Bread overtakes dairy to improve iodine intake in New Zealand

According to the latest New Zealand Total Diet Study (2016 NZTDS), the declining intake of iodine has been reversed for the first time since the mid-1990s thanks to the mandatory use of iodized salt in bread manufacture.


Are iodine intakes adequate in New Zealand?

Iodization of salt was first introduced in New Zealand in 1924 which dramatically reduced the rate of goiter, from 30% of schoolchildren to less than 1% (1). In the past 20 years, several studies have indicated a re-emergence of mild iodine deficiency in New Zealand (2-4). This led to the mandatory fortification of bread with iodine through the replacement of non-iodized salt with iodized salt in New Zealand from September 2009.

Representative surveys of the iodine status of New Zealand adults have shown significant improvements since the introduction of mandatory fortification of bread. Adults in a regional 2014/15 survey had a median urinary iodine concentration of 103 μg/L, in comparison to 53 μg/L in the 2008/09 Adult Nutrition Survey (5). This level of intake is borderline adequate, and iodine remains a priority nutrient as long as there are concerns that intake levels in the New Zealand diet are inadequate or are approaching inadequate levels.

2016 NZTDS: estimating total dietary iodine intake

The 2016 New Zealand Total Diet Study (2016 NZTDS) was a large-scale food survey undertaken over the 2016 calendar year. The study involved the analysis of 1,056 composite food samples, with eight samples taken of 132 different food types. The selected food types represent the most commonly consumed foods for the majority of New Zealanders. All 1,056 of the collected samples were analyzed for iodine using ICP-MS. Using simulated diets developed for 10 New Zealand population cohorts, including

For the first time in the NZTDS two Pacific Island ethnicity adult cohorts, the dietary exposure/intake has been estimated.

Presence and concentrations of iodine in foods

Iodine concentrations were detected in 61% (640 out of 1,056) of the sampled foods. Because the 2016 NZTDS had comparable limits of reporting (LOR) to those used in the 2009 NZTDS, the reported prevalence of iodine can be considered similar to that of 2009 NZTDS, where 66% (643 out of 982) of the food samples had detectable iodine concentrations. In 2016, iodine was widespread across the food types, however, the majority of foods (498) had concentrations of less than 0.1 mg/kg iodine. The highest iodine concentrations were in oysters (0.8–1.8 mg/kg) and mussels (0.9–3.1 mg/kg).

The impact of mandatory fortification of bread with iodine is evident in the large increase in iodine concentrations in bread in the 2016 NZTDS, compared with previous NZTDSs (Figure 1).

Of the foods newly included in the 2016 NZTDS simulated diets, sushi shows appreciable iodine concentrations (range 0.18–0.76 mg/kg). This is expected to result from the use in the sushi wraps of seaweed (nori), a natural iodine accumulator that is reported to contain 29–46 mg/kg iodine (6).

Foods contributing to iodine intakes

It is important to note that the estimates do not account for any iodine intake through the use of discretionary iodized salt, which may increase iodine intake. Iodine intakes for adult females were the lowest of the adult population cohorts, with an estimated dietary intake of 100 μg/day. For all the adult age groups, the largest contribution to iodine intakes was from cereal grain-based foods, with dairy and fish, meat and eggs...
also major contributors. Mandatory fortification of bread with iodine has markedly increased the contribution of cereal-based foods to total iodine intake (Figure 2). While dairy products have historically been the largest source of iodine intake in the New Zealand diet, bread was the primary dietary source of iodine in the 2016 NZTDS.

In the child and teenage cohorts, the estimated iodine intakes ranged from 70 μg/day for toddlers to 133 μg/day for teenage boys. The child and teenage population cohorts showed a similar high contribution from grains in the diet as the adults. For the infant and toddler age groups, dairy products were the most important source for toddlers, and dairy-based infant formula for infants. This is consistent with the 2009 NZTDS, in which dairy products contributed 66% of the iodine intake for toddlers, and infant formula 72% of the intake for infants.

Comparison with dietary requirements

The increase in iodine intake evident since the 2009 NZTDS meant that all of the population cohorts met or exceeded the estimated average requirements (EAR) for iodine. The dietary iodine intake for infants was 76% of the adequate intake (AI), as no EAR is available in this population.

The increase in dietary iodine intakes across the population cohorts is a large change from the plateau in iodine intakes since the 1997/98 NZTDS and the large decrease noted in the NZTDS studies before this (Figure 3). As a result of mandatory fortification of bread with iodine, all of the population cohorts, except infants, are now receiving dietary iodine intakes sufficient to meet nutritional requirements. This has not been achieved in most of the population cohorts since the early 1990s.

Not many other national diet surveys analyze for iodine, as many nations’ soils naturally contain iodine concentrations sufficient to contribute to dietary intakes. The Irish Total Diet Study (ITDS) reported higher dietary intakes of iodine for all of its age groups, compared with the 2016 NZTDS (7). In the ITDS, dairy products were the major contributors to dietary iodine intake.

Conclusions

Dietary intake estimates for iodine have shown a remarkable improvement for all of the population cohorts, compared with previous NZTDSs, largely as a result of the mandatory fortification of bread with iodine. The daily dietary intakes for iodine for all population cohorts, apart from infants, now meet or exceed the relevant NRVs, reversing the decline seen since the mid-1990s.

References

7. FSAI (Food Safety Authority of Ireland), 2016. Report on a Total Diet Study carried out by the Food Safety Authority of Ireland in the period 2012–2014. FSAI, Dublin.