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IDD Newsletter

World Health Organization European Region

IODINE globalnetwork

Prevention and control of iodine deficiency in the WHO European Region
adapting to changes in diet and lifestyle

IODINE GLOBAL NETWORK is a nongovernmental organization dedicated to sustained optimal iodine nutrition and the elimination of iodine deficiency throughout the world.

A major report by WHO and IGN highlights a persistent, potentially costly, and likely re-emerging problem of iodine deficiency in Europe

Iodine deficiency, especially mild deficiency, is a widespread problem in Europe. And while it can be addressed easily and inexpensively through the consumption of iodized salt, a 1999 World Health Organization (WHO) survey showed Europe lagging behind Africa, Asia and South America, with the lowest salt iodization coverage of all the WHO regions at 28%. In 2018, the EUthyroid Project funded by Horizon Europe noted that due to lack of valid data, they were uncertain about the scale of the problem, but suggested that up to half of all newborns in Europe are at risk of iodine deficiency.

This concern was shared by IGN, as well as WHO's Regional Office for Europe, and Kiwanis International, the civil society organization that was part of successful global efforts to prevent iodine deficiency. Following discussions with WHO and Kiwanis, IGN brought together a team of report authors whose work had already highlighted emerging problems as well as lack of data or progress on already acknowledged issues.

In 2022, Dr. Maria Andersson, Dr. Rodrigo Moreno-Reyes, IGN's Regional Coordinator for Western and Central Europe, Dr. Sarah Bath of the University of Surrey and IGN's Regional Coordinator for Eastern Europe, Dr. Gregory Gerasimov, began work on the report, a journey that took more than two years to complete. Their approach was to create something both comprehensive and unique, combining information sourced not only from scientific publications and public health reports but also animal husbandry science and reporting, and the food industry.

IGN Executive Director Werner Schultink © IGN

The report's findings were first brought to the region's attention at a side event of the 77th World Health Assembly in Geneva on May 29, sponsored by the governments of Switzerland and Germany. The launch was opened by Awilo Ochieng Pernet, of the Swiss Federal Food Safety and Veterinary Office, on behalf of the Government of Switzerland. It was co-chaired by Kremlin Wickramasinghe of WHO's Regional Office for Europe and Werner Schultink, Executive Director, IGN.

The event featured presentations by the report's authors and discussions among key stakeholders, including international organizations like UNICEF and the SUN Movement, and industry associations such as EUsalt. Participants included Filip Delanote (Kiwanis International), Dr. Maria Andersson (IGN), Dr. Rodrigo Moreno Reyes (IGN), Dr. Sarah Bath (University of Surrey), Jonah Goodman (Journalist), Karan Courtney Haag (UNICEF Europe and Central Asia Regional Office), Editha Giese (German Federal Ministry of Food and Agriculture), Irina Zodrow (SUN Movement Secretariat), and Martina Gonzalez from the Global Alliance for Prevention of Spina Bifida.

The event was successful, with lively dialogue between presenters, panelists and stakeholders. Reflecting on the discussions,

Partners and stakeholders attending the event © IGN

IGN Executive Director Werner Schultink commented: *"It is sad and shocking to see all the evidence that iodine deficiency still exists in Europe and that the problem is creeping 'silently' back in a region which invented one of the most effective nutrition and public health interventions more than 100 years ago: adding small amounts of iodine to salt. I am therefore very proud of the collaboration with WHO, and that we were able to launch this report at the sidelines of the World Health Assembly, one of the most significant yearly health meetings. It was also very encouraging to get the support from both Switzerland and Germany, as well as from a wide range of partners including UNICEF, GAIN, SUN, MNF, European Thyroid Federation. I am hopeful that this substantive report will be used to achieve improvement."*

"The side event made us take a step back in time to understand where we come from with the fascinating story on the journey Switzerland went through that Jonah Goodman shared, and to where we stand today in Europe still with remaining iodine deficiency. The excellent report that was pulled together with expertise and energy by those involved showed the big challenges we still face in Europe. The audience was very engaged and interested in the topic. The interest and commitment from WHO, Kiwanis and the Swiss and German governments gave me a feeling of hope that iodine still is on people's radar screen and receives the attention it deserves. Continued dialogue and critical thinking to find solutions together with the mission IGN has to make sure that the story of success doesn't get forgotten but also that we need to remain vigilant and focus on finding sustainable solutions" commented IGN Senior Advisor Arnold Timmer.

Filip Delanote, of Kiwanis International, who supported the publication of the report, spoke about the history of the civil society organization's work over a period spanning more than 30 years, and pledged that their campaign for sustained IDD elimination would continue, mobilizing public support where Kiwanis has members and engaging corporations, foundations and NGOs to join Kiwanis in this important work.

Further discussions emphasized key points such as the importance of addressing changing dietary trends to ensure sustained adequate iodine intake. The economic impact of iodine deficiency, even in its mild forms, on public health and productivity was highlighted as well as the potential of increasing iodine intake through iodization of salt used in food staples. Additionally, the rise in mild iodine deficiency disorders (IDD) in Europe was explored, as well as concerns that similar problems may be hampering progress – or indeed causing it to decline – in countries around the world.

The launch of this report at WHA77 underscored the urgent need for coordinated efforts to combat iodine deficiency in Europe and amplified the call for member states to strengthen and expand large-scale food fortification programs, including salt iodization, to prevent micronutrient deficiencies and related health issues.

The full report can be accessed on iris.who.int/handle/10665/376863. IGN has also distilled key messages from the report which we share below. More information can also be accessed on the IGN website.

Awilo Ochieng Pernet, of the Swiss Federal Food Safety and Veterinary Office, speaking on behalf of the Government of Switzerland, who sponsored the event © IGN

Prevention and control of iodine deficiency in the WHO European Region

Adapting to changes in diet and lifestyle

Produced by the WHO Regional Office for Europe and the Iodine Global Network
Supported by Kiwanis International

Emerging trends in iodine nutrition: Key messages from the report

About the report:

Iodine deficiency, especially mild deficiency, is a widespread problem in the WHO European Region. Since the last WHO report on iodine deficiency in the Region was published 15 years ago, a wealth of new data on iodine status has become available, particularly concerning vulnerable population groups. This report is unique as it combines information sourced not only from scientific publications and public health reports, but also animal husbandry science and reporting, and the food industry.

The problem of iodine deficiency

The human body needs constant, small amounts of iodine in the diet for the synthesis of thyroid hormones that maintain numerous basic physiological functions, including metabolism and brain development. Normal diets in most countries do not contain enough iodine.

Insufficient intake results in iodine deficiency, a problem in rich and poor countries. Beyond the visible sign of goiter, it also increases the frequency of preventable thyroid disorders, such as thyroid nodules, multinodular goiter, and hyperthyroidism, particularly in adults and older people. Untreated hyperthyroidism increases the risk of cardiac arrhythmia, heart failure, osteoporosis, adverse pregnancy outcomes and cognitive impairment in older people.

Severe iodine deficiency during pregnancy can lead to low blood levels of thyroid hormones, increasing the risk of lasting intellectual impairment that reduces a child's IQ.

Adding tiny amounts of iodine to salt for human and animal consumption to address the problem is simple and very inexpensive – a recent German study estimated it at 11 cent per person per year – and has been carried out in most countries around the world for the past three decades.

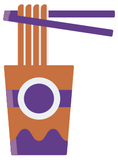
Over time, less attention has been paid to the prevention of iodine deficiency and progress is being eroded in some countries, increasing the risk of endangered brain development of children and re-emergence of thyroid diseases, including goiter.

IGN side-event at the 77th World Health Assembly, Geneva, Switzerland

Salt iodization remains the main strategy to ensure adequate iodine intake in the European Region. Lifestyle choices and dietary trends, including increasing use of processed foods and the switch to plant-based diets and dairy alternatives, are contributing to persistent, and in some countries increased, insufficient iodine intakes.

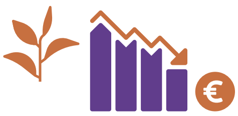
Milk and dairy products are important sources of iodine in many western and central European countries, especially for children. Many animal feeds and supplements are enriched with iodine to improve farm animals' health and milk yields. Yet consumption of dairy products is declining among adolescents and adults, increasing their risk of iodine deficiency.

Iodine status in adults and pregnant women is less than optimal in several countries with voluntary or no salt iodization. Iodine intake and status should be optimized prior to pregnancy. The shift towards plant-based dairy alternatives, particularly among women, who already bear a higher risk of iodine deficiency and thyroid diseases than men, is concerning for their iodine nutrition, especially in countries relying on milk as a source of iodine, as most dairy alternatives do not contain it.



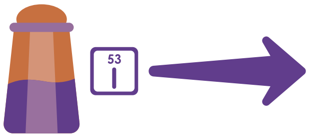
Foods produced or cooked outside the home, such as bread, processed meats, or ready-to-eat meals, are now the **main sources of salt in a Western diet (70–80% of total)**. Yet recent market surveys found just 9% of salt in processed food products in Germany and 34% in Switzerland was iodized. In 24 countries with voluntary or no iodization, **commonly consumed foods are often produced with non-iodized salt.**

Poor knowledge of the consequences of iodine deficiency among the public, health authorities, health professionals and food producers is a **barrier to improving iodine intake**. There is little understanding that advice to reduce salt intake for health reasons is compatible with using iodized salt.



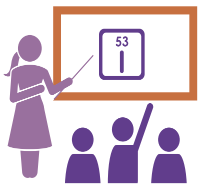
Because of dietary and lifestyle changes, variation in national salt iodization regulations, and lack of understanding of iodine nutrition in the European Region context, **progress toward optimizing iodine intake may be stalling** or even declining in some countries. If adequate iodine intake in the Region is not maintained, iodine deficiency disorders will return, resulting in economic loss.

Mild iodine deficiency exists throughout the European Region, with a major impact on population health and the economy.



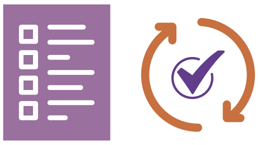
At current iodine levels in salt in the European Region, there is **no risk for iodine excess.**

Salt iodization, implemented in 43 of 53 Member States, plus Kosovo,[1] (n=54) has prevented the most detrimental health consequences of severe iodine deficiency. Iodization is mandatory in 30 of these and voluntary in 13.



Iodine status in school-age children is adequate in 26 of 28 European Region Member States, plus Kosovo, with data on urinary iodine concentration, largely due to salt iodization and dietary iodine from milk and dairy products. Recent studies indicate iodine intakes in some countries with voluntary salt iodization are decreasing.

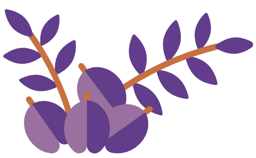
1 All references to Kosovo in this document should be understood to be in the context of the United Nations Security Council resolution 1244 (1999).



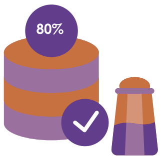
Routine iodine status surveillance using nationally representative population-based studies is lacking in most countries and in many the most recent data is more than 10 years old. Data frequently comes from universities, medical experts, and research centres, often with little support or recognition from health authorities. Only Switzerland and the United Kingdom publicly fund regular population iodine status monitoring. In eastern European and central Asian countries (except Kazakhstan and the Russian Federation) surveys have only been conducted with external support from donor agencies, making future monitoring unsustainable.

Emerging trends:
Ways forward

Because of **the importance of dairy to iodine sufficiency** in the Region, regulations for animal feeds and milk-iodine concentrations should be part of iodine deficiency prevention programmes. The dairy industry needs to be involved in efforts to ensure iodine adequacy in many countries.



As the trend for plant-based diets grows, with the increased popularity and availability of plant-based alternatives to key sources of iodine (milk, dairy, fish), coordinated action is needed to ensure appropriate fortification of alternative milk and dairy products with iodine.



Data shows that in countries where the use of **iodized foodgrade salt in households and processed foods is mandatory**, particularly in domestic products such as bread, bakery goods and processed meats, **population iodine status is generally adequate**. In countries with over 80% use of iodized salt in the bakery industry (Armenia, Belarus, Georgia, Republic of Moldova, others) population iodine intake is adequate.

Food businesses trading across borders in the European Region must comply with salt iodization regulations in each country, increasing complexity in the supply chain, which has led to the use of non-iodized salt. Mutual recognition of different national legislation and acceptance of products following the rules of another country may provide more legal certainty for food business operators and remove barriers to intra-community or international trade.

Salt reduction and salt iodization policies and programmes must be integrated.

More research is needed on the association between iodine status and thyroid disorders, as well as on the cost-effectiveness of salt iodization versus treatment of thyroid disorders.

Alternative methods to provide more regular information on national iodine status are needed and monitoring should include the adult population (particularly women of reproductive age), adolescents and/or pregnant women. **Political commitment, funding allocation and new strategies for population monitoring of iodine status are needed.**

Countries should take advantage of national health and nutrition surveys and surveillance systems, including those for sodium intake, as well as using health facilities (such as maternity centres) to measure urinary iodine concentration.

Read the report on iris.who.int/handle/10665/376863

Thirty-year follow-up observation of the impact of iodine fortification strategy on intellectual development of children

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Abstract

Objective:

To follow up and observe the intellectual development of school children aged 8-10 in Baicheng County, Xinjiang Uygur Autonomous Region, historically a region with prevalence of severe iodine deficiency disorders, before and after effective control of the disease, to evaluate the impact of iodine supplementation on protection of children's intellectual development and provide a theoretical basis for scientific supplements of iodine.

Methods:

The Combined Raven's Test for Rural China (CRT-RC) was used to observe the intellectual development of 660 Uyghur school children aged 8-10 in Baicheng County in 1989, 2002, 2006, 2012 and 2018, respectively. Children's intelligence quotient (IQ) was calculated using CRT-RC's 1987 normal sample of rural children in the same age group. Data on average iodized salt coverage (C-IS) and childhood total goiter rate (TGR) from multiple local surveys and the median urinary iodine (mUIC) of children were collected, combined with the "Criteria for Elimination of Iodine Deficiency Disorders" (GB 16006-2008) and the United Nations International Children's Fund (UNICEF) recommended standards. The status of iodine deficiency during children's growth (IDG) was divided into complete exposure to iodine deficiency, no exposure, and semi exposure. The Flynn effect (FE) gain was calculated using norm samples of children aged 8-10 in 1987, 1996 and 2006 of CRT-RC, and the differences in children's intellectual development after FE correction before and after IDG reached the standard were compared.

Results:

The IQ of children were (81.67±14.13), (83.26±14.05), (89.68±13.58), (98.50±14.33) and (103.23±15.25) points in Baicheng County in 1989, 2002, 2006, 2012 and 2018, respectively. The difference between different years was statistically significant ($F = 58.357$, $P < 0.01$). The three indicators of C-IS, TGR, and mUIC did not meet the standards during the IDG evaluation period in the 1989, 2002, and 2006 groups, which were during complete exposure to iodine deficiency. In the 2012 group, which was semi-exposed, only mUIC met the standard. In the 2018 group, three indicators all met the standard, which was no exposure. The FE gains from 1987 compared to 1996, and 1996 compared to 2006 were 0.96 points/year and 0.74 points/year, respectively; after FE correction, the actual gains of IQ in 2002 and 2006 compared with 1989, and 2012 and 2018 compared with 2006 were - 9.57, - 6.11, 4.38, and 4.67 points, respectively.

Conclusions:

In iodine deficient areas, intermittent iodine supplementation (1989-2009) for children exposed to iodine deficiency during growth did not effectively protect children's intellectual development. Continuous and effective iodine supplementation (2010-2018) with iodized salt as the core and covering children's growth period has obvious positive effects on protection of children's normal intellectual development. In the future, we will continue to observe the influence of IDG full-cycle suitable iodine nutrition on children's intellectual development.

Keywords:

Iodine; Deficiency diseases; Child; Intellectual development Fund program: National Nature Science Foundation of China (81573103)
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Introduction

The most negative effect of iodine deficiency is harmful impact on brain development, resulting in abnormal neuronal migration patterns and irreversible damage to the cerebral cortex, hippocampus, and cerebellum caused by insufficient synthesis of thyroid hormone (TH). TH has essential effects on brain neurodevelopment during gestation, especially the first two years of life, such as neuronal migration and differentiation, myelin sheath formation, axon growth, transcriptional regulation, synaptic plasticity, and neurotransmitter release.[1] At the same time, myelin sheath formation and axonal growth are important for the development of cognitive functions. These processes occur rapidly in the first 20 years of life, remain in a constant state of development during adulthood, peak around 40 years of age, and begin to degenerate after that.[2] TH plays a protective role in demyelinating diseases as well as in myelin repair.[3] Severe iodine deficiency during pregnancy leads to the development of endemic cretinism. Mild to moderate iodine deficiency during pregnancy also causes varying degrees of neurocognitive developmental delay, manifested as significant mental retardation, with an absolute value of about 12.45 points in lost IQ of children with iodine deficiency.[4-5] Iodized salt is important to prevent iodine-deficiency and protect brain development and is safe, effective, convenient, and economical. Effective iodine supplementation, especially salt iodization, can save 8.7 points of IQ in children.[5] Therefore, effective iodine supplementation **based on salt iodization throughout the life cycle**, especially in the early stages of fetal development, is essential.

Baicheng County was once an endemic area of historical severe iodine deficiency disease. Iodine deficiency disorders were widespread, with prevalence of endemic cretinism reaching 9.77% in some townships. Early interventions to prevent and control iodine deficiency included supplying iodized salt, injection of iodized oil, iodization of drinking and irrigation water, and oral iodized oil capsules.[7-8] During that time, children of different ages intermittently faced varying degrees of iodine deficiency, and experienced delayed development of their intellectual capacity.

In 2006, after the discovery of younger children with endemic cretinism after 11 years of Universal Salt Iodization (USI),[9] the then Ministry of Health pressed the "Emergency Iodine Replacement Measures to be Taken in the Areas at High Risk of IDD" (Trial Implementation Opinions) (File: Health Office of Disease Control and Development [2008] No. 71) to implement a prevention and control strategy, of which USI was the core, with the addition of oral iodized oil capsules for key populations. The local government provided iodized salt free to poorer populations. Since 2010, Coverage of Iodized Salt has continuously met the National Standard for IDD Elimination (95%), and no more children with cretinism are found by local monitoring surveys.[10] The strategy based on adequate iodized salt assists Baicheng to realize sustained elimination of iodine deficiency disorders.[10]

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Longitudinal observation of children's intellectual development over time is one of the most important methods to describe the effectiveness of iodine supplementation and prevention. However, this method must consider the effects of educational, economic, and social-environmental changes. The Flynn effect (FE) explains how intelligence is affected over time in an intergenerational population. FE is influenced by the rapid development of formal education, training in reasoning and abstract thinking, and environmental factors[11] and is related to the psychological tests used. The FE for the IQ points of the general IQ test increases by 3.1 points per decade, and the nonverbal test by 7 points.[12] After considering an FE gain of approximately 3 points per decade, one study estimated that salt iodization in the United States raised children's IQ in iodine-deficient areas by approximately 12 points.[13] In the present study, we used the Combined Raven's Test for Rural China (CRT-RC) five times during the past 30 years to assess the changes in the IQ development of schoolchildren aged 8-10 years in Baicheng. We analyzed FE gain using the normative data among the same age group in the rural areas in the CRT-RC data in 1987, 1996, and 2006. We also used the normative data of the rural population of the same age group in CRT-RC in 1987, 1996, and 2006 to analyze the FE gain and objectively assess the effect of the iodine supplementation strategy.

1. Objectives and methods

1.1 Subjects:

In 1989, 2002, 2006, 2012, and 2018, in Baicheng, a historical IDD area, Uyghur schoolchildren aged 8-10 years old were selected as survey respondents to observe changes in intellectual development using a clustered randomly sampling method. A total of 660 children were investigated. The male-to-female ratio was 1.17:1.00 (356:304). The study was approved by the Ethics Committee of Tianjin Medical University, and the surveyed group signed an informed consent form.

1.2 Intelligence assessment:

There were five investigation groups: 1989, 2002, 2006, 2012, and 2018. The unified CRT atlas was used, and the group test method was used for the assessment under the guidance of the investigators in the Uyghur language; all raw scores were based on the 1987 norm of CRT-RC to calculate the IQ value. When the IQ value was <54 points, they were all recorded as 54 points.

1.3 Iodine nutrition assessment:

The level of iodine nutrition of children was determined by the status of iodine deficiency during the period of their growth (IDG). IDG years were reviewed from the quiz year forward to 11 years IDG, because the age of the investigation subjects were all 8-10 years old, one year was added to the preparation and pregnancy period. The severity of iodine deficiency was based on three indicators, including household C-IS, average of total goiter rate (TGR) and median urinary iodine in children (mUIC) from multiple local monitoring data during the IDG period. IDG was assessed from these indicators, which described prevention and treatment, condition, and iodine nutrition respectively. According to the National Standard for the Elimination of Iodine Deficiency Diseases (GB 16006-2008), prevention and treatment indicators were judged based on C-IS ≥95%, and condition indicators were judged based on children aged 8-10 years old GR <5%; the iodine nutrition standard for the general population (including children) was adopted as the mUIC of 100~299μg/L recommended by UNICEF in 2018.[14-15] Three indicators of IDG did not meet the standard for complete exposure to iodine deficiency; all of them met the standard for non-exposure, and at least 1 met the standard for semi-exposure.

1.4 Calculation and correction of FE gain:

The raw data for children aged 8-10 from national normative data of CRT-RC version of 1987, 1996, and 2006 were transferred to IQ points according to the 1987 norm. FE gain was calculated according to the chronological difference between twice normative data (1987 and 1996, 1996 and 2006). The formula is: corrected IQ value = IQ points of starting year - IQ points of current year - FE gain.

1.5 Statistics:

SPSS24.0 software was used for statistics and analysis. If found to be normal distribution by the homogeneity of variance test with F value >0.05, quantitative data were described by x ±S. One-way ANOVA were used to analyze the difference of multiple groups, and further two-by-two comparisons were performed by LSD-t test. Quantitative data which did not conform to normal distribution were described by median (quartile). Qualitative data were described by rate (%). The value of p<0.05 was taken as the difference was statistically significant.

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2. Results

2.1 Intelligence assessment:

Comparison of IQ values of children aged 8-10 in the 1989, 2002, 2006, 2012 and 2018 groups showed statistically significant differences (F = 58.357, P<0.01). The IQ values of children in the 2006, 2012 and 2018 groups were significantly higher than those of the 1989 and 2002 groups, and the 2012, 2018 groups were significantly higher than the 2006 group (all P<0.01). (*Table 1*).

2.2 Results of iodine nutrition survey during the growth period of children:

For the groups of 1989, 2002, and 2006, the indicators of C-IS, GR, and mUIC during the assessment period of IDG did not reach the National Standard of IDD control and were judged to be full exposure to iodine deficiency. For the 2012 group, only mUIC reached the Standard and was judged to be semi exposure. For the 2018 group, all indicators reached the Standard and was judged to be control. (*Table 1*).

2.3 Calculation and correction of FE gain:

IQ values of normative samples of children aged 8-10 years from the data of CRT-RC norm of 1987, 1996, and 2006 were 100.00±15.48, 108.65±15.17 and 116.07±15.20 points respectively, with statistically significant differences in the comparison between the groups (F=164.93, p<0.01). The FE gain in IQ values was 0.96 points/year and 0.74 points/year for the 1987 vs. 1996 group and the 1996 vs. 2006 group, respectively.

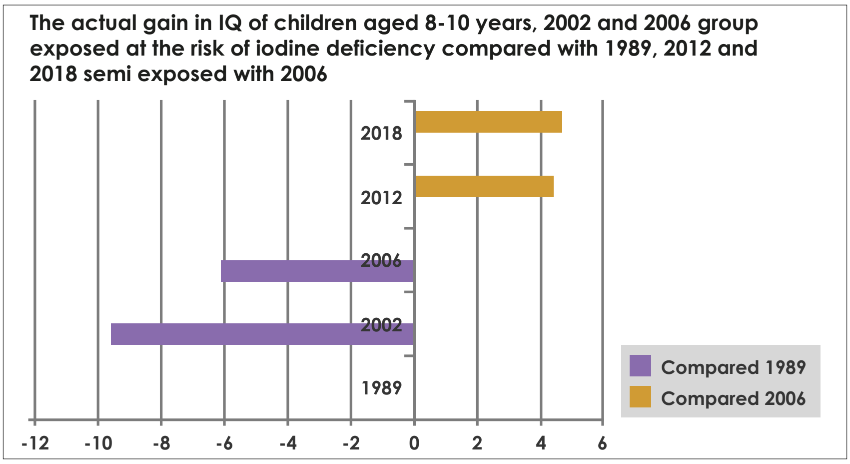
The correction of IQ value before 1996 was calculated with the FE gain of 0.96 points/year; after 1996, it was calculated with 0.74 points/year. The interval from 1989-2009 was the period of intermittent iodine supplementation, and the results of the IQ assessment were all based on the results of 1989 as the starting value. 2010-2018 was the period of sustainable and effective iodine supplementation, and the results of IQ assessment were based on the results of 2006 as the starting point. After correction of FE gain, the actual gain in IQ of children aged 8-10 years in 2002, 2006, 2012, and 2018 were -9.57, -6.11, 4.38, and 4.67 points, respectively.

Table 1: Intelligence and iodine nutritional assessment results of children aged 8-10 years in Baicheng, Xinjiang Uygur Autonomous Region in different years[26-29]

Year	N	IQ (x ± s)	Number of low intelligence (percentage, %)[a]	IDG Evaluation Timeframe	C-IS(%) $M(P_{25}\sim P_{75})$	TGR(%) $M(P_{25}\sim P_{75})$	UIC[µg/L, $M(P_{25}\sim P_{75})$
1989	72	81.67 ± 14.13	16 (22.22)	1978 – 1989	5.00[f]	29.14 (23.67~33.9)	-[g]
2002	94	83.26 ± 14.05	13 (13.83)	1991– 2002	44.8 (36.15~77.2)	32.06 (25.64~50.00)	78.05 (70.48~117.30)
2006	167	89.68 ± 13.58[bc]	3 (7.78)	1995 – 2006	60.00 (57.12~80.73)	26.60 (21.75~32.29)	90.10 (65.65~136.97)
2012	60	98.50 ± 4.33[bcd]	1 (1.67)	2002 – 2013	88.50 (61.00~96.53)	15.40 (2.53~28.08)	142.71 (72.35~211.82)
2018	267	103.23 ± 5.25[bcd]	6 (2.25)	2007 – 2018	97.30 (88.80~98.63)	1.67 (1.59~6.41)	208.59 (176.77~232.05)

Note: IQ: intelligence quotient;
IDG: status of iodine deficiency during children's growth;
C-IS: coverage of iodized salt;
TGR: goiter rate;
M is the median;
P25 and P75 are the 25th and 75th percentiles, respectively;
a: Low intelligence is defined as an IQ value of <69 points;
b: P<0.01 compared with the 1989 group;
c: P<0.01 compared with the 2002 group;
d: P<0.01 compared with the 2006 group;
e: There were emergency iodine supplementation measures in all 5 assessment time periods;
f: Only data were reported at one time during this assessment time period;
-: means no data available.

Figure 1: IQ improved and exposed at the risk of iodine deficiency



3. Discussion

Iodine is essential for the normal development of the brain in children, especially during brain plasticity, which is during gestation and for two years after birth.[4] The development of myelination is very closely related to intelligence, and it is due to myelination that children's performance in all areas improves, as demonstrated by animal experiments.[30] The process of myelination continues into adulthood, and also depends on the action of TH. Therefore, iodine intake is important during pregnancy and continuously during the child's entire growth period.

Baicheng is rich in rock salt (soil salt) resources, which are easily accessible and inexpensive. This, together with a need for greater awareness of the problem of iodine deficiency among its residents, has made it severely challenging to popularize iodized salt. Since the 1960s, Baicheng has been engaged in prevention and control of IDD, and large-scale surveys and iodine supplementation were carried out in 1972, 1978, 1983, 1990, and 1993, respectively, with the main measures including injection or oral iodized oil. Since then, measures have been taken to iodize drinking and irrigation water. By 2000, the local C-IS was 59%. These measures helped to prevent and control iodine deficiency during the period when the C-IS was difficult to increase. However, the effects fluctuated, as reflected in the fact that the IDGs were very unstable, and new cases of cretinism in children with cretinism were found.[9] Our research also showed that the IDG indicators, C-IS, TGR and mUIC of children in the 1989, 2002, and 2006 groups, did not meet the standards defined. However, although the absolute value of the IQ among children aged 8-10 years increased from 81.76 points in 1989 to 89.68 points in 2006, the IQ's value did not increase after correction by FE.

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After gradual implementation of the national policy in 2008, mUIC reached more than 100 μg/L, C-IS was more than 95% since 2010, and TGR was less than 5%. For children surveyed in 2012, the three indicators of IDG gradually improved from 2008 to the standard for IDD control in 2010. However, because the children were exposed to iodine deficiency for half of their growth period, after correction for FE gain, IQ values of children in the 2012 cohort were higher than those of children in the 2006 cohort by 4.38-points. Although children in the 2018 cohort may have received emergency iodine supplementation during pregnancy, they were still exposed to iodine-deficient environments for the first two years of life. Moreover, this period is a critical period for cognitive development, and there was a 4.67-point increase in IQ compared with the 2006 cohort, corrected for FE gain. This finding was lower than that of similar studies in the United States, mainly because the critical period of brain development was still affected by iodine deficiency, suggesting that it is necessary to continue to follow up and observe the study.

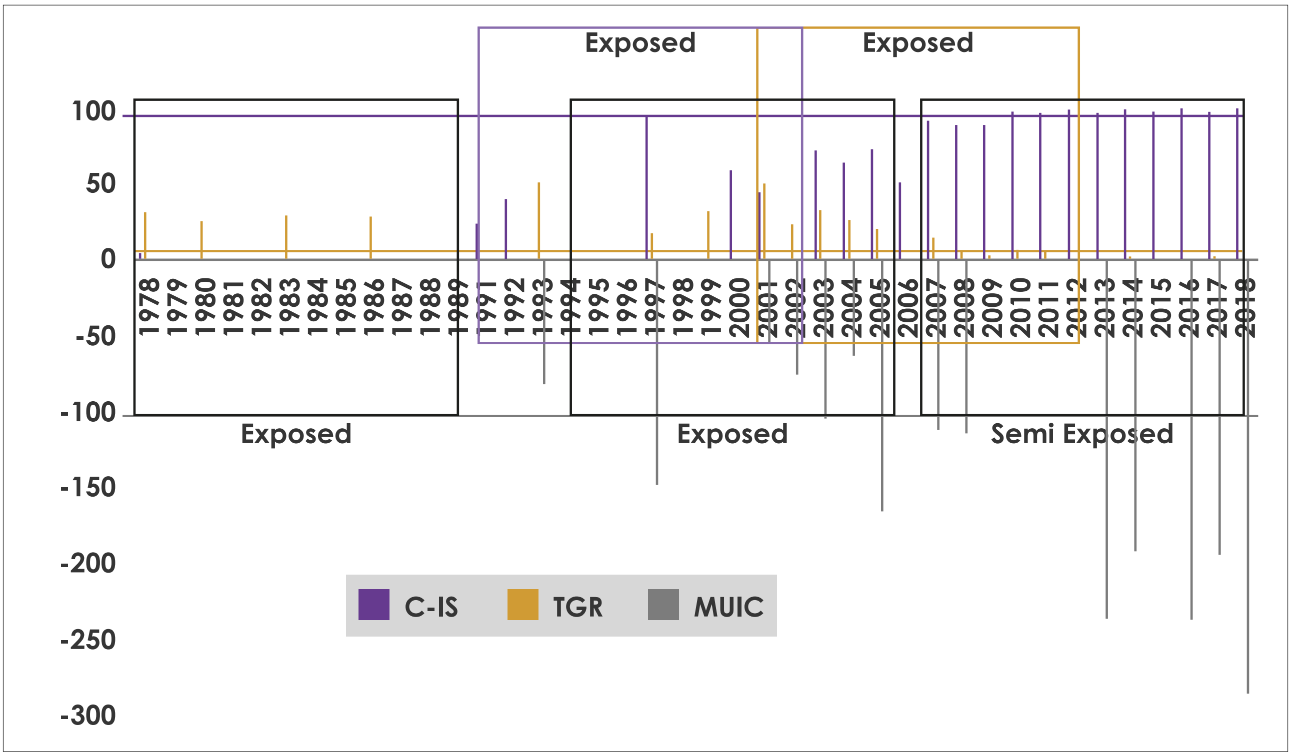
Factors affecting children's intellectual development include education, socioeconomics, and nutritional status. The current view is that FE arises mainly due to environmental factors, including formal education patterns, cultural and scientific enhancement, pre- and postnatal nutrition, childlessness, and increased environmental complexity, which improve people's ability to engage in complex thinking and problem solving. The CRT is a culturally fair (culture-fair test) and nonverbal test that measures fluid intelligence, biased toward testing problem-solving skills.[11] General tests are more dependent on what is learned, and FE gain is lower than that of CRT-type tests, 0.31 points/year.[12] Flynn's[31] analysis of 14 national IQ tests showed an FE gain of 0.588 (0.181 ~ 1.250) when CRT was used. It has been proven that FE does continue to grow, but has a pattern of fast and then slow growth, and when the environment is suitable, will quickly reach the average curve and then will plateau and not grow endlessly.[32]

Therefore, the effectiveness of iodine supplementation still needs to be examined despite the 21.56-point increase in the absolute value of children's IQ in 2018 compared to 1989. Before 2010, children's IDG indicators were not fully met, and prevention and treatment measures were intermittent. In 2006, there was an 8.01-point increase in the absolute value of children's IQ compared with that in 1989, but the actual change was negative after corrected by the FE gain. After realization of sustained and effective iodine supplementation in 2010, IQ values were all positive after corrected by the FE gain, compared with the results in 2006.

This study is still limited by some factors. The samples in the CRT-RC norm are from Han Chinese population, which may have some influence on the magnitude of FE gained due to different cultures and thinking. The collection of IDG ratings was also limited to the status of iodine supplementation during the growth period of the children, which may have relied too much on the results of the data and did not clarify whether emergency iodine supplementation was received during pregnancy or not, and also on the individual's iodine nutritional. Sample sizes in some years were not large enough. At the same time, it was not observed that the brain development of children protected by adequate iodine nutrition during the whole growth period of IDG, and it is still valuable to continue to observe the intellectual development of local children.

In summary, continuous effective iodine supplementation, which can be achieved only through salt iodization may benefit children's intellectual development more positively than intermittent iodine supplementation strategies during their growth.

Figure 2: IDG



Notes

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Sentinel site assessment of household coverage of adequately iodized salt in Armenia using different complementary sources of data

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Keywords and acronyms:

universal salt iodization (USI), monitoring, household coverage, adequately iodized salt, iodized salt standard, iodine deficiency disorders (IDD), FORTIMAS methodology.

Introduction

Iodization of edible salt is globally accepted as the primary intervention to ensure adequate iodine status among populations.[1, 2, 3, 4, 5, 7] It is currently estimated that 124 countries require iodization of at least some form of edible salt,[2] especially household salt. Since 1993, the number of countries considered iodine deficient has been reduced from 133 to 23.[6]

Over the last two decades, there has been remarkable progress towards the elimination of iodine deficiency disorders (IDD) and sustained optimum iodine nutrition in Armenia, largely attributed to the voluntary iodization of salt by Avan Salt Plant (ASP) in 1995, followed by mandatory implementation of the national universal salt iodization (USI) strategy since 2004.[8-12] The effectiveness of mandatory iodization of all edible salt in the country was first assessed based on a national survey on iodine nutrition and salt iodization in 2005. That survey showed that about 97% of households in Armenia used adequately iodized salt (containing ≥15 mg/kg iodine), and the national median urinary iodine concentration (mUIC) among 8-10 years old children (313 µg/L) was slightly above the WHO-recommended upper limit.[8,9] Therefore, the national regulatory standard was modified to reduce iodine content in salt from 50 ± 10 mg/kg to 40 ± 15 mg/kg at production, border entry points, and market level. Then, the attainment of the goal of elimination of iodine deficiency in Armenia was acknowledged by the Network for Sustained Elimination of Iodine Deficiency in 2006.[7]

The sustained widespread use of iodized salt was documented by the 2015 Armenia Demographic and Health Survey (DHS) which found that >99% of households in the country used salt containing ≥5 mg/kg iodine.[13] A national survey conducted in 2016-17 showed that iodine concentration in ~93% of household salt samples was within the national standard (mean iodine content of 35.5 mg/kg), and mUIC among school-age children was 243 µg/L, also well within the recommended range.[10,14]

Avan Salt Plant, the country's sole industrial-scale salt producer and a strong proponent of USI in Armenia, has continued supplying iodized salt for domestic consumption since the national iodization law went into effect. Edible iodized salt is also imported, mostly from Iran.

Avan Salt Plant
Credit: Amos Chapple

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Based on provisions of the national "Law on Food Safety" (2006), market level monitoring of the quality of iodized salt, which was previously carried out by the (former) State Food Safety Service (SFSS) of the Ministry of Agriculture from 2009 until 2019, has since been continued by the Food Safety Inspection Body (FSIB).[1]

From a public health perspective, WHO recommends that national surveys of household coverage of iodized salt and population iodine status be carried out every 3-5 years. However, the high cost of such surveys is a significant barrier to their regular implementation. Recent landscape assessments in 63 countries in Africa, South Asia, Eastern Europe and Central Asia, found that only 49% of the countries had data on household coverage of iodized salt that was less than 5 years old. Only 22% of the countries had data less than 5 years old mUIC[2] among their populations. Population mUIC data were more than 10 years old in 51% of the countries[15]

Experience has shown that it is unrealistic to expect ongoing external (or internal) funding every few years for costly, statistically representative national surveys of iodized salt coverage and/or population iodine status. To address this, IGN has supported the adaptation of the FORTIMAS[3] methodology as a much less costly program monitoring and surveillance approach that countries could implement to track the status of their salt iodization programs, without much external funding support

The FORTIMAS approach includes secondary analysis of data on production, imports and geographic distribution of industrially vs. non-industrially iodized salt. Such data may be provided by domestic producers and importers and/or available through relevant government authorities, such as the Food Control Agency, Ministry of Industry of Industry, Ministry of Economy, etc. That information is then triangulated with findings of primary data on household coverage of **adequately** iodized salt (containing ≥15 mg/kg iodine)[1] and iodine status among 1st trimester pregnant women, collected using **sentinel site**[4] and purposive (non-probabilistic) data collection methods. To assess the feasibility and utility of that approach in Armenia, IGN supported its "pilot" implementation in the country in 2023-24. Trials of the approach have also been recently supported by IGN in Sri Lanka and Tanzania. This article presents findings of secondary data on "expected" national population coverage of (any) iodized salt, and primary data on the rate of household coverage of **adequately** iodized salt in Armenia in 2023.

Material and methods

Design of the non-probabilistic data collection approach to assess the coverage of iodized salt and iodine status of 1st trimester pregnant women in Armenia first included the calculation of expected annual rate of population coverage of iodized salt in the country based on:

1. Total annual quantity of iodized salt available in the country (for use by households, commercial food catering businesses (e.g., public restaurants and canteens), and processed food production facilities (e.g., bakeries, snack food producers etc.).
2. Estimated average per capita **salt** consumption of 12.5 g/day.[5]
3. Annual national population size.[6]

As illustrated in *Figure 1*, data provided by the Avan Salt Plant and the Ministry of Economy show that annual trends in the overall quantity of domestically produced and imported iodized salt has been stable in Armenia during the past decade, and decreases in domestic production have been offset by increased imports. Thus, the annual rate of expected population coverage of iodized salt has remained stable over the same time period (*Figure 2*).

1 In July 2019, the Ministry of Agriculture was abolished; the Ministry of Economic Development and Investments was transformed into the Ministry of Economy with the agricultural sector in its structure. In addition, the SFSS was transformed into the **Food Safety Inspection Body (FSIB)** under the Government of the Republic of Armenia.

2 The main indicator of iodine status of a population[5]

3 www.smarterfutures.net/fortimas; accessed 6 March 2024.

4 "Sentinel site" refers to a community (a large town or a district) within a region, purposively selected, based on its "expected" rate of **population coverage** of (adequately) iodized salt, where household salt samples and urine samples of (1st trimester) pregnant women could be feasibly collected for testing to "confirm" adequate (or inadequate) rate of household **coverage** of **adequately** iodized salt and **median urinary iodine** concentration among pregnant women.

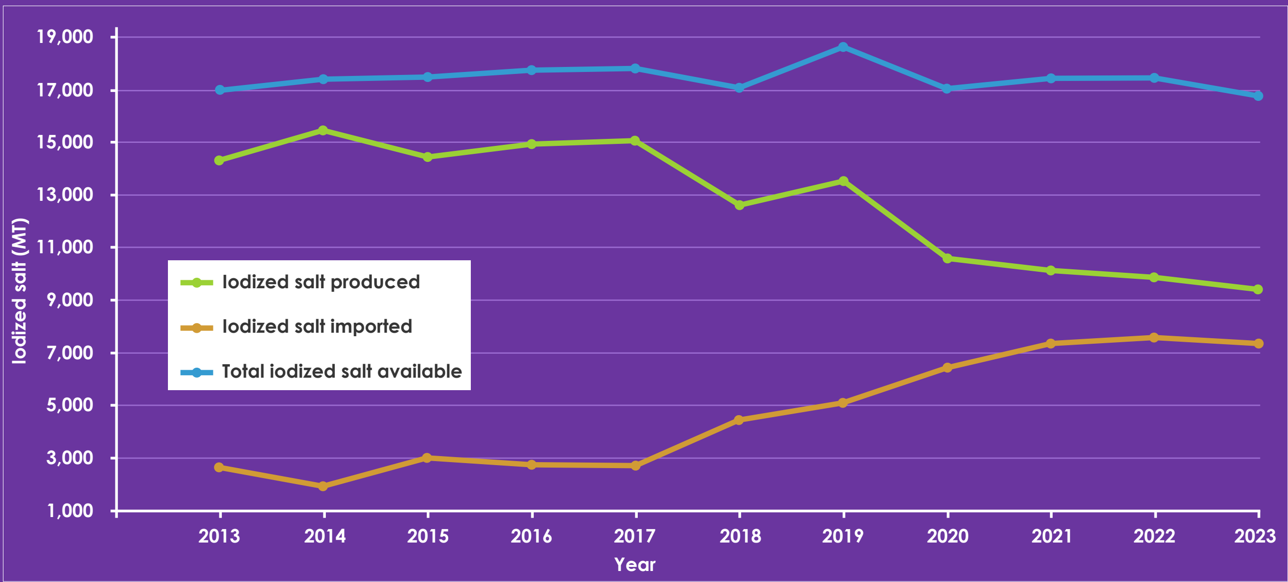
5 Global Fortification Data Exchange (GFDx) – www.fortificationdata.org/country-fortification-dashboard/?alpha3_code=ARM&lang=en; accessed 10 March 2024.

6 Source: www.macrotrends.net/global-metrics/countries/ARM/armenia/population; accessed 5 March 2024.

It should be noted that the consistently higher than 100% "expected" population coverage of iodized salt in Armenia over time may in part be due to an actual higher per capita intake of salt than 12.5 g/day, some inaccuracies in the annual quantities of iodized salt production and imports, and/or unknown amounts of the iodized salt that is not consumed during a given year.

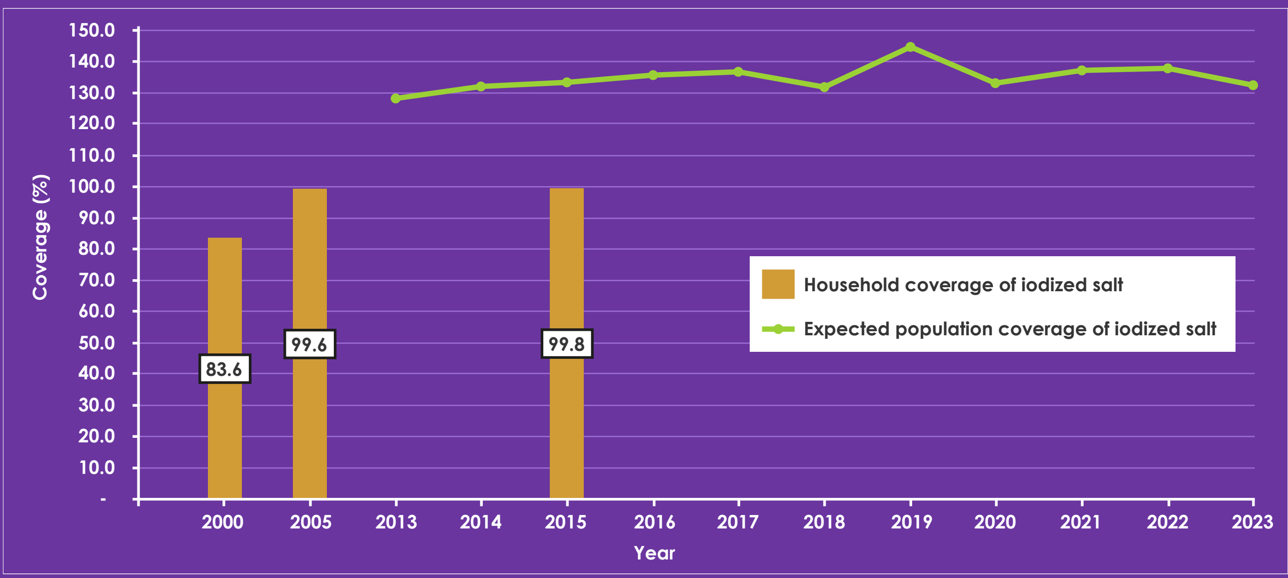
Household coverage of iodized salt, as a proxy measure of the population's overall access to, and intake of, dietary iodized salt in Armenia, has been assessed through nationally representative surveys, including three rounds of DHS, the last two of which were conducted after iodization was mandated in 2004 (*Figure 2*). The 2015 DHS found that 99 to 100 percent of households in each region (or Marz) used (any) iodized salt.[14]

Figure 1: Trends in annual quantities of domestic vs. imported vs. total iodized salt available in Armenia from 2013-2023.*



*Based on reported data from Avan Salt Plant and Armenia Ministry of Economy, on quantities of domestically produced and imported iodized salt, respectively.

Figure 2: Trends in annual rates of **expected population coverage*** *vs.* **assessed household coverage**** *of iodized salt in Armenia: 2000 through 2023.*



*Based on data from Avan Salt Plan and Armenia Ministry of Economy on annual quantities of production and imports of iodized salt: 2013-2023.

**Based on findings of nationally representative Demographic and Health Surveys implemented in Armenia in 2000, 2005 and 2015.

Figure 3: Marzes (Regions) in Armenia (in grey shade) where sentinel site data on household coverage of iodized salt were collected through elementary schools as "data collection points."

Armenia FORTIMAS Sentinel Sites		
Code	**Marz**	**Sentinel Sites**
1	Yerevan	Nork district
2	Yerevan	Erebuni district
3	Yerevan	Malatia district
4	0	Echmiadzin city
5	Ararat	Ararat city
6	Kotayk	Abovyan city
7	Shirak	Gyumri city

Based on all the above information, and the feasibility to quickly recruit the required number of 1st trimester pregnant women through their largest antenatal care facilities, Nork, Erebuni, and Malatia districts in Yerevan (capital) region, and cities of Echmiadzin, Ararat, Abovyan, Gyumri in Armavir, Ararat, Kotayk and Shirak regions respectively, were purposively selected as sentinel sites for primary data collection (*Figure 3*). A public elementary school (located within the catchment area of the selected antenatal care facility) was selected in each of those communities (i.e. a total of 7 schools) for data collection on household use of iodized salt.

To estimate overall household coverage of iodized salt in the country in 2023, a total of 210 students, 30 sixth graders from each of the selected elementary schools, were recruited to bring 30 – 40 gm of table/kitchen salt from their homes (household salt). Each student was provided a small (5 x 7 cm) zip-lock plastic bag labelled with the predesignated identification codes of the selected school (i.e., data collection point) and the student who brought the sample. Upon collection at the school, the relevant information was recorded in a formal reporting form, which together with the samples were transported to the ASP laboratory for testing of iodine content. That laboratory routinely determines iodine levels in food-grade salt, using a validated quantitative assessment tool - iodometric titration (GOST R 51575). In addition, a copy of the household salt collection form was kept at the Armenia National Institute of Health (NIH) in Yerevan.

Results and Discussion

Each of the 210 household salt samples were tested for iodine content within 8 to 14 days of collection; about 41% in less than 10 days, the rest were tested within 10-14 days. Nearly 6% of the salt samples were non-iodized, and of those, 11 were from households in Shirak, while one was from a household in Yerevan (data not shown) (*Table 1*). Although the 30 household salt samples collected in Shirak were not enough to adequately estimate household coverage in that region, the finding that 11 of 30 salt samples collected in its largest district were not iodized, is nevertheless of concern because only 1 of the 199 salt samples from the other 6 sentinel sites was found to contain no iodine. Further assessment of iodized salt marketed in Shirak may be warranted to better understand the reason for the unusually high rate of non-iodized salt that was found.

Table 1: Ranges of iodine level in household salt in Armenia in 2023.

Salt iodine level (mg/kg)	Salt samples (N)	Prevalence (%)
0.0	12	5.7
10 – 14.9	4	2.0
≥15	194	92.4
Total samples tested	210	100.0

In contrast, only 2% of all the household salt samples from the 7 sentinel sites contained <15 mg/kg iodine, while over 92% were found to be adequately iodized (containing ≥15 mg/kg iodine based on global public health guidance) (*Table 1*). Furthermore, among the 198 salt samples found to be iodized, a mean iodine concentration of 32.8 mg/kg was within the national regulatory standard of 40 ± 15 mg/kg (data not shown).

Using the categories of edible salt falling within vs. outside the national iodization standard, as used by the FSIB for regulatory monitoring of food-grade salt in the commercial sector in Armenia, nearly 23% of the household salt samples from the sentinel sites fell "outside standard" (*Table 2*). Furthermore, among those salt samples, only 1% contained >55 mg/kg iodine, while about 17% contained <25 mg/kg iodine (data not shown). In comparison, a recent analysis of data on iodine content of salt samples collected from various market sources in Armenia and tested by the FSIB in 2023, found that the iodine content of about 31% of those salt samples fell "outside standard."[16]

In summary, given the findings of complementary information that indicate consistently high expected population coverage of iodized salt, and its assessed household coverage via statistically representative surveys, during the past decade (*Figures 1* and *2*), our finding of about 92% household coverage of adequately iodized salt (containing ≥15 mg/kg iodine) in Armenia in 2023 appears to be quite reliable. The is particularly important because the cost of this pilot implementation of the FORTIMAS approach as an initial round of annual iodized salt program monitoring and surveillance in Armenia was only a fraction of that of a typical nationally representative survey of household iodized salt coverage and population iodine status. **As the Armenia NIH has now developed the overall framework of an "Armenia FORTIMAS System" including the collection of sentinel site data on household coverage of iodized salt and mUIC among 1st trimester pregnant women, we estimate that they could annually carry out the overall data collection and analysis approach summarized above, over the next ten years at about the same current cost as one "typical" nationally representative household iodized coverage and population iodine status survey.**

Table 2: The proportion of household salt samples with iodine content outside standard. Armenia, 2023.*

Salt iodine level	Salt samples (N)	Prevalence (%)
Outside standard	48	22.9
Within standard	162	77.1
Total samples tested	210	100.0

*Defined as salt with 40 ± 15 mg/kg iodine content.

Implementing the methodology during a site visit in Armenia © IGN

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Utilizing regulatory inspection data toward monitoring and surveillance of a national salt iodization program: Case study from Armenia

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Keywords and acronyms:

salt; iodine, standard, universal salt iodization (USI), regulatory monitoring, processed foods (PFs)

Introduction

There is growing international recognition that with changing patterns of food consumption around the world, up to 70-80% of dietary salt now comes from commercially processed foods. Such foods that contain iodized salt are the main source of dietary iodine among consumers.[2-4, 6, 7, 9, 10, 13, 14, 16, 17] In Armenia, a recent comparative study showed that consumption of commercially processed foods accounts for 61.3% of the average per capita salt intake of 9.8g/day among the population.[1] There is therefore a common understanding among public health policymakers in, that the use of iodized salt in commercially processed foods is essential in sustaining adequate iodine nutrition among the Armenian population. Continued vigilance is needed to assure continued use of adequately iodized salt in the production of relevant commercially processed foods to achieve and sustain optimal iodine status among all population groups.[2]

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Universal salt iodization (USI) in Armenia is mandated through the Republic of Armenia (RA) government decree No 353-N issued on 12 February 2004, which prohibits the production and imports of non-iodized edible salt and its use in commercially processed foods. A year later, a national survey showed that 97% of household salt samples contained more than 15 mg iodine/kg of salt, and the median urinary iodine concentration (mUIC) among children 8-10 years old was at the WHO-recommended upper limit. Therefore, the national regulation was modified, calling for a reduction in iodine content in salt from 50 ± 10 mg/kg to 40 ± 15 mg/kg.[12]

The success in attaining the goal of elimination of iodine deficiency in Armenia was acknowledged in 2006 by the Network for Sustained Elimination of Iodine Deficiency.[16] A follow-up national iodine status survey, conducted in 2016-2017, confirmed that the country's population has adequate iodine nutrition and is protected against such deficiency.[8]

Until 2017, risk-based audits by the national Food Safety Inspection Body (FSIB) did not include inspections of iodine content of salt used in commercially processed foods. The USI component for regulatory inspection and enforcement of the use of iodized salt in processed foods was established through a Joint Order (829-A and 74-A, March 2016) of the Ministries of Health and Agriculture (currently, Economy). With monitoring of the iodine content of domestically produced and imported salt in retail outlets, food catering entities and processed food production facilities in 2017 and 2018, FSIB found that the iodine content in almost 10% of ≈300 food-grade salt samples in those settings was classified as not within the national regulatory standard of 25 – 55 mg/kg iodine content[2] (herewith referred to as "outside standard"). However, the FSIB reports did not specify whether the deviations in salt iodine content were below or above the standard range. Such analysis would help to better assess the overall quality of iodized salt in the country and inform adjustments to the national salt iodization regulations, if needed.[15]

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This study was undertaken (as a part of an overall approach to track the effective coverage of iodized salt in Armenia)[1] to further summarize FSIB's more recent regulatory monitoring data on dietary salt classified as outside standard, and to assess the proportions of market sources of salt considered non-iodized, inadequately iodized, adequately iodized, and excessively iodized, based on international classifications.[18] Quantitative data on salt iodine content, determined by the FSIB Laboratory Services Center (FSIB/LSC), were assessed in conjunction with information on the type of facilities within domestic markets as well as points of import where samples were collected. Findings could help guide future programmatic decision making among relevant public and private sector stakeholders of the national USI program.

Material and methods

Using iodometric titration as the official laboratory method (per GOST R 51575), the FSIB/LSC routinely determines iodine levels in food-grade salt collected by its inspectors, to determine if the iodine content of the salt is outside standard. For this study, data were extracted from FSIB/LSC form N1 (annex to Joint Order (829-A and 74-A, March 2016) for calendar years 2021 through 2023, to determine the proportion of food-grade salt used in commercially proof as outside standard during those three years. Of 1,916 salt samples tested, 1,392 were collected from selected retail outlets, food catering facilities, and processed food production businesses across Armenia. Another 524 samples were collected from imported food-grade batches of salt at border control points over the same three-year period.

1 Parvanta I, Verster A and Johnson Q. FORTIMAS: An approach for tracking the population coverage and impact of a flour fortification program. Smarter Futures. Brussels, 2014. (www.smarterfutures.net/fortimas).

Table 1: Trends in the proportion of food-grade salt with iodine content outside standard across different market sources in Armenia during calendar years 2021, 2022 and 2023.

Year	Retail outlets		Commercial food caterers		Processed food producers		Cumulative market sources		Border points	
	Tested (N)	Outside standard	Tested (N)	Outside standard	Tested (N)	Outside standard	Tested (N)	Outside standard	Total	Outside standard
2021	224	4.9%	123	2.4%	128	1.6%	475	3.4%	172	2.3%
2022	222	9.5%	147	9.5%	126	14.3%	495	10.7%	217	0.5%)
2023	307	34.9%	75	22.7%	40	20.0%	422	31.3%	135	5.2%
Total	**753**	**18.5%**	**345**	**9.9%**	**294**	**9.5%**	**1392**	**14.4%**	**524**	**2.3%**

To further assess the public health implications of the use of outside standard salt, quantitative data on iodine concentrations in the total of 185 such salt samples identified by the FSIB/in 2022 and 2023, were extracted from the FSIB/LSC records and categorized as non-iodized (<5mg/kg); "inadequately iodized" (5–14.9 mg/kg); adequately iodized (15–40 mg/kg); and over-iodized (>40mg/kg), based on their iodine levels, per international guidelines which also define household salt with iodine concentration ≥15 mg/kg as adequately iodized.[18]

Results and discussion

Of a total of 1,392 salt samples tested for iodine content by FSIB/LSC in 2021 through 2023, the highest number were from domestic retail outlets (753), followed by commercial food catering facilities (345), and processed food production businesses (294). In addition, 524 samples were collected from batches of imported salt at border points. (*Table 1*).

The findings indicate increases in the proportion of dietary salt classified as "outside standard" across all the monitored sites from 2021-2023. However, cumulative FSIB monitoring data from all market sources of processed foods indicated an alarming 10-fold increase in the proportion of outside standard salt used by the commercial facilities in 2023 (31.3%) compared to 2021 (3.4%). Although the proportion of outside standard dietary salt samples from border posts was much less overall, there was still an increase of >40% in that category of salt tested in 2023 (5.2%) compared to 2022 (0.5%) (*Table 1*). The reasons for the increase in the overall proportion of outside standard dietary salt should be determined, and appropriate steps taken by the single domestic industrial-scale producer of edible salt (Avan Salt), as well as salt importers, to minimize the production and marketing of inadequately iodized salt in Armenia.

Because the FSIB's classification of iodized salt as "outside standard" does not indicate whether the salt is over or under-iodized, it is not helpful in informing the relevant private and public sector stakeholders as to the appropriate measures to be taken to improve the performance of the USI program in Armenia. Therefore, we analyzed data on the measured levels of iodine in a total of 185 salt samples classified by the FSIB as outside standard in 2022 and 2023, and found that during that two-year period, close to 30% of that salt contained no iodine and about 7% more was inadequately iodized (*Table 2*).

Table 2: Categories of iodine levels in food-grade salt from domestic supply chain (retail, catering and food industry) for 2022 and 2023 based on international recommendations.

Year	Salt samples classified as "outside standard" based on national standard of 25 - 55 mg/kg (N)	Categories of iodized salt quality based on iodine concentration							
		No iodine (< 5 mg/kg)		Inadequate (5–14.9 mg/kg)		Adequate (15–40 mg/kg)		Excess (> 40 mg/kg)	
		N	%	N	%	N	%	N	%
2022	53	17	32.1	7	13.2	28	52.8	1	1.9
2023	132	37	28.0	7	5.3	86	65.1	2	1.5
Total	**185**	**54**	**29.2**	**14**	**7.6**	**114**	**61.6**	**3**	**1.6**

Data source: FSIB/LSC laboratory records.

WHO recommends universal salt iodization of food grade salt, including salt used in commercial food production.[18] In Armenia, about 61% of salt consumption is from processed foods (PFs), and bread is a basic component of population diet,[1,2] with an average per capita salt intake estimated as 3.75 grams/day and comprising about 38% of dietary salt intake. Approximately 40% of the recommended daily intake (RDI) of iodine in Armenia is attributed to the consumption of bread containing adequately iodized salt,[1] and combined with consumption of adequately iodized household salt, constitutes about 75% of their overall daily iodine intake[2]

The iodine requirement of all population groups is covered in settings where adequately iodized salt is consumed by >90% of the population.[5, 17, 18] The aim of the national standard for iodized salt in Armenia (40 mg/kg ±15 mg/kg) is to allow for the addition of sufficient amounts of iodine to dietary salt to ensure the efficacy and safety of the product in sustaining adequate iodine status among the population as a whole. Based on the findings of this study, the increasing proportion of outside standard salt found across key market sectors, as well as salt entering at border points, indicate a deviation from the national USI strategy.

In conclusion, the increased presence/use of inadequately iodized salt across key commercial entities in Armenia, as well as the apparent increase in the proportion of outside standard imported salt in the last few years, emphasize the need for appropriate follow up by the public and private sector stakeholders of the national USI program to ensure that challenges in production and imports of quality iodized salt are addressed. Continued systematic analysis of the FSIB/LSC regulatory monitoring data, including the direction and magnitude of noncompliance with the iodized salt standard, and sharing the findings accordingly, would help to better assess the public health risk of consumption of dietary salt that does not meet the national iodization standard.

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Iodized salt: Celebrating the centennial of a major US public health triumph

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Just over a century ago, much of the U.S. population experienced disfiguring and debilitating disorders related to iodine deficiency. In 2024, we celebrate 100 years of salt iodization – a tremendous public health achievement.

Soils across much of the upper Midwest and Pacific Northwest and throughout the Appalachians are poor in iodine, which resulted in iodine-deficient diets for humans and livestock in those areas at a time when foods were largely produced locally. These regions were known as the "goiter belt."

At the time of the draft for World War I, 31% of military candidates from one region in Michigan were considered unfit for service due to goiter too large to allow them to button a uniform. U.S. Public Health Service surveys in the 1920s reported goiter rates of 70% to 100% in school children in portions of Michigan, Minnesota and Wisconsin.

However, for a long time the underlying cause of this disorder was unknown. An 1867 publication cited a list of 42 different prevailing hypotheses regarding the cause of endemic goiter, including infection, lack of sunshine, nutritional deficiency, toxin exposure, poor air and consanguinity.

David Marine, MD, an Ohio pathologist, and Oliver Kimball, then a medical student, conducted a seminal clinical trial in Akron between 1917 and 1920. A total of 2,190 schoolgirls were treated with iodine supplements twice annually. Controls were the 2,305 girls who declined the intervention. Goiter developed or worsened in only 0.2% in the treated group, compared with 14% of controls. This conclusively demonstrated that endemic goiter could be prevented with iodine.

Based on this work and on transatlantic reports of a salt iodization program instituted in Switzerland, David Cowie, MD, a pediatrician and chair of the Michigan Medical Society, proposed in 1922 that the U.S. adopt salt iodization to eliminate endemic goiter. Working with Marine and Kimball, Cowie engaged local stakeholders, including physicians, grocers and salt producers, to develop iodine deficiency prevention efforts.

Urged on by Cowie, in 1923, William Hale, PhD, a chemist at the Dow Chemical Company, developed a method for mass iodized salt production. In 1924, iodized salt was introduced in Michigan, and later that year Morton Salt became the first company to roll out iodized salt distribution nationally.

Portrait of a man with goiter in 1900 John D. Strunk

Critics resist salt iodization

Salt is a useful vehicle for iodine fortification because individuals tend to ingest stable amounts of salt daily, it is consumed across populations, and the salt iodization process is straightforward and inexpensive to implement.

U.S. salt iodization efforts initially met with strong opposition in some quarters, in part due to concerns about safety. Some of the most vocal initial pushback came from goiter surgeons, who may have seen a threat to their livelihood. However, when iodized salt was first introduced, there was clearly a transient increase in rates of hyperthyroidism. In 1926, Charles Hartsock, MD, a Cleveland Clinic thyroid surgeon and a leading critic of salt iodization, reported multiple cases of hyperthyroidism triggered by iodized salt use.

By 1934, these hyperthyroidism rates had subsided, and it was observed that although rates of thyroid surgery in Michigan hospitals had increased during the first 3 years after salt iodization, there was subsequently a rapid 60% decline.

In 1951, a survey of Michigan schoolchildren found that the prevalence of goiter had decreased from 38.6% in 1924 to only 1.4%. National public health advocacy and education efforts continued in the U.S. for the decades following iodized salt initiation. However, in 1948, U.S. legislation mandating iodized salt use failed to pass, and in the U.S., unlike most other countries today, salt iodization remains voluntary.

Iodization benefits go beyond goiter

Salt iodization programs were initially focused on the prevention of endemic goiter, but over the past century there has been a growing recognition that iodine deficiency causes not just goiter, but a whole spectrum of adverse health effects known as the iodine deficiency disorders that also encompass adverse obstetric outcomes, cretinism and impaired neurodevelopment.

Based on aptitude tests administered by the U.S. military, economists have estimated that for the one-quarter of the U.S. population that was initially the most iodine deficient, salt iodization raised average population IQ by 15 points. Similar gains have been seen in other regions more recently as iodized salt programs have been introduced in most countries around the globe over the past 3 decades. Due to these global public health efforts, led by organizations including UNICEF, WHO, and the Iodine Global Network (IGN; formerly the International Council for the Control of Iodine Deficiency Disorders, or ICCIDD), the worldwide prevalence of clinical iodine deficiency disorders as assessed by goiter rates fell from 13.1% in 1993 to 3.2% in 2019, while iodine deficiency disorders have been prevented in 20.5 million newborns annually. The resulting improvement in population IQ has led to an approximate $33 billion global economic benefit.

Return of the 'goiter belt'

Much of the history of iodine deficiency in the U.S. history has been forgotten, and it is important not to become complacent. Because mild iodine deficiency has re-emerged in U.S. pregnant women over the last 15 years, the American Thyroid Association and the American Academy of Pediatrics now recommend daily iodine supplements for U.S women who are planning pregnancy, pregnant or breastfeeding.

Only just over half of table salt sold in the U.S. is currently iodized, and commercially processed foods, the source of most of the salt in the U.S. diet, do not typically include iodized salt.

Dairy has become an important source of iodine in the U.S. diet but is not consumed as broadly as salt across the population. Growing use of plant-based milk substitutes, which do not contain iodine, may cause a further decline in U.S. iodine intakes.

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As we celebrate past public health successes, it is important to remember that the U.S. "goiter belt" could return if we do not remain mindful about the importance of optimal iodine nutrition for human health.

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The assessment of the contribution of industrially processed foods (IPF) to the intake of salt and iodine in the adult population in Tajikistan

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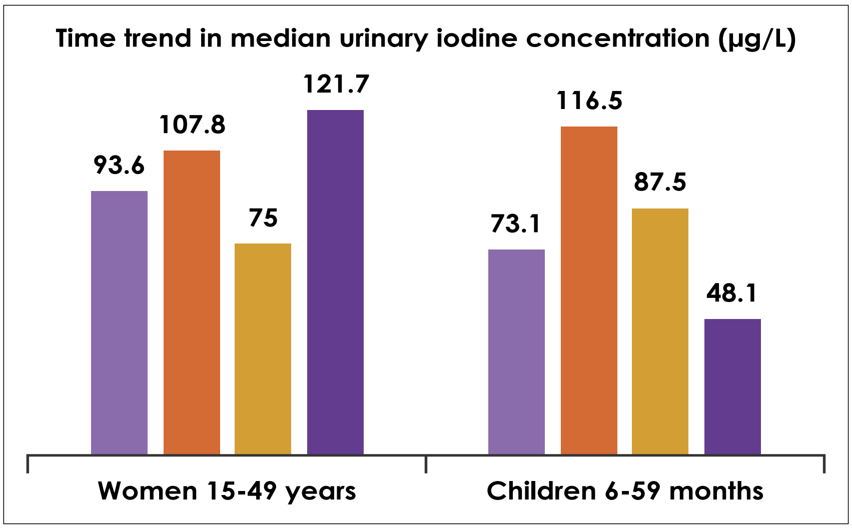
Background

Tajikistan's population is prone to iodine deficiency disorders (IDD) due to lack of iodine in the soil and the food derived from it. The country has invested in the universal salt iodization (USI) program since the 1990s as a highly effective strategy for preventing and controlling iodine deficiency. Tajikistan adopted the law "On the provision of population with fortified food products" in 2019, requiring all edible salt to be adequately iodized, including salt used in industrially processed foods (IPF). Significant investment has been made to increase demand for adequately iodized salt through mass communication campaigns and to improve the capacity of salt producers and government inspectorates to produce adequately iodized salt by strengthening legislative and regulatory measures. Efforts have also been made to improve the capacity of internal and external quality control and quality assurance, as well as to equip factories and labs with necessary supplies.

Despite decades of efforts by the government and support from development partners, the 2016 national nutrition survey revealed that iodine deficiency continued to be a public health concern, with children aged 6-59 months and women of reproductive age having suboptimal iodine status with median urinary iodine concentration (mUIC) of 87.5 µg/L and 75 µg/L, respectively (*Figure 1*). The latest national iodine status survey conducted in 2021 also highlighted stagnation in the national USI program, where 36.6% of households were using any iodized salt (>5 mg/kg), with only 12.8 per cent being adequately iodized (15-40 mg/kg). The iodine status among children aged 6-59 months was also found to be inadequate (mUIC 48.1 µg/L), while that of women of reproductive age showed a seemingly adequate level (mUIC 121.7 µg/L).

Figure 1: Median urinary iodine concentration (µg/L) among women of reproductive age and children aged 6-59 months between 2003 and 2012.



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Global food systems are rapidly changing due to industrialization, globalization and urbanization, leading to shifts in eating patterns with stronger reliance on the use of IPF and declining consumption of home-cooked foods. Tajikistan is no exception. As processed foods and condiments account for an increasing share of total salt intake relative to household salt, the national USI program needs to take into consideration potential different sources of salt and iodine. However, there are no reliable estimates on the use of iodized salt in the production of IPF and condiments in Tajikistan. Against this backdrop, there was a need to assess the use of salt in processed foods and condiments to estimate the contribution of IPF to the intake of salt and iodine in the adult population of Tajikistan.

Methods

The assessment used the tool "Program guidance on the use of iodized salt in industrially processed foods" developed by IGN.[1] The tool supports assessment of salt and iodine intake from salt-containing IPF based on modeling. The guidance also helps collect information on situational contexts on food and salt production and consumption, legislative and enabling environments, as well as other factors that influence the success of the national salt iodization program.

Based on availability and reliability of data, four IPFs that are most frequently consumed and which contain a significant amount of salt were selected for the assessment: bread, sausages, cheeses and pasta. Since the average per capita daily consumption of sausages, cheeses and pasta appeared very low for a country with a population of 9.5 million, these items were combined as "other IPF" with an estimated daily consumption of 50 grams per capita with a salt content of 2.5 per cent. Daily consumption of bread was estimated at 450 grams per capita with a salt content of 1.5 per cent. Total daily salt intake per capita was estimated at 14.6 grams, with table salt and bread providing approximately equal amounts (6.5 and 6.8 grams, respectively), while other IPF accounted for 1.3 grams per day. An average iodine concentration in salt of 11 mg/kg found in the national iodine status survey 2021 was used for the modeling. Iodine concentration is salt was well below the national standard (25-55 mg/kg) due to insufficient potassium iodate procurement by salt producers and weak regulatory monitoring by the concerned government agencies.

The modelling tool used to calculate the contribution of table salt and the most common IPF to the iodine intake of the adult population based on average per capita consumption. Iodine intake was calculated both in absolute amount (µg/day) and as a percentage of the Recommended Nutrient Intake (RNI) for adults (150 µg/day) and of the Estimated Average Requirements (EAR) (90 µg/day). Specifically, the modelling tool calculated the following:

- **Potential iodine intake**, calculated based on the presumption of 100% iodization of both table salt and salt used in IPF.
- **Estimated current iodine intake**, calculated based on the current proportion of iodization of both table salt and slat used in IPF.
- **Potential and estimated iodine intake after reduction of salt consumption by 15%**, calculated based on the current proportion of iodization of both table salt and salt used in IPF.


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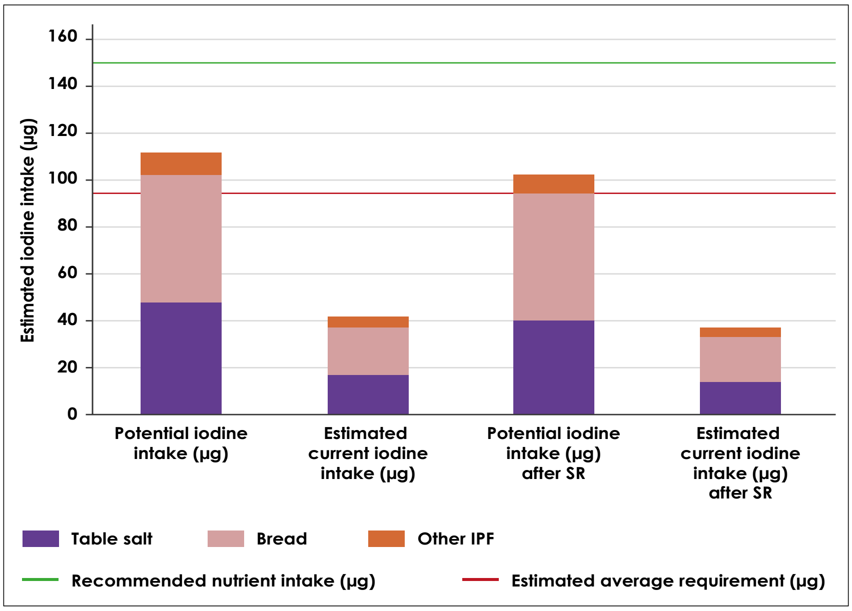
1 The detailed methodology is available at www.ign.org/latest/stories/program-guidance-on-the-use-of-iodized-salt-in-industrially-processed-foods/

Figure 2: Potential and estimated current iodine intake with table salt, bread and other IPF before and after 15% salt reduction (SR) with average iodine level in salt of 11 mg/kg and 37% iodized salt coverage.



The modelling considered three scenarios based on different levels of iodine content in salt:

- **Scenario 1:** iodine content of 11mg/kg, which was an average iodine concentration in salt according to the national iodine status survey 2021.
- **Scenario 2:** iodine content of 25mg/kg, which is the lower limit for iodine content in salt according to the national salt iodization standard (25-55mg/kg).
- **Scenario 3:** iodine content of 40mg/kg, which is the average iodine content in salt required by the national standard (25-55mg/kg).

Results

Modeling of iodine intake from selected processed foods in the adult population in Tajikistan.

Modelling based on Scenario 1 showed that, with the existing average iodine content in salt and potential 100% iodization of table salt and salt in bread and processed foods, potential iodine intake can only reach 110 µg/day, below the RNI of 150 µg/day (*Figure 2*).

Estimated current iodine intake based on current iodization coverage of 37% (national iodine status survey 2021) was only 41.2 µg/day. If a 15 per cent salt reduction target is achieved, the estimated iodine intake in adults could be as low as 38 µg/day.

Modelling based on Scenario 2 was based on assumptions that iodized salt would have an average iodine content of 25 mg/kg and 75% iodized salt coverage (*Figure 3*). While this scenario is fictitious for Tajikistan today, it could be achieved in future after significant improvement of iodized salt quality and coverage.

In this "ideal" scenario, with average iodine in salt concentration of 25 mg/kg and 75% iodized salt coverage (in households and bakeries), estimated iodine intake will be close to optimal (190.3 µg/day, or 127% of RNI). Moreover, iodine intake would remain optimal even after potential reduction of salt intake by 155 (*Figure 3*).

The modelling under Scenario 3 showed that, with potential (100%) and estimated (75%) coverage at an average iodine content in salt of 40 mg/kg, iodine intake among adults would be too high at 412 µg/day and 304 µg/day, respectively (*Figure 4*). Even after 15% salt reduction, iodine intake could be over 250 µg/day in adults.

Figure 3: Potential and estimated current iodine intake with table salt, bread and other IPF before and after 15% reduction (SR) with average iodine level in salt of 25 mg/kg and 75% iodized salt coverage.

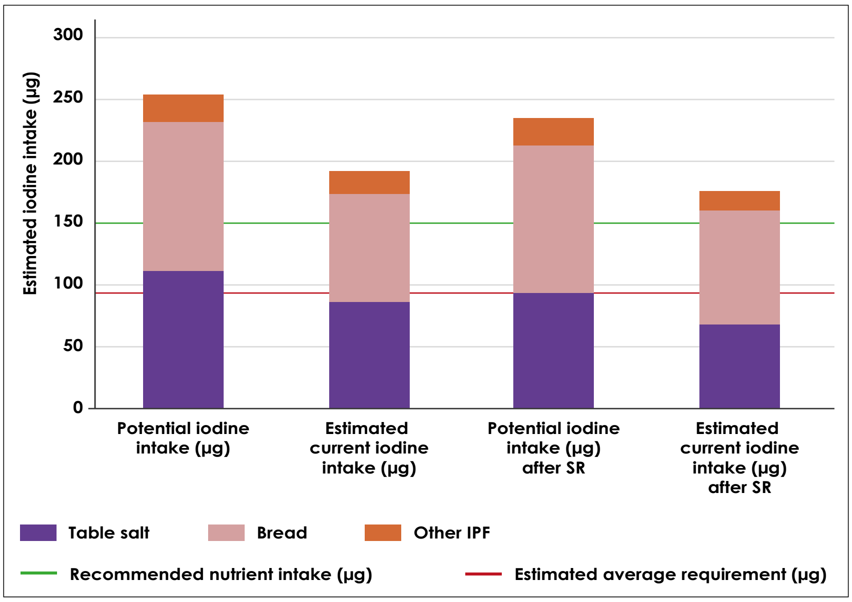
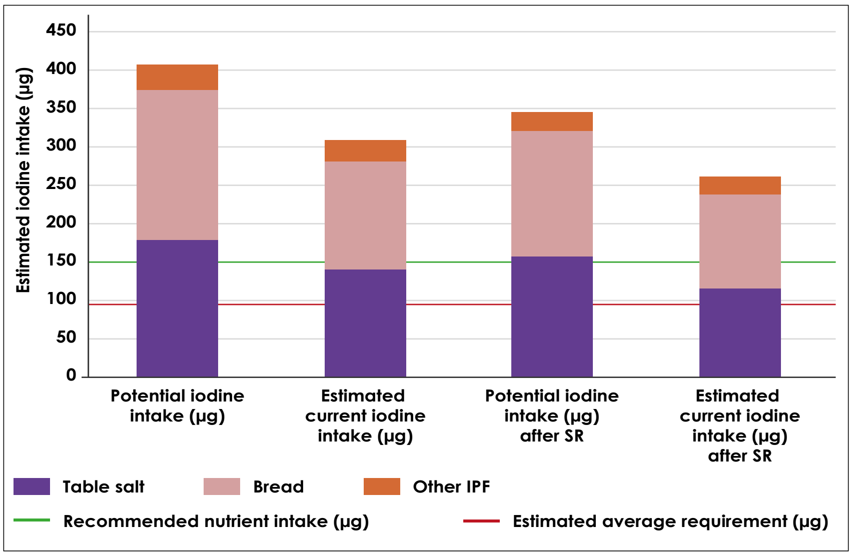


Figure 4: Potential and estimated current iodine intake with table salt, bread and other IPF before and after 15% salt reduction (SR) with average iodine level in salt of 40 mg/kg and 75% iodized salt coverage.



Discussion

The current assessment of the contribution of IPF to the iodine intake of the adult population in Tajikistan demonstrated that if iodized adequately, table salt and bread are the two major sources of iodine in the diet. The modelling exercises with limited available data suggested that, with current coverage of iodized salt and the current iodine content in salt (Scenario 1), the adult population would not be able to meet their daily iodine needs, while in the two hypothetical scenarios of coverage and salt iodization levels, table salt and IPF (especially bread) at the current consumption levels would allow adequately or even excessive iodine intake.

The modelling based on the current salt iodization level and coverage (Scenario 1) showed that the adult population only obtain 41.2 µg/day of iodine from table salt, bread and other IPF. The recently published national iodine status survey in Tajikistan reported that while salt iodization level was far from optimal (12.8% and 37% of salt adequately and inadequately iodized, respectively), the iodine status among women of reproductive age appeared to be adequate (mUIC of 121.7 µg/l), with no statistical differences between mUIC of women using adequately iodized salt and that of those using non-iodized or inadequately iodized salt. This discrepancy between salt iodization level at household level and mUIC among women of reproductive age, together with the results of the current assessment, may suggest the existence of additional sources of iodine in the diet not accounted for by the models used. Several studies from Ghana, Senegal and Haiti reported optimal iodine nutrition despite poor quality and low population coverage with iodized salt, and suggested that bouillon cubes could contribute substantially to iodine intake when manufactured with iodized salt. Some popular bouillon cube brands (like Maggi and Gallina Blanka) have large production in Russia and export to neighboring countries, including Tajikistan. One bouillon cube can potentially contain 120-160 µg of iodine. Additional research is needed to assess the volume of import and consumption of bouillon cubes and similar condiments in Tajikistan to understand their possible role in iodine nutrition in the Tajik population.

The modelling under Scenario 3 (salt iodized at 40 mg/kg) demonstrated that the estimated iodine intake could be excessive at 304.5 µg/day, or 203% of the RNI for adults. While the national salt iodization standard and the sanitary and epidemiological norms for salt iodization require that all edible salt be iodized at 25-55 mg/kg, this may be too high for Tajikistan considering the current salt consumption level. Under Scenario 2 (iodine level in salt at 25 mg/kg, iodized salt coverage 75%), an estimated iodine intake would be close to optimal requirements at 190.3 µg/day, or 127% of the RNI. This may indicate a possibility of lowering the existing official standard for salt iodization (40 mg/kg) to 25 mg/kg with a range of 20-30 mg/kg, which can prevent the risk of excessive iodine intake and at the same time significantly save cost for the salt producers or the centralized procurement of potassium iodate (i.e. a revolving fund, currently under discussion).

There were several study limitations. Availability and quality of data on the export, import, production and consumption of IPF was suboptimal. Official annual production data for the selected IPF (sausages, cheeses and pasta) provided very low per capita consumption quantities, which could be due to underreporting by industry. Similarly, no information existed on household consumption of table salt in Tajikistan. Some estimates suggested that neighboring Central Asian countries had much higher population salt consumption (14.9 g in Uzbekistan and 17.2 g in Kazakhstan and Kyrgyzstan) than Tajikistan at 10.4 g. For the current modelling, some assumptions regarding table salt consumption and salt consumption from IPF had to be made to be comparable with similar consumption patterns in the neighboring Central Asian countries.

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Knowledge of mothers and women of child-bearing age of the importance of iodine for the health of children: synopsis of a systematic review

Sara Visco[*], **Dr. Jessica Rigutto-Farebrother**[**,***]

Introduction

Iodine is an essential micronutrient crucial for thyroid hormone synthesis, particularly during pregnancy when demand increases by approximately 50%. Despite the recognized importance of iodine for maternal and fetal health, iodine deficiency disorders (IDD) continue to pose significant risks, including pregnancy loss, infant mortality, neonatal hypothyroidism, and neurodevelopmental impairments. The World Health Organization (WHO) has identified iodine deficiency as a preventable cause of brain damage, advocating for universal salt iodization (USI) as a key strategy. However, recent evidence suggests that iodine deficiency remains prevalent among women both periconceptually and in pregnancy in many countries, indicating the need for additional interventions to improve iodine status in this group and support brain development in utero and cognitive outcomes in childhood.

This systematic review had two primary objectives:

1. Evaluate the knowledge of mothers and women of childbearing age regarding the importance of iodine for children's health;

2. Assess the effectiveness of educative strategies in increasing iodine knowledge in women.

Methods

Eligibility criteria included studies assessing iodine knowledge or educative strategies targeting mothers or women of child-bearing age. Original research papers from peer-reviewed journals were considered, and data extraction focused on questionnaire details and knowledge levels. Studies published between 1990 and 2024 were included, and searches were conducted in PubMed, Web of Science, and Scopus (latest search date 16 January 2024). Data synthesis was conducted narratively due to heterogeneity in study designs, and quality assessment included validation scores for questionnaires.

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Results

Fourteen studies involving 6,565 participants, predominantly pregnant women, were included. Studies were conducted in Ireland, Norway, Portugal and the UK; Iran; China; Ethiopia, and Australia. Most studies reported low levels of iodine knowledge, with strong variations in assessment methods. Educative strategies, primarily randomized controlled trials, showed a significant improvement in knowledge scores but lacked evidence of improved iodine status. Validation scores for questionnaires were generally low, indicating a need for stronger study design and documentation.

Discussion

The findings highlight the critical need to address inadequate iodine knowledge as a public health priority, particularly as most participants across studies had minimal exposure to iodine information from healthcare professionals. Additionally, most participants included in this review were pregnant women, emphasizing the importance of evaluating knowledge among women planning to conceive and women of child-bearing age in general.

The review identifies global disparities in iodine knowledge and nutrition policies, with countries like the United Kingdom facing challenges due to the lack of legislative mandates for iodine fortification.[1] In contrast, countries like Australia have implemented successful fortification programs, indicating the effectiveness of policy interventions in improving iodine status.[2] However, persistent gaps in knowledge despite fortification underscore the need for comprehensive public health strategies that combine fortification with targeted educational campaigns.

Education plays a pivotal role in enhancing iodine knowledge, as demonstrated by studies in Ethiopia and Iran using community-based iodine nutrition education program or digital strategies like text messages. All studies showed a significant increase in knowledge post-intervention. However, increased knowledge did not always translate into improved iodine status, indicating the influence of various socio-cultural and environmental factors. Adopting a more comprehensive approach to planning health promotion should be considered.

Moreover, the review highlights methodological challenges in assessing iodine knowledge, including variations in questionnaire design and validity assessment. Standardization of assessment techniques and methods to capture data, as well as the development of a core outcomes set, are recommended to enhance comparability and facilitate evidence synthesis in future research.

Conclusion

In conclusion, the systematic review reveals a concerning lack of iodine knowledge among mothers and women of childbearing age, necessitating urgent action from public health authorities. Educative strategies show promise in addressing knowledge gaps, but further research is needed to evaluate their effectiveness in improving iodine status. Standardization of assessment techniques and methods to capture data is an essential step towards enhancing qualitative research quality and informing evidence-based interventions to combat iodine deficiency effectively.


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IGN's National Coordinators – our eyes, ears and voices for iodine nutrition

IGN has a unique and committed network of Regional and National Coordinators, who have been crucial to success in improving iodine nutrition. Our National Coordinators, who are largely volunteers and often work for government agencies, development agencies, or nutrition institutions, are invaluable sources of country-specific knowledge, offering in-depth insights and serving as vital contacts and partners in the implementation of essential activities.

They identify issues and advocate for support to address them, providing technical assistance in designing, implementing, analyzing, and reporting on iodine-related interventions. Additionally, they play a pivotal role in supporting the implementation of legislation and regulations pertaining to salt iodization.

In this column, we will highlight the work of individual National Coordinators, asking specific questions to give a broader understanding of their importance to our organization.

Dr. Kapil Yadav, IGN's National Coordinator in India

Dr. Yadav joined the All India Institute of Medical Sciences (AIIMS) in 2003 and is currently a faculty member at the AIIMS' Centre for Community Medicine in New Delhi. His areas of interest include iodine and iron deficiency disorders. He is also the Nodal Officer for the National Centre and Advanced Research on Anemia Control at AAIMS.

As a National Coordinator, what motivates you to contribute your time and effort to this cause and the Iodine Global Network?

My motivation comes from the significant progress the India program has made in reducing the prevalence of iodine deficiency. I have been involved with this initiative since iodine deficiency was a serious public health problem. Seeing how public health interventions, like iodized salt, can solve the issue of iodine deficiency and prevent goiter motivates me to continue working for this cause.

The widespread availability of iodized salt, reaching almost every household, and the reduced prevalence of iodine deficiency stand as examples of the success of these interventions. This exemplary public health achievement demonstrates how concerted efforts can lead to substantial improvements in health outcomes. The journey has been filled with unique challenges and invaluable learning experiences.

How do you collaborate with local stakeholders and partners to improve the program?

I believe collaboration with local stakeholders is achieved through a multi-tiered approach. India's National Coalition for Sustained Optimal Iodine Intake (NSOI) serves as a platform that brings together government agencies, private sector entities, civil society, international organizations, academia, and media. This collaboration facilitates knowledge sharing, advocacy efforts, and joint implementation of key activities for the elimination of iodine deficiency disorders (IDD).

Several states have established coalitions mirroring the NSOI structure. This localization of the collaborative effort ensures better alignment with specific state needs. Frequent coalition meetings at both national and state levels ensure continuous communication, problem-solving, and progress tracking.

Using webinars allows for efficient knowledge sharing and capacity building across a wider geographical range empowers local stakeholders, especially in areas with weaker programs. By engaging stakeholders through these methods, we strengthen our collective efforts to improve iodine nutrition and address the challenges of IDD.

Can you share the biggest challenges you face in your role?

One of the most significant challenges is coordinating among the diverse stakeholders involved in the program's implementation – aligning government bodies, private sector entities, civil society organizations, and international partners requires ongoing communication and collaboration.

Enacting legislative changes, such as mandating iodized, prohibiting non-iodized salt and addressing prevailing myths and misconceptions surrounding iodized salt are other major challenges. Education campaigns and community engagement initiatives are crucial for dispelling misinformation and fostering acceptance among the public.

Another challenge is ensuring a consistent supply of iodized salt to every household. Close coordination with salt producers and distributors, along with capacity-building efforts, is essential for maintaining adequate iodization levels and quality control measures.

What are some successes or achievements you had in your role? What are you most of proud of?

The overall impact of the salt iodization program has been the biggest success. This achievement shows the importance of sustained advocacy, coordination, and innovative approaches in addressing complex public health challenges. Overcoming legislative barriers, industry resistance, and misconceptions surrounding iodized salt was a collective achievement for everyone involved in the program.

I am most proud of the positive impact it has had on the health and well-being of individuals and communities. It serves as a reminder of the transformative power of public health interventions.

How do you see the future of iodine nutrition in your region and what do you need to make it better?

Ensuring universal access to adequately iodized salt, aiming for 100% coverage, is crucial for achieving optimum iodine intake across all segments of society. Aligning iodine nutrition efforts with salt reduction strategies is essential to address the dual challenge of iodine deficiency and non-communicable diseases. Empowering state and districts to develop tailored strategies will address local needs and ensure sustained optimal iodine intake.

Continuous monitoring of iodine levels through public health laboratories is necessary to track progress and identify areas needing intervention. Mandating the use of adequately iodized salt in key food programs, such as school or work meals, Anganwadis (rural child care centers), and processed food items, will help reach vulnerable populations. Periodic assessments of dietary iodine intake are essential to inform targeted interventions and ensure adequacy. Lastly, strengthening the capacity of salt manufacturing industries, including the private sector, will sustain the production of iodized salt and meet demand effectively.

Dr. Gihan Fouad, IGN's National Coordinator in Egypt

Dr. Gihan Fouad is former Head of the National Institute of Nutrition at the Ministry of Health, Egypt, and is a Professor of Pediatrics and a Clinical Nutritionist with expertise in child nutrition. She has a passion for continuous learning across topics ranging from finance to research and training.

As a National Coordinator, what motivates you to contribute your time and effort to this cause and the Iodine Global Network?

I was nominated as IGN National Coordinator in 2021, coinciding with the start of my role as Head of the National Nutrition Institute (NNI) in Egypt. NNI had served as the hosting site for the IDD program from 2009-2019 and achieved significant success. Contributing to IGN allows me to collaborate with dedicated professionals and leverage collective expertise to address iodine deficiency and improve nutrition in our region.

How do you collaborate with local stakeholders and partners to improve the program?

In July 2021, I recommended a meeting which NNI organized, bringing together representatives from various partners in the USI program. We held a workshop to assess the current state of the program and discussed the necessity of conducting a national survey to understand iodine deficiency among vulnerable groups like pregnant women and newborns. I emphasized the importance of reactivating the role of the scientific secretariat for iodine deficiency to coordinate efforts and expand its role to support all micronutrients. One key initiative was to activate a website for salt factories allowing them to receive funding for potassium iodate.

The meeting also resulted in increasing government funding for the iodine program, which now covers the purchase of potassium iodate and supervision of its use. Raising societal awareness about the importance of using fortified salt while promoting moderate salt intake was another priority, as well as supporting small producers and distributors to ensure their participation in the salt iodization program.

Can you share the biggest challenges you face in your role?

The landscape analysis of the iodine nutrition situation in Egypt was a significant challenge due to its comprehensive nature and the need for extensive collaboration but was crucial for informing future programmatic actions and advancing universal salt iodization (USI) in Egypt.

I worked with IGN to conduct the analysis in partnership with the UNICEF Regional Office for MENA. The study aimed to assess the status of salt iodization in Egypt, map household use of iodized salt, and examine IDD indicators. This assessment covered national policies and strategies, legislation, standards, regulation and enforcement, the production, importation, and distribution of iodized salt, program management and coordination, monitoring and surveillance, utilization, and raising awareness.

The landscape analysis intended to inform programmatic actions by developing a national roadmap. We gathered data on iodine nutrition, universal salt iodization policies, and program actions by reviewing secondary documents and interviewing key informants. Relevant documents were collected from various sources, including national and regional development partners, and through web searches. Dr. Izzeldin Hussein, IGN's Regional Coordinator, visited Egypt in May 2022, facilitating discussions and a national workshop.

In January 2023, a two-day regional workshop was organized by UNICEF MENA and IGN, with participation from Iraq, Sudan, Egypt, and Lebanon. The draft landscape analysis results were presented and discussed, and inputs for the national action plan were formulated. These were to be taken forward with national stakeholders upon return to their respective countries. The landscape analysis was pivotal in shaping the direction of iodine nutrition efforts and addressing the program's challenges.

What are some successes or achievements you had in your role? What are you most of proud of?

With support from the Ministry of Health and an official decree backed by UNICEF, we successfully conducted a landscape analysis. Additionally, we held three workshops in Egypt from 2021-2023 to advance the process and reinforce our efforts.

How do you see the future of iodine nutrition in your region and what do you need to make it better?

During a workshop in Amman, Jordan, from January 24-25, 2023, our team, including myself, identified several program bottlenecks. We then outlined remedial actions, assessed the level of effort required, and evaluated the chances of success and the expected impact on program improvement. By addressing these issues and implementing the identified solutions, we aim to significantly enhance iodine nutrition in our region.

In the news

Aligning salt reduction and salt iodization in South Asia

A webinar on salt reduction and salt iodization for South Asian countries was organized by IGN and UNICEF's Regional Office for South Asia on 21 May 2024 and attracted nearly 200 participants. The next IDD Newsletter will report back on this important event and how it advances both public health agendas together in the region.

Guest panelists of this event were Dr. Shweta Khandelwal (Senior Nutrition Advisor, Jhpiego India), Dr. Angela De Silva (WHO SEARO Regional Advisor), Dr. Aravinda Wickramasinghe (Consultant Community Physician, Sri Lanka) and Dr. Zivai Murira (Regional Nutrition Advisor, UNICEF ROSA).

The webinar was facilitated by Dr. Renuka Jayatissa (Regional Coordinator IGN South Asia) and Arnold Timmer (Senior Advisor IGN). A policy brief on salt iodization and salt reduction programs, developed by the UNICEF Regional Office for South Asia and IGN formed the basis for the discussion.

A historic meeting for food fortification in Eastern and Southern Africa has been postponed

A meeting due to take place in Mombasa, Kenya in July to develop a regional action plan on food fortification had to be postponed due to political unrest. The meeting sought to achieve greater progress in tackling vitamin and mineral deficiencies and giving its population greater access to nutritional diets.

The meeting is a logical extension of the work of the highly successful Iodine Regional Coordination Mechanism, which has flourished due to its management under a public health mechanism and a solid framework for concerted action by stakeholders, which has led to progress on iodine nutrition for millions of people in the region. The meeting has been rescheduled for October. Watch for more details on our website and in the the next edition of the IDD newsletter.

WHO/IGN report on iodine deficiency in Europe to be discussed at 3rd WIA International Conference

The WHO/IGN report on prevention and control of iodine deficiency in Europe – which is the cover story in this newsletter – will be high on the agenda of the 3rd International Conference of the World Iodine Association on 7-8 October 2024.

The conference will bring together leaders and experts from the scientific, academic and medial communities along with industry representatives and policy makers to discuss the latest scientific findings and policy developments in the prevention of iodine deficiency disorders

Attendees will hear presentations from report authors on topics such as the dietary shift away from dairy as well as the implications of the report beyond Europe's borders. A key session on multi-stakeholder advocacy will discuss how best to use the comprehensive information in this new report to advocate for action in Europe and globally to ensure that populations are protected from iodine deficiency.

The IDD Newsletter is published quarterly by the Iodine Global Network and distributed free of charge to email subscribers and appears on the Iodine Global Network's website (www.ign.org). The Newsletter welcomes comments, new information, and relevant articles on all aspects of iodine nutrition, as well as human interest stories on IDD elimination in countries.

For further details about the IDD Newsletter, please contact: info@ign.org.

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