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Iodine Status in Europe in 2014

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Iodine deficiency has been recognised as a worldwide problem since the last century [1]. The International Council for Iodine Deficiency Disorders Global Network (ICCIDD GN) has underpinned remarkable progress in ameliorating this problem during the last nearly 30 years and especially during the last decade [2]. The number of iodine-deficient countries in the world has decreased from 54 in 2003 to 47 in 2007 and 32 in 2011 [3]. This remarkable rate of progress has been largely due to intensive work by the ICCIDD GN, UNICEF and WHO. Nevertheless, of these 32 countries, 11 (34%) are in Europe, the largest number from any continent [3].

West and Central Europe has a total population of about 600 million situated in 35 countries (table 1), with country populations ranging from 0.3 to 75 million. Attention was drawn to the iodine deficiency problem in this area more than 10 years ago [4]. In general, the iodine deficiency is mild, but nevertheless this may have an impact on childhood development. For example, mild-to-moderate iodine deficiency in the first trimester of pregnancy was associated with increased odds of the intelligence quotient of offspring being in the lowest quartile (odds ratio: 1.43; 95% CI: 1.04–1.98; p = 0.03), with the greatest negative impact observed with the verbal intelligence quotient (odds ratio: 1.66; 95% CI: 1.20–2.31; p = 0.002) [5]. A review of the current evidence indicates that a correction of mild-to-moderate iodine deficiency improves cognitive performance in school-age children, but there are insufficient data on developmental outcomes in early life [6]. There are 2 randomised studies of iodine supplementation in children with mild iodine deficiency in Albania [7] and New Zealand [8] showing improved cognition. However, large-scale controlled trials are now needed to clarify whether gestational iodine supplementation will benefit infant and childhood neurodevelopment in more European countries with marginal iodine deficiency.

During 2013, a postal enquiry survey was performed requesting relevant information on the iodine status from all national coordinators of the ICCIDD GN in the West and Central European region. In addition to the 35 countries, there are 3 (Austria, Kosovo and Montenegro) where there is no national coordinator for the ICCIDD GN and from where no data are available for 2013. Information from all countries was not available on some items of the questionnaire, but all countries with an ICCIDD national coordinator responded. It should be noted that the WHO/ICCIDD criteria for an adequate iodine status in a population are a median urinary iodine (UI) of 100 μg/l or more, with <20% having a UI of <50 μg/l [3]. In pregnancy, the median UI should be at least 150 μg/l, on account of increased iodine requirements during gestation and lactation [9].

The results of the questionnaire showed, firstly, that salt iodisation is mandatory in 13 countries and not mandatory in 21 (no response to this question was received

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Table 1. Countries of the ICCIDD GN in West and Central Europe

Albania	Latvia
Austria[1]	Lithuania
Belgium	Luxembourg
Bosnia	Macedonia
Bulgaria	Montenegro[1]
Croatia	The Netherlands
Cyprus	Northern Cyprus
Czech Republic	Norway
Denmark	Poland
Estonia	Portugal
Finland	Romania
France	Serbia
Germany	Slovakia
Greece	Slovenia
Hungary	Spain
Iceland	Sweden
Israel	Switzerland
Italy	Turkey
Kosovo[1]	UK

[1] Countries without an ICCIDD representative.

from 1 country). This represents at least 400 million people living in countries with no mandatory legislation for iodised salt. No data are available from this survey on household iodised salt coverage rates. Some countries, such as Switzerland, have a high rate (80%), but in others (e.g. the UK) the coverage is only about 5%. A recent survey of the iodine status was performed within the last 2 years in 16 countries and not performed in 14, with information lacking from 5 countries. The median UI concentration, either nationally or regionally, ranged from 78 to 252 μg/l in 26 countries, with 6 of those countries (23%) having a UI of <100 μg/l. Data on the iodine status in pregnancy were available from 21 countries and indicated that it was adequate in only 8 countries (38%). When asked as to whether there is ongoing monitoring of the iodine status in the country, 16 national coordinators responded positively and 17 indicated that there was no monitoring.

A few examples will illustrate the situation further. In the Netherlands, iodine intake by pregnant women is sufficient as determined by a single UI measurement in more than 1,000 pregnant women in Rotterdam with a median UI of 225 μg/l [10]. This is in contrast to Norway, where the median UI was <100 μg/l in an admittedly smaller sample [11]. In Poland there has been an improvement in median UI in pregnancy from 105 μg/l in 2010 to 121 μg/l in 2011, but this figure is still suboptimal [12]. A comprehensive evaluation of the iodine status in pregnancy in Belgium has shown that median UI values are suboptimal [13]. This is despite the fact that 60% of the women reported taking iodine supplements during gestation [14]. Interestingly, the frequency of elevated neonatal thyroid-stimulating hormone levels was still low (3%) in this population [15]. In Denmark, while the majority of pregnant women took iodine-containing supplements, the subgroup of non-users was still iodine deficient after the introduction of iodine fortification of salt [16].

The iodine status is adequate in some countries. Following a new salt law in Croatia (population: 4.5 million) in 1996, UI values have steadily increased from <100 μg/l in 1997 to 150 μg/l in 2002, and even higher (approx. 200 μg/l) in 2009 [17]. This is a success story in a small country but it also shows the necessity of further monitoring, in this case to avoid an iodine excess. In Kosovo and Montenegro, in 2007 there was optimum iodine nutrition [18], and this is continuing in Kosovo, but not in Montenegro because of a lack of funding [van der Haar, pers. commun., 2013]. In Romania (population: 19 million), subsequent to mandatory iodisation in 2002/2003, the UI has increased from approximately 90 μg/l in 2004 to 135 μg/l in 2011, which is a satisfactory outcome. However, there is a suboptimal iodine status of pregnant women in nine countries (Albania, Belgium, Czech Republic, Greece, Israel, Norway, Portugal, Romania and Serbia) and evidence of iodine deficiency in the general as well as the pregnant population in 5 countries (France, Hungary, Ireland, Italy and the UK). This means that an inadequate iodine supply in pregnancy is present in approximately 30% of the European countries.

The most populous countries in the region are France, Germany, Italy, Spain, Turkey and the UK, with a combined population of about 390 million, i.e. two thirds of the whole area. Only 2 of these countries (Italy and Spain) have iodisation legislation, which is not always adhered to. In contrast, all but 2 of the countries (Spain and the UK) have national monitoring. There have been several regional studies in Spain, e.g. in Catalonia [19]. The UI concentration in the general population is adequate in Spain (although deficient in Northern Spain [20]) and France, and borderline or mildly deficient in the other countries. Moderate-to-severe iodine deficiency still existed in 27.8% of the Turkish population in 2007, which was much better than in 1997 and 2002 [21].

In the UK, iodine deficiency has emerged as a public health issue following several decades of apparent iodine sufficiency [22]. There is evidence from a national survey of iodine deficiency in 15-year-old schoolgirls [23] as well as in pregnant women from several areas [24, 25]. A lon-

gitudinal study on children from their mothers' pregnancy to the age of 20 years has shown significant associations between suboptimal maternal iodine nutrition and intellectual performance [26]. Despite the fact that probably around two thirds of the pregnant women in the UK are iodine deficient, a recent government scoping paper from the standing advisory commission on nutrition has not recommended iodine supplementation in pregnancy and even still questions the methodology of the iodine status assessment in populations [27]. There is a requirement for a national large-scale survey of iodine supply in pregnant women in the UK to confirm the initial findings from relatively small samples. There are some indications that UI concentrations in young UK schoolchildren are adequate [Rayman, pers. commun.]. However, this group usually consumes the largest amount of milk and its iodine status cannot be used as a proxy for the adult population [28].

In summary, there is a re-emerging iodine deficiency in industrialised countries of Europe, although the iodine status of some countries is satisfactory. Of particular concern is the fact that pregnant women in many countries have inadequate iodine nutrition. It also appears that about 400 million people from 20 countries have no or limited access to iodised salt. The demonstration of adequate iodine intake in some sections of the population (e.g. schoolchildren) should not be a barrier to recommending a national salt iodisation programme.

The overall picture of iodine nutrition in Europe in the early 21st century is still a cause for concern (with some exceptions). Salt iodisation is known to be a highly cost-effective method of supplying iodine to a population, although there are other sources of iodine that can be employed. The ICCIDD GN has had an admirable record in advocacy during the past nearly 30 years in relation to the promotion of universal salt iodisation and to an increasing awareness of iodine deficiency and its adverse consequences particularly in children. A significant part of the population in Europe is mildly deficient in iodine; an increase in dietary iodine consumption by 50–100 μg/day would be beneficial, with minimal or no adverse consequences. More national data are required, particularly on the pregnant population, where current evidence – although incomplete for many countries – suggests that there is suboptimal iodine nutrition. We now need to move forward in Europe by increasing advocacy activities, providing more epidemiological evidence as well as involving the European Union in order to recognise and prevent the problems of iodine deficiency in its backyard.

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