149.23, p<0.0000 Solution 25 Pill/tablet 12 Capsule 5	4347 2384 01) 4741 3553 1115	0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21)	85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001)
<u>12m or more</u> 9 Formulation (l ² =98%; Chi ² =149.23, p<0.0000 Solution 25 Pill/ tablet 12	4347 2384 01) 4741 3553	0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49)	85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001)
$\frac{12m \text{ or more } 9}{Formulation (l^2=98\%; Chi^2=149.23, p<0.0000 Solution 25 Pill/tablet 12 Capsule 5 Powder 1$	4347 2384 01) 4741 3553 1115 401	0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14)	85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable
12m or more 9 Formulation (I ² =98%; Chi ² =149.23, p<0.0000	4347 2384 01) 4741 3553 1115 401 5434	0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21)	85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable
12m or more 9Formulation (l ² =98%; Chi ² =149.23, p<0.0000 Solution 25 Pill/tablet 12 Capsule 5 Powder 1Prevalence of zinc deficiency (RR) 15 Iron co-supplementation (l ² =97%; Chi ² =34.2'	4347 2384 01) 4741 3553 1115 401 5434 7, p<0.00001)	0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53)	85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001
$\frac{12m \text{ or more } 9}{Formulation (l^2=98\%; Chi^2=149.23, p<0.0000 Solution 25Pill/tablet 12Capsule 5Powder 1Prevalence of zinc deficiency (RR) 15Iron co-supplementation (l^2=97%; Chi^2=34.2'with iron 6$	4347 2384 01) 4741 3553 1115 401 5434 7, p<0.00001) 1704	0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53) 0.62 (0.55 to 0.69)	85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001 69%; 16.19 (p=0.006)
12m or more 9Formulation (l ² =98%; Chi ² =149.23, p<0.0000 Solution 25 Pill/tablet 12 Capsule 5 Powder 1Prevalence of zinc deficiency (RR) 15 Iron co-supplementation (l ² =97%; Chi ² =34.2' with iron 6 without iron 14	4347 2384 01) 4741 3553 1115 401 5434 7, p<0.00001)	0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53)	85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001
$\frac{12m \text{ or more } 9}{Formulation (l^2=98\%; Chi^2=149.23, p<0.0000 Solution 25Pill/tablet 12Capsule 5Powder 1 $ Prevalence of zinc deficiency (RR) 15 Iron co-supplementation (l^2=97%; Chi^2=34.2' with iron 6 without iron 14 Age (l^2=92%; Chi^2=24.36, p<0.00001)	4347 2384 01) 4741 3553 1115 401 5434 7, p<0.00001) 1704 3840	0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53) 0.62 (0.55 to 0.69) 0.37 (0.33 to 0.42)	85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001 69%; 16.19 (p=0.006) 85%; 94.31 (p<0.00001)
$\frac{12m \text{ or more } 9}{Formulation (l^2=98\%; Chi^2=149.23, p<0.0000 Solution 25Pill/ tablet 12Capsule 5Powder 1Prevalence of zinc deficiency (RR) 15Iron co-supplementation (l^2=97%; Chi^2=34.2'with iron 6without iron 14Age (l^2=92%; Chi^2=24.36, p<0.00001)6m to 1y 1$	4347 2384 01) 4741 3553 1115 401 5434 7, p<0.00001) 1704 3840 549	0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53) 0.62 (0.55 to 0.69) 0.37 (0.33 to 0.42) 0.62 (0.54 to 0.70)	85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001 69%; 16.19 (p=0.006) 85%; 94.31 (p<0.00001) 0%; 0.07 (p=0.79)
$\frac{12m \text{ or more } 9}{Formulation (l^2=98\%; Chi^2=149.23, p<0.0000 Solution 25Pill/ tablet 12Capsule 5Powder 1 Prevalence of zinc deficiency (RR) 15Iron co-supplementation (l^2=97%; Chi^2=34.2'with iron 6without iron 14Age (l^2=92%; Chi^2=24.36, p<0.00001)6m to 1y 11y to 5y 9$	$ \begin{array}{r} 4347 \\ 2384 \\ 01) \\ 4741 \\ 3553 \\ 1115 \\ 401 \\ \hline 5434 \\ 7, p<0.00001) \\ 1704 \\ 3840 \\ \hline 549 \\ 3761 \\ \end{array} $	0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53) 0.62 (0.55 to 0.69) 0.37 (0.33 to 0.42) 0.62 (0.54 to 0.70) 0.41 (0.37 to 0.47)	85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001 69%; 16.19 (p=0.006) 85%; 94.31 (p<0.00001) 0%; 0.07 (p=0.79) 91%; 116.81 (p<0.00001)
$\frac{12m \text{ or more } 9}{Formulation (l^2=98\%; Chi^2=149.23, p<0.0000 Solution 25Pill/ tablet 12Capsule 5Powder 1 Prevalence of zinc deficiency (RR) 15Iron co-supplementation (l^2=97%; Chi^2=34.2'with iron 6without iron 14Age (l^2=92%; Chi^2=24.36, p<0.00001)6m to 1y 11y to 5y 95y to 13y 5$	4347 2384 01) 4741 3553 1115 401 5434 7, p<0.00001) 1704 3840 549	0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53) 0.62 (0.55 to 0.69) 0.37 (0.33 to 0.42) 0.62 (0.54 to 0.70)	85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001 69%; 16.19 (p=0.006) 85%; 94.31 (p<0.00001) 0%; 0.07 (p=0.79)
$\frac{12m \text{ or more } 9}{Formulation (l^2=98\%; Chi^2=149.23, p<0.0000 Solution 25Pill/tablet 12Capsule 5Powder 1 \frac{Prevalence of zinc deficiency (RR) 15}{Iron co-supplementation (l^2=97\%; Chi^2=34.2' with iron 6 without iron 14}{Age (l^2=92\%; Chi^2=24.36, p<0.00001) 6m to 1y 1 1y to 5y 9 5y to 13y 5}Dose (l^2=96\%; Chi^2=74.93, p<0.00001)$	4347 2384 01) 4741 3553 1115 401 5434 7, p<0.00001) 1704 3840 549 3761 1234	0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53) 0.62 (0.55 to 0.69) 0.37 (0.33 to 0.42) 0.62 (0.54 to 0.70) 0.41 (0.37 to 0.47) 0.31 (0.20 to 0.49)	85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001 69%; 16.19 (p=0.006) 85%; 94.31 (p<0.00001) 0%; 0.07 (p=0.79) 91%; 116.81 (p<0.00001) 0%; 3.53 (p=0.74)
$\frac{12m \text{ or more } 9}{Formulation (l^2=98\%; Chi^2=149.23, p<0.0000 Solution 25Pill/tablet 12Capsule 5Powder 1 \frac{Prevalence of zinc deficiency (RR) 15}{Iron co-supplementation (l^2=97\%; Chi^2=34.2' with iron 6 without iron 14}{Age (l^2=92\%; Chi^2=24.36, p<0.00001) 6m to 1y 1 1y to 5y 9 5y to 13y 5}\\Dose (l^2=96\%; Chi^2=74.93, p<0.00001) 5mg to 10mg 3$	4347 2384 01) 4741 3553 1115 401 5434 7, p<0.00001) 1704 3840 549 3761 1234 1181	0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53) 0.62 (0.55 to 0.69) 0.37 (0.33 to 0.42) 0.62 (0.54 to 0.70) 0.41 (0.37 to 0.47) 0.31 (0.20 to 0.49) 0.34 (0.27 to 0.44)	85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001) 69%; 16.19 (p=0.006) 85%; 94.31 (p<0.00001) 0%; 0.07 (p=0.79) 91%; 116.81 (p<0.00001) 0%; 3.53 (p=0.74) 71%; 6.81 (p=0.03)
$\frac{12m \text{ or more } 9}{Formulation (l^2=98\%; Chi^2=149.23, p<0.0000 Solution 25Pill/ tablet 12Capsule 5Powder 1 \frac{Prevalence of zinc deficiency (RR) 15}{Iron co-supplementation (l^2=97\%; Chi^2=34.2'with iron 6without iron 14}{Age (l^2=92\%; Chi^2=24.36, p<0.00001)6m to 1y 11y to 5y 95y to 13y 5}\\Dose (l^2=96\%; Chi^2=74.93, p<0.00001)5mg to 10mg 310mg to 15mg 7$	4347 2384 01) 4741 3553 1115 401 5434 7, p<0.00001) 1704 3840 549 3761 1234 1181 2890	0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53) 0.62 (0.55 to 0.69) 0.37 (0.33 to 0.42) 0.62 (0.54 to 0.70) 0.41 (0.37 to 0.47) 0.31 (0.20 to 0.49) 0.34 (0.27 to 0.44) 0.57 (0.52 to 0.63)	85%; 178.87 (p<0.00001) 88%; 84.94 (p<0.00001) 90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001) 69%; 16.19 (p=0.006) 85%; 94.31 (p<0.00001) 0%; 0.07 (p=0.79) 91%; 116.81 (p<0.00001) 0%; 3.53 (p=0.74) 71%; 6.81 (p=0.03) 81%; 48.40 (p<0.00001)
$\begin{array}{rrrrr} 12m \ or \ more \ 9 \\ \hline Formulation \ (l^2=98\%; Chi^2=149.23, p<0.0000 \\ Solution \ 25 \\ Pill/ \ tablet \ 12 \\ Capsule \ 5 \\ Powder \ 1 \\ \hline \end{array}$	4347 2384 01) 4741 3553 1115 401 5434 7, p<0.00001) 1704 3840 549 3761 1234 1181	0.52 (0.46 to 0.58) 0.59 (0.50 to 0.67) 0.78 (0.72 to 0.84) 0.42 (0.35 to 0.49) 1.07 (0.94 to 1.21) -0.06 (-0.25 to 0.14) 0.49 (0.45 to 0.53) 0.62 (0.55 to 0.69) 0.37 (0.33 to 0.42) 0.62 (0.54 to 0.70) 0.41 (0.37 to 0.47) 0.31 (0.20 to 0.49) 0.34 (0.27 to 0.44)	90%; 293.32 (p<0.00001) 88%; 96.60 (p<0.00001) 88%; 56.53 (p<0.00001) Not applicable 86%; 144.77 (p<0.00001) 69%; 16.19 (p=0.006) 85%; 94.31 (p<0.00001) 0%; 0.07 (p=0.79) 91%; 116.81 (p<0.00001) 0%; 3.53 (p=0.74) 71%; 6.81 (p=0.03)

Duration (I ² =97%; Chi ² =71.67, p<0.00001 0m to 6m 6	2554	0.22 (0.18 to 0.27)	72%; 24.89 (p=0.0008)
6m to 12m 5	1043	0.22 (0.18 to 0.27) 0.59 (0.53 to 0.67)	35%; 9.19 (p=0.16)
12m or more 4	1947	0.55 (0.48 to 0.64)	87%; 39.02 (p<0.0001)
<i>Formulation</i> (I ² =91%; Chi ² =22.12, p<0.00		0.55 (0.48 to 0.04)	6770, 59.02 (p<0.00001)
Solution 7	2415	0.49 (0.44 to 0.54)	89%; 87.85 (p<0.00001)
Pill/tablet 7	2392	0.59 (0.50 to 0.68)	80%; 29.32 (p<0.0001)
Capsule 2	883	0.29 (0.23 to 0.37)	60%; 7.43 (p=0.06)
- <i>m</i>			
Blood haemoglobin (SMD) 27	6024	-0.05 (-0.10 to 0.00)	45%; 63.96 (p=0.002)
Iron co-supplementation (I ² =0%; Chi ² =0.7	0, p=0.40)		· · · · · ·
with iron 17	3098	-0.01 (-0.08 to 0.07)	63%; 42.74 (p=0.0003)
without iron 19	2913	0.04 (-0.04 to 0.11)	54%; 39.06 (p=0.003)
<i>Age</i> (I ² =0%; Chi ² =1.53, p=0.46)			
6m to 1y 7	2192	-0.04 (-0.12 to 0.05)	69%; 32.49 (p=0.0003)
<i>1y to 5y</i> 12	2332	0.04 (-0.04 to 0.12)	62%; 33.89 (p=0.001)
5y to 13y 6	1286	0.01 (-0.11 to 0.13)	10%; 8.93 (p=0.35)
Dose ($I^2=0\%$; Chi ² =2.12, p=0.71)	0.66		200/ 0.16 (0.15)
Omg to 5mg 4	966	0.01 (-0.12 to 0.14)	39%; 8.16 (p=0.15)
5mg to 10mg 2 10mg to 15mg 16	306	-0.01 (-0.23 to 0.21)	0%; 0.56 (p=0.45)
10mg to 15mg 16 15mg to 20mg 4	3452	0.01 (-0.06 to 0.08) -0.04 (-0.24 to 0.17)	58%; 44.83 (p=0.0007)
20mg or more 3	364 1025	-0.04 (-0.24 to 0.17) 0.10 (-0.02 to 0.22)	25%; 5.31 (p=0.26) 83%; 23.74 (p<0.00001)
Duration (I ² =52%; Chi ² =4.20, p=0.12)	1023	0.10 (-0.02 10 0.22)	0570, 25.74 (p<0.00001)
Duration ($1 = 32\%$; CIII = 4.20, p=0.12) Om to 6m 7	672	0.17 (0.01 to 0.33)	74%; 27.23 (p=0.0003)
6m to 12m 14	3738	-0.01 (-0.08 to 0.06)	39%; 27.71 (p=0.05)
12m or more 7	1601	0.01 (-0.09 to 0.11)	61%; 23.36 (p=0.005)
Formulation ($I^2=0\%$; Chi ² =1.38, p=0.71)			, <u></u> (p 0.000)
Solution 15	2990	0.01 (-0.06 to 0.08)	64%; 52.48 (p<0.00001)
Pill/tablet 8	1605	0.01 (-0.09 to 0.12)	67%; 24.34 (p=0.002)
Capsule 4	989	0.07 (-0.06 to 0.20)	0%; 4.31 (p=0.51)
Powder 1	427	-0.07 (-0.26 to 0.12)	Not applicable
Prevalence of anaemia (RR) 13	4287	1.00 (0.95 to 1.06)	37%; 28.52 (p=0.05)
Iron co-supplementation (I ² =0%; Chi ² =0.0	· · •		500/ 01 00 / 0 01
with iron 10	2755	1.00 (0.91 to 1.09)	58%; 21.20 (p=0.01)
without iron 9 A_{22} ($I^2 = 80$) · Chi ² = 2.17 p = 0.24)	1532	1.00 (0.93 to 1.08)	0%; 7.31 (p=0.50)
Age (I ² =8%; Chi ² =2.17, p=0.34) 6m to 1y 6	1726	1.01 (0.95 to 1.08)	39%; 11.43 (p=0.12)
$\begin{array}{c} om \ to \ 1y \ 6 \\ 1y \ to \ 5y \ 6 \end{array}$	2161	0.99 (0.88 to 1.12)	50%; 14.07 (p=0.05)
5y to 13y 2	400	0.73 (0.47 to 1.12)	0%; 0.84 (p=0.66)
<i>Dose</i> (I^2 =68%; Chi ² =12.56, p=0.01)	-100	0.75 (0.77 10 1.12)	070, 0.04 (p=0.00)
$Omg \ to \ 5mg \ 2$	616	1.01 (0.94 to 1.09)	31%; 2.91 (p=0.23)
5mg to 10mg 1	208	0.94 (0.47 to 1.87)	Not applicable
10mg to 15mg 8	3069	1.01 (0.92 to 1.11)	15%; 13.00 (p=0.29)
15mg to 20mg 1	181	0.76 (0.40 to 1.46)	Not applicable
20mg or more 1	213	0.17 (0.06 to 0.46)	Not applicable
Duration (I ² =83%; Chi ² =11.42, p=0.003)			
0m to 6m 2	325	0.18 (0.06 to 0.48)	0%; 0.39 (p=0.53)
6m to 12m 7	1989	1.01 (0.94 to 1.08)	40%; 13.33 (p=0.10)
12m or more 5	1973	1.00 (0.90 to 1.12)	0%; 3.38 (p=0.85)
Formulation (I ² =7%; Chi ² =3.21, p=0.36)		a aa (a = -	
Solution 4	1115	0.90 (0.78 to 1.04)	73%; 18.87 (p=0.002)
	1050	1.02 (0.95 to 1.10)	
Pill/tablet 6	1958	1 00 00 00 1 1 1	0%; 3.36 (p=0.85)
Capsule 2	886	1.00 (0.88 to 1.13)	3%; 3.08 (p=0.38)
		1.00 (0.88 to 1.13) 1.19 (0.81 to 1.73)	
Capsule 2 Powder 1	886 328	1.19 (0.81 to 1.73)	3%; 3.08 (p=0.38) Not applicable
Capsule 2 Powder 1 Plasma ferritin (SMD) 19	886 328 4474		3%; 3.08 (p=0.38) Not applicable
Capsule 2 Powder 1 Plasma ferritin (SMD) 19 Iron co-supplementation (l ² =91%; Chi ² =11)	886 328 4474 1.08, p=0.0009)	1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13)	3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.00001
Capsule 2 Powder 1 Plasma ferritin (SMD) 19 Iron co-supplementation (l ² =91%; Chi ² =11 with iron 14	886 328 4474 1.08, p=0.0009) 2765	1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02)	3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.00001) 80%; 64.00 (p<0.00001)
Capsule 2 Powder 1 Plasma ferritin (SMD) 19 Iron co-supplementation (l ² =91%; Chi ² =11 with iron 14 without iron 11	886 328 4474 1.08, p=0.0009)	1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13)	3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.00001) 80%; 64.00 (p<0.00001)
$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	886 328 4474 1.08, p=0.0009) 2765 1709	1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17)	3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.00001) 80%; 64.00 (p<0.00001) 97%; 389.92 (p<0.00001)
$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	886 328 4474 1.08, p=0.0009) 2765 1709 1166	1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03)	3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.00001) 80%; 64.00 (p<0.00001) 97%; 389.92 (p<0.00001) 20%; 6.26 (p=0.28)
$\begin{array}{r c} Capsule & 2\\ Powder & 1 \end{array}$ $\begin{array}{r c} Plasma \ ferritin \ (SMD) & 19\\ Iron \ co-supplementation \ (l^2=91\%; \ Chi^2=11)\\ with \ iron & 14\\ without \ iron & 11\\ \hline Age \ (l^2=0\%; \ Chi^2=1.02, \ p=0.60)\\ & 6m \ to \ 1y \ 4\\ & 1y \ to \ 5y \ 9 \end{array}$	886 328 4474 1.08, p=0.0009) 2765 1709 1166 2716	1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.08)	3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.00001) 80%; 64.00 (p<0.00001) 97%; 389.92 (p<0.00001) 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.00001)
$\begin{array}{c} Capsule \ 2\\ Powder \ 1 \end{array}$ $\begin{array}{c} \textbf{Plasma ferritin (SMD)} & \textbf{19} \\ \hline \textbf{Iron co-supplementation (I^2=91\%; Chi^2=11)} \\ with iron \ 14\\ \hline without iron \ 11\\ \hline Age (I^2=0\%; Chi^2=1.02, p=0.60) \\ & 6m to \ 1y \ 4\\ I y to \ 5y \ 9\\ & 5y to \ 13y \ 5 \end{array}$	886 328 4474 1.08, p=0.0009) 2765 1709 1166	1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03)	3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.00001) 80%; 64.00 (p<0.00001) 97%; 389.92 (p<0.00001) 20%; 6.26 (p=0.28)
$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	886 328 4474 1.08, p=0.0009) 2765 1709 1166 2716 534	1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.08) -0.05 (-0.24 to 0.15)	3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.00001) 80%; 64.00 (p<0.00001) 97%; 389.92 (p<0.00001) 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.00001) 47%; 11.30 (p=0.08)
$\begin{array}{c} Capsule \ 2\\ Powder \ 1 \end{array}$ $\begin{array}{c} \textbf{Plasma ferritin (SMD)} & \textbf{19} \\ \hline \textbf{Iron co-supplementation (I^2=91\%; Chi^2=11)} \\ with iron \ 14\\ \hline without iron \ 11\\ \hline Age (I^2=0\%; Chi^2=1.02, p=0.60) \\ & 6m to \ 1y \ 4\\ I y to \ 5y \ 9\\ & 5y to \ 13y \ 5 \end{array}$	886 328 4474 1.08, p=0.0009) 2765 1709 1166 2716	1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.08)	3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.00001) 80%; 64.00 (p<0.00001) 97%; 389.92 (p<0.00001) 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.00001)
$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	886 328 4474 (.08, p=0.0009) 2765 1709 1166 2716 534 371	1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.08) -0.05 (-0.24 to 0.15) -0.07 (-0.28 to 0.14)	3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.00001) 80%; 64.00 (p<0.00001) 97%; 389.92 (p<0.00001) 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.00001) 47%; 11.30 (p=0.08) 29%; 4.21 (p=0.24) Not applicable
$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	886 328 4474 1.08, p=0.0009) 2765 1709 1166 2716 534 371 78	1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.08) -0.05 (-0.24 to 0.15) -0.07 (-0.28 to 0.14) -0.15 (-0.63 to 0.34)	3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.00001) 80%; 64.00 (p<0.00001) 97%; 389.92 (p<0.00001) 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.00001) 47%; 11.30 (p=0.08) 29%; 4.21 (p=0.24) Not applicable
$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	886 328 4474 1.08, p=0.0009) 2765 1709 1166 2716 534 371 78 3171	1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.08) -0.05 (-0.24 to 0.15) -0.07 (-0.28 to 0.14) -0.15 (-0.63 to 0.34) -0.20 (-0.28 to -0.13)	3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.00001) 80%; 64.00 (p<0.00001) 97%; 389.92 (p<0.00001) 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.00001) 47%; 11.30 (p=0.08) 29%; 4.21 (p=0.24) Not applicable 97%; 428.29 (p<0.00001)
$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	886 328 4474 1.08, p=0.0009) 2765 1709 1166 2716 534 371 78 3171 314 652	1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.08) -0.05 (-0.24 to 0.15) -0.07 (-0.28 to 0.14) -0.15 (-0.63 to 0.34) -0.20 (-0.28 to -0.13) -0.14 (-0.36 to 0.08)	3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.00001) 80%; 64.00 (p<0.00001) 97%; 389.92 (p<0.00001) 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.00001) 47%; 11.30 (p=0.08) 29%; 4.21 (p=0.24) Not applicable 97%; 428.29 (p<0.00001) 0%; 2.05 (p=0.56)
$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	886 328 4474 1.08, p=0.0009) 2765 1709 1166 2716 534 371 78 3171 314 652	1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.08) -0.05 (-0.24 to 0.15) -0.07 (-0.28 to 0.14) -0.15 (-0.63 to 0.34) -0.20 (-0.28 to -0.13) -0.14 (-0.36 to 0.08)	3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.00001) 80%; 64.00 (p<0.00001) 97%; 389.92 (p<0.00001) 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.00001) 47%; 11.30 (p=0.08) 29%; 4.21 (p=0.24) Not applicable 97%; 428.29 (p<0.00001) 0%; 2.05 (p=0.56)
$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	886 328 4474 1.08, p=0.0009) 2765 1709 1166 2716 534 371 78 3171 314 652)	1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.08) -0.05 (-0.24 to 0.15) -0.07 (-0.28 to 0.14) -0.15 (-0.63 to 0.34) -0.20 (-0.28 to -0.13) -0.14 (-0.36 to 0.08) 0.17 (0.02 to 0.33) 0.06 (-0.07 to 0.20) -0.07 (-0.17 to 0.03)	3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.00001) 80%; 64.00 (p<0.00001) 97%; 389.92 (p<0.00001) 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.00001) 47%; 11.30 (p=0.28) 29%; 4.21 (p=0.24) Not applicable 97%; 428.29 (p<0.00001) 0%; 2.05 (p=0.56) 79%; 12.57 (p=0.002) 79%; 32.68 (p<0.0001) 28%; 12.55 (p=0.18)
$\begin{array}{c c} Capsule & 2 \\ Powder & 1 \end{array} \\ \hline \\ \hline Plasma \ ferritin \ (SMD) & 19 \\ \hline Iron \ co-supplementation \ (l^2=91\%; \ Chi^2=11) \\ with \ iron & 14 \\ without \ iron & 14 \\ \hline without \ iron & 11 \\ \hline \\ Age \ (l^2=0\%; \ Chi^2=1.02, \ p=0.60) \\ & 6m \ to \ 1y \ 4 \\ Iy \ to \ 5y \ 9 \\ \hline \\ 5y \ to \ 13y \ 5 \\ \hline \\ Dose \ (l^2=79\%; \ Chi^2=18.71, \ p=0.0009) \\ \hline \\ 0mg \ to \ 5mg \ 3 \\ 5mg \ to \ 10mg \ 1 \\ 10mg \ to \ 5mg \ 3 \\ 5mg \ to \ 10mg \ 1 \\ 10mg \ to \ 5mg \ 3 \\ 5mg \ to \ 10mg \ 1 \\ 15mg \ to \ 20mg \ 3 \\ 20mg \ or \ more \ 3 \\ \hline \\ Duration \ (l^2=92\%; \ Chi^2=26.28, \ p<0.00001 \\ \hline \\ 0m \ to \ 6m \ 7 \\ 6m \ to \ 12m \ 7 \\ 12m \ or \ more \ 4 \\ \hline \end{array}$	886 328 4474 1.08, p=0.0009) 2765 1709 1166 2716 534 371 78 3171 314 652) 902 1735 1779	1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.08) -0.05 (-0.24 to 0.15) -0.07 (-0.28 to 0.14) -0.15 (-0.63 to 0.34) -0.20 (-0.28 to 0.13) -0.14 (-0.36 to 0.08) 0.17 (0.02 to 0.33) 0.06 (-0.07 to 0.20)	3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.00001) 97%; 389.92 (p<0.00001) 97%; 62.6 (p=0.28) 98%; 439.66 (p<0.00001) 47%; 11.30 (p=0.08) 29%; 4.21 (p=0.24) Not applicable 97%; 428.29 (p<0.00001) 0%; 2.05 (p=0.56) 79%; 14.57 (p=0.002) 79%; 32.68 (p<0.0001)
$\begin{array}{r c c c c c c c c c c c c c c c c c c c$	886 328 4474 (.08, p=0.0009) 2765 1709 1166 2716 534 371 78 3171 314 652) 902 1735 1779 001)	1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.08) -0.05 (-0.24 to 0.15) -0.07 (-0.28 to 0.14) -0.15 (-0.63 to 0.34) -0.20 (-0.28 to -0.13) -0.14 (-0.36 to 0.08) 0.17 (0.02 to 0.33) 0.06 (-0.07 to 0.20) -0.07 (-0.17 to 0.03)	3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.00001) 80%; 64.00 (p<0.00001) 97%; 389.92 (p<0.00001) 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.00001) 47%; 11.30 (p=0.28) 29%; 4.21 (p=0.24) Not applicable 97%; 428.29 (p<0.00001) 0%; 2.05 (p=0.56) 79%; 12.57 (p=0.002) 79%; 32.68 (p<0.0001) 28%; 12.55 (p=0.18)
$\begin{array}{c c} Capsule & 2 \\ Powder & 1 \end{array} \\ \hline \\ Plasma ferritin (SMD) & 19 \\ \hline \\ \hline \\ Iron co-supplementation (l^2=91%; Chi^2=11) \\ with iron & 14 \\ without iron & 14 \\ without iron & 14 \\ \hline \\ \hline \\ \hline \\ \hline \\ Age (l^2=0\%; Chi^2=1.02, p=0.60) \\ \hline \\ & 6m to 1y & 4 \\ I y to 5y & 9 \\ \hline \\$	886 328 4474 1.08, p=0.0009) 2765 1709 1166 2716 534 371 78 3171 314 652) 902 1735 1779	1.19 (0.81 to 1.73) 0.07 (0.00 to 0.13) -0.05 (-0.13 to 0.02) -0.27 (-0.38 to 0.17) -0.14 (-0.26 to 0.03) -0.16 (-0.24 to 0.08) -0.05 (-0.24 to 0.15) -0.07 (-0.28 to 0.14) -0.15 (-0.63 to 0.34) -0.20 (-0.28 to -0.13) -0.14 (-0.36 to 0.08) 0.17 (0.02 to 0.33) 0.06 (-0.07 to 0.20) -0.07 (-0.17 to 0.03)	3%; 3.08 (p=0.38) Not applicable 95%; 480.50 (p<0.00001) 80%; 64.00 (p<0.00001) 97%; 389.92 (p<0.00001) 20%; 6.26 (p=0.28) 98%; 439.66 (p<0.00001) 47%; 11.30 (p=0.28) 29%; 4.21 (p=0.24) Not applicable 97%; 428.29 (p<0.00001) 0%; 2.05 (p=0.56) 79%; 12.57 (p=0.002) 79%; 32.68 (p<0.0001) 28%; 12.55 (p=0.18)

Capsule	3 (939	-0.54 (-0.69 to -0.38)	99%; 364.74 (p<0.00001)
Powder		339 317	-0.18 (-0.40 to 0.04)	Not applicable
			. , ,	
Prevalence of iron deficiency (RR) Iron co-supplementation (1 ² =0%; Chi ² =		3149	0.99 (0.89 to 1.10)	15%; 16.44 (p=0.29)
with iron		2301	1.02 (0.89 to 1.17)	47%; 15.03 (p=0.06)
with tron without iron		947	0.94 (0.79 to 1.11)	0%; 0.90 (p=0.97)
Age (I^2 =44%; Chi ² =3.56, p=0.17)		, , ,		0,0,000 (p 00,7)
6m to 1y	3 0	905	0.92 (0.82 to 1.05)	25%; 5.34 (p=0.25)
ly to 5y		1992	1.16 (0.94 to 1.44)	13%; 5.75 (p=0.33)
5y to 13y		351	1.12 (0.61 to 2.04)	0%; 1.80 (p=0.62)
<i>Dose</i> (I ² =49%; Chi ² =5.86, p=0.12)				
Omg to 5mg	1	144	0.78 (0.61 to 1.00)	Not applicable
10mg to 15mg		2634	1.03 (0.91 to 1.16)	14%; 10.42 (p=0.32)
15mg to 20mg		194	1.07 (0.52 to 2.18)	Not applicable
20mg or more		276	2.16 (0.72 to 6.44)	0%; 0.15 (p=0.93)
Duration ($I^2=52\%$; Chi ² =4.12, p=0.13)				4
Om to 6m		276	2.16 (0.72 to 6.44)	0%; 0.15 (p=0.93)
6m to 12m		981	0.88 (0.73 to 1.05)	22%; 5.13 (p=0.27)
12m or more		1991	1.04 (0.91 to 1.18)	15%; 7.04 (p=0.32)
Formulation (I ² =0%; Chi ² =1.87, p=0.3			. /	· • • /
Solution		1163	0.90 (0.75 to 1.08)	18%; 7.31 (p=0.29)
Pill/ tablet		1199	1.05 (0.91 to 1.20)	51%; 6.17 (p=0.10)
Capsule	2 8	886	0.88 (0.56 to 1.37)	0%; 1.09 (p=0.78)
				· · · · ·
Plasma copper (SMD)	11 :	3071	-0.22 (-0.29 to 0.14)	68%; 37.47 (p=0.0002)
Iron co-supplementation (I ² =64.1%; CI	hi ² =2.71, p=	=0.09)		
with iron	4	550	-0.10 (-0.25 to 0.05)	0%; 2.45 (p=0.49)
without iron	9 2	2421	-0.25 (-0.33 to -0.17)	75%; 32.34 (p<0.00001)
Age (I ² =71%; Chi ² =3.46, p=0.06)				
6m to 1y	3	865	-0.11 (-0.24 to 0.02)	0%; 1.27 (p=0.87)
5y to 13y	8	2206	-0.26 (-0.35 to -0.17)	79%; 32.74 (p<0.00001)
Dose (I ² =90%; Chi ² =29.23, p<0.00001				
Omg to 5mg		410	-0.08 (-0.27 to 0.12)	25%; 4.00 (p=0.26)
5mg to 10mg		519	-0.31 (-0.49 to -0.13)	75%; 3.98 (p=0.05)
10mg to 15mg		1310	-0.01 (-0.12 to 0.10)	0%; 5.40 (p=0.61)
20mg or more		930	-0.46 (-0.59 to -0.33)	Not applicable
Duration (I ² =94%; Chi ² =30.84, p<0.00				
0m to 6m		1355	-0.44 (-0.55 to -0.33)	0%; 0.17 (p=0.68)
6m to 12m		1168	-0.08 (-0.20 to 0.04)	0%; 3.23 (p=0.78)
12m or more		548	0.06 (-0.11 to 0.24)	7%; 3.23 (p=0.36)
<i>Formulation</i> (I ² =95%; Chi ² =20.76, p<0	,			
Solution		2490	-0.37 (-0.46 to -0.29)	97%; 370.26 (p<0.00001)
Pill/ tablet	3 4	439	-0.83 (-1.01 to -0.65)	99%; 277.02 (p<0.00001)

Appendix 7: Additional forest plots

Incidence of lower respiratory tract infection

	1 2		Zinc	No Zinc		Risk Ratio	Risk Ratio
Study or Subgroup	log[Risk Ratio]	SE	Total	Total	Weight	IV, Fixed, 95% CI	IV, Fixed, 95% CI
Long 2006 (2)	-0.24816892	0.67082039	192	180	0.2%	0.78 [0.21, 2.91]	· · · ·
Long 2006	-0.10536052	0.45946829	181	183	0.5%	0.90 [0.37, 2.21]	
Brown 2007	0.18232156	0.42839042	101	99	0.6%	1.20 [0.52, 2.78]	
Penny 2004	-0.14058195	0.29777877	80	79	1.2%	0.87 [0.48, 1.56]	
Soofi 2013	0.22314355	0.2627712	659	646	1.6%	1.25 [0.75, 2.09]	
Sazawal 1996	-0.59000642	0.25375961	297	306	1.7%	0.55 [0.34, 0.91]	
Rahman 2001	0.63062682	0.25241624	170	161	1.7%	1.88 [1.15, 3.08]	
Richard 2006 (2)	0.02032	0.25200806	210	208	1.7%	1.02 [0.62, 1.67]	
Rahman 2001 (2)	0	0.24928541	175	160	1.7%	1.00 [0.61, 1.63]	
Richard 2006	-0.01129956	0.22645541	209	209	2.1%	0.99 [0.63, 1.54]	
Veenemans 2011	0.05383699	0.2132558	153	153	2.4%	1.06 [0.69, 1.60]	
Veenemans 2011 (2)	0.17745056	0.20798032	151	155	2.5%	1.19 [0.79, 1.80]	
Baqui 2003 (2)	-0.15645218	0.14256197	162	165	5.3%	0.86 [0.65, 1.13]	-++
Baqui 2003	-0.00673403	0.13486419	161	157	5.9%	0.99 [0.76, 1.29]	
Muller 2001	0.17162318	0.12304944	342	344	7.1%	1.19 [0.93, 1.51]	+
Lind 2003 (2)	-0.02898754	0.08383997	170	170	15.4%	0.97 [0.82, 1.14]	
Lind 2003	-0.02739897	0.08077837	170	170	16.6%	0.97 [0.83, 1.14]	
Bhandari 2002	-0.00591199	0.05834957	1241	1241	31.7%	0.99 [0.89, 1.11]	+
Total (95% CI)			4824	4786	100.0%	1.00 [0.94, 1.07]	•
Heterogeneity: $Chi^2 = 2$	17.16, df = 17 (P	$= 0.44$); $I^2 = 1$	%				
Test for overall effect:							0.5 0.7 1 1.5 2
	(-,					Favours Zinc Favours No Zin

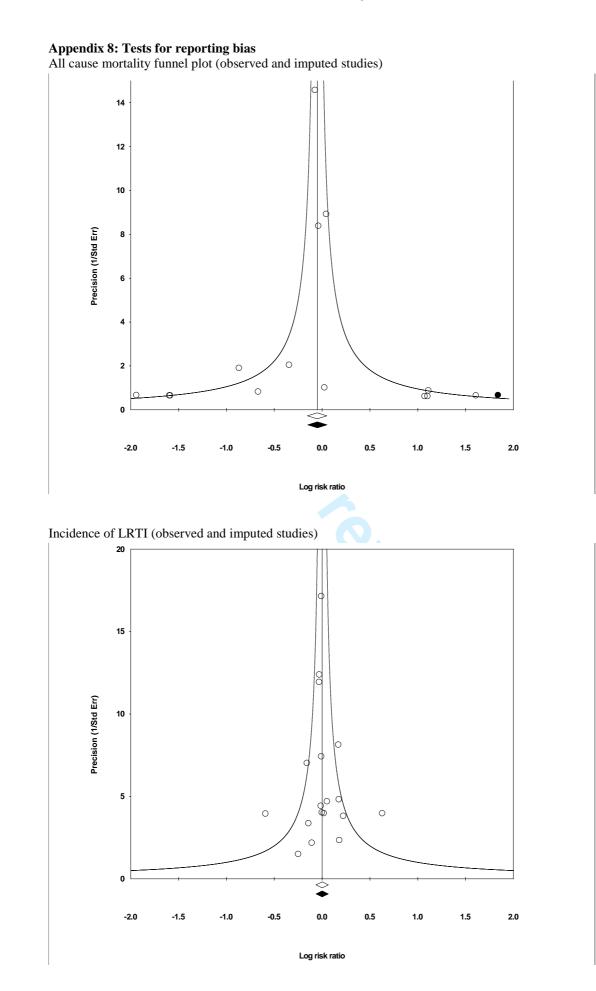
Incidence of malaria

Study or Subgroup	log[Risk Ratio]	SE	Zinc Total	No Zinc Total	Weight	Risk Ratio IV, Fixed, 95% CI	Risk Ratio IV, Fixed, 95% CI
Shankar 2000	-0.37018553	0.42956235	136	138	1.3%	0.69 [0.30, 1.60]	
Richard 2006 (2)	-0.09844007	0.41742355	210	208	1.3%	0.91 [0.40, 2.05]	
Richard 2006	-0.06536678	0.32891813	209	209	2.1%	0.94 [0.49, 1.78]	
Muller 2001	0.02817088	0.23737988	341	344	4.1%	1.03 [0.65, 1.64]	
Veenemans 2011	0.00837462	0.0727393	153	153	43.9%	1.01 [0.87, 1.16]	-
Veenemans 2011 (2)	0.10019023	0.07006137	151	155	47.3%	1.11 [0.96, 1.27]	
Total (95% CI)			1200	1207	100.0%	1.05 [0.95, 1.15]	•
Heterogeneity: Chi ² = 3	2.04, df = 5 (P =	0.84 ; $I^2 = 0\%$					0.5.0.7 1 1.5.2
Test for overall effect:	Z = 0.93 (P = 0.3)	5)					Favours Zinc Favours No Zin

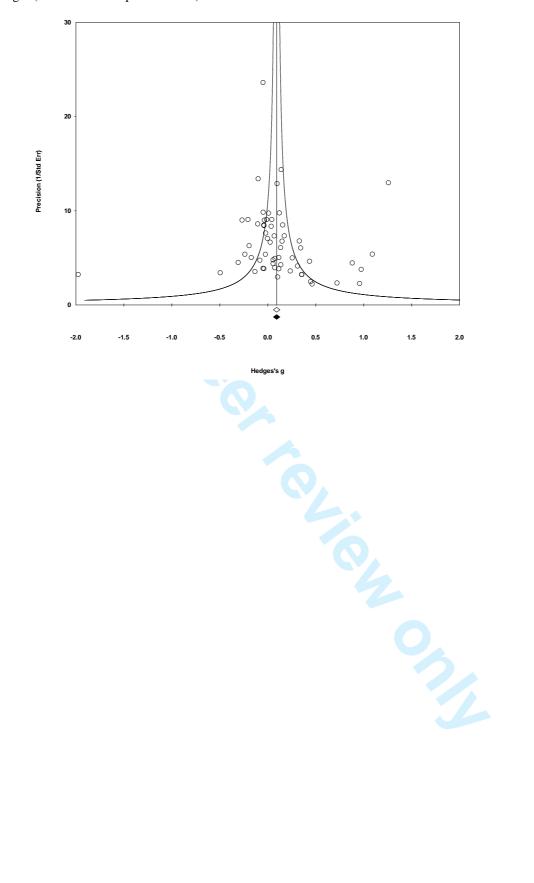
Participants with ≥ 1 vomiting episode

1	0	T					
			Zinc	No Zinc		Risk Ratio	Risk Ratio
Study or Subgroup	log[Risk Ratio]	SE	Total	Total	Weight	IV, Fixed, 95% CI	IV, Fixed, 95% CI
Kurugöl 2006	0.28768207	0.75055535	100	100	0.7%	1.33 [0.31, 5.81]	
Gupta 2007	0.51549853	0.44177764	854	858	2.0%	1.67 [0.70, 3.98]	
Lind 2003	0.25343215	0.16826769	162	164	13.9%	1.29 [0.93, 1.79]	+
Lind 2003 (2)	0.55134234	0.14130384	161	163	19.7%	1.74 [1.32, 2.29]	_
Bhandari 2007	0.15688142	0.0785542	16289	16341	63.7%	1.17 [1.00, 1.36]	
Total (95% CI)			17566	17626	100.0%	1.29 [1.14, 1.46]	•
Heterogeneity: Chi ² =	6.31, df = 4 (P =	0.18 ; $I^2 = 37$	7%				0.5 0.7 1 1.5 2
Test for overall effect:	Z = 4.08 (P < 0.1)	0001)					Favours Zinc Favours No Zinc

Silva 2006	Std. Mean Difference	SE	No Zinc Total		Weight	Std. Mean Difference IV, Fixed, 95% CI	Std. Mean Difference IV, Fixed, 95% CI
	sector and a state work of a large large with a state and provide the	1.10761519	30	2.8	0.0%	2.13 [-0.04, 4.30]	
Nakamura 1993	1.7108436	0.49561271	11	10	0.2%	1.71 [0.74, 2.68]	
Sayeg Porto 2000	0.07926742	0.44915102	9	.9	0.2%	0.08 (-0.80, 0.96)	
Rosales 2004	1.39772302	0.39918356	14	16	0.3%	1.40 [0.62, 2.18]	
Rosales 2004 (2)	1.59178434	0.393349	15	18	0.3%	1.59 [0.82, 2.36]	
Garcia 1998	0.61895336	0.34825576	17	16	0.4%	0.62 (-0.06, 1.30)	
Smith 1999	1.02871696	0.33059672	20	20	0.4%	1.03 [0.38, 1.68]	
Gibson 1989	-0.07887671		18	17	0.4%	-0.08 [-0.73, 0.57]	
Clark 1999		0.32653377	19	23	0.4%	1.09 [0.45, 1.73]	
Walravens 1989	-0.32044174	0.3159476	25	16	0.5%	-0.32 [-0.94, 0.30]	
Walravens 1983	-0.21002838		20	20	0.5%	-0.21 [-0.82, 0.40]	
Udomkesmalee 1992		0.30343932	35	33	0.5%	2.17 [1.57, 2.76]	
Sempertegui 1996		0.30001048	25	23	0.5%	0.94 [0.35, 1.53]	
Udomkesmalee 1992 (Z)		0.29181765	33	32	0.5%	1.81 [1.23, 2.38]	
Tupe 2009		0.28675374	40	43	0.6%	1.30 [0.74, 1.86]	
fallahi 2007		0.28402418	25	24	0.6%	0.40 [-0.16, 0.95]	
Mahloudji 1975	-0.165458	0.2788914	25	25	0.6%	-0.17 [-0.71, 0.38]	
iandstead 2008			25	25	0.6%		
la Lo 2011		0.27877714		34	0.7%	0.14 [-0.40, 0.69]	
		0.24941159	32			0.63 [0.14, 1.11]	
Schultink 1997		0.24494512	34	33	0.8%	0.47 [-0.01, 0.95]	
fettiarachchi 2008 (2)		0.24267158	30	114	0.8%	0.87 [0.39, 1.34]	
Ruz 1997	-0.04794779		33	36	0.8%	-0.05 [-0.52, 0.42]	-
Mazariegos 2010		0.23138369	40	35	0.9%	0.40 [-0.05, 0.85]	
Muller 2001		0.22576313	40	41	0.9%	0.64 [0.20, 1.08]	
Bagul 2003	0.30706347	0.22305208	38	42	0.9%	0.31 [-0.13, 0.74]	-
Sagui 2003 (2)	0	0.21750534	42	41	1.0%	0.00 [-0.43, 0.43]	+
Hettiarachchi 2008		0.21562749	41	100	1.0%	0.51 [0.09, 0.94]	
Umeta 2000		0.21307062	50	50	1.0%	1.10 [0.68, 1.51]	
Hong 1982		0.21124116	67	64	1.0%	1.94 [1.53, 2.36]	
Rosado 1997		0.20662869	47	45	1.1%	0.49 [0.09, 0.89]	
Rosado 1997 (2)		0.20438775	50	49	1.1%	0.63 [0.23, 1.03]	
Uckardes 2009		0.18964639	54	56	1.3%	0.14 [-0.23, 0.52]	-
		0.17762983	69	65	1.4%		
Penny 2004						0.73 [0.39, 1.08]	
Nuchler 2008		0.16887846	49	142	1.6%	0.70 [0.37, 1.03]	
Cavan 1993	0.51245133	0.1679712	74	71	1.6%	0.51 [0.18, 0.84]	
Rahman 2001 (2)	-0.08998801		70	71	1.6%	-0.09 [-0.42, 0.24]	T
Brown 2007		0.16389707	8.4	70	1.7%	0.54 [0.21, 0.86]	
Rahman 2001	-0.11598147		77	74	1.7%	-0.12 [-0.43, 0.20]	
Chang 2010	0.36204843	0.15223956	89	85	2.0%	0.36 [0.06, 0.66]	
Richard 2006	0.67063373	0.15053466	92	93	2.0%	0.67 [0.38, 0.97]	
Chen 2012	0.43585676	0.14985294	93	-88	2.0%	0.44 [0.14, 0.73]	-
Richard 2006 (2)	0.27769813	0.14757993	90	94	2.1%	0.28 [-0.01, 0.57]	
Shankar 2000	-0.18954625		109	103	2.4%	-0.19 [-0.46, 0.08]	-
Tielsch 2006		0.13023913	146	152	2.7%	0.35 [0.10, 0.61]	
Friis 1997	0.40647134	0.1292236	121	122	2.7%	0.41 [0.15, 0.66]	
Chang 2010 (2)		0.12815887	93	177	2.8%	0.25 [-0.00, 0.50]	
Veenemans 2011	1.33657691	0.1276632	150	149	2.8%	1.34 [1.09, 1.59]	-
Lind 2003 (2)		0.12563884	136	136	2.9%	0.79 [0.55, 1.04]	
Lind 2003		0.12535047	143	134	2.9%	0.86 [0.61, 1.11]	
			151	148	3.0%		
Veenemans 2011 (2)		0.12407823				1.12 [0.87, 1.36]	
Wessells 2012		0.11129748	146	279	3.7%	1.30 (1.08, 1.52)	-
Soofi 2013	-0.05814114		203	198	4.6%	-0.06 [-0.25, 0.14]	T
Sazawal 1996		0.08664303	292	285	6.1%	0.83 [0.66, 1.00]	
DiGirolamo 2010		0.07877571	318	328	7.4%	0.19 [0.03, 0.34]	+
Bhandari 2002		0.07309568	499	450	8.6%	1.46 [1.32, 1.60]	
Bhandari 2007	0.49031017	0.0714016	419	438	9.0%	0.49 [0.35, 0.63]	-
			4717	5093	100.0%	0.62 [0.58, 0.67]	1
		and a set of the second					1. 6 1 1
	.45, df = 55 (P < 0.000	01); l' = 91%					
feterogeneity: Chi ² = 582		01); P = 91%					-4 -2 0 2 Equipues No Zine Equipues Zine
feterogeneity: Chi ² = 582		01); l' = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 91%					
feterogeneity: Chi ² = 582		01); P = 91%					
feterogeneity: Chi ² = 582		01); F = 91%					
feterogeneity: Chi ² = 582		01); r = 915					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); r = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); F = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); F = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); F = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); F = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 913;					
feterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
Heterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); P = 91%					Favours No Zinc Favours Zinc
feterogeneity: Chi ² = 582		01); F = 91%					Favours No Zinc Favours Zinc
Total (95% CI) Heterogeneity: Chi ² = 5.82 Test for overall effect: Z =		01); F = 91%					Favours No Zinc Favours Zinc



Height (observed and imputed studies)



REFERENCES

1. Ahmed T, Svennerholm AM, Al Tarique A, Sultana GN, Qadri F. Enhanced immunogenicity of an oral inactivated cholera vaccine in infants in Bangladesh obtained by zinc supplementation and by temporary withholding breast-feeding. Vaccine. 2009; **27**(9): 1433-9.

2. Bates CJ, Evans PH, Dardenne M, Prentice A, Lunn PG, Northrop-Clewes CA, et al. A trial of zinc supplementation in young rural Gambian children. British Journal of Nutrition. 1993; **69**(1): 243-55.

3. Behrens RH, Tomkins AM, Roy SK. Zinc supplementation during diarrhoea, a fortification against malnutrition? Lancet. 1990; **336**(18): 442-3.

4. Berger J, Ninh NX, Khan NC, Nhien NV, Lien DK, Trung NQ, et al. Efficacy of combined iron and zinc supplementation on micronutrient status and growth in Vietnamese infants. European Journal of Clinical Nutrition. 2006; **60**(4): 443-54.

5. Dijkhuizen MA, Winichagoon P, Wieringa FT, Wasantwisut E, Utomo B, Ninh NX, et al. Zinc supplementation improved length growth only in anemic infants in a multi-country trial of iron and zinc supplementation in South-East Asia. Journal of Nutrition. 2008; **138**(10): 1969-75.

6. Wieringa FT, Berger J, Dijkhuizen MA, Hidayat A, Ninh NX, Utomo B, et al. Combined iron and zinc supplementation in infants improved iron and zinc status, but interactions reduced efficacy in a multicountry trial in Southeast Asia. Journal of Nutrition. 2007; **137**(2): 466-71.

7. Brooks WA, Santosham M, Naheed A, Goswami D, Wahed MA, Diener-West M, et al. Effect of weekly zinc supplements on incidence of pneumonia and diarrhoea in children younger than 2 years in an urban, low-income population in Bangladesh: Randomised controlled trial. Lancet. 2005; **366**(9490): 999-1004.

8. Campos Junior D, Veras Neto MC, Silva Filho VL, Leite MF, Holanda MBS, Cunha NF. Zinc supplementation may recover taste for salt meals. Jornal de Pediatria. 2004; **80**(1): 55-9.

9. Cuevas LE, Almeida LMD, Mazunder P, Paixao AC, Silva AM, Maciel L, et al. Effect of zinc on the tuberculin response of children exposed to adults with smear-positive tuberculosis. Annals of Tropical Paediatrics. 2002; **22**(4): 313-9.

10. Duggan C, Penny ME, Hibberd P, Gil A, Huapaya A, Cooper A, et al. Oligofructosesupplemented infant cereal: 2 randomized, blinded, community-based trials in Peruvian infants. The American journal of clinical nutrition. 2003; **77**(4): 937-42.

11. Fahmida U, Rumawas JSP, Utomo B, Patmonodewo S, Schultink W. Zinc-iron, but not zinc-alone supplementation, increased linear growth of stunted infants with low haemoglobin. Asia Pacific Journal of Clinical Nutrition. 2007; **16**(2): 301-9.

12. Hashemipour M, Kelishadi R, Shapouri J. Effect of zinc supplementation on insulin resistance and components of the metabolic syndrome in prepubescent obese children. Pediatric Diabetes. 2009; **10**: 94.

13. Hashemipour M, Kelishadi R, Shapouri J, Sarrafzadegan N, Amini M, Tavakoli N, et al. Effect of zinc supplementation on insulin resistance and components of the metabolic syndrome in prepubertal obese children. Hormones. 2009; **8**(4): 279-85.

14. Kelishadi R, Hashemipour M, Adeli K, Tavakoli N, Movahedian-Attar A, Shapouri J, et al. Effect of zinc supplementation on markers of insulin resistance, oxidative stress, and inflammation among prepubescent children with metabolic syndrome. Metab. 2010; **8**(6): 505-10.

15. Heinig MJ, Brown KH, Lonnerdal B, Dewey KG. Zinc supplementation does not affect growth, morbidity, or motor development of US term breastfed infants at 4-10 mo of age. American Journal of Clinical Nutrition. 2006; **84**(3): 594-601.

16. Heinig MJ, Brown KH, Lonnerdal B, Dewey KG. Zinc supplementation does not affect growth, morbidity, or motor development of U.S. breastfed infants at 4-10 mo. FASEB Journal. 1998; **12**(A970): Abstract 5617.

17. Hess SY, Bado L, Aaron GJ, Ouedraogo JB, Zeilani M, Brown KH. Acceptability of zinc-fortified, lipid-based nutrient supplements (LNS) prepared for young children in Burkina Faso. Maternal and Child Nutrition. 2011; **7**(4): 357-67.

18. Imamoglu S, Bereket A, Turan S, Taga Y, Haklar G. Effect of zinc supplementation on growth hormone secretion, IGF-I, IGFBP-3, somatomedin generation, alkaline phosphatase, osteocalcin and growth in prepubertal children with idiopathic short stature. J Pediatr Endocrinol. 2005; **18**(1): 69-74.

19. Rosado JL, Lopez P, Kordas K, Garcia-Vargas G, Ronquillo D, Alatorre J, et al. Iron and/or zinc supplementation did not reduce blood lead concentrations in children in a randomized, placebo-controlled trial. Journal of Nutrition. 2006; **136**(9): 2378-83.

20. Rico JA, Kordas K, Lopez P, Rosado JL, Garcia Vargas G, Ronquillo D, et al. Efficacy of iron and/or zinc supplementation on cognitive performance of lead-exposed Mexican schoolchildren: a randomized, placebo-controlled trial. Pediatrics. 2006; **117**(3): e518-e27.

21. Kordas K, Stoltzfus RJ, Lopez P, Alatorre Rico J, Rosado JL. Iron and zinc supplementation does not improve parent or teacher ratings of behavior in first grade Mexican children exposed to lead. Journal of Pediatrics. 2005; **147**(5): 632-9.

22. NCT01472211. Water-based Zinc Intervention Trial in Zinc Deficient Children. 2012.

23. Osendarp SJM, Santosham M, Black RE, Wahed MA, Raaij JMAv, Fuchs GJ. Effect of zinc supplementation between 1 and 6 mo of life on growth and morbidity of Bangladeshi infants in urban slums. American Journal of Clinical Nutrition. 2002; **76**(6): 1401-8.
24. Payne-Robinson HM, Golden MH, Golden BE, Simeon DT, The zinc sandwich and

24. Payne-Robinson HM, Golden MH, Golden BE, Simeon DT. The zinc sandwich and growth. Lancet. 1991; **337**(8746): 925-6.

25. Perrone L, Salerno M, Gialanella G, Feng SL, Moro R, Di Lascio R, et al. Long-term zinc and iron supplementation in children of short stature: effect of growth and on trace element content in tissues. Journal of Trace Elements in Medicine & Biology. 1999; **13**(1-2): 51-6.

26. Ronaghy H, Fox MR, Garnsm, Israel H, Harp A, Moe PG, et al. Controlled zinc supplementation for malnourished school boys: a pilot experiment. American Journal of Clinical Nutrition. 1969; **22**(10): 1279-89.

27. Ronaghy HA, Reinhold JG, Mahloudji M, Ghavami P, Fox MR, Halsted JA. Zinc supplementation of malnourished schoolboys in Iran: increased growth and other effects. American Journal of Clinical Nutrition. 1974; **27**(2): 112-21.

28. Roxas BV, Intengan CL, Juliano BO. Effect of zinc supplementation and high-protein rice on the growth of preschool children on a rice-based diet. Qualitas Plantarum. 1980; **30**(3/4): 213-22.

29. Shingwekar AG, Mohanram M, Reddy V. Effect of zinc supplementation on plasma levels of vitamin A and retinol-binding protein in malnourished children. Clinica Chimica Acta. 1979; **93**(1): 97-100.

30. Shrivastava SP, Roy AK, Jana UK. Zinc supplementation in protein energy malnutrition. Indian Pediatrics. 1993; **30**(6): 779-82.

31. Walravens PA, Chakar A, Mokni R, Denise J, Lemonnier D. Zinc supplements in breastfed infants. Lancet. 1992; **340**(8821): 683-5.

32. Wasantwisut E, Winichagoon P, Chitchumroonchokchai C, Yamborisut U, Boonpraderm A, Pongcharoen T, et al. Iron and zinc supplementation improved iron and zinc status, but not physical growth, of apparently healthy, breast-fed infants in rural communities of northeast Thailand. Journal of Nutrition. 2006; **136**(9): 2405-11.

33. Yanfeng X, Ling W, Jing Y, Rong Z. The effect of status of zinc, calcium on growth of children aged $3\sim6$ years in Xi'an and analysis of effectiveness of zinc supplement. Journal of Xi'an Medical University, English Edition. 1997; **9**(1): 48-51.

34. Zeba AN, Sorgho H, Rouamba N, Zongo I, Rouamba J, Guiguemde RT, et al. Major reduction of malaria morbidity with combined vitamin A and zinc supplementation in young children in Burkina Faso: a randomized double blind trial. Nutrition Journal. 2008; **7**: 7.

35. Arabaci FI, Kaya A, Gultekin A, Icagasoglu FD, Mutlu EC. Comparison of efficacies of divalent, trivalent irons and divalent iron plus zinc preparations in paediatric patients with iron deficiency anemia. Turkiye Klinikleri Pediatri. 2010; **19**(3): 210-5.

36. Chicourel EZ. Efeito Da Suplementação No Desenvolvimento Físico E Cognitivo De Pré-Escolares. São Paulo, Brazil: Universidade de São Paulo; 2001.

37. CTRI/2010/091/001417. A clinical trial to study the effect of zinc sulfate in reducing the incidence of diarrhea, acute respiratory tract infections and in promoting growth in infants of 6-11 months of age.

38. Jimenez R, Sagaro E, Lafita Y. How growth infants supplemented with zinc sulfate after an episode of persistent diarrhea. Journal of Pediatric Gastroenterology & Nutrition; 2000. p. S26.
39. Mitter SS, Havt A, Moore SR, Mota RM, Oria RB, Guerrant RL, et al. Zinc supplementation exposes associations between the interleukin 8 (-251 A/T) polymorphism and markers for higher intestinal inflammation in children from Northeast Brazil. American Journal of Tropical Medicine and Hygiene. 2009; 1): 23-4.
 NCT00133406. Long-term impact and intervention for diarrhea in Brazil. NCT00228254. Vitamin A and zinc: prevention of pneumonia (VAZPOP) study. NCT00374023. A Study on Immunological Effect of Vitamin A and Zinc in a Placebo
 Controlled 4 Cell Trial. 43. NCT00421668. A Trial of Zinc and Micronutrients in Tanzanian Children. 44. NCT00589264. Zinc and biobehavioral development in early childhood. 45. NCT00944359. Impact of preventive and therapeutic zinc supplementation programs
 among young children. 46. NCT00967551. Micronutrient Sprinkles in a Daycare Center. 47. NCT00980421. Safety of various mode of delivery of iron supplement on iron toxicity markers in preschool children.
 48. NCT01306097. Zinc Supplementation and Severe and Recurrent Diarrhea. 49. NCT01616693. Zinc and/or Probiotic Supplementation of Rotavirus and Oral Polio Virus Vaccines.
50. Smith RM, King RA, Spargo RM, Cheek DB, Field JB, Veitch LG. Growth-retarded Aboriginal children with low plasma zinc levels do not show a growth response to supplementary zinc. Lancet. 1985; i(8434): 923-4.
 51. Ahmed T, Arifuzzaman M, Lebens M, Qadri F, Lundgren A. CD4+ T-cell responses to an oral inactivated cholera vaccine in young children in a cholera endemic country and the enhancing effect of zinc supplementation. Vaccine. 2009; 28(2): 422-9. 52. Akramuzzaman SM, Mahalanabis D, Mitra AK, Rahman MM. Effect of long-term
 supplementation of zinc in undernourished young children of a poor periurban community in Bangladesh [abstract]. J-Gastroenterol-Hepatol; 1994. p. A132. 53. Alarcon K, Kolsteren PW, Prada AM, Chian AM, Velarde RE, Pecho IL, et al. Effects of separate delivery of zinc or zinc and vitamin A on hemoglobin response, growth, and diarrhea in young Peruvian children receiving iron therapy for anemia. American Journal of
 Clinical Nutrition. 2004; 80(5): 1276-82. 54. Albert MJ, Qadri F, Wahed MA, Ahmed T, Rahman AS, Ahmed F, et al. Supplementation with zinc, but not vitamin A, improves seroconversion to vibriocidal antibody in children given an oral cholera vaccine. The Journal of infectious diseases; 2003.
 p. 909-13. 55. Qadri F, Ahmed T, Wahed MA, Ahmed F, Bhuiyan NA, Rahman AS, et al. Suppressive effect of zinc on antibody response to cholera toxin in children given the killed, B subunit-whole cell, oral cholera vaccine. Vaccine; 2004. p. 416-21.
 56. Ba Lo N, Aaron GJ, Hess SY, Dossou NI, Guiro AT, Wade S, et al. Plasma zinc concentration responds to short-term zinc supplementation, but not zinc fortification, in young children in Senegal. American Journal of Clinical Nutrition. 2011; 93(6): 1348-55. 57. Baqui AH, Zaman K, Persson LA, El Arifeen S, Yunus M, Begum N, et al. Simultaneous Weekly Supplementation of Iron and Zinc Is Associated with Lower
 Morbidity Due to Diarrhea and Acute Lower Respiratory Infection in Bangladeshi Infants. Journal of Nutrition. 2003; 133(12): 4150-7. 58. Baqui AH, Walker CL, Zaman K, El Arifeen S, Chowdhury HR, Wahed MA, et al.
 Weekly iron supplementation does not block increases in serum zinc due to weekly zinc supplementation in Bangladeshi infants. The Journal of nutrition; 2005. p. 2187-91. 59. Black MM, Baqui AH, Zaman K, Ake Persson L, El Arifeen S, Le K, et al. Iron and zinc supplementation promote motor development and exploratory behavior among
 Bangladeshi infants. The American journal of clinical nutrition; 2004. p. 903-10. 60. Fischer Walker CL, Baqui AH, Ahmed S, Zaman K, El Arifeen S, Begum N, et al. Low-dose weekly supplementation of iron and/or zinc does not affect growth among Bangladeshi infants. European Journal of Clinical Nutrition. 2009; 63(1): 87-92.

61. Bhandari N, Bahl R, Taneja S, Strand T, Molbak K, Ulvik RJ, et al. Substantial reduction in severe diarrheal morbidity by daily zinc supplementation in young north Indian children. Pediatrics. 2002; **109**(6): e86.

62. Bhandari N, Bahl R, Taneja S, Strand T, Molbak K, Ulvik RJ, et al. Effect of routine zinc supplementation on pneumonia in children aged 6 months to 3 years: Randomised controlled trial in an urban slum. British Medical Journal. 2002; **324**(7350): 1358-61.

63. Manger MS, Strand TA, Taneja S, Refsum H, Ueland PM, Nygard O, et al. Cobalamin status modifies the effect of zinc supplementation on the incidence of prolonged diarrhea in 6- to 30-month-old North Indian children. Journal of Nutrition. 2011; **141**(6): 1108-13.

64. Manger MS, Taneja S, Strand TA, Ueland PM, Refsum H, Schneede J, et al. Poor folate status predicts persistent diarrhea in 6- to 30-month-old north Indian children. The Journal of nutrition; 2011. p. 2226-32.

65. Taneja S, Strand TA, Sommerfelt H, Rajiv B, Nita B. Zinc supplementation for four months does not affect growth in young north Indian children. Journal of Nutrition. 2010; **140**(3): 630-4.

66. Taneja S, Bhandari N, Bahl R, Bhan MK. Impact of zinc supplementation on mental and psychomotor scores of children aged 12 to 18 months: a randomized, double-blind trial. Journal of Pediatrics. 2005; **146**(4): 506-11.

67. Taneja S, Bhandari N, Strand TA, Sommerfelt H, Refsum H, Ueland PM, et al. Cobalamin and folate status in infants and young children in a low-to-middle income community in India. The American journal of clinical nutrition. 2007; **86**(5): 1302-9.

68. Bhan G, Bhandari N, Taneja S, Mazumder S, Bahl R. The effect of maternal education on gender bias in care-seeking for common childhood illnesses. Social Science & Medicine. 2005; **60**(4): 715-24.

69. Bhandari N, Taneja S, Mazumder S, Bahl R, Fontaine O, Bhan MK, et al. Adding zinc to supplemental iron and folic acid does not affect mortality and severe morbidity in young children. Journal of Nutrition. 2007; **137**(1): 112-7.

70. Arsenault JE. Dietary zinc intake of young children in Peru and the United States, and effects of supplemental zinc on energy intake, appetite, body composition, and plasma leptin, ghrelin, and insulin concentrations of Peruvian infants [3230603]. United States -- California: University of California, Davis; 2006.

71. Arsenault JE, De Romana DL, Penny ME, Van Loan MD, Brown KH. Additional zinc delivered in a liquid supplement, but not in a fortified porridge, increased fat-free mass accrual among young Peruvian children with mild-to-moderate stunting. Journal of Nutrition. 2008; **138**(1): 108-14.

72. Arsenault JE, Havel PJ, De Romana DL, Penny ME, Van Loan MD, Brown KH. Longitudinal measures of circulating leptin and ghrelin concentrations are associated with the growth of young Peruvian children but are not affected by zinc supplementation. American Journal of Clinical Nutrition. 2007; **86**(4): 1111-9.

73. Brown KH, De Romana DL, Arsenault JE, Peerson JM, Penny ME. Comparison of the effects of zinc delivered in a fortified food or a liquid supplement on the growth, morbidity, and plasma zinc concentrations of young Peruvian children. American Journal of Clinical Nutrition. 2007; **85**(2): 538-47.

74. Castillo-Duran C, Garcia H, Venegas P, Torrealba I, Panteon E, Concha N, et al. Zinc supplementation increases growth velocity of male children and adolescents with short stature. Acta Paediatrica. 1994; **83**(8): 833-7.

75. Castillo-Duran C, Hertrampf ED, Ruz MO, Torrejon CS, Salazar G. Controlled trial of zinc supplementation on growth and body composition in Chilean children from low income groups. Pediatric Research; 2002. p. 188a.

76. Cavan KR. The assessment of the zinc status of a group of school children from a periurban area of Guatemala City, Guatemala [NN70828]. Canada: University of Guelph (Canada); 1991.

77. Cavan KR, Gibson RS, Grazioso CF, Isalgue AM, Ruz M, Solomons NW. Growth and body composition of periurban Guatemalan children in relation to zinc status: a longitudinal zinc intervention trial. American Journal of Clinical Nutrition. 1993; **57**(3): 344-52.

2

3

4

5

6 7

8

9

10

11

12

13

14

15

16

17

18

19

20 21

22

23

24

25

26

27

28

29

30

31

32 33

34

35

36

37

38

39

40

41

42

43

44

45 46

47

48

49

50

51

52

53

54

55

56

57

58 59

60

BMJ Open

Grazioso CF, Isalgue M, de Ramirez I, Ruz M, Solomons NW. The effect of zinc 78. supplementation on parasitic reinfestation of Guatemalan schoolchildren. American Journal of Clinical Nutrition. 1993; 57(5): 673-8. 79. Chang S. El Arifeen S. Bari S. Wahed MA. Rahman KM. Rahman MT. et al. Supplementing iron and zinc: double blind, randomized evaluation of separate or combined delivery. European Journal of Clinical Nutrition; 2010. p. 153-60. 80. Chen L, Liu Y-F, Gong M, Jiang W, Fan Z, Qu P, et al. Effects of vitamin A, vitamin A plus zinc, and multiple micronutrients on anemia in preschool children in Chongqing, China. Asia Pacific Journal of Clinical Nutrition. 2012; 21(1): 3-11. 81. Chhagan M. The effect of micronutrient supplementation on morbidity and growth in South African children [3351928]. United States -- Massachusetts: Tufts University, Gerald J. and Dorothy R. Friedman School of Nutrition Science and Policy: 2009. Chhagan MK, Van den Broeck J, Luabeya K-KA, Mpontshane N, Tomkins A, Bennish 82. ML. Effect on longitudinal growth and anemia of zinc or multiple micronutrients added to vitamin A: a randomized controlled trial in children aged 6-24 months. BMC Public Health. 2010; 10: 145. 83. Chhagan MK, Van den Broeck J, Luabeya KK, Mpontshane N, Tucker KL, Bennish ML. Effect of micronutrient supplementation on diarrhoeal disease among stunted children in rural South Africa. European Journal of Clinical Nutrition. 2009; 63(7): 850-7. Luabeya KK, Mpontshane N, Mackay M, Ward H, Elson I, Chhagan M, et al. Zinc or 84. multiple micronutrient supplementation to reduce diarrhea and respiratory disease in South African children: a randomized controlled trial. PLoS ONE [Electronic Resource]. 2007; 2(6): e541. 85. Van den Broeck J, Mackay M, Mpontshane N, Kany Kany Luabeya A, Chhagan M, Bennish ML. Maintaining data integrity in a rural clinical trial. Clin Trials. 2007; 4(5): 572-82. 86. Clark PJ, Eastell R, Barker ME. Zinc supplementation and bone growth in pubertal girls. Lancet. 1999; 354(9177): 485. 87. Cole CR, Sampaio DLB, de Mattos ÂP, Ribeiro TCM, de Q. Leite ME, Costa-Ribeiro H. Suplementação de Zinco e Outros Micronutrientes Através do Uso de "Sprinkles": Impacto na Ocorrência de Doença Diarreica e Infecções Respiratórias em Crianças Institucionalizadas. 2012. Dehbozorgi P, Mohseni P, Mazloom Z. The influence of zinc sulfate supplementation 88. on the growth of school age children in villages around Shiraz 2002, 2003. Journal of Medical Sciences. 2007; 7(4): 690-3. Bui VQ, Digirolamo AM, Stein AD, Ramakrishnan U, Ramirez-Zea M, Flores-Ayala 89. RC, et al. No effect of 6-month zinc supplementation on anthropometric measures in 6-11 year-old urban school children in Guatemala. The FASEB Journal. 2009; 23 (S1). 90. DiGirolamo AM, Ramirez-Zea M, Wang M, Flores-Ayala R, Martorell R, Neufeld LM, et al. Randomized trial of the effect of zinc supplementation on the mental health of school-age children in Guatemala. American Journal of Clinical Nutrition. 2010; 92(5): 1241-50. Ebrahimi S, Pormahmodi A, Kamkar A. Study of zinc supplementation on growth of 91. schoolchildren in Yasuj, Southwest of Iran. Pakistan Journal of Nutrition. 2006; 5(4): 341-2. Fallahi E, Kimiagar M, Nazari A, Hasanvand MA, Seifi M. Effect of zinc and iron 92. supplementation on indicators of iron, zinc and vitamin A status of primary school children. Pakistan Journal of Biological Sciences. 2007; 10(7): 1088-92. 93. APP. dF. Impacto antropométrico da suplementação semanal de zinco em escolares com déficit de crescimento: ensaio randomizado duplo-cego. São Paulo, Brazil: Universidade Federal de São Paulo; 2002. Friis H, Ndhlovu P, Mduluza T, Kaondera K, Sandstrom B, Michaelsen KF, et al. The 94. impact of zinc supplementation on Schistosoma mansoni reinfection rate and intensities: a randomized, controlled trial among rural Zimbabwean schoolchildren. European Journal of Clinical Nutrition. 1997; 51(1): 33-7. 95. Friis H, Ndhlovu P, Mduluza T, Kaondera K, Sandstrom B, Michaelsen KF, et al. The impact of zinc supplementation on growth and body composition: a randomized, controlled

trial among rural Zimbabwean schoolchildren. European Journal of Clinical Nutrition. 1997; **51**(1): 38-45.

96. Garcia H, Ugarte F, Henriquez C, Iniquez G, Salazar T, Pizarro F, et al. Lack of effect of zinc supplementation on growth and somatothrophic axis in children with idiopathic short stature and diminished growth velocity. [Spanish] Ausencia de efecto de la suplementacion con cinc sobre el crecimiento y el eje somatotrofico en ninos con talla baja idiopatica y velocidad de crecimiento disminuida. Endocrinologia. 1998; **45**(5): 183-7.

97. Gibson RS, Vanderkooy PD, MacDonald AC, Goldman A, Ryan BA, Berry M. A growth-limiting, mild zinc-deficiency syndrome in some southern Ontario boys with low height percentiles. American Journal of Clinical Nutrition. 1989; **49**(6): 1266-73.

98. Gracia B, Plata Cd, Rueda A, Mosquera M, Suarez MF, Pradilla A. Effect of zinc supplementation on growth velocity of pre school children. Colombia Medica. 2005; **36**(4(Suppl. 3)): 31-40.

99. Gupta DN, Mondal SK, Ghosh S, Rajendran K, Sur D, Manna B. Impact of zinc supplementation on diarrhoeal morbidity in rural children of West Bengal, India. Acta Paediatrica. 2003; **92**(5): 531-6.

100. Gupta DN, Krishnan R, Mondal SK, Subrata G, Bhattacharya SK. Operational feasibility of implementing community-based zinc supplementation: impact on childhood diarrheal morbidity. Pediatric Infectious Disease Journal. 2007; **26**(4): 306-10.

101. Hambidge KM, Chavez MN, Brown RM, Walravens PA. Zinc supplementation of low-income pre-school children. Trace element metabolism in man and animals. 1978; **3**: 296-9.

102. Hambidge KM, Krebs NF, Walravens PA. Growth velocity of young children receiving a dietary zinc supplement. Nutrition Research. 1985; 5(SUPPL. 1): S-306-S-16.
103. Han J, Yang Y, Shao X, He M, Bian L, Wang Z. Effect of micronutrient supplementation on the growth of preschool children in China. Nutritional Sciences. 2002; 5(3): 155-60.

104. Yang Y-X, Han J-H, Shao X-P, He M, Bian L-H, Wang Z, et al. Effect of micronutrient supplementation on the growth of preschool children in China. Biomed Environ Sci. 2002; **15**(3): 196-202.

105. Hettiarachchi M, Liyanage C, Wickremasinghe R, Hilmers DC, Abrams SA. The efficacy of micronutrient supplementation in reducing the prevalence of anaemia and deficiencies of zinc and iron among adolescents in Sri Lanka. European Journal of Clinical Nutrition. 2008; **62**(7): 856-65.

106. Hong ZY. [Observation on the therapeutic effect of zinc on underweight children]. Chung Hua I Hsueh Tsa Chih. 1982; **62**(7): 415-9.

107. Ince E, Kemahli S, Uysal Z, Akar N, Cin S, Arcasoy A. Mild zinc deficiency in preschool children. Journal of Trace Elements in Experimental Medicine; 1994. p. 135-41. 108. Kartasurya MI, Ahmed F, Subagio HW, Rahfiludin MZ, Marks GC. Zinc combined with vitamin A reduces upper respiratory tract infection morbidity in a randomised trial in preschool children in Indonesia. British Journal of Nutrition. 2012; **108**(12): 2251-60. 109. Kikafunda JK, Walker AF, Allan EF, Tumwine JK. Effect of zinc supplementation on growth and body composition of Ugandan preschool children: a randomized, controlled, intervention trial. American Journal of Clinical Nutrition. 1998; **68**(6): 1261-6.

110. Sandstead HH. Improving study design. AmJ ClinNutr; 1999. p. 110-1.

111. Solomons NW, Ruz M, Gibson RS. Single-nutrient interventions with zinc. The American journal of clinical nutrition. 1999; **70**(1): 111-3.

112. Kurugol Z, Akilli M, Bayram N, Koturoglu G. The prophylactic and therapeutic effectiveness of zinc sulphate on common cold in children. Acta Paediatrica. 2006; **95**(10): 1175-81.

113. Larson CP, Nasrin D, Saha A, Chowdhury MI, Qadri F. The added benefit of zinc supplementation after zinc treatment of acute childhood diarrhoea: a randomized, double-blind field trial. Trop Med Int Health. 2010; **15**(6): 754-61.

114. Sheikh A, Sohel S, Ahmad SM, Nasrin D, Setarun N, Alam MM, et al. Zinc influences innate immune responses in children with enterotoxigenic Escherichia coli induced diarrhea. Journal of Nutrition. 2010; **140**(5): 1049-56.

1	
2	115. Lind T. Iron and zinc in infancy: Results from experimental trials in Sweden and
3	Indonesia [C816987]. Sweden: Umea Universitet (Sweden); 2004.
4	116. Lind T, Lonnerdal B, Stenlund H, Gamayanti IL, Ismail D, Seswandhana R, et al. A
5	community-based randomized controlled trial of iron and zinc supplementation in
6	Indonesian infants: effects on growth and development. American Journal of Clinical
7	Nutrition. 2004; 80 (3): 729-36.
8	
9	117. Lind T, Lonnerdal B, Stenlund H, Ismail D, Seswandhana R, Ekstrom E-C, et al. A
	community-based randomized controlled trial of iron and zinc supplementation in
10	Indonesian infants: interactions between iron and zinc. American Journal of Clinical
11	Nutrition. 2003; 77(4): 883-90.
12	118. Lind T, Seswandhana R, Persson L-A, Lonnerdal B. Iron supplementation of iron-
13	replete Indonesian infants is associated with reduced weight-for-age. Acta Paediatrica. 2008;
14	97 (6): 770-5.
15	119. Long KZ, Montoya Y, Hertzmark E, Santos JI, Rosado JL. A double-blind,
16	
17	randomized, clinical trial of the effect of vitamin A and zinc supplementation on diarrheal
18	disease and respiratory tract infections in children in Mexico City, Mexico. American
19	Journal of Clinical Nutrition. 2006; 83 (3): 693-700.
20	120. Long KZ, Rosado JL, Montoya Y, de Lourdes Solano M, Hertzmark E, DuPont HL, et
21	al. Effect of vitamin A and zinc supplementation on gastrointestinal parasitic infections
22	among Mexican children. Pediatrics. 2007; 120 (4): e846-55.
23	121. Rosado JL, Caamano MC, Montoya YA, de Lourdes Solano M, Santos JI, Long KZ.
24	Interaction of zinc or vitamin A supplementation and specific parasite infections on Mexican
25	infants' growth: a randomized clinical trial. European Journal of Clinical Nutrition. 2009;
26	
27	63 (10): 1176-84.
28	122. Sanchez-Hernandez JJ, Long K, Al Mamun A, Rosado JL, Del Carmen Caamano M,
29	Marks G. Nutritional status as a modifier of the effect of vitamin a or zinc supplementation
30	on gastrointestinal parasite infections in Mexican children. FASEB Journal Conference:
31	Experimental Biology. 2011; 20110409(20110413).
32	123. Mahloudji M, Reinhold JG, Haghshenass M, Ronaghy HA, Fox MR, Halsted JA.
33	Combined zinc and iron compared with iron supplementation of diets of 6- to 12-year old
34	village schoolchildren in southern Iran. American Journal of Clinical Nutrition. 1975; 28(7):
35	721-5.
36	124. Malik A, Taneja S. Report on the trial for Effect of Short Course Prophylactic Zinc
37	
38	Supplementation of 2 weeks on diarrhea morbidity in Infants of 6-11 months of age. 2013.
39	125. Marinho HA, Shrimpton R, Giugliano R, Burini RC. Influence of enteral parasites on
40	the blood vitamin A levels in preschool children orally supplemented with retinol and/or
41	zinc. European Journal of Clinical Nutrition. 1991; 45(11): 539-44.
42	126. Mazariegos M, Hambidge KM, Westcott JE, Solomons NW, Raboy V, Das A, et al.
43	Neither a zinc supplement nor phytate-reduced maize nor their combination enhance growth
44	of 6- to 12-month-old Guatemalan infants. Journal of Nutrition. 2010; 140(5): 1041-8.
45	127. Meeks Gardner J, Witter M, Ramdath D. Zinc supplementation morbidity and growth
46	in stunted Jamaican children [abstract]. West Indian Medical Journal; 1998. p. 28-9.
47	128. Meeks Gardner J, Witter MM, Ramdath DD. Zinc supplementation: effects on the
48	
49	growth and morbidity of undernourished Jamaican children. European Journal of Clinical
50	Nutrition. 1998; 52 (1): 34-9.
50	129. Meeks Gardner JM, Powell CA, Baker-Henningham H, Walker SP, Cole TJ,
52	Grantham-McGregor SM. Zinc supplementation and psychosocial stimulation: effects on the
52 53	development of undernourished Jamaican children. American Journal of Clinical Nutrition.
53 54	2005; 82 (2): 399-405.
54 55	130. Mozaffari-Khosravi H, Shakiba M, Eftekhari MH, Vahidi AR. Effects of zinc
55 56	supplementation on the physical growth of 2-5 years old children. Iranian Journal of
50 57	Endocrinology and Metabolism. 2008; 10 (4): Pe363-Pe71, En417.
58	131. Mozaffari-Khosravi H, Shakiba M, Eftekhari MH, Fatehi F. Effects of zinc
58 59	
59 60	supplementation on physical growth in 2-5-year-old children. Biological Trace Element
00	Research. 2009; 128 (2): 118-27.

132. Garenne M, Becher H, Ye Y, Kouyate B, Muller O. Sex-specific responses to zinc supplementation in Nouna, Burkina Faso. Journal of Pediatric Gastroenterology & Nutrition. 2007; **44**(5): 619-28.

133. Muller O, Becher H, van Zweeden AB, Ye Y, Diallo DA, Konate AT, et al. Effect of zinc supplementation on malaria and other causes of morbidity in west African children: randomised double blind placebo controlled trial. BMJ. 2001; **322**(7302): 1567.

134. Muller O, Garenne M, Reitmaier P, Baltussen van Zweeden A, Kouyate B, Becher H. Effect of zinc supplementation on growth in West African children: A randomized doubleblind placebo-controlled trial in rural Burkina Faso. International Journal of Epidemiology. 2003; **32**(6): 1098-102.

135. Nakamura T, Nishiyama S, Futagoishi-Suginohara Y, Matsuda I, Higashi A. Mild to moderate zinc deficiency in short children: effect of zinc supplementation on linear growth velocity. Journal of Pediatrics. 1993; **123**(1): 65-9.

136. Ninh NX, Thissen JP, Collette L, Gerard G, Khoi HH, Ketelslegers JM. Zinc supplementation increases growth and circulating insulin-like growth factor I (IGF-I) in growth-retarded Vietnamese children. American Journal of Clinical Nutrition. 1996; **63**(4): 514-9.

137. Penny ME, Marin RM, Duran A, Peerson JM, Lanata CF, Lonnerdal B, et al. Randomized controlled trial of the effect of daily supplementation with zinc or multiple micronutrients on the morbidity, growth, and micronutrient status of young Peruvian children. American Journal of Clinical Nutrition. 2004; **79**(3): 457-65.

138. Penny ME, Peerson JM, Marin RM, Duran A, Lanata CF, Lonnerdal B, et al. Randomized, community-based trial of the effect of zinc supplementation, with and without other micronutrients, on the duration of persistent childhood diarrhea in Lima, Peru. Journal of Pediatrics. 1999; **135**(2 I): 208-17.

139. Rahman MM. Effect of simultaneous zinc and vitamin A supplementation on the biochemical indices of vitamin A nutriture, morbidity, and growth in Bangladeshi children: A randomized, double blind, placebo controlled trial [9968167]. United States -- Alabama: The University of Alabama at Birmingham School of Public Health; 1999.

140. Rahman MM, Tofail F, Wahed MA, Fuchs GJ, Baqui AH, Alvarez JO. Short-term supplementation with zinc and vitamin A has no significant effect on the growth of undernourished Bangladeshi children. American Journal of Clinical Nutrition. 2002; **75**(1): 87-91.

141. Rahman MM, Vermund SH, Wahed MA, Fuchs GJ, Baqui AH, Alvarez JO. Simultaneous zinc and vitamin A supplementation in Bangladeshi children: randomised double blind controlled trial. BMJ. 2001; **323**(7308): 314-8.

142. Rahman MM, Wahed MA, Fuchs GJ, Baqui AH, Alvarez JO. Synergistic effect of zinc and vitamin A on the biochemical indexes of vitamin A nutrition in children. American Journal of Clinical Nutrition. 2002; **75**(1): 92-8.

143. Richard SA, Zavaleta N, Caulfield LE, Black RE, Witzig RS, Shankar AH. Zinc and iron supplementation and malaria, diarrhea, and respiratory infections in children in the Peruvian Amazon. Am J Trop Med Hyg. 2006; **75**(1): 126-32.

144. Allen LH, Rosado JL, Casterline JE, Lopez P, Munoz E, Garcia OP, et al. Lack of hemoglobin response to iron supplementation in anemic mexican preschoolers with multiple micronutrient deficiencies. American Journal of Clinical Nutrition. 2000; 71(6): 1485-94.
145. Munoz EC, Rosado JL, Lopez P, Furr HC, Allen LH. Iron and zinc supplementation improves indicators of vitamin A status of Mexican preschoolers. American Journal of Clinical Nutrition. 2000; 71(3): 789-94.

146. Rosado JL, Lopez P, Munoz E, Martinez H, Allen LH. Zinc supplementation reduced morbidity, but neither zinc nor iron supplementation affected growth or body composition of Mexican preschoolers. American Journal of Clinical Nutrition. 1997; **65**(1): 13-9.

147. Rosales FJ, Kang Y, Pfeiffer B, Rau A, Romero-Abal ME, Erhardt JG, et al. Twice the recommended daily allowance of iron is associated with an increase in plasma alpha-1 antichymotrypsin concentrations in Guatemalan school-aged children. Nutrition Research. 2004; **24**(11): 875-87.

2

3

4

5

6 7

8

9

BMJ Open

148. Bentley ME, Caulfield LE, Malathi R, Santizo MC, Hurtado E, Rivera JA, et al. Zinc supplementation affects the activity patterns of rural Guatemalan infants. Journal of Nutrition. 1997; 127(7): 1333-8. 149. Rivera JA, Ruel MT, Santizo MC, Lonnerdal B, Brown KH, Zinc supplementation improves the growth of stunted rural Guatemalan infants. Journal of Nutrition. 1998; 128(3): 556-62. 150. Ruel MT, Rivera JA, Santizo MC, Lonnerdal B, Brown KH. Impact of zinc supplementation on morbidity from diarrhea and respiratory infections among rural 10 Guatemalan children. Pediatrics. 1997; 99(6): 808-13. 11 151. Ruz M. Castillo-Duran C. Lara X. Codoceo J. Rebolledo A. Alalah E. A 14-mo zinc-12 supplementation trial in apparently healthy chilean preschool children. American Journal of 13 Clinical Nutrition. 1997; 66(6): 1406-13. 14 152. Penland JG, Sandstead HH, Alcock NW, Daval HH, Chen XC, Li JS, et al. A 15 preliminary report: effects of zinc and micronutrient repletion on growth and 16 neuropsychological function of urban Chinese children. Journal of the American College of 17 Nutrition. 1997; 16(3): 268-72. 18 153. Sandstead HH, Penland JG, Alcock NW, Daval HH, Chen XC, Li JS, et al. Effects of 19 repletion with zinc and other micronutrients on neuropsychologic performance and growth 20 21 of Chinese children. American Journal of Clinical Nutrition. 1998; 68(Supplement 2): 470S-22 5S. 23 154. Sandstead HH, Prasad AS, Penland JG, Beck FWJ, Kaplan J, Egger NG, et al. Zinc 24 deficiency in Mexican American children: influence of zinc and other micronutrients on T 25 cells, cytokines, and antiinflammatory plasma proteins. American Journal of Clinical 26 Nutrition. 2008; 88(4): 1067-73. 27 155. Sanjur D, Garcia A, Aguilar R, Furumoto R, Mort M. Dietary patterns and nutrient 28 intakes of toddlers from low-income families in Denver, Colorado. Journal of the American 29 Dietetic Association. 1990; 90(6): 823-9. 30 156. Sayeg Porto MA, Oliveira HP, Cunha AJ, Miranda G, Guimarães MM, Oliveira WA, 31 et al. Linear growth and zinc supplementation in children with short stature. Journal of 32 33 pediatric endocrinology & metabolism : JPEM; 2000. p. 1121-8. 34 157. Chugh K. Zinc therapy in acute diarrhea. Indian Pediatrics. 1996; 33(4): 352. 35 158. Dhingra U, Hiremath G, Menon VP, Dhingra P, Sarkar A, Sazawal S. Zinc deficiency: 36 descriptive epidemiology and morbidity among preschool children in peri-urban population 37 in Delhi, India. J Health Popul Nutr. 2009; 27(5): 632-9. 38 159. Sazawal S, Bentley M, Black RE, Dhingra P, George S, Bhan MK. Effect of zinc 39 supplementation on observed activity in low socioeconomic Indian preschool children. 40 Pediatrics. 1996; 98(6): 1132-7. 41 160. Sazawal S, Black RE, Bhan MK, Bhandari N, Sinha A, Jalla S. Zinc supplementation 42 in young children with acute diarrhea in India. New England Journal of Medicine. 1995; 43 **333**(13): 839-44. 44 161. Sazawal S. Effect of zinc supplementation on diarrheal morbidity among urban slum 45 children in India [9617598]. United States -- Maryland: The Johns Hopkins University; 46 47 1996. 48 162. Sazawal S, Black RE, Bhan MK, Jalla S, Bhandari N, Sinha A, et al. Zinc 49 supplementation reduces the incidence of persistent diarrhea and dysentery among low 50 socioeconomic children in India. Journal of Nutrition. 1996; 126(2): 443-50. 51 163. Sazawal S, Black RE, Bhan MK, Jalla S, Sinha A, Bhandari N. Efficacy of zinc 52 supplementation in reducing the incidence and prevalence of acute diarrhea- a community-53 based, double-blind, controlled trial. American Journal of Clinical Nutrition. 1997; 66(2): 54 413-8. 55 164. Sazawal S, Black RE, Jalla S, Mazumdar S, Sinha A, Bhan MK. Zinc supplementation 56 reduces the incidence of acute lower respiratory infections in infants and preschool children: 57 A double-blind, controlled trial. Pediatrics. 1998; 102(1 I): 1-5. 58 59 165. Sazawal S, Dhingra U, Deb S, Bhan MK, Menon VP, Black RE. Effect of zinc added 60 to multi-vitamin supplementation containing low-dose vitamin A on plasma retinol level in children--a double-blind randomized, controlled trial. J Health Popul Nutr. 2007; 25(1): 62-6. 29

166. Sazawal S, Jalla S, Mazumder S, Sinha A, Black RE, Bhan MK. Effect of zinc supplementation on cell-mediated immunity and lymphocyte subsets in preschool children. Indian Pediatrics. 1997; **34**(7): 589-97.

167. Sazawal S, Black RE, Ramsan M, Chwaya HM, Dutta A, Dhingra U, et al. Effect of zinc supplementation on mortality in children aged 1-48 months: a community-based randomised placebo-controlled trial. Lancet. 2007; **369**(9565): 927-34.

168. Sazawal S, Black RE, Ramsan M, Chwaya HM, Stoltzfus RJ, Dutta A, et al. Effects of routine prophylactic supplementation with iron and folic acid on admission to hospital and mortality in preschool children in a high malaria transmission setting: community-based, randomised, placebo-controlled trial.[Erratum appears in Lancet. 2006 Jan 28;367(9507):302]. Lancet. 2006; **367**(9505): 133-43.

169. de Benoist B, Darnton-Hill I, Lynch S, Allen L, Savioli L. Zinc and iron supplementation trials in Nepal and Tanzania. Lancet. 2006; **367**(9513): 816.

170. Kordas K, Siegel EH, Olney DK, Katz J, Tielsch JM, Kariger PK, et al. The effects of iron and/or zinc supplementation on maternal reports of sleep in infants from Nepal and Zanzibar. J Dev Behav Pediatr. 2009; **30**(2): 131-9.

171. Olney DK, Pollitt E, Kariger PK, Khalfan SS, Ali NS, Tielsch JM, et al. Combined iron and folic acid supplementation with or without zinc reduces time to walking unassisted among Zanzibari infants 5- to 11-mo old. Journal of Nutrition. 2006; **136**(9): 2427-34.

172. Kariger PK, Stoltzfus RJ, Olney D, Sazawal S, Black R, Tielsch JM, et al. Iron deficiency and physical growth predict attainment of walking but not crawling in poorly nourished Zanzibari infants. The Journal of nutrition. 2005; **135**(4): 814-9.

173. Kordas K, Siegel EH, Olney DK, Katz J, Tielsch JM, Chwaya HM, et al. Maternal reports of sleep in 6-18 month-old infants from Nepal and Zanzibar: association with iron deficiency anemia and stunting. Early Human Development. 2008; **84**(6): 389-98.

174. DK. O. Modeling The Effects Of Anemia, Malaria, Growth And Micronutrient Supplementation On Development Of Young Zanzibari Children. Davis, CA: University of California, Davis; 2006.

175. Olney DK, Pollitt E, Kariger PK, Khalfan SS, Ali NS, Tielsch JM, et al. Young Zanzibari children with iron deficiency, iron deficiency anemia, stunting, or malaria have lower motor activity scores and spend less time in locomotion. The Journal of nutrition. 2007; **137**(12): 2756-62.

176. Olney DK KP, Stoltzfus RJ, Khalfan SS, Ali NS, Tielsch JM, et al. Development of nutritionally at-risk young children is predicted by malaria, anemia, and stunting in Pemba, Zanzibar. Journal of Nutrition 2009; **139**(4): 763-72.

177. Schultink W, Merzenich M, Gross R, Shrimpton R, Dillon D. Effects of iron-zinc supplementation on the iron, zinc, and vitamin A status of anaemic pre-school children in Indonesia. Food and Nutrition Bulletin. 1997; **18**(4): 311-7.

178. Correa León E TM, Navarrete F, Aguirre L, Saa B. Deficiencia De Zinc E Inmunidad Celular. Quito, Ecuador: FCM; 1992.

179. Sempertegui F, Estrella B, Correa E, Aguirre L, Saa B, Torres M, et al. Effects of short-term zinc supplementation on cellular immunity, respiratory symptoms, and growth of malnourished Equadorian children. European Journal of Clinical Nutrition. 1996; **50**(1): 42-6.

180. Shah U, Malik MA, Alam S, Shaheen A, Mohammad R, AlTannir M. The efficacy of zinc supplementation in young children with recurrent acute lower respiratory infections: A randomized double-blind placebo controlled trial. Journal of Paediatrics and Child Health. 2011; **47**: 13.

181. Shankar AH, Genton B, Baisor M, Jaino P, Tamja S, Adiguma T, et al. The influence of zinc supplementation on morbidity due to Plasmodium falciparum: A randomized trial in preschool children in Papua New Guinea. American Journal of Tropical Medicine and Hygiene. 2000; **62**(6): 663-9.

182. Shankar AH GB, Tamja S, Arnold S, Wu L, Baisor M, et al. Zinc supplementation can reduce malaria-related morbidity in preschool children. American Journal of Tropical Medicine and Hygiene. 1997; **57**(Supplement 3): 249 (Abstract 434).

183. Silva APR, Vitolo MR, Zara LF, Castro CFS. Efeito da suplementação de zinco a crianças de 1 a 5 anos de idade. J pediatr (Rio J). 2006; **82**(3): 227-31.

184. Smith JC, Makdani D, Hegar A, Rao D, Douglass LW. Vitamin A and zinc supplementation of preschool children. Journal of the American College of Nutrition; 1999. p. 213-22.
185. Soofi S, Cousens S, Iqbal SP, Akhund T, Khan J, Ahmed I, et al. Effect of provision of daily zinc and iron with several micronutrients on growth and morbidity among young children in Pakistan: a cluster-randomised trial. Lancet. 2013.
186. Coles CL, Sherchand JB, Khatry SK, Katz J, Leclerq SC, Mullany LC, et al. Zinc modifies the association between nasopharyngeal Streptococcus pneumoniae carriage and risk of acute lower respiratory infection among young children in rural Nepal. Journal of
Nutrition. 2008; 138 (12): 2462-7. 187. Katz J, Khatry SK, Leclerq SC, Mullany LC, Yanik EL, Stoltzfus RJ, et al. Daily supplementation with iron plus folic acid, zinc, and their combination is not associated with younger age at first walking unassisted in malnourished preschool children from a deficient
population in rural Nepal. Journal of Nutrition. 2010; 140 (7): 1317-21. 188. Murray-Kolb LE, Khatry SK, Katz J, Schaefer BA, Cole PM, Le Clerq SC, et al. Preschool micronutrient supplementation effects on intellectual and motor function in school-aged nepalese children. Archives of Pediatrics and Adolescent Medicine. 2012; 166 (5): 404-10.
189. Siegel EH. Anemia, motor development, and cognition: A randomized trial of iron- folic acid and/or zinc supplementation in young Nepali children [3172698]. United States
Maryland: The Johns Hopkins University; 2005. 190. Siegel EH, Kordas K, Stoltzfus RJ, Katz J, Khatry SK, LeClerq SC, et al. Inconsistent effects of iron-folic acid and/or zinc supplementation on the cognitive development of infants. Journal of health, population, and nutrition. 2011; 29 (6): 593-604.
191. Surkan PJ, Shankar M, Katz J, Siegel EH, Leclerq SC, Khatry SK, et al. Beneficial effects of zinc supplementation on head circumference of Nepalese infants and toddlers: a randomized controlled trial. European Journal of Clinical Nutrition. 2012; 66 (7): 836-42. 192. Tielsch JM, Khatry SK, Stoltzfus RJ, Katz J, LeClerq SC, Adhikari R, et al. Effect of daily zinc supplementation on child mortality in southern Nepal: a community-based, cluster randomised, placebo-controlled trial. Lancet. 2007; 370 (9594): 1230-9.
193. Tielsch JM, Khatry SK, Stoltzfus RJ, Katz J, LeClerq SC, Adhikari R, et al. Effect of routine prophylactic supplementation with iron and folic acid on preschool child mortality in southern Nepal: community-based, cluster-randomised, placebo-controlled trial. Lancet. 2006; 367 (9505): 144-52.
194. Tupe RP, Chiplonkar SA. Zinc supplementation improved cognitive performance and taste acuity in Indian adolescent girls. Journal of the American College of Nutrition. 2009; 28 (4): 388-96.
 195. Chiplonkar SA, Kawade R. Effect of zinc- and micronutrient-rich food supplements on zinc and vitamin A status of adolescent girls. Nutrition. 2012; 28(5): 551-8. 196. Uçkarde, Y., Tekçiçek M, Ozmert EN, Yurdakök K. The effect of systemic zinc supplementation on oral health in low socioeconomic level children. The Turkish journal of
pediatrics; 2009. p. 424-8. 197. Uckardes Y, Ozmert EN, Unal F, Yurdakok K. Effects of zinc supplementation on parent and teacher behaviour rating scores in low socioeconomic level Turkish primary
school children. Acta Paediatrica. 2009; 98 (4): 731-6. 198. Uckardes Y, Ozmert EN, Unal F, Yurdakok K. The effect of zinc supplementation on Hacettepe Psychological Adaptation Scale scores in low socioeconomic level primary school
children. Cocuk Saglg ve Hastalklar Dergisi. 2009; 52 (2): 53-9. 199. Kramer TR, Udomkesmalee E, Dhanamitta S, Sirisinha S, Charoenkiatkul S, Tuntipopipat S, et al. Lymphocyte responsiveness of children supplemented with vitamin A and zinc. American Journal of Clinical Nutrition. 1993; 58 (4): 566-70.
200. Udomkesmalee E, Dhanamitta S, Sirisinha S. Effect of vitamin A and zinc supplementation on the nutriture of children in northeast Thailand. American Journal of Clinical Nutrition. 1992; 56 (1): 50-7.
 201. Gibson RS. Zinc supplementation for infants. Lancet. 2000; 355(9220): 2008-9. 202. Umeta M, West CE, Haidar J. Zinc supplements increased growth more in stunted infants than in non-stunted infants. Evidence-Based Medicine. 2001; 6(2): 50.

203. Umeta M, West CE, Haidar J, Deurenberg P, Hautvast JG. Zinc supplementation and stunted infants in Ethiopia: a randomised controlled trial. Lancet. 2000; **355**(9220): 2021-6. 204. Vakili R, Vahedian M, Khodaei GH, Mahmoudi M. Effects of zinc supplementation in occurrence and duration of common cold in school aged children during cold season: A double-blind placebo-controlled Trial. Iranian Journal of Pediatrics. 2009; **19**(4): 376-80. 205. Veenemans J. Effect of preventive supplementation with zinc and other micronutrients on malaria and diarrhoeal morbidity in African children [Thesis]. Wageningen, Netherlands: Wageningen University; 2011.

206. Veenemans J, Mank T, Ottenhof M, Baidjoe A, Mbugi EV, Demir AY, et al. Protection against diarrhea associated with Giardia intestinalis Is lost with multi-nutrient supplementation: a study in Tanzanian children. PLoS neglected tropical diseases. 2011; **5**(6): e1158.

207. Veenemans J, Milligan P, Prentice AM, Schouten LR, Inja N, Heijden AC, et al. Effect of supplementation with zinc and other micronutrients on malaria in Tanzanian children: a randomised trial. PLoS medicine; 2011. p. e1001125.

208. Veenemans J, Schouten LRA, Ottenhof MJ, Mank TG, Uges DRA, Mbugi EV, et al. Effect of preventive supplementation with zinc and other micronutrients on non-malarial morbidity in Tanzanian pre-school children: a randomized trial. PLoS ONE [Electronic Resource]. 2012; **7**(8): e41630.

209. Krebs NF, Hambidge KM, Walravens PA. Increased food intake of young children receiving a zinc supplement. American Journal of Diseases of Children. 1984; **138**(3): 270-3. 210. Walravens PA, Krebs NF, Hambidge KM. Linear growth of low income preschool children receiving a zinc supplement. American Journal of Clinical Nutrition. 1983; **38**(2): 195-201.

211. Walravens PA, Hambidge KM, Koepfer DM. Zinc supplementation in infants with a nutritional pattern of failure to thrive: A double-blind, controlled study. Pediatrics. 1989; **83**(4): 532-8.

212. Wessells R OZ, Rouamba N, Hess SY, Ouedraogo JB, Brown KH. The effect of zinc supplementation, provided as either a liquid ZnSO4 solution or a dispersible tablet, on plasma zinc concentration among young Burkinabe children. FASEB Journal Conference: Experimental Biology. 2011; **25:236.1**.(236): 1.

213. Wessells KR, Ouedraogo ZP, Rouamba N, Hess SY, Ouedraogo J-B, Brown KH. Short-term zinc supplementation with dispersible tablets or zinc sulfate solution yields similar positive effects on plasma zinc concentration of young children in Burkina Faso: a randomized controlled trial. Journal of Pediatrics. 2012; **160**(1): 129-35.e3.

214. Wuehler SE, Sempertegui F, Brown KH. Dose-response trial of prophylactic zinc supplements, with or without copper, in young Ecuadorian children at risk of zinc deficiency. American Journal of Clinical Nutrition. 2008; **87**(3): 723-33.

215. Wuehler S. Estimation of the global risk of zinc deficiency and assessment of the impact of three doses of zinc supplementation, with or without copper, on markers of zinc and copper status, morbidity and growth among young Ecuadorian children [0819713]. United States -- California: University of California, Davis; 2007.

PRISMA 2009 Checklist

Section/topic	#	Checklist item	Reported on page #
TITLE			
Title	1	Identify the report as a systematic review, meta-analysis, or both.	1
ABSTRACT	<u> </u>		
Structured summary	tructured summary 2 Provide a structured summary including, as applicable: background; objectives; data sources; study eligibility criteria, participants, and interventions; study appraisal and synthesis methods; results; limitations; conclusions and implications of key findings; systematic review registration number.		2
INTRODUCTION			
Rationale	3	Describe the rationale for the review in the context of what is already known.	3
Objectives	4	Provide an explicit statement of questions being addressed with reference to participants, interventions, comparisons, outcomes, and study design (PICOS).	3
METHODS			
Protocol and registration	5	Indicate if a review protocol exists, if and where it can be accessed (e.g., Web address), and, if available, provide registration information including registration number.	3
Eligibility criteria	6	Specify study characteristics (e.g., PICOS, length of follow-up) and report characteristics (e.g., years considered, language, publication status) used as criteria for eligibility, giving rationale.	
Information sources	7	Describe all information sources (e.g., databases with dates of coverage, contact with study authors to identify additional studies) in the search and date last searched.	3, App 1
Search	8	Present full electronic search strategy for at least one database, including any limits used, such that it could be repeated.	App 1
Study selection	9	State the process for selecting studies (i.e., screening, eligibility, included in systematic review, and, if applicable, included in the meta-analysis).	3
Data collection process	10	Describe method of data extraction from reports (e.g., piloted forms, independently, in duplicate) and any processes for obtaining and confirming data from investigators.	3
Data items	11	List and define all variables for which data were sought (e.g., PICOS, funding sources) and any assumptions and simplifications made.	3
Risk of bias in individual studies	12	Describe methods used for assessing risk of bias of individual studies (including specification of whether this was done at the study or outcome level), and how this information is to be used in any data synthesis.	3, 5
Summary measures	13	State the principal summary measures (e.g., risk ratio, difference in means).	3
Synthesis of results	14	Describe the methods of handling data and combining results of studies, if done, including measures of consistency (e.g., I ²) for each meta-analysis. For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml	3



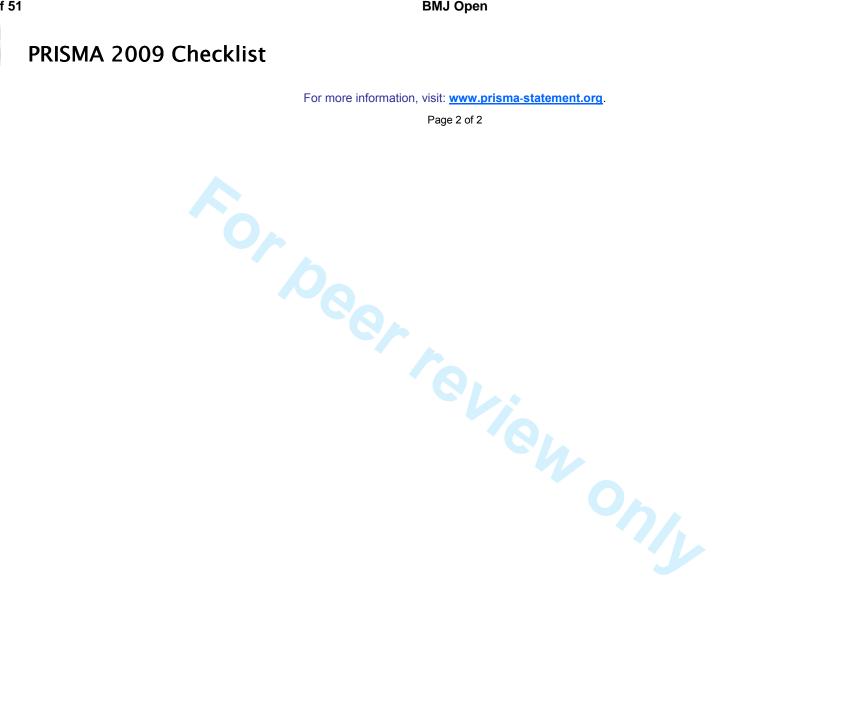
PRISMA 2009 Checklist

Pag	e 1	1 of	2

Page 1 of 2				
Section/topic	#	Checklist item	Reported on page #	
Risk of bias across studies	15	Specify any assessment of risk of bias that may affect the cumulative evidence (e.g., publication bias, selective reporting within studies).		
Additional analyses	16	Describe methods of additional analyses (e.g., sensitivity or subgroup analyses, meta-regression), if done, indicating which were pre-specified.		
RESULTS				
Study selection	17 Give numbers of studies screened, assessed for eligibility, and included in the review, with reasons for exclusions at each stage, ideally with a flow diagram.		4, Fig 1	
Study characteristics	18	For each study, present characteristics for which data were extracted (e.g., study size, PICOS, follow-up period) and provide the citations.	App 4	
Risk of bias within studies	19	Present data on risk of bias of each study and, if available, any outcome level assessment (see item 12).	App 5	
Results of individual studies	20	For all outcomes considered (benefits or harms), present, for each study: (a) simple summary data for each intervention group (b) effect estimates and confidence intervals, ideally with a forest plot.	Fig 3 to 5, App 7	
Synthesis of results	21	Present results of each meta-analysis done, including confidence intervals and measures of consistency.	4-5, Table 2-3	
Risk of bias across studies	22	Present results of any assessment of risk of bias across studies (see Item 15).	4, Fig 2	
Additional analysis	23	Give results of additional analyses, if done (e.g., sensitivity or subgroup analyses, meta-regression [see Item 16]).	5-6, Table 4, App 6 and 8	
DISCUSSION				
Summary of evidence	ry of evidence 24 Summarize the main findings including the strength of evidence for each main outcome; consider their relevance to key groups (e.g., healthcare providers, users, and policy makers).		6-7	
Limitations	25	Discuss limitations at study and outcome level (e.g., risk of bias), and at review-level (e.g., incomplete retrieval of identified research, reporting bias).	6-7	
) Conclusions	26	Provide a general interpretation of the results in the context of other evidence, and implications for future research.	7	
FUNDING				
Funding	27	Describe sources of funding for the systematic review and other support (e.g., supply of data); role of funders for the systematic review.	2	

46 From: Moher D, Liberati A, Tetzlaff J, Altman DG, The BRISNER Geology Profected/Bengeipe Heme for Systematic Bevieve Linde Mate Applying: The PRISMA Statement. PLoS Med 6(6): e1000097. 47 doi:10.1371/journal.pmed1000097

Page 51 of 51



For peer review only - http://bmjopen.bmj.com/site/about/guidelines.xhtml