



Lives Saved Tool Technical Note

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Technical note on effect size of iron fortification

Background

In previous versions of LiST, four interventions: iron fortification, periconceptual blanket iron supplementation, iron and folic acid supplementation during pregnancy (IFA), and multiple micronutrient supplementation during pregnancy (MMN) were included for iron-deficiency anemia¹.

In LiST, the impacts of interventions were calculated separately for non-pregnant women and pregnant women. For pregnant women, they will receive iron through one or more mechanisms (food fortification, IFA, or MMN) and all the mechanisms were assumed to be equally effective. For non-pregnant women, we assumed that they will either receive blanket iron supplementation or iron-fortified food.

Update

We decide to drop the intervention—blanket iron supplementation for non-pregnant women and keep iron fortification as the only intervention addressing iron-deficiency anemia among non-pregnant women. We made this decision as we do not find any population-level program for delivering iron tablets to non-pregnant women and because now we have coverage of iron fortification based on the Food Fortification Initiative (FFI) database (<https://www.ffinetwork.org/>). A paper describing the methods used to estimate coverage of iron fortification can be found in the 2021 LiST supplement and on the LiST website².

We also have updated effectiveness of iron fortification for women of reproductive age (WRA) based on a 2019 systematic review³. Keats et al. included 9 studies (RCTs, repeated cross-sectional, before-after) looking at improved anemia following large-scale food fortification with iron among WRA, including 3 studies pertaining specific to pregnant women. The fortified food vehicles were varied, ranging from rice, salt, maize flour, wheat flour, rice, soy sauce, fish sauce, to milk. The fortificant compound also varied across studies. An effect size for iron deficiency anemia was not reported. Iron fortification reduced any anemia by 34% (RR=0.66; 95% CI: 0.58, 0.76; 9 studies in 131,971 women; moderate quality evidence) among WRA and 27% (RR=0.73; 95% CI: 0.64, 0.84; 3 studies in 17,063 women; moderate quality evidence) among pregnant women. We will apply the same effect size 0.34 to all WRA, including both non-pregnant women and pregnant women.

We choose to use Keats et al as an updated reference because compared to the previous source—Das et al⁴, more studies are included in this recent review. We are also aware of the two Cochrane reviews on maize and wheat flour fortification for preventing anemia^{5,6}. After reviewing the full text, we think the Cochrane reviews are less relevant to LiST. One because our baseline iron fortification coverage also included food vehicles other than wheat flour and maize flour. Second the Cochrane reviews did not provide subgroup analysis for WRA.

Two additional things to note: One our effect size estimate for WRA is a conservative estimate as the effect size is based on efficacy in reducing any anemia, not just iron deficiency anemia. Iron fortification might be more effective at reducing iron-deficiency anemia. Second there was some evidence on different effect of iron fortification on pregnant women, but since there were not sufficient studies and the point of estimate effect size (0.27) fall in between the confidence interval of effect size for WRA, we applied the same effect size to non-pregnant women and pregnant women.

Conclusion

In the most recent version of LiST (Spectrum version 6.08), there are three interventions that affect iron-deficiency anemia among WRA: iron fortification, iron and folic acid supplementation, and multiple micronutrient supplementation. Iron fortification, with an effect size of 0.34, is applied to both non-pregnant women and pregnant women. IFA or MMN, with an effect size of 0.67, is applied to pregnant women only. See the table below for summary of the three interventions.

Intervention	Relevant population	Effect size, RR (95% CI)	Data Source
Iron fortification	All WRA	0.34 (0.24-0.42)	Keats et al 2019 ³
Iron and folic acid supplementation in pregnancy (IFA)	Pregnant women	0.67 (0.31, 0.84)	Pena-Rosas et al 2015 ⁷
Multiple micronutrient supplementation in pregnancy (MMN)	Pregnant women	0.67 (0.31, 0.84)	Pena-Rosas et al 2015 ⁷

Note: WRA women of reproductive age includes non-pregnant women and pregnant women.

Reference

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