The Brussels Declaration on Iodine

Sustained Priorities and Strengthened Commitment in Iodine Deficiency Prevention Programmes

The EUthyroid2 Consortium*

Short running title: Brussels Iodine Declaration of the EUthyroid2 Consortium

Key words: iodine deficiency; prevention; education



Address for correspondence:
Henry Völzke, M.D.
Institute for Community Medicine, SHIP/ Clinical-Epidemiological Research
University Medicine Greifswald
Walther Rathenau Str. 48
D-17475 Greifswald; Germany
Phone:+49 - 3834 – 867707; Fax: +49 - 3834 – 866684;
e-mail: voelzke@uni-greifswald.de

* Contributors to the EUthyroid2 Consortium

Henry Völzke[1], Vivien Henck[1], Till Ittermann[1], Phil Pendt[1], Muhammad Nasir Khan Khattak[1], Rehman Mehmood Khattak[2], Aisha Imtiaz[2], Muhammad Altaf Khan[2], Gitte Ravn-Haren[3], Bodil Just Christensen[3,4,] Georgia Soursou[5], Konstantinos C. Makris[5], Simona Gaberšček[6,7], Katja Zaletel[6,7], Katica Bajuk Studen[6,7], Małgorzata Trofimiuk-Müldner[8], Alicja Hubalewska-Dydejczyk[8], Magdalena Kamińska[8], Jayne V. Woodside[9], Sarah C. Bath[10], Linda Henderson[11], Anna Bokor[11], Lisbeth Dahl[12], Synnøve Næss Sleire[12], Helena Filipsson Nyström[13, 14], Mithila Faruque[15], Natalia Cecon-Stapel[16], Attilio Caligiani[17], Anika Reinhart[16], Theresa Heering[16], Freia De Bock[16,18]

[1]Institute for Community Medicine, University Medicine Greifswald, Germany; [2]Department of Zoology, Islamia College Peshawar, Khyber Pakhtunkhwa, Pakistan; [3]National Food Institute, Technical University of Denmark, Denmark; [4]Department of Biomedical Sciences, University of Copenhagen, Denmark; [5]Cyprus International Institute for Environmental and Public Health, School of Health Sciences, Cyprus University of Technology, Limassol; [6]Division of Nuclear Medicine, University Medical Centre Ljubljana, Slovenia; [7]Faculty of Medicine, University of Ljubljana, Slovenia; [8]Chair and Department of Endocrinology, Jagiellonian University Medical College, Kraków, Poland; [9]Centre for Public Health, Queen's University Belfast, Belfast, UK; [10]Faculty of Health and Medical Sciences, University of Surrey, Guildford, Surrey, UK; [11]Thyroid Federation International, The Netherlands; [12]Institute of Marine Research, Seafood, Nutrition and Environmental State, Bergen, Norway; [13]Department of Endocrinology, Sahlgrenska University Hospital, Gothenburg, Sweden; [14]Department of Internal Medicine and Clinical Nutrition, Institute of Medicine, University of Gothenburg, Sweden; [15]Bangladesh University of Health Sciences, Dhaka, Bangladesh; [16]Department of General Pediatrics, Neonatology and Pediatric Cardiology, Medical Faculty and University Hospital Cologne, Heinrich-Heine-University Düsseldorf, Düsseldorf, Germany; [17]World Iodine Association Brussels, Belgium; and [18]Charité – Universitätsmedizin Berlin, corporate member of Freie Universität Berlin and Humboldt-Universität zu Berlin, Institute for Medical Sociology and Rehabilitation Science, Berlin, Germany

Joint Declaration

Iodine deficiency disorders (IDDs) represent a global health threat, affecting both individuals and societies across the life course. Their consequences are wide, ranging from hypo- and hyperthyroidism, and goitre, to impaired fetal neurodevelopment resulting from iodine deficiency during pregnancy; collectively placing a substantial burden on healthcare systems. Although IDDs are entirely preventable and substantial progress has been achieved over the past century, recent trends suggest that some of these gains are beginning to erode worldwide.(1) At the same time, competing public health priorities are increasingly diverting attention and resources away from IDD prevention, thereby amplifying pressures on already strained public healthcare systems.

The harmonised data of regional and national studies of the initial EUthyroid consortium (2015-2018) revealed a low iodine status across Europe, especially among young and pregnant women. Thus, the consortium estimated that approximately 50% of pregnant women have an iodine status below the level recommended by the World Health Organisation.(2) Consequently, EUthyroid's Krakow Declaration on Iodine called for policymakers, public health officials, and scientists to act to ensure IDD prevention across Europe by harmonising obligatory Universal Salt Iodisation (USI), conducting monitoring and evaluation of fortification programmes, and supporting measures necessary to ensure the effectiveness of IDD prevention programmes including regular iodine monitoring and adapting prevention programmes if necessary.(3)

Since 2018, when the Krakow Declaration on Iodine has been published, a few European countries have initiated activities to improve the iodine status of their

populations. For example, Germany has started an information campaign to increase the awareness of iodine deficiency-related risks, particularly addressing young people. Of note, this has been the first publicly funded iodine information campaign since the German reunification in 1990. In Sweden, the National Food Agency has recommended the food industry to use more iodine fortified instead of non-fortified salt. In Denmark, the level of mandatory iodine fortification of household salt and salt added to bread and bakery products was increased by 54% (from 13 ppm to 20 ppm) in 2019.(4) In Norway, a voluntary iodine fortification strategy was introduced in 2025, raising the permitted iodine concentration in household salt and salt used by the bread and bakery industry from 5 to 20 ppm, with a long-term objective of transitioning to mandatory fortification.(5)

Current studies from European countries continue to show a concerning prevalence of mild-to-moderate iodine deficiency status in populations investigated.(6, 7) Accordingly, a 2024 report by the World Health Organisation concluded that in Europe the “iodine status in adults and pregnant women is less than optimal in several countries with voluntary or no salt iodisation”.(8)

The EUthyroid2 consortium has identified **three major barriers** to improving iodine status in European populations:

1. The low awareness of iodine nutrition and the health risks related to iodine deficiency among the general population.
2. The increasing shift towards plant-based diets, which requires greater attention to iodine intake.
3. The EU technical labelling requirements for iodised food products.

Background

The iodine status is a major determinant of thyroid disorders, and thyroid conditions are a major cause of morbidity in Europe, particularly in women.(9) The adverse effects of iodine deficiency, although well established, receive surprisingly little political and public attention. Adults living in iodine-deficient regions carry a high risk of goitre, thyroid nodules, hyperthyroidism, and secondarily increased cardiovascular risks. While clinical diseases due to severe iodine deficiency such as massive goitre or cretinism have become rare, subclinical hyperthyroidism remains relatively common and is frequently undiagnosed. This condition is associated with an increased risk of mortality, cardiac arrhythmias, and coronary heart disease.(10) Iodine deficiency imposes tremendous costs on the healthcare systems of affected regions,(11) but can easily be prevented through effective fortification strategies. In addition to iodised table- and industrial salt, iodine-enriched livestock feed and targeted fortification of selected foods remains essential in maintaining adequate iodine status at the population level, alongside dietary sources of iodine such as fish and other seafood, eggs, milk, and dairy products. Iodine fortification is a delicate matter as it can easily lead to a too high intake, which can also increase the risk of thyroid diseases. Thus, when introducing fortification programmes, national monitoring programmes are also essential to monitor both the iodine status and the incidence of thyroid disorders in the population.

The iodine requirements increase substantially in pregnancy, and iodine deficiency during pregnancy may increase the risk of developmental impairment of the offspring. Thus, IDD affects the entire life cycle, and the unborn foetus and children are especially vulnerable as the brain is still under development. The previous World Health Organisation report stated that 15 of 54 countries in Europe had iodine deficiency

during pregnancy, whereas only nine demonstrated iodine adequacy, and 30 lacked respective data.(1) Thus, a large number of children may be exposed to inadequate iodine supply during fetal development, potentially compromising their cognitive potential.(12)

In many regions worldwide, dietary sources alone are insufficient to meet the increased iodine requirements during pregnancy because there are limited dietary iodine sources and too few information on sources of iodine.(13) Therefore, iodine supplementation during pregnancy is recommended in many countries.(14, 15) There is, however, currently insufficient evidence that iodine supplementation is effective in preventing neurocognitive impairment in the offspring in mildly-to-moderately iodine deficient regions,(16) which may be explained by two limitations. First, iodine supplementation is needed during (very) early pregnancy,(17) which is often not feasible in practice, because pregnancy is frequently unrecognised at this stage. Besides the low quality and limited power of the few available randomised controlled trials investigating the effects of iodine supplementation on the neurocognitive development in the offspring,(16) initiation of supplementation too late in pregnancy may therefore explain the insufficient evidence of beneficial effects. Therefore, iodine supplementation should ideally begin before conception and at the latest, during the first trimester of pregnancy.(17) This recommendation is supported by findings from Norwegian register-based analyses that demonstrated an association between maternal iodine deficiency and increased risk of attention-deficit/hyperactivity disorder (ADHD) in the offspring. These studies also found that iodine supplementation initiated between gestational weeks 0 and 12 did not attenuate this risk.(18) In addition, women with marked iodine deficiency before pregnancy who initiated supplementation during early pregnancy showed a slightly increased risk of having a child diagnosed with ADHD,

suggesting that supplementation may not fully compensate for inadequate iodine status at conception.(18)

The second limitation with supplementation is the low awareness of iodine deficiency-related risks that is common not only among women of reproductive age, but even among healthcare professionals. For example, studies demonstrated that only 20% of pregnant women in Northern Ireland,(19) 25% in Scotland,(20) and 26% in Norway(21) were aware of their increased iodine requirements during pregnancy or the potential consequences of iodine deficiency for the foetus. Similarly, in the United States, approximately 70% of midwifes and obstetricians do not recommend iodine supplementation before and during pregnancy or during lactation, despite recommendations of national medical societies.(22) In Australia, although 71% of healthcare professionals were aware of the national recommendation for iodine supplementation, only 38% and 44% knew the recommended dosage and duration, respectively.(23) These findings are concerning because greater awareness of iodine nutrition is consistently associated with better iodine status among pregnant women.(24)

Building on the initial EUthyroid project, which evaluated existing IDD prevention programmes in Europe and established critical infrastructures for conducting valid monitoring studies, EUthyroid2 seeks to fill important gaps in IDD prevention in Europe and beyond and to overcome current shortcomings in the effectiveness of these programmes.

The initial EUthyroid consortium conducted a Delphi survey among experts from different fields across 36 countries, which demonstrated that the main barriers to achieve an optimal iodine supply in general populations included challenges related to

knowledge and information, implementation and management, communication and cooperation, political support, and differences between the European countries.(25) Consequently, the EUthyroid consortium released the Krakow Declaration on Iodine in 2018 to call on national governments and health authorities to monitor and evaluate iodine fortification programmes on a regular basis and to increase awareness of populations with respect to risks related to iodine deficiency.(3)

Although the Krakow Declaration on Iodine was endorsed by 79 organisations, IDD prevention strategies remain fragmented across Europe, with marked differences in legislation, fortification approaches (mandatory or voluntary), food vehicles selected (salt, bread, and/or animal feed) and surveillance (none, irregular or regular monitoring and evaluation). In addition, the nearly complete absence of public information campaigns has contributed to persistently low awareness of IDD among the general population, particularly in countries with iodine fortification programmes based on the voluntary principle.

Ensuring a Euthyroid Europe

Expanding the Krakow Declaration on Iodine,(3) the signatories of the Brussels Declaration on Iodine urge on policymakers, public health officials, food producers, patient organisations, scientists, and industry representatives to join forces to ensure that existing strategies to prevent IDD, especially in young women, are fully implemented across Europe. Specifically, the EUthyroid2 consortium calls for:

1. Strengthening public information campaigns and integrating the role of iodine in healthy living into standard school and training programmes for healthcare professionals.

2. Enabling and encouraging appropriate iodine fortification of plant-based foods, especially those that replace traditional iodine sources (e.g., milk and dairy products, eggs, and fish).
3. Simplifying and harmonising the labelling of iodised salt in foods to improve clarity for consumers and facilitate informed choices.

Information campaigns and school curricula

The EUthyroid2 consortium (Figure 1 for regional distribution of contributors) performed intervention studies in adolescents and young women to find best practice models for reaching and informing these important population groups, thereby increased their awareness and improving their iodine status. Strengthening iodine intake in these populations helps establish the foundation for their own thyroid and general health, as well as that of their future offspring. Preliminary results indicate that multimodal intervention approaches can achieve these aims. Once the studies are completed, all results and best practice methods developed within the EUthyroid2 studies will be disseminated to political stakeholders, the scientific community and the public.

Once funding of research projects has come to an end, there will often be limited further action. The so-called transfer or implementation gap does also exist in public health research, where the primary transfer target is the political sphere. Therefore, we call here for political action to establish public information campaigns, focusing on the general population and, particularly, on young women. This action is especially important for countries with iodine fortification programmes based on a voluntary principle and those countries with no iodisation legislation. Health risks related to iodine deficiency, along with risks related to deficiencies of other micronutrients should be

included in regular school curricula to further warrant best possible sustainability of awareness improvement.

Responsibility: National and EU education and health authorities

Appropriate iodine fortification of plant-based food products

In Western societies, the growing shift towards plant-based diets warrants increased attention to iodine intake, as most plant-based foods are naturally low in iodine. Consequently, strategies to ensure adequate iodine intake must be adapted to these evolving dietary patterns.(26)

In countries with established IDD prevention programmes, different vehicles for iodine fortification are used, for example table salt, edible oil, bread, and animal feed. Iodine fortification of animal feed increases the iodine content of eggs, milk and dairy products, making these important dietary sources of iodine in many populations. In Europe, women of reproductive age are particularly vulnerable to inadequate iodine intake.(2) One explanation may be the increasing tendency to reduce or avoid animal-based foods, which applies especially to young women.(27) This is especially relevant in countries without mandatory salt iodisation, where animal-source foods are the most important sources of iodine.

An additional challenge is that iodine deficiency is often asymptomatic in younger individuals, while still posing risks during pregnancy. Individuals who are aware of these risks, but nevertheless reduce or avoid animal products, may turn to seaweed as an alternative source of iodine in their diet. However, seaweed can contain excessively high and highly variable amounts of iodine, which are commonly not indicated on the label.(28, 29) Combined with the lack of a simple method for assessing individual iodine status, this makes it difficult for plant-based consumers to achieve an adequate and safe iodine intake.(30)

Against this background, the EUthyroid2 consortium recommends considering iodine fortification of plant-based alternatives, particularly those intended to replace milk and dairy products, eggs and fish. The iodine concentration in these products should be aligned with the average iodine content of the foods they are designed to replace. In line with the recommendations of the Krakow Declaration of Iodine,(3) populations' iodine status and the incidence of thyroid disorders should be regularly monitored, particularly after changes in iodisation legislation, dietary patterns and of course, the introduction of iodine-fortified plant-based food alternatives.

Responsibility: Governments, food industry, and scientists

Simplifying labelling of iodised salt in food products

Consumption of processed food is common among young European populations. For example, a study in five Mediterranean countries demonstrated that 95% of children and adolescents consume ultra-processed food on a daily basis.(31)

European labelling regulations require iodine compounds used in iodised salt to be declared in the ingredient list of processed foods. Food manufacturers have expressed concerns that such labelling may discourage consumers who prefer products perceived as natural.(32) These concerns may contribute to the limited use of iodised salt in processed foods across Europe. For example, in Germany, iodised salt is only used in 10% of industrially produced bread and baked goods.(33)

Thus, an increase of the iodine content in food will counteract the trend towards a low iodine status. Simplification and harmonisation of labelling may help to increase the acceptance of iodine as an essential nutrient and, consequently, improve iodine status, particularly in young people.

Responsibility: EU, national governments, and food industry

Support us:

The signatories of the Brussels Declaration on Iodine call upon all stakeholders across Europe and beyond to strengthen collaboration and mobilise the expertise and resources needed to eliminate iodine deficiency. Through coordinated action, we can ensure that future generations are able to reach their full health and cognitive potential, free from the preventable consequences of iodine deficiency.

Funding

The EUthyroid2 consortium is funded by the European Union's Horizon Europe Funding (Project: 101095643) and UK Research and Innovation (Reference Number: 10068239).

References

1. Prevention and control of iodine deficiency in the WHO European Region. . World Health Organization. 2024.
2. Ittermann T, Albrecht D, Arohonka P, Bilek R, de Castro JJ, Dahl L, et al. Standardized Map of Iodine Status in Europe. Thyroid. 2020;30(9):1346-54.
3. The Krakow Declaration on Iodine: Tasks and Responsibilities for Prevention Programs Targeting Iodine Deficiency Disorders. Eur Thyroid J. 2018;7(4):201-4.
4. 28/05/2019 Bna. Bekendtgørelse om tilsætning af jod til husholdningssalt og salt i brød og almindeligt bagværk m.v. Ministeriet for Fødevarer, Landbrug og Fiskeri. .
5. Abel MH, G; Lamglait-Solberg, A; Dalane JO. Innføring av jodberikningsprogram i Norge. Norsk tidsskrift for ernæring 2025;23:98-104.
6. Johnsen M, Skeie G, Braaten T, Abel MH, Huber S, Kjellevold M, et al. Inadequate iodine status among women of childbearing age in Northern Norway: a cross-sectional study. Food Nutr Res. 2025;69.
7. Groufh-Jacobsen S, Hess SY, Aakre I, Folven Gjengedal EL, Blandhoel Pettersen K, Henjum S. Vegans, Vegetarians and Pescatarians Are at Risk of Iodine Deficiency in Norway. Nutrients. 2020;12(11).
8. Prevention and control of iodine deficiency in the WHO European Region: adapting to changes in diet and lifestyle. World Health Organization. 2024.
9. Mollehave LT, Eliasen MH, Strele I, Linneberg A, Moreno-Reyes R, Ivanova LB, et al. Register-based information on thyroid diseases in Europe: lessons and results from the EUthyroid collaboration. Endocr Connect. 2022;11(3).
10. Collet TH, Gussekloo J, Bauer DC, den Elzen WP, Cappola AR, Balmer P, et al. Subclinical hyperthyroidism and the risk of coronary heart disease and mortality. Arch Intern Med. 2012;172(10):799-809.
11. Schaffner M, Rochau U, Muhlberger N, Conrads-Frank A, Qerimi Rushaj V, Sroczynski G, et al. The economic impact of prevention, monitoring and treatment strategies for iodine deficiency disorders in Germany. Endocr Connect. 2021;10(1):1-12.
12. Charoenratana C, Leelapat P, Traisrisilp K, Tongsong T. Maternal iodine insufficiency and adverse pregnancy outcomes. Matern Child Nutr. 2016;12(4):680-7.
13. Nazeri P, Mirmiran P, Shiva N, Mehrabi Y, Mojarrad M, Azizi F. Iodine nutrition status in lactating mothers residing in countries with mandatory and voluntary iodine fortification programs: an updated systematic review. Thyroid. 2015;25(6):611-20.
14. Taylor PN, Vaidya B. Iodine supplementation in pregnancy - is it time? Clin Endocrinol (Oxf). 2016;85(1):10-4.
15. Korevaar TIM, Leung AM, Alexander EK, Bliddal S, Boelaert K, Brenta G, et al. American Thyroid Association 2026 Guidelines for Thyroid Disease in Preconception, Pregnancy, and Postpartum. Thyroid. 2026;36(5):481-544.
16. Dineva M, Fishpool H, Rayman MP, Mendis J, Bath SC. Systematic review and meta-analysis of the effects of iodine supplementation on thyroid function and child neurodevelopment in mildly-to-moderately iodine-deficient pregnant women. Am J Clin Nutr. 2020;112(2):389-412.
17. Levie D, Korevaar TIM, Bath SC, Murcia M, Dineva M, Llop S, et al. Association of Maternal Iodine Status With Child IQ: A Meta-Analysis of Individual Participant Data. J Clin Endocrinol Metab. 2019;104(12):5957-67.
18. Abel MH, Ystrom E, Caspersen IH, Meltzer HM, Aase H, Torheim LE, et al. Maternal Iodine Intake and Offspring Attention-Deficit/Hyperactivity Disorder: Results from a Large Prospective Cohort Study. Nutrients. 2017;9(11).
19. McMullan P, Hunter A, McCance D, Woodside JV, Mullan K. Knowledge about iodine requirements during pregnancy and breastfeeding among pregnant women living in Northern Ireland. BMC Nutr. 2019;5:24.

20. Bouga M, Lean MEJ, Combet E. Iodine and Pregnancy-A Qualitative Study Focusing on Dietary Guidance and Information. Nutrients. 2018;10(4).
21. Garnweidner-Holme L, Aakre I, Lilleengen AM, Brantsaeter AL, Henjum S. Knowledge about Iodine in Pregnant and Lactating Women in the Oslo Area, Norway. Nutrients. 2017;9(5).
22. De Leo S, Pearce EN, Braverman LE. Iodine Supplementation in Women During Preconception, Pregnancy, and Lactation: Current Clinical Practice by U.S. Obstetricians and Midwives. Thyroid. 2017;27(3):434-9.
23. Guess K, Malek L, Anderson A, Makrides M, Zhou SJ. Knowledge and practices regarding iodine supplementation: A national survey of healthcare providers. Women Birth. 2017;30(1):e56-e60.
24. Pinheiro C, Xavier Moreira N, Ferreira P, Matta Coelho C, Guimaraes J, Pereira G, et al. Iodine knowledge is associated with iodine status in Portuguese pregnant women: results from the IoMum cohort study. Br J Nutr. 2021;126(9):1331-9.
25. Schaffner M, Rochau U, Stojkov I, Qerimi Rushaj V, Volzke H, Marckmann G, et al. Barriers Against Prevention Programs for Iodine Deficiency Disorders in Europe: A Delphi Study. Thyroid. 2021;31(4):649-57.
26. Nicol K, Nugent AP, Woodside JV, Hart KH, Lynch K, Mangan N, et al. Eating within planetary boundaries - a cross-country analysis of iodine provision from the EAT-Lancet diet. NPJ Sci Food. 2025;9(1):252.
27. Wozniak H, Larpin C, de Mestral C, Guessous I, Reny JL, Stringhini S. Vegetarian, pescatarian and flexitarian diets: sociodemographic determinants and association with cardiovascular risk factors in a Swiss urban population. Br J Nutr. 2020;124(8):844-52.
28. Smyth PPA. Iodine, Seaweed, and the Thyroid. Eur Thyroid J. 2021;10(2):101-8.
29. Aakre I, Solli DD, Markhus MW, Maehre HK, Dahl L, Henjum S, et al. Commercially available kelp and seaweed products - valuable iodine source or risk of excess intake? Food Nutr Res. 2021;65.
30. Unosawa K, Aita T, Hamaguchi S. Hypothyroidism Due to Seaweed Overconsumption. Cureus. 2024;16(2):e55231.
31. Rosi A, Giampieri F, Abdelkarim O, Aly M, Ammar A, Frias-Toral E, et al. Unhealthy Ultra-Processed Food Consumption in Children and Adolescents Living in the Mediterranean Area: The DELICIOUS Project. Int J Public Health. 2025;70:1608318.
32. Schirmacher H, Elshiewy O, Boztug Y. That's not natural! Consumer response to disconfirmed expectations about 'natural' food. Appetite. 2023;180:106270.
33. Iodine intake in Germany on the decline again - tips for a good iodine intake. Bundesinstitut für Risikobewertung. 2020.

Figure 1. Regional distribution of institutions contributing to EUthyroid2

