Objective Simulating the probable impact of grain amaranth and highly absorbable, low-Fe micronutrient powder (MNP) on Fe status in a potential target population is an essential step in choosing and developing an appropriate actual intervention.

Design We simulated the potential effect of fortifying maize porridge with grain amaranth or MNP on the prevalence of inadequate Fe intake and Fe deficiency using data from two cross-sectional surveys. In the first survey (2008), dietary intake data were collected by two 24 h recalls (*n* 197). Biochemical data (*n* 70) were collected in the second survey (2010). A simulation with daily consumption for 80 d of non-fortified maize porridge (60 g of maize flour), amaranth-enriched porridge (80 g of grain amaranth–maize flour, 70:30 ratio) or maize porridge fortified with MNP (2·5 mg Fe as NaFeEDTA) was done.

Setting Mwingi District, Kenya.

Subjects Pre-school children aged 12–23 months.

Results Prevalence of anaemia, Fe deficiency and Fe-deficiency anaemia was 49 %, 46 % and 24 %, respectively. Consumption of non-fortified, amaranth-enriched and MNP-fortified maize porridge was estimated to provide a median daily Fe intake of 8·6 mg, 17·5 mg and 11·1 mg, respectively. The prevalence of inadequate Fe intake was reduced to 35 % in the amaranth-enriched porridge group and 45 % in the MNP-fortified porridge group, while ferritin concentration was increased in both (by 1·82 (95 % CI 1·42, 2·34) μg/l and 1·80 (95 % CI 1·40, 2·31) μg/l, respectively; $P < 0·005$) compared with the non-fortified maize porridge group, resulting in a decreased prevalence of Fe deficiency (27 %) in the two fortification groups.

Conclusions Addition of grain amaranth or low-Fe MNP to maize-based porridge has potential to improve Fe intake and status in pre-school children.