British Journal of Nutrition (2017), **117**, 439–440

Invited Commentary

Global iodine status has improved: but we must not be complacent

(First published online 20 February 2017)

I deficiency has been described as the single greatest cause of preventable mental impairment[1]. I is an essential nutrient necessary for the production of thyroid hormones, which control metabolic processes and growth and development, especially of the brain and central nervous system[2]. I deficiency is a global problem affecting both developed and developing countries; however, in the recent years there has been excellent progress in improving global I status. The most recent Iodine Global Network (IGN) scorecard (2015) designates twenty-six countries, including Ireland, as I insufficient compared with 116 countries in 1993[3,4].

In a recent issue of the *British Journal of Nutrition*, McNulty *et al.*[5] presents the I intake and status of the Irish population using data from the Irish National Adult Survey (2008–2010)[6] and the Irish Total Diet Study (2012–2014)[7]. The median urinary iodine concentration (UIC) for the Irish adult population was 107 μg/l, which is within the range of 100–199 μg/l recommended by the World Health Organization for dietary adequacy for adults and children[8,9]. Thus, at a glance, it might appear that the population now has an adequate status, which seemingly indicates there is no cause for concern.

However, the assessment of I status is far from straight forward. There is currently no definitive method to assess the I status of an individual. Furthermore, thyroid hormones are not good measures of I status as populations with suboptimal status can have concentrations within normal reference ranges[10]. The WHO recommends assessing the I status of a population using a spot sample of urine. The median UIC of a population is then compared with recommended cut-offs. The IGN defines the I status of a country based on the UIC of school-aged children (≥6 years of age) and the Irish data date from 1999[4]. School-age children would need to be surveyed for the IGN to review the I status of Ireland. In other developed countries such as Australia and New Zealand UIC is higher in school-aged children than adults[11]. Although children's dietary intake of I is lower their urine is much more concentrated than adults, although both have the same cut-offs to indicate deficiency (median UIC <100 μg/l). It has been argued that the median UIC cut-off for deficiency in adults should be lower at 60–70 μg/l[12], which would put the Irish adult population well into the sufficient category. It is probable that the population assessment based on school-aged children would indicate sufficiency.

Recent research has found that when I status is sufficient in school-age children, there could still be deficiency in pregnant and breast-feeding women in the same population[13,14]. McNulty *et al.*[5] found that 66 % of women achieved the Institute of Medicine's estimated average requirement (EAR; 95 μg/d) for I, although intakes were lowest in women aged 18–35 years.[15]. I requirements increase significantly during pregnancy to meet both maternal and fetal needs and increased maternal renal loss[16]; I is also secreted into breastmilk thus maternal requirements are high during lactation[17]. Using current intakes, 77 % of Irish women of childbearing age (18–50 years) would have intakes below the EAR for pregnancy (160 μg/d)[18]. Thus, even with increased food intake during pregnancy, many of these women would be unlikely to achieve an adequate intake of I if they became pregnant. It is well established that severe I deficiency during pregnancy can result in cretinism in the infant, characterized by serious mental and physical impairment; this is not likely to occur in Ireland at the observed intakes. However, even mild to moderate deficiency in early life may affect neurobehavioural development. Thus, it is essential that I status is monitored not only in school-age children but also in both pregnant and breast-feeding women. In other countries where intakes are sufficient for children but suboptimal for pregnant and breast-feeding women supplementation is recommended for these women[19]. It has also been suggested that the IGN global score card should reflects both school-age children and pregnant women[14].

McNulty *et al.*[5] demonstrated that milk was the main dietary source of I and I status was higher in the winter than the summer (median UIC 152 *v.* 108 μg/l, respectively). Levels of I in Irish milk are currently bolstered by farming practices, which involve the use of I-containing compounds in dairy sanitation; winter intakes are further increased by salt licks and fodder for dairy cows enriched with I. Any change to these practices could markedly influence the I intake of the Irish population. Moreover, European Food Safety Authority (EFSA) has recommended reducing the levels of I permitted in complete animal feed from 5 to 2 mg/kg, which could reduce human I intake in Ireland[20]. It is essential that Ireland continue to monitor the I content of milk in order to prevent I deficiency, but also I excess. Further research should also consider individuals who exclude milk from the diet.

In conclusion, the recent work by McNulty *et al.*[5] suggests that for the majority of Irish adults I status is currently sufficient, although intakes in women of childbearing age are the lowest and of concern. It is essential that I status is now assessed in children and also pregnant and breast-feeding women; supplementation may be required during pregnancy and lactation. As milk is the major source of I in Ireland it is vital that both the I content of the diet and also I status of the population continues to be monitored, as changing farming practices could

dramatically influence status. This Irish study is a comprehensive example of the complexities of assessing I status. There has been much progress in improving global I status among school-aged children in the recent years; however, sufficient I status is not something that can be taken for granted. Population I status is vulnerable to farming practices, changes in the food supply and also individual dietary choices. We must continue to evaluate both I status in the population and also dietary sources of I. Sufficiency in one group does not equate to sufficiency in all groups and the use of school-age children alone to determine the status of the whole population needs to be reconsidered.

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doi:10.1017/S0007114517000113

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