The value of food fortification as a public health intervention

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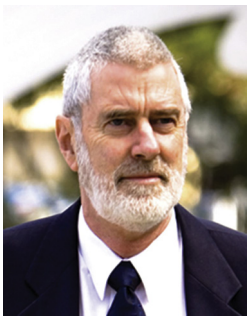
Making iodine fortification of bread mandatory in Tasmania successfully improved population iodine levels



Iodine is a micronutrient essential for thyroid hormone synthesis. Inadequate dietary intake is associated with preventable iodine deficiency disorders, including neurological impairment, goitre, and hypothyroidism. The effectiveness of iodised salt for improving population iodine levels and of urine iodine assessment for detecting deficits have led to iodine deficiency being eliminated in many countries where it was once a problem.[1]

The article by Hynes and colleagues in this issue of the Journal[2] corroborates earlier data that support the benefit of replacing a voluntary iodine bread fortification program in Tasmania with a mandatory program.[3] The authors note that iodine nutrition is considered adequate when the median urinary iodine concentration (UIC) of the population is 100–200 μg/L and fewer than 20% of tested samples have values below 50 μg/L.[2] The median UIC of samples of Tasmanian schoolchildren rose from 74 μg/L ($n = 215$) during the pre-fortification period (1998–2000) to 108 μg/L ($n = 1482$) in the voluntary fortification period (2003–2007), and to 130 μg/L ($n = 733$) with mandatory fortification (2011–2016). The proportion of samples with values below 50 μg/L decreased from 18% during pre-fortification to 9.5% with voluntary fortification and 3.3% with mandatory fortification.

Nevertheless, Hynes and her co-authors emphasise that the increased iodine requirements during pregnancy and lactation necessitate further supplementation. The 2011–12 National Health Measures Survey found that two-thirds of women of childbearing age (16–44 years old) had iodine levels below 150 μg/L, the recommended level for women who are pregnant, breastfeeding, or considering pregnancy.[4] Even mild iodine deficiency during pregnancy can have long term adverse impacts on fetal neurodevelopment.[5]

Food Standards Australia New Zealand (FSANZ) recommends the mandatory fortification of specific foods with particular vitamins or minerals when there is a significant public health need to do so. In both countries, the replacement of normal salt in bread with iodised salt is now mandatory. Australia also requires that folic acid (to prevent neural tube defects) and thiamine (to prevent Wernicke–Korsakoff syndrome) be added to wheat flour for making bread (apart from organic varieties), and that vitamin D be added to margarines and other spreads.[6] FSANZ also permits manufacturers in both countries to voluntarily add iodine to salt, fluoride to bottled water, and specific vitamins and minerals to plant-based milks, non-alcoholic beverages, and brewed soft drinks. Calcium may be added to milk and chewing gum, plant sterols to margarine, low fat milks, yoghurts, cheese, and breakfast cereals, and folic acid to breakfast cereals. These additives must be listed on food labels, and the conditions for making nutritional content and health claims about foods are listed in an FSANZ standard.[6]

Unlike Australia, where fortification of flour with folic acid is mandatory, it is voluntary in New Zealand. As a primary public health program, encouraging women to select foods or supplements providing the recommended daily intake of 400 μg folic acid has its limitations. As many as 50% of pregnancies are unplanned; as the neural tube closes early in embryonic development, women should commence folic acid supplementation prior to becoming pregnant, and maintain it throughout the first trimester of their pregnancy.

Mandatory fortification with folic acid is popular as a regulatory approach because it does not require active behavioural change, has a broad impact, and has been shown to be more effective at achieving recommended nutrient levels than voluntary approaches.[7] The aim of folic acid fortification, however, is to compensate a presumed genetic defect in individuals who are at risk but cannot be individually identified; this is conceptually different to boosting the iodine content of foodstuffs to ameliorate a population deficiency. Folic acid fortification thus raises ethical questions about exposing the many for the benefit of a few; concerns have been expressed that exposing children to high levels of folic acid over their entire lifetime may increase their risk of adverse effects.[8]

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Manufacturers of foods and beverages are increasingly adopting the FSANZ option of voluntary food fortification. While some fortified products may be beneficial for specific populations, such as foods containing plant sterols for people with hypocholesteremia,[9] they can also be over-promoted, unnecessary, and expensive.[10] Ongoing monitoring of the population is required to ensure that safe upper limits for levels of nutrients (including folic acid) are not breached. Finally, promotion of the Australian Dietary Guidelines[11] remains crucial, as there are many more health benefits in consuming whole foods than in taking isolated supplements.

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