Iron Fortification Programs And Iron Status

Food Fortification Initiative
Enhancing Grains for Healthier Lives

Opportunity

Iron fortification programs can improve a population's iron status when three conditions are met:

1) programs are well implemented and monitored
2) coverage and consumption are optimized
3) iron compounds are added at recommended concentrations

Global burden of iron deficiency (Stevens, 2013)

Data from 107 countries estimated the global prevalence of anemia in 2011 was 29% in non-pregnant women, 38% in pregnant women, and 43% in children (6-59 months). The proportion of anemia amenable to iron was estimated to be 50% in non-pregnant and pregnant women and 42% in children.

From 1995-2011, mean hemoglobin improved only slightly in non-pregnant women (125 g/L to 126 g/L), pregnant women (112 g/L to 114 g/L) and children (109 g/L to 111 g/L).

Public health approaches

Public health approaches to reduce iron deficiency include fortifying food staples or condiments, dietary diversification, biofortification, and dietary supplements.

Fortifying staple foods is considered the most cost-effective, safest (Hurrell 2010), and most practical approach to increase iron intake on a widespread and sustainable basis (Gera, 2012).

Wheat flour is the staple most commonly fortified with iron in large-scale fortification programs (Peña-Rosas 2014). Wheat flour fortification is currently mandated in 82 countries (FFI 2015).

Efficacy studies of iron fortification in foods

Three recent systematic reviews of the effect of iron-fortified foods (cereals, salt, condiments, and commercially processed foods) all showed positive effects on hemoglobin and/or iron status.

- Gera (2012) found a 41% reduction in anemia and a 52% reduction in iron deficiency.
- Das (2013) found a 45% reduction in anemia in children and 32% reduction in women.
- Athe (2013) found a significant increase in hemoglobin concentration of 5.09 g/L.

Effectiveness studies of iron fortification in foods

Success fortifying with iron as a public health intervention depends on several factors including:

- adequate legislation and regulations (e.g., bioavailable iron compounds mandated at meaningful levels)
- monitoring and enforcement
- consumption of fortified foods in sufficient amounts (Martorell 2015).

In a review of wheat flour fortification programs, only 9 of 78 programs were judged to be effective; the others used iron compounds which were not bioavailable and/or provided too little iron fortificant (Hurrell 2010).

The few effectiveness studies (n=13) that exist provide limited evidence for the effectiveness of flour fortification for improving anemia prevalence; however, it is consistent for improving low ferritin prevalence in women (Pachón, in press).

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More recently, anemia in Costa Rica was shown to be lower after fortification in both children (19.3% versus 4.0%) and women (18.4% versus 10.2%). Iron deficiency declined in children from 26.9% to 6.8% and iron deficiency anemia declined from 6.2% to undetectable levels (Martorell, 2015).

WHO guidelines for wheat flour fortification

WHO issued interim guidelines which suggest the types of bioavailable iron fortificants and concentration levels to add to flour (WHO 2009).

WHO is conducting a Cochrane review to assess the effects of wheat flour fortification (Peña-Rosas 2014), and new WHO guidelines for wheat flour fortification will be published in 2016.

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