Indigenous adults in northern Australia are mildly iodine deficient

A cross-sectional study found that the median urinary iodine concentrations of young people in the Top End of the Northern Territory increased following the introduction of mandatory fortification of bread in Australia. However, median levels for some groups, particularly pregnant women and women of child-bearing age, remain in the mildly deficient range.

Iodine deficiency returned as a significant public health problem in Australia during the 1990s. It had historically existed in the southeast of the mainland and in Tasmania, but deliberate strategies and unintentional iodine supplementation had led to its disappearance until it re-emerged in some parts of Australia (1). In response to national data indicating mild iodine deficiency, fortification of salt used in bread has been mandatory across Australia since October 2009.

Prior to fortification, Indigenous young people in the Top End of the Northern Territory were classified as mildly to moderately iodine-deficient (2). This study, the authors analyzed median urine iodine concentration (UIC) data from two longitudinal studies, the Aboriginal Birth Cohort (ABC) and the non-Indigenous Top End Cohort (TEC), reported both pre- and post-mandatory fortification. The cohorts are part of the Life Course Program based in Darwin (3,4). For the Indigenous ABC group, “pre-fortification” refers to data from 2006–2007; for the non-Indigenous TEC group, it refers to data from 2007–2009. For both groups, “post-fortification” refers to data collected in 2013–15. Spot urine samples were analyzed at the Institute of Clinical Pathology and Medical Research (ICPMR) at Westmead Hospital in Sydney. The pre-fortification data for the two cohorts are the only Australian data on the iodine status of non-clinical adult populations.

Iodine status pre- and post-fortification
The pre-fortification values for each group were substantially below the minimum desirable level of 100 μg/L, also when compared by urban vs. rural residence (80% of Indigenous participants lived in remote areas at both assessments) (Table 1). Although the median UICs for Indigenous and non-Indigenous urban participants were not significantly different, levels were significantly lower for Indigenous participants in remote locations (53; IQR, 28–75 μg/L).

Among non-Indigenous urban participants, the median UIC was significantly lower for non-pregnant women than for men (Figure 1).

The median UIC among young people in the NT Top End increased substantially after mandatory iodine fortification was introduced. The median UIC for all participants who were assessed at both time points was 101.0 (IQR, 66–163) μg/L, significantly higher than pre-fortification (Table 1). However, the median UICs for remote Indigenous participants (94.0 μg/L; IQR 63–152 μg/L) and for urban non-Indigenous pregnant women were still slightly below recommended level (Figure 1).

Despite the small sample size, urinary iodine was assessed in 22 pregnant women pre-fortification (18 remote Indigenous, four urban Indigenous participants) and in 24 women post-fortification (14 remote Indigenous, seven urban Indigenous, three urban non-Indigenous participants). The median pre-fortification concentration was 48.0 (IQR, 36–67) μg/L, the median post-fortification level 93.0 (IQR, 62–171) μg/L; both values were below the recommended minimum of 150 μg/L.
Iodized salt in bread: is it enough?

Iodization of salt used in bread is the most likely explanation for the increased urinary iodine levels. The results of this study are consistent with the change in UIC predicted on the basis of the iodine concentrations in bread after fortification and the bread intake in remote areas reported in national surveys (5). The estimated median intake by remote Indigenous women rose from 72 μg to 132 μg per day after fortification. Bread consumption varies widely between individuals, and lower consumption could explain the smaller increases in some population groups.

The UIC interquartile range was generally broader after fortification became mandatory. This is expected, as bread is not eaten in the same amounts each day. A similar phenomenon was observed in Tasmania during the voluntary iodine fortification program (6).

The median UIC values for our populations were lower than reported by national surveys: the median UIC for adults aged 18–24 years in the general Australian population (2011–12) was 138 μg/L for the Indigenous Australian population (2012–13), 135 μg/L (7). Median UIC was similar for Indigenous men and women (135 v 134 μg/L) (7) but was higher for men than women in the general Australian population (131 v 118 μg/L) (8). The differences between the present results and those of national surveys are probably explained by differences in the characteristics of participants in our Life Course Program, reflecting the fact that national and state-level results can mask local variations.

Despite the rises in median UIC, the values for women of child-bearing age remained in the mildly deficient range; further, the median UIC for pregnant women was low, and the median UIC for pregnant Indigenous women in remote locations was less than half the recommended level for pregnant women, suggesting that iodine supplementation — recommended by the National Health and Medical Research Council for all pregnant and breastfeeding women — was not being practised. The results of this study suggest that pregnant women living in previously iodine-deficient parts of Australia may still be iodine-deficient; this question requires further investigation. In addition, targeted interventions may be needed to improve iodine intake in vulnerable populations.

The known: Iodine deficiency re-emerged in Australia in the 1990s, motivating mandatory fortification of bread with iodized salt in 2009.

The new: The median urinary iodine concentration of 368 young Northern Territory residents increased from 58 μg/L (interquartile range [IQR], 35–83 μg/L) to 101 μg/L (IQR, 66–163 μg/L) after fortification became mandatory. Urban Indigenous and non-Indigenous participants achieved adequate iodine levels, but remote Indigenous and urban non-Indigenous women were still mildly iodine-deficient.

The implications: Although iodine fortification has generally been successful, targeted interventions are needed to improve intake by some Australians, particularly women of child-bearing age.