# IDD Newsletter

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

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**100 years of salt iodization in Switzerland**

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**iodine**

*network*
100 years of salt iodization: Switzerland’s pioneering journey in preventing iodine deficiency

Dr. Sc. Maria Andersson Senior scientist, Nutrition Research Unit, University Children’s Hospital Zürich, Switzerland; President Swiss Fluoride and Iodine Commission of the Swiss Academy of Medical Sciences; Member of the IGN Board

Salt iodization is the most cost-effective intervention to correct and prevent iodine deficiency and is currently reaching 88% of households worldwide.¹ But maintaining high coverage is challenging, especially in countries where the program has been effective over a long time and the current generation has not seen or experienced goiter and other clinical consequences of severe iodine deficiency. The population may not be aware of why it is important to consume iodized salt.

The first salt iodization program was introduced 100 years ago in Switzerland in 1922,² and two years later in the United States.³ A French chemist working in South America was the first to suggest the use of iodine-containing salt to prevent goiter in the 1830s.³ However, it took almost a century until it was demonstrated that goiter and cretinism due to severe iodine deficiency could be prevented by providing iodine supplementation or by adding iodine to salt.³ Salt is an ideal vehicle for iodine fortification because it is consumed by all population groups at relatively stable amounts from day to day. Salt iodization is inexpensive and relatively simple to implement and monitor. This article describes the Swiss salt iodization program, summarizes the current situation, and discusses future challenges.

Switzerland was historically affected by severe iodine deficiency

Before the introduction of iodized salt, Switzerland was affected by high rates of endemic goiter and cretinism.² In certain endemic areas, goiter was present in up to 50% of newborns and close to all schoolchildren.² Hearing disability likely due to iodine deficiency
affected 1/400 inhabitants across the country. In the worst affected places, as many as 1/10 to 1/200 infants were born a cretin.

Iodine levels in soil and groundwater are low in most parts of Switzerland, particularly in the mountain regions, and plant-based foods such as fruits, vegetables, beans, and crops are therefore poor sources of iodine. The typical Swiss diet does not meet dietary iodine requirements without iodized salt.

**The Swiss salt iodization program – an international model historically**

Iodized salt was introduced in the Canton of Appenzell in 1922 and has been implemented nationally since 1952. The salt iodization program showed rapid effects. The incidence of goiter due to iodine deficiency reduced within years following the introduction.²

The Swiss salt iodization program has been an international model with its cautious step by step approach. Iodine is added to salt as potassium iodide and the amount of iodine was increased in steps, from 3.75 mg/kg initially to 7.5 mg/kg in 1962, 15 mg/kg in 1980, 20 mg/kg in 1998 and 25 mg/kg in January 2014 (allowed range, 20-40 mg iodine/kg).² The Swiss Saltworks, owned by the Cantons and the Principality of Liechtenstein, holds monopoly to extract salt in the country. The fortification of salt with iodine is voluntary, which means that the company must provide both iodized and non-iodized salt to allow consumer choice. The price is the same for both fortified and non-fortified salt.

An important reason for the success of the Swiss salt iodization is the close and longstanding cooperation between government bodies, academia including experts in nutrition, endocrinology, obstetrics and public health, and Swiss Saltworks in a well-working public-private partnership. The original Goiter Committee (Schweizerischen Kropfkommission) was established by dedicated physicians as early as 1922 and was succeeded by the current Fluoride and Iodine Commission which is part of the Swiss Academy of Medical Sciences. The Committee reviews the situation, available scientific data and information on the sales of iodized salt on a regular basis and recommends changes to the policy if needed.

**National monitoring every 5 years: The iodine intake is currently overall adequate, but low in some population groups**

Iodine status is monitored in nationally representative cross-sectional studies every five years since 1999, funded by the Federal Food Safety and Veterinary Office. The iodine concentration is measured in spot urine samples collected in school-age children and pregnant women.² The two most recent studies collected a repeat urine sample and measured urinary creatinine, to account for intra-individual variability and urine volume and better reflect the current iodine intake. Iodine has also been measured in epidemiological studies monitoring sodium intake using 24 h urine collections.⁵,⁶,⁷

The data shows stable adequate intake in children 6-12 years old and in adult men,⁵,⁶,⁷ but intake is insufficient in approximately 14% of Swiss women raising concern for deficiency in population groups at the lower end of the intake distribution.⁵,⁶,⁷ Iodine intake is also borderline low in pregnant women, lactating women, and infants with high dietary requirements,⁵,⁸ and low in individuals following a vegan diet.⁹

To improve the overall iodine intake, iodine concentration in salt was increased from 20 to 25 mg/kg in January 2014.⁴ However, a national study in 2015 showed...
only a modest improvement in children’s iodine intake and no improvement in women of reproductive age and pregnant women. The median urinary iodine concentrations in these population groups are fluctuating just around the WHO thresholds. Preliminary results from the 5th national iodine study, conducted in 2020-22, confirms adequate iodine intake in school children. But urinary iodine concentration is below the WHO threshold in pregnant women who are not consuming an iodine containing dietary iodine supplement. The situation is not unique to Switzerland: low iodine intake in pregnant and lactating women is observed in many other European countries.

**Iodized salt only partially used in convenience foods**

The original concept of salt iodization was addition of iodine to all salt consumed. Data from countries with mandatory salt iodization, with the same salt iodine content as in Swiss salt (25 mg/kg), report adequate iodine intake in all population groups. This data demonstrates that a level of fortification at 25 mg/kg is appropriate if all salt is iodized. However, the urinary iodine concentration in Swiss children and women is only half of that observed in the populations covered by mandatory salt iodization, suggesting incomplete coverage of iodized salt in Switzerland. Population-based studies measuring urinary sodium and urinary iodine concentration alongside, confirm that less than half of the salt consumed is iodized.

Even if the use of iodized salt in households is high (>80%), only 61% of the food-grade salt sold in 2020 was iodized (Swiss Saltworks AG, 2021). This is problematic as the main part (70-80%) of the total salt consumption is through foods produced or cooked outside the home.

Iodized salt must be indicated on food labels and a recent market survey supported by the Federal Food Safety and Veterinary Office showed that only 34% of all convenience foods sold in
Switzerland are produced with iodized salt.\textsuperscript{11} Bread is one of the main sources of salt in the Swiss diet today and most bakeries (87\%) use iodized salt, which is very good. The proportion of meat and meat products with iodized salt is also high (78\%), whereas vegan products rarely contain iodized salt (8\%). Of all different processed foods, those produced for the local market contain iodized salt more often (47\%) than imported products (9\%).

Salt intake is well above international recommendations in children (6.1 g) and adults (7.8-9.2 g/day).\textsuperscript{5,6} The Swiss nutrition strategy for 2017-2024 set out to reduce the overall sodium intake to <6 g salt per day in order to prevent hypertension and other non-communicable diseases. Therefore, in order to avoid emerging iodine deficiency in the Swiss population it would be important to improve the coverage of iodized salt in processed foods, i.e. iodized salt must be used more frequently than non-iodized salt.

**Milk and dairy products are also important sources of iodine in the Swiss diet**

Milk and dairy products are other complementary and important dietary sources of iodine in the Swiss diet, particularly in children. Cow’s milk and dairy products including cheese, yogurt, and eggs, contain iodine thanks to animal feeds fortified with iodine and milk processing practices. The median iodine concentration in conventional Swiss cow’s milk is 110 μg/L and one glass (0.3 L) of milk provides approximately 30 μg iodine, although the variability is large. The iodine content in milk depends on season, farming type, fodder practices and use of iodine containing disinfectants.\textsuperscript{12} The concentration is higher in the winter when cows are fodder-fed, compared to the summer. Conventional milk contains more iodine than organic milk, as the iodine content in fodder is low in organic farming.

Conventional milk contains more iodine than organic milk, as the iodine content in fodder is low in organic farming.

Milk and dairy products partially compensate and complement the incomplete coverage of iodized salt, but the per capita consumption of cow’s milk and cheese products is declining. Individuals that exclude dairy products and/or replace cow’s milk with plant-based milk products may be at risk of inadequate iodine intakes, particularly individuals following a vegan diet.\textsuperscript{9} Milk substitutes like oat, rice, almond and soy drinks contain virtually no iodine, unless they are fortified.\textsuperscript{13} Saltwater fish, seafood and seaweed are rich in iodine, but the contribution is generally limited due to infrequent consumption.

**Is borderline low iodine intake a health concern?**

The thyroid gland is generally able to adapt to mildly iodine-deficient intakes.\textsuperscript{14} However, chronic low iodine intake leads to increased thyroid activity, a physiological mechanism that helps to compensate for the low iodine intake. Increased thyroid activity can be assessed by measuring the concentration of thyroglobulin in the blood. Increased thyroglobulin concentration has been documented in Swiss women.\textsuperscript{5} Chronic thyroid stimulation may increase the risk of autonomous thyroid growth, toxic nodular goiter and hyperthyroidism in the population, particularly in older
Improved iodine intakes and iodine sufficiency normalize thyroid activity, reduces the incidence of thyroid nodules and autonomy, and prevents thyroid disorders in the general population.

New challenges to maintain adequate iodine intakes in all population groups

Even if the majority of Swiss households use iodized salt, many consumers are no longer aware of why their choice of salt and food products still matters. The successful salt iodization program in Switzerland faces new challenges.

In October 2022, the Federal Food Safety and Veterinary Office and the Swiss Fluoride and Iodine Commission organized a Symposium to celebrate the success of 100 years salt iodization. A panel of nutrition and public health experts, medical doctors, food producers, policy makers and politicians discussed the current challenges for salt iodization as a public health strategy in Switzerland. Lack of knowledge of the health importance of iodized salt and lost recall of the history of iodine deficiency were pointed out as major barriers to continue ensuring adequate iodine nutrition for the prevention of thyroid disorders. Ignorance or even misperceptions about iodized salt are common, not only in the general public but also among the medical community and food producers.

Food industry representatives exemplified some of the reasons why iodized salt may not be used in the food production:

1. “The use of iodized salt in the food production usually brings more difficulties than solutions, particularly when it comes to food labelling of products for export.”

Most countries in Europe, including Switzerland, have voluntary legislation for iodized salt. Food producers that export to other counties prefer using non-iodized salt as this is accepted in most European countries. However, local and national politicians confirmed that the political majority is in favor of keeping voluntary legislation for iodized salt and that a change to mandatory legislation is unlikely.

2. “There is simply no strong consumer demand for iodized salt.”

Food producer representatives explained that some consumers view iodine in salt as an “unnatural” additive and argued that non-iodized salt is perceived as a “healthier” choice and sometimes preferred from a marketing perspective. Fear for declining sales due to consumer groups opposing the use of iodized salt was voiced. However, the food producers stressed that the Swiss regulatory requirement to declare “iodized salt” is good as it still provides a more positive message than declaration of “salt, potassium iodide”, as done in some other European countries. The need for new communication strategies by responsible authorities targeted to the general population and appropriate information from the medical community to help overcome misinformation was stressed. Food industry interest organizations acknowledged that they can make an important contribution to public health by using iodized salt whenever possible and provide adequate customs information.

3. “Iodized salt is not always perceived as a healthy food choice.”

In conclusion, 100 years of iodized salt has successfully eliminated goiter, cretinism and other consequences of severe iodine deficiency in Switzerland. But there are new challenges that need to be addressed. More effective communication of the health benefits of iodized salt must be targeted to the medical profession, food producers and consumers to create renewed demand for iodized salt. The coverage of iodized salt must improve to ensure adequate iodine nutrition in all population groups and prevent iodine deficiency disorders also in future generations.

For more information: Hundert Jahre jodiertes Salz (admin.ch)


Michael Zimmermann, editor of the IDD Newsletter since 2005, steps down

Some thoughts from Gregory Gerasimov, Regional Coordinator, Eastern Europe and Central Asia

The IDD Newsletter was founded at practically at the same time as International Council for Control of Iodine Deficiency Disorders (ICCIDD), the predecessor of the Iodine Global Network, by John Dunn MD, Professor of Endocrinology at University of Virginia in Charlottesville (USA), who was Secretary of the Board and later ICCIDD Executive Director.

At first, the newsletter was short - a few pages printed in black and white for limited distribution. But as time went on, it became the voice of the global iodine community. The newsletter went online in the mid-1990s and reached thousands of subscribers worldwide. After John Dunn’s sudden passing in 2004, Constance Pittman, MD, ICCIDD Board Member and Professor of the University of Alabama in Birmingham (USA) became interim editor.

In April 2005 in Cape Town (South Africa), the ICCIDD Board announced Michael D. Zimmermann MD as the new editor of the IDD Newsletter and website. Michael at that time worked at the Human Nutrition Laboratory, Swiss Federal Institute of Technology (ETH), Zurich, Switzerland and so, for the next 18 years Zurich became the home of the IDD Newsletter and Michael Zimmermann its host.

Over the years, Michael significantly strengthened the newsletter, which became an important source of new information on the iodine status of nations and populations, iodized salt production and distribution and, most of all, told stories about people who were working hard to attain USI, which WHO later called one of the most important public health successes, on a par with elimination of smallpox and polio.

If somebody ever wanted to write a history of the global success of USI for reaching the goal of optimum iodine nutrition worldwide, the IDD Newsletter would be the best source of information on what happened every year in different parts of the world. It contained reports from countries and regions, summaries of the most important research publications, human interest stories, and information on the daily work of ICCIDD/IGN and its members. The newsletter currently reaches over 6,000 readers worldwide as an e-copy and is digitally archived on the IGN website.

For me personally, the IDD Newsletter provided the opportunity to publish results of research projects and human-interest stories from the region that wouldn’t otherwise have been accepted by scientific journals, but were important for history and appreciated by the newsletter’s readership. Five years ago, I started my own Iodine Blog with the main objective of providing summaries of the most interesting (in my opinion) articles from the Newsletter in the Russian language for those who were unable to read them in the original.

However, as time passed by and progress in IDD elimination achieved on a global scale, the stream of information to IDD Newsletter from countries and regions started to dry up. To compensate for that loss, Michael started to publish bigger excerpts from scientific publications, which was a very good idea. Now, after 18 years in the role, Michael decided to retire from editorship of the IDD Newsletter. We hope he will continue as an active contributor.

On behalf of the many readers of the IDD Newsletter I want to thank Michael for his successful work and dedication. IGN also wants to thank Kiwanis International, which has supported the production and distribution of the newsletter over the past decade.
Where now for the IDD Newsletter?

Werner Schultink, Executive Director, IGN

The IDD Newsletter was created at a time when the global public health agenda was focused on the issue of iodine deficiency, and a large international community, from the private sector to civil society, was engaged in the achievement of Universal Salt Iodization. Firstly, in its printed format, it was one of the few means of sharing specialized knowledge and information with this community.

As technology changed, its next iteration as an electronic publication allowed it to effectively reach this global community, and thousands of subscribers not only read, but actively used the publication to share knowledge, research, progress and ideas. Michael’s stewardship of the newsletter at this time placed it at the heart of developments and gave a voice to those working to improve iodine nutrition. Kiwanis International’s support for the publication of the newsletter allowed us to continue its publication over the past decade. Designer Urs Imholz, who has worked on the publication with Michael for many years, also deserves credit for keeping the publication fresh and attractive to readers.

Technology has changed once again, and this, together with environmental and cost factors, has led IGN to the decision that the newsletter will only be electronically distributed from now on.

Michael’s decision to step down has also led us to reflect on the very different situation we are in today regarding global attention to iodine deficiency. The world has moved on and competing demands for attention mean that time, focus and resources devoted to the problem have diminished. Such large-scale public health campaigns are essentially a thing of the past, and resources to continue these activities are becoming even scarcer.

How we deal with the problem of iodine deficiency too has changed. From the early newsletter days of documenting quick wins, we have moved to a realization that salt needs to be iodized forever to maintain and advance the progress made.

Moving forward, this newsletter will explore the role of iodine nutrition in this changed environment, challenging readers to think about new ways to use what we have learned to make iodine nutrition programs equitable and sustainable.

We’d also love to hear from you. Share your views with us here about what you want from the newsletter.
An in-depth look at data on salt iodization and urinary iodine

Mathilde Maurel, Nutrition specialist, IGN; Arnold Timmer, Senior Advisor, IGN

Introduction

Universal Salt Iodization (USI) is one of the most successful public health efforts of the past 35 years. Iodization, which involves addition of a small amount of iodine to all edible salt, is a safe, affordable and effective way to ensure adequate population iodine intake. Two indicators are key to guiding program managers in measuring salt iodization program performance and outcome: iodine levels in household salt (HHIS) and population urinary iodine concentration (mUIC). This information is typically collected in stand-alone nationally representative surveys or as part of other nutrition or micronutrient surveys. Demographic and Health Surveys and Multiple Indicator Cluster surveys are the most common surveys that include measurement of iodine in salt. Separate global databases are maintained for each indicator: the WHO Vitamin and Mineral Nutrition Information System (VMNIS)\(^1\) and the IGN Scorecard\(^2\) for iodine status and the UNICEF salt iodization database\(^3\) for household coverage of iodized salt.

These surveys are resource intensive, and take months or even years to complete. We asked ourselves the questions:

What information is available in the databases, what is the age of the data, does the information reflect who is reached and more importantly not reached, and how is the information used? We tried to answer these questions by reviewing information available in these global databases.

Do countries know their iodine program status?

Among the 197 countries listed in the database, a majority have data available, with 82% having data on iodine status and 62% having data on household iodized salt coverage. Starting with iodine status, 161 of the 197 countries (82%) have national data\(^1\) on mUIC among school-aged children. In South East Asia and the Pacific and Western Europe we find the largest number of countries without data.

Looking at availability of sub-national data, only 35 out of 161 countries (22%) have information at sub-national level. When it comes to surveyed population groups, school aged children are the most studied (mainly because of easy access through schools). Other population groups are less frequently studied: pregnant women (33%), women of reproductive age (32%), adolescents (12%), adults\(^2\) (11%) and lactating women (8%).

When we look at HHIS with any iodine (>0 ppm), 62% of countries (123 out of 197) have national data. This is lower than availability of iodine status data. Countries without data are mainly in Western Europe, Central America and South East Asia and the Pacific.

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1  The latest available data estimate was used in the analysis irrespective of its age
2  Men and non-pregnant, non-breastfeeding women combined
Unlike iodine status, most surveys include subnational data on HHIS - 103 countries out of 123 (84%).

Unfortunately, most household surveys do not measure iodine in salt and urinary iodine at the same time. Only 10 countries collected both indicators in the same survey. This makes it more difficult to assess the performance of the iodization program and whether salt iodization results in adequate iodine intake, whether there are regions or population groups within a country that are deficient or whether there are other iodine sources in the diet than iodized salt.

**What does the data tell us?**

The information on iodine status is encouraging, with 128 countries having adequate mUIC (between 100 and 300μg/L) among school-aged children (Figure 3). Among countries with data, 13 (8%) have excessive iodine status with mUIC (> 300μg/L) and 20 (12%) are iodine deficient (mUIC <100μg/L).

Data on household iodized salt consumption (Figure 4) show that 52 countries have reached the USI target with more than 90% of households using iodized salt (>0ppm), and another 38 countries are on track with coverage between 70 and 90%. However, 33 countries have HHIS below 70% which represents a risk of not assuring adequate iodine intake for the entire population.

**Are the data reflecting the current situation?**

While the picture is encouraging, an important aspect to consider is the age of the data. The data we used are the most recently available, but for many countries these data are outdated. According to WHO recommendations, household-level data on salt iodine content and population-based UIC data should be collected every five years. However, in practice, the majority of data are older than 5 years for both household iodized salt coverage and iodine status. Indeed, 84% of the countries with data on iodine status (133 out of 158) have data older than 5 years and half (54% – 85 out of 158) are more than 10 years old. Data on household coverage with iodized salt are slightly more recent but 70% of the data (85 out of the 122 countries with data) are older than 5 years and 26% (32 countries) older than 10 years.

Another aspect to be taken into consideration is equity. Most countries have scaled up salt iodization programs, so the question of who is not reached becomes the focus. National level data show success, but sub-national data is needed to answer this question and the situation is not encouraging. For iodine status among school children, 141 countries have adequate iodine status with mUICs above 100μg/L, but only 21% (30 countries) have sub-national data. For those countries with national iodine adequate status, more than half see iodine deficiency sub-nationally (mUIC <100μg/L).
Therefore, looking at national level data may give the impression that the country is performing well when this may not be the case.

The same observation can be made for data on household iodized salt coverage presented in Figure 6 below. Of the 90 countries which have 70% iodized salt coverage or higher, 73 (81%) have sub-national data, and among these, 26 countries (36%) show regions with coverage < 70%. Therefore, it is important to ensure that all regions of a country are performing equally well and are not left behind.

**What do we learn from looking at the mUIC and HHIS together?**

Looking at mUIC and HHIS together, of the 77 countries studied, most are on track to achieve USI with 53 (69%) having scaled up salt iodization (HHIS >70%) and with adequate iodine status (100-300μg/L). Only about 8% of countries are deficient and do not have adequate iodized salt coverage. Two countries are also deficient at national level despite iodized salt coverage > 70%.

A possible explanation is that the standard for iodine content in salt is set too low or that salt iodization is not carried out according to the standard. However, it is important to mention the limitations of this data analysis, as to examine mUIC and HHIS data together, the data must be spaced at most two years apart, which applied to 77 countries. The combination of analyzing mUIC and HHIS data emphasizes its importance in correctly analyzing program effectiveness.

Most countries have data on iodine status and household iodized salt coverage, and the results are quite encouraging. However, data gaps are a major limitation. Sometimes no data is available at all, and even when available, these may be outdated or not analyzed. mUIC and HHIS data are very rarely collected together, which is necessary for an informed judgement about the functioning of the salt iodization program and its impact. Iodine status surveys mostly focus on school children, which masks the status in other population groups, which for a variety of reasons may differ from school children, for example, if school feeding is provided.
The importance for mature programs to focus on equity highlighted the need to go beyond national averages, which is essential to steer programs in identifying unprotected populations and tracking corrective action. Even when countries collect equity data, we observe that it often is not used to improve salt iodization. Combined mUIC and HHIS review helps better answer the question of program effectiveness and identify gaps and inconsistencies.

An important point not addressed in this article is capturing information about whether iodine is provided through salt used in processed foods. This may be an important contributor to population iodine intake.

The results presented in this analysis suggest that improvement is needed in the collection of iodine program performance indicators: How do we collect these periodically? Are there alternative methods to collect information other than surveys? How do we ensure both HHIS and mUIC are collected jointly?

Furthermore, we need to ensure that we look beyond national averages to ensure equity of coverage.

We need to make optimal use of the collected information and look at HHIS and mUIC in combination. The future agenda should also reflect how iodine provided by processed foods can be captured somehow as an important program input, and finally, dietary iodine sources other than salt need also to be considered in monitoring the performance of iodine programs.

   who.int/teams/nutrition-and-food-safety/databases/vitamin-and-mineral-nutrition-information-system/data

   ign.org/scorecard


Re-emergence of iodine deficiency in Sri Lanka

Mandatory iodization of edible salt was initiated in Sri Lanka in 1995. The impact of iodized salt on population iodine status has primarily been assessed based on nationally representative surveys of median Urinary Iodine Concentration (mUIC) among children aged 6-10 years every 5 to 6 years between 2000 and 2022. Iodine status among pregnant women was assessed in 2010, 2015 and 2022.

Production and marketing of iodized salt

Although official data on actual annual production has not been reported, three large producers (30,000 MT/year), and one medium producer (15,000 MT/year) distribute iodized salt (free flowing and crystal) across the island nation for use by households and in commercially prepared processed foods. The titration method is consistently used by these salt producers to test and document the iodine content of salt using samples collected semi-hourly at the end of the production line. In addition, it is estimated that iodized salt produced by over 200 “small” salt processors represents about 10–15% of the total iodized salt marketed in Sri Lanka. Most of those small-scale processors add potassium iodate (KIO3) to raw salt (procured from one or more of the large producers) using manual methods which might result in less homogenous levels of iodine in their products. Import of edible iodized salt is currently prohibited.

Laws and regulations for iodized salt

The first regulation on salt iodization in 1994 banned the production, distribution and sale of non-iodized salt for human consumption and set the iodization level at 25 ppm. It was amended in 2005 in accordance with the findings of the Medical Research Institute (MRI) survey in 2005, i.e, high urinary iodine levels indicating excess iodine intake among the population. The revised national standard in Sri Lanka requires that edible salt contain iodine at a range of 15-30 ppm. The Directorate of Environment and Occupational Health (E&OH) in the Ministry of Health (MoH) is responsible for monitoring and enforcing the iodized salt standard which is carried out by Food and Drugs and Public Health Inspectors authorized under the Food Act.

New information on population iodine status

The most recent nationwide assessment was carried out in 2022. The report of the National Nutrition and Micronutrient survey in Sri Lanka was published in 2023 (NNMN-2023) by the MRI in partnership with UNICEF and WFP. The objective of the survey was to assess population nutritional and micronutrient status at national and provincial levels. Iodine nutrition status was also assessed among children and adults.

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NNMN-2023 was a cross-sectional study, which was carried out in a representative sample of 2,936 households from the 25 districts of Sri Lanka using a multistage cluster sampling procedure in 2022. Altogether, 105 clusters were included. The study population included children aged 6 months to 17 years, adult women and men aged 18-60 years, older adults >60 years and pregnant women. Urine samples of selected participants were collected to test urine iodine excretion using the ammonium persulfate method, and quality control was done by the EQUIP program of the United States Centers for Disease Control and Prevention (CDC).

Household salt samples were collected to determine salt iodine levels by the titration method.

Table 1 shows mUIC of different population groups. Median levels were similar in all population groups and below the optimum level of >100 μg/L except among children aged 5-9 years of age. The slight increase in mUIC in children may reflect use of micronutrient powders. The most alarming feature of this study is the very low level of mUIC among pregnant women.

Comparing these results with previous data in Sri Lanka, it is apparent that iodine intake in the population has decreased substantially since 2016. As shown in Figure 1, after improvement in iodine status of the target population groups from 2000 to 2016, substantial deterioration in population iodine status was found in 2022. Based on international guidance, Sri Lanka’s population is iodine deficient at this time.

Table 1: Median urinary iodine concentration of children, adults and pregnant women

<table>
<thead>
<tr>
<th>Population groups</th>
<th>n</th>
<th>Median urine iodine (μg/L)</th>
<th>25th - 75th percentile</th>
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<tbody>
<tr>
<td>Children aged 6-59 months</td>
<td>712</td>
<td>93.8</td>
<td>44.4-173.5</td>
</tr>
<tr>
<td>Children aged 5-9 years</td>
<td>404</td>
<td>101.0</td>
<td>53.9-180.8</td>
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<td>Children aged 10-17 years</td>
<td>402</td>
<td>90.5</td>
<td>47.5-161.4</td>
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<td>Adult women aged 18-60 years</td>
<td>861</td>
<td>78.1</td>
<td>41.8-133.4</td>
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<td>Adult men aged 18-60 years</td>
<td>493</td>
<td>89.4</td>
<td>46.5-156.7</td>
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<tr>
<td>Adults &gt;60 years</td>
<td>352</td>
<td>67.3</td>
<td>36.6-135.7</td>
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<tr>
<td>Pregnant women</td>
<td>895</td>
<td>77.2</td>
<td>38.8-141.8</td>
</tr>
</tbody>
</table>

Figure 1: Trends in mUIC(μg/L) among children aged 6-10 years and pregnant women in Sri Lanka
Household coverage of iodized salt

In 2022, salt samples were collected from 2,291 households and tested for iodine content. As shown in Figure 2, only 2% of household salt samples were not iodized. 26% were inadequately iodized, containing 5-14.9 ppm iodine. Overall, 72% of households used adequately iodized salt containing >15 ppm iodine (as defined in global guidance). Of those samples, 67% contained iodine levels within the national regulation range of 15-30 ppm, while 5% contained more than 30 ppm iodine. These results show lower household coverage of adequately iodized salt compared to previous assessments.

Although household coverage of salt with any level of iodine continues to remain well above 95% in Sri Lanka, household level coverage of adequately iodized salt has decreased from a high of 91% in 2005 to 72% in 2022. Several factors may have contributed to this decline. First, producers have raised concerns about their ability to consistently meet the narrow range of the current standard (15-30ppm). Second, the penalty for going over the standard is ten times higher than for being under the standard, based on single samples, which may have led producers to iodize at the lower level of the permitted range. Other factors such as potassium iodate costs may also have contributed to this decline.

This study raises serious concerns about the adequacy of iodine intake in Sri Lanka. It further highlights the need for careful management of salt iodization programs to ensure sustainability. Similar concerns have been raised recently in other parts of the world, where declines in iodine nutrition have been observed. However, based on prior experience in the country, the situation could be remedied by appropriate adjustment of the national standard for quality iodized salt to at least 20–40 ppm.

These developments also highlight the need to track population coverage of quality iodized salt more actively and systematically across the country and confirm sustained impact of the national salt iodization program once close to 90% or more of the population once again has continued access to sufficient and well-iodized dietary salt. In this regard, with support from Iodine Global Network (IGN), the Sri Lanka Medical Research Institute is leading the assessment of the utility and feasibility of using the FORTIMAS methodology as a public-private sector approach to assess the effective coverage of the national salt iodization program over time.

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**Figure 2: Distribution of iodine content (ppm) in salt at household level**

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1 smarterfutures.net/fortimas
Background

Tanzania has made tremendous progress on Universal Salt Iodization (USI). For the past 30 years, the country has maintained coverage of over 90% of households accessing salt iodized above 5 parts per million (ppm) and 61% accessing adequately iodized salt (>15ppm iodine). Tanzania has maintained a stable population median urine iodine concentration (mUIC) within the WHO recommended level of 100-299μg/L. However, there are uncorrelated trends between consumption of iodized salt and observed mUIC across regions, where some regions show excessive mUIC levels with household coverage of adequately iodized salt of below 90%, while others have the recommended mUIC levels, but with low coverage of adequately iodized salt (<50%). The scientific reason for this diversity in Tanzania is unknown and it can be hypothesized that the variation of iodine status by regions is possibly influenced by the existence of alternative sources of dietary iodine from other foods, including industrially processed foods (IPFs) and possibly drinking water. Thus, we conducted a cross-sectional study to explore possible IPFs with iodine and their sources that may contribute to the total dietary iodine intake among some population groups in Tanzania.

Methods

Quantitative and qualitative approaches were used to collect data from study participants comprised of food manufacturers/processors, Small and Medium Enterprises (SMEs) and local hawkers located in six regions namely: Dar es Salaam, Dodoma, Arusha, Tanga, Iringa, and Urban West in Zanzibar (Figure 1). These regions were selected because they are more industrialized and urbanized, and mUIC was observed to be excessive (>300μg/L). In addition, some regions like Tanga, Urban West, and Dar es Salaam along the Indian Ocean coastal belt are the main producers of salt, but also have high access to imported and locally processed foods. Since some inland regions such as Iringa, Arusha, and Dodoma...
are also urbanized and import iodized salt they are assumed to have a high consumption of IPFs both imported and from local food processing industries.

The assessment focused on determining iodine content in salt used as an ingredient, preservative, and flavouring agent for IPFs from industries, SMEs including hawkers (street mobile food vendors selling mainly local pastes, roasted banana, maize popcor, fruits, sweet & Irish potatoes, cassava, barbeque, and eggs all processed at home) as well as from inland water sources. Awareness of the importance of iodized salt use in IPF was assessed through factory owners, managers, and SMEs as Key interview Informants (KII). A total of 81 KII were conducted (i.e. 68 from mainland Tanzania and 13 from Town West Zanzibar), and three did not consent, leaving 78 interviewees who participated in the study.

A purposive sampling technique was used to obtain the number of food industries to be included. A structured questionnaire was used to collect quantitative data and a checklist guide for interview was used to collect qualitative information from study participants. The tools were developed in English and then translated into Swahili. In addition, tape recorders were used to capture the discussion during KII, and Rapid Test Kits (RTK) were used to confirm the presence of iodine in the salt used for manufacturing/processing of IPFs. All tools were pre-tested on November 15, 2022, in supermarkets/wholesale shops, food processing industries, and SMEs in Temene Municipality, Dar-es-Salaam.

Various data collection techniques were used, including face-to-face in-depth interviews with key informants and observations in food production industries, supermarkets, wholesale shops, and SMEs. Checking documents and records took place for verification. Consent was sought from each respondent, before administering the questionnaire or starting interviews. Interviews were conducted with production managers or industry owners in each selected food processing or manufacturing industry and with SMEs in quiet places with enough privacy in the study areas.

Quantitative data were analyzed using SPSS for Windows software (IBM version 21). Data were evaluated for normal distribution using the Shapiro-Wilk test. Determination of iodine concentration from 229 samples (i.e. 182 salt and 47 water samples) collected and analyzed using titration method and ammonium persulfate method using Sandell Kolthoff reaction, respectively (WHO 2007). All statistical analysis was tested at the level of significance p < 0.05. All 78 narrative interviews conducted with factory owners, managers and SMEs from the six regions of Tanzania to gain their opinions on various practices and perceptions related to IPFs and the use of iodized salt were transcribed verbatim and coded thematically. Analysis of transcripts was done by qualitative content.

Ethical approvals for conducting the study were obtained from the National Institute of Medical Research (NIMR) with Ref. No: NMR/HQ/R.8a/Vol.IX/4034 dated July 5, 2022, and for Zanzibar, the approval certificate was obtained from Zanzibar Health Research Ethics Committee (ZAHREC) Ref: No. ZAHREC/04/PR/FEB/2023/0S dated 14th February 2023. A letter
of introduction to the regions and businesses to be visited was granted to the research team by the President’s Office-Regional Administration and Local Government Authority (PO-RALG) with assistance from TFNC. All KII participants were requested to sign the consent form before starting the discussion and tape recording.

Results

There are varieties of IPFs containing salt available at the main points of sale in Tanzania, both imported and locally made by industries, SMEs, and hawkers. They range from animal sources to pastes, cereals, bakeries, fish, and snacks (Figure 2). Such foods include animal products like sausages and salami; milk products including cheese and long-life milk; baked products like bread, cakes, biscuits, doughnuts, and chapatti; dried fish from the sea and fresh water; crisps from potatoes, banana, and cassava; nuts especially groundnuts, cashew nuts and snacks including popcorn, roasted maize, semi-ripe mangoes, and boiled eggs. Other widely available IPFs are spices, including condiments; bouillons, sauces such as tomato ketchup and chilli; spreads including margarine and butter and canned foods which are beef, chicken, fish, vegetables, and fruits.

Most (86.2%) IPFs containing salt were locally produced and processed in Tanzania and 75.0% were solely used for domestic consumption. 95.4% of the salt samples collected contained iodine, with overall mean iodine content of 25.6 ppm (ranging from 4.2 to 76.2 ppm). All the salts were crushed/ fine crystal salt types irrespective of whether used by industries, SMEs, or hawkers. Iodine content in salt processed from inland borehole water in Dodoma had a mean iodine concentration of 9.3 ppm (ranging from 0.0 to 25 ppm, and 70.3% CV). The water used for producing salt in Dodoma had median water iodine concentration (mWIC) of 1288.6 μg/L (range 307.8 μg/L to 3884.4 μg/L, and 59.6% CV.

A similar scenario was found in Urban West in Zanzibar where water samples used for public

Figure 2: Varieties of IPFs commonly available for consumption in Tanzania
consumption and IPF production had an overall mWIC of 169.8 μg/L (range 12.3 μg/L to 190.1 μg/L) and 60.7 μg/L (range 17.6 μg/L to 106 μg/L), respectively. Iodine content in salt used for IPF products produced had a mean iodine content of 24.02ppm (range from 8.45ppm to 51.84ppm).

To our knowledge, no one has ever documented whether the water commonly used for industrial food processing and domestic use contains iodine either in mainland Tanzania and the Islands of Zanzibar.

The majority (74.4%) of KIs had a high level of awareness and commitment to using iodized salt in their IPFs because of the importance of iodine in human health and development. While the majority (78.0%) of the KIs indicated that their products used iodized salt and 22.0% were uncertain, 76.9% have never heard of anyone in IPFs being penalized for not using iodized salt in their food products.

Furthermore when respondents were asked about the intended use of produced IPF products, 78.2% responded the products were for local consumption, while 20.5% mentioned they were for both local consumption and exports, while only 1.3% of IPFs were solely for export purpose.

**Conclusion**

Overall findings showed that IPFs prepared with iodized salt already exist in Tanzania and are widely consumed by both urban and rural dwellers, therefore indirectly contributing to the current optimal iodine nutrition status of the population. The use of iodized salt for food processing is not a purposive strategy approach, but rather a coincidence to ongoing national USI program implementation. The found mean iodine content of 25.6ppm used for Tanzania’s IPF products is within the East Africa regional standard at household level.

Despite the knowledge of KIs of the importance of using iodized salt in the IPFs produced, there is still some inconsistency in utilization of this type of salt. It is also likely that there are more natural sources of iodine that are consumed by the population, contributing to optimal iodine intake as observed in two studied regions. There is therefore a need to further explore and map such areas in both mainland Tanzania and Zanzibar for better informed USI strategy. Modelling the iodine provided by certain foods based on their consumption patterns should be done from time to time to understand the contribution of these foods in different scenarios, especially in areas where the use of iodized table salt is low.

**Keywords:**

Industrially processed foods, iodine

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**Figure 3: Purpose of produced IPF products (N=78)**
A unique sentinel survey method for assessing iodized salt consumption in China

Qian Ming, Professor, Tianjin Medical University and IGN Regional Coordinator for China and Eastern Asia

Introduction

In iodine deficient (ID) areas where iodized salt is the main means of preventing and controlling iodine deficiency disorders (IDD), household iodized salt coverage (HHIS) is recommended by WHO as an indicator of elimination or sustainable control of IDD (WHO/UNICEF/ICCIDD, 2007). Since 2016, China has been conducting National IDD Monitoring Surveys (NIDDMS) every year, measuring household iodized salt use. China uses the term 'eligible' iodized salt consumption (E-IS) to reflect adequacy based on adherence to the varying regional standards established in China for iodization levels, rather than use of IS coverage which reflects adequate iodization based on WHO standards. E-IS is a key indicator with a goal of achieving >90% coverage.

Rapid technological development has enabled the use of electronic surveys as an alternative or addition to costly national surveys. An electronic questionnaire can quickly collect information in a limited period for evaluating iodized salt consumption (IS) among people in a target area, effectively using a sentinel surveillance method. According to data from the China Internet Network Information Center (CNNIC), a total of 1.067 billion people were internet users in China in 2022, with a penetration rate of 75.6%. With the support of IGN and the Chinese Endemic Disease Society, we have used the internet to conduct iodized salt surveys since 2017.
Methods

The questionnaire is composed of three parts: knowledge, iodized salt consumption behavior, and influencing factors. Three options have been set for IS consumption: consuming IS, not consuming IS, and consuming both. The electronic survey cannot assess iodine levels and thus cannot assess E-IS. The survey targets first year students of medicine, nursing, public health, and laboratory science in medical universities. Enrollment in Chinese universities is centrally planned, with a relatively fixed representation from each province, which provides a fixed number of students and an opportunity for continuous survey tracking.

The students are asked to forward questionnaires to their families or to other individuals in their hometowns. At present, we have surveyed students at several universities in the southeast, northeast and northwest of China, and have expanded to Xinjiang and Tibet. Surveys were completed during COVID-19, although response rates were lower than expected in 2022. The total sample over the past 6 years was 34,679. We used WeChat to distribute guidelines and QR codes, which were linked to the questionnaire on the Wenjuanxing platform. Respondents completed the survey using mainly mobile phones or computers.

Results

Surveys were completed from 2017-2022, and household coverage with IS based on questionnaire responses (IS-Ques) was compared with national survey results. Table 1 summarizes results, and includes comparison of IS-Ques with national IS and E-IS:

<table>
<thead>
<tr>
<th>Year</th>
<th>n</th>
<th>IS-Ques</th>
<th>National IS</th>
<th>National E-IS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>2,468</td>
<td>90.44</td>
<td>95.80</td>
<td>90.10</td>
</tr>
<tr>
<td>2018</td>
<td>392</td>
<td>90.82</td>
<td>95.70</td>
<td>90.30</td>
</tr>
<tr>
<td>2019</td>
<td>7,470</td>
<td>92.29</td>
<td>95.90</td>
<td>90.22</td>
</tr>
<tr>
<td>2020</td>
<td>11,555</td>
<td>90.10</td>
<td>95.90</td>
<td>92.00</td>
</tr>
<tr>
<td>2021</td>
<td>9,572</td>
<td>90.06</td>
<td>95.40</td>
<td>91.30</td>
</tr>
<tr>
<td>2022</td>
<td>3,222</td>
<td>91.09</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Average</strong></td>
<td><strong>34,679</strong></td>
<td><strong>90.69</strong></td>
<td><strong>95.74</strong></td>
<td><strong>90.70</strong></td>
</tr>
</tbody>
</table>

Table 1: Comparison of IS-Ques with national IS and E-IS

Notes:
1. IS-Ques: including only iodized salt intake or both IS and non-IS intake from question survey
2. National IS: coverage of household IS intake (>5mg iodine/kg) from National IDD Monitoring Survey (NIDDMS)
3. National E-IS: coverage of household adequate IS intake (18.5-32.5 or 21-39 mg iodine/kg, based on National Standard) from NIDDMS
Discussion

China has been conducting National IDD Monitoring Survey (NIDDMS) every year, which provides a good comparison to assess the validity indicator of our survey method. Our reported coverage rates of household IS consumption (IS-Ques) are very close to the results from the national survey data for the same years. This high level of agreement is likely because:

- China has had a high IS or E-IS coverage rate for more than ten years.
- The quality of edible salt is closely monitored.
- The sample size of our surveys is large and regional distribution covers most provinces.

We estimate the budget of annual NIDDMS, which covers 2,800 counties, may be over 0.3 billion Yuan. Our sentinel survey shows similar results, but the cost is minimal. This sentinel survey method provides dynamic observation of the population’s IS consumption and should be sensitive to changes in influencing factors, such as knowledge about salt iodization, and use of processed foods. If our data varies from those of NIDDMs, it may be helpful for us to analyze, confirm, and follow up to identify populations at risk for iodine deficiency, for example due to lower IS coverage rates among highly educated or wealthier individuals, or residents of large cities or coastal regions. Our survey method may be limited by the relatively small sample size compared to national surveys, and by poor internet access among the elderly and those living in remote areas.

Conclusions

The sentinel survey method showed that coverage of IS reached over 90%, demonstrating similar results to national surveys. Due to the Monopoly Measure and Regulation against IDD, the quality of edible salt in the market is guaranteed, and the iodine content of iodine in salt is marked on the packaging, which allows respondents to know the type of salt consumed. Sentinel questionnaire surveys are very convenient for understanding people’s behavior related to consumption of iodized salt, factors influencing consumption of IS, and identifying high-risk populations or regions. This approach can easily and quickly collect information, at low cost, with relatively good validity. The sentinel approach can be used to explore the situation for regions that may have at-risk populations.
The Bon Sel Initiative

Editorial comment

One issue facing many countries is the situation with small salt producers who struggle to consistently iodize the small amounts of salt they produce.

This often leads to a risk for regional iodine deficiency, and has proven to be a difficult problem—trying to ensure that small producers maintain their livelihood while sustaining good iodization.

In Haiti, as this article describes, a successful model has been developed that provides a market for small producers while ensuring consistent iodization.

The model uses a social enterprise approach, with establishment of a salt processor buying local salt from small producers, cleaning and iodizing that salt, and promoting its use for school lunch programs and selected processed foods (in this case bread), as well as release to the retail market.

The business model is self-sustaining through sale of industrial salt to the beverage industry. Such an approach may have broader applicability in other countries with many small producers.
Socially equitable and effective provision of iodized salt in Haiti

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2. Laboratory for Nutrition and Metabolic Epigenetics, Institute for Food, Nutrition and Health, ETH Zürich, Zürich, Switzerland
3. Kwasans Foundation, USA

Background

Haiti ranks as the number four country worldwide for malnourishment with more than 70% of children and women of childbearing age at risk of iodine deficiency. It is estimated that only 7.5% of households in Haiti purchase any salt with iodine, while in only 3% of those households is the salt fortified to current WHO recommendations. The University of Notre Dame (United States) Global Center for Development of the Whole Child (GC-DWC) has a mandate to lift children out of adversity through education and to use evidence-based approaches not only advance children’s academic achievement, but also create safe, supportive, and equitable family, school, and community environments. Recognizing the importance of early life and childhood nutrition on cognitive development and its impact on education and societal productivity, the Haiti Program at the GC-DWC and the Haitian Ministry of Health (MSPP) collaborated to create the Bon Sel Initiative (BSI). BSI seeks to prevent Iodine Deficiency Disorders (IDDs) and eliminate lymphatic filariasis (LF). LF is a neglected tropical disease, causing severe swelling and disfigurement in the extremities and a high burden of morbidity. To this end, BSI produces and distributes salt fortified with iodine and/or iodine with diethylcarbamazine (DEC) to treat LF, in LF-endemic areas. The GC-DWC added the BSI as one of its core programs in 2020.

3 Global database, 2021. based on Multiple Indicator Cluster Surveys (MICS), Demographic and Health Surveys (DHS) and other nationally representative household surveys, 2014–2020.
4 iei.nd.edu/gc-dwc accessed 4 May 2023
**Bon Sel initiative model**

BSI operates as a social enterprise initiative (SEI) and non-profit entity, leveraging business principles for humanitarian purposes, through the Dioceses of Cap Haitien in the north of Haiti and Hinche in the Central Plateau. BSI supplies financial and logistical support to the Holy Cross Congregation (CSC) in Haiti, who, in turn operates the salt processing and fortification facility, and employs the personnel that produce and market salt products and services.

BSI ensures success in disease prevention through its comprehensive approach to production of both iodized salt and iodized salt enriched with diethylcarbamazine-citrate (DEC). Since local production is currently insufficient to meet demand, BSI sources raw salt from both small, local, and larger, regional salt producers. It then processes and packages this salt at its own processing and fortification facility at Delmas-2 in Port-au-Prince. Strict quality control procedures are in place that maintain BSI's strong internal quality control record, with salt iodine content that is verified through titration. BSI maintains distribution partners and conducts marketing programs and consumer education in targeted communities. Finally, routine monitoring and surveillance of effective distribution and consumption of the iodized or double-fortified salt through assessment of LF transmission and population IDD risk completes the feedback model offered by the BSI, as shown in Figure 1.

BSI focuses internal resources on salt processing, packaging, and development of consumer education materials, and leverages external partnerships for production of raw salt and for distribution of finished salt products. BSI operates within a salt supply chain, remaining cognizant that it is a dynamic and interdependent process.\(^5\)

Less than 10% (estimated) of the locally produced solar salt in Haiti is made with modern “multi-basin” systems. The remaining 90% of production is produced in single-pond systems, which generate raw salt that is extremely challenging to process and fortify. In total, Haiti produces approximately 24,000 MT of salt, while market demand for salt is estimated at 36,000 MT. Thus, Haiti is a net importer of salt, particularly for those users requiring higher quality salt than typically available in Haiti. BSI is the only salt processor in Haiti. The current processing capacity is approximately 9,000 MT per year, with a goal to expand processing capacity via a project in northern Haiti, with an additional 2,000-3,000 MT capacity. (The remainder of the salt is for industrial use and not iodized.) BSI collaborates with Haitian salt producers by purchasing as much local salt as possible, to remain as a consistent and reliable purchaser of local salt. BSI also offers a competitive market price to support and encourage local production. In further supporting local producers, another goal of BSI is to improve the quality of locally produced salt. Thus, as well as

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\(^5\) Further details can be found in the BSI report, “The Haitian Sea Salt Industry: Supply Chain Assessment (June 2020).”
offering a competitive market price, BSI pays more for higher quality salt. BSI has collaborated with several initiatives to that end (e.g., working with DID/PANSEH, SOPROCOSA, and AMURT respectively). BSI also partners with the Kwasans Entrepreneurial Center to connect Haitian salt producers with the BSI facility to educate salt farmers on high-quality production and operational excellence, modeled after the best practices observed with universities across the United States and their respective agricultural extensions. This further serves to strengthen knowledge transfer and capacity building in-country, as well as supporting the sustainability of the overall program.

By implementing and expanding surveillance efforts across Haiti and operating the salt processing and fortification facility, BSI is flexible enough to intervene quickly as needed. This also provides greater control in quality and distribution, which helps ensure effective utilization by Haitians and progress against the core mandate of LF and IDD prevention. BSI takes pride in not only improving the health of Haitians, but also serving as an employment opportunity for Haitians. The facility currently employs over 40 individuals, all of whom are Haitian nationals. It has an unblemished safety record and stable workforce.

In accomplishing its primary, health-related, mandate, BSI also benefits the Haitian salt industry and market. BSI is making progress in transforming consumer expectations towards food-grade, fortified and packaged salt, while salt producers are incentivized to increase raw salt quality to minimum international standards. In addition to the health benefits of fortified salt, BSI’s unfortified industrial salt is used in many water purification systems to provide safe, clean drinking water across Haiti.

BSI provides fortified salt at a competitive market price in the retail, food service, food-processing segments while providing unfortified salt profitably in the industrial segment. Packaged salt is marketed under the brand name of Bon Sel Dayiti. By providing value-added sales and service to each of its four market segments served (retail, foodservice, food-processing, industrial), BSI generates sufficient margins to offset most of or all its operating expenses.

Despite the social unrest, environmental challenges and economic upheavals, BSI has continued throughout to be successful in bringing fortified salt to Haitians, many aid programs targeting health benefits have had to curtail or suspend their programs during difficult periods, yet, as a SEI, managed and operated by Haitians, BSI has been able to continue operations and distribution to key customers in all four market segments.

The GC-DWC BSI initiative has partnered with the Kwasans Foundation, the University of Notre Dame Haiti – Hinche, and ETH Zürich, Switzerland, to monitor progress in the population. Leveraging the GC-DWC’s long-term relationship with the Dioceses of Cap Haitien and Hinche has allowed for a surveillance program of iodine status in school children, as a critical population to ensure adequate iodine intakes for optimal cognitive development and growth. Furthermore, by partnering with the University of Notre Dame Haiti – Hinche and working closely with vice Rector Fr. Jean Herald, PhD, the surveillance protocol is kept at low costs and simultaneously helps to build local capacity. As such, the technicians who conduct the surveillance protocol are part of the bioscience program at the University of Notre Dame Haiti – Hinche. There are plans

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to upgrade laboratory space at the University of Notre Dame Haiti – Hinche to conduct iodine status and LF prevalence monitoring and surveillance in situ, which are currently under consideration.

**Results and future application**

Based on the results from the study recently conducted in Hinche, the overall risk of IDD in the sample population appeared to be almost halved, most likely due to the increased distribution of Bon Sel Dayiti fortified salt in the food service and food-processing segments, some of which appear to be reaching children in schools through school-meal programs offered by WFP. BSI is a regular supplier to WFP.

Reviewing previous research from 1996 through our study in 2022, the median urinary iodine content (UIC) in school-age children increased from 39 μg/L to 131 μg/L, and reaching the threshold of 100 μg/L currently stipulated by the WHO to indicate population iodine sufficiency, as described in Figure 2. Additionally, the study indicated a possible risk of anemia in the participating children, leading the team to realize there are many other nutrient deficiencies that must be monitored and prioritized.

While salt is an effective vehicle for iodine supplementation, we are also evaluating alternative vehicles to supplement additional micronutrients. BSI believes its operating model can be applied to other micronutrients and implemented in additional countries facing similar public health challenges.

**Figure 2: An improvement compared to historical data in Haiti**

From 1996 to 2022, the median UIC level in school-age children increased from 39 μg/L to 131 μg/L. The red line at 100 μg/L indicates the current WHO target for iodine adequacy in school children.

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Enhancing regional salt trade in West and Central Africa

Senegal is the largest producer of salt in Western and Central Africa, followed by Ghana. The rest of the countries in the region import salt. Regional trade is therefore an essential factor in ensuring the availability of quality iodized salt to importing countries.

Enhancing regional trade has the potential not only to improve the availability of iodized salt, but to contribute to economic growth and sustainable development by creating opportunities for economies of scale and enabling the movement of salt from producing to importing countries.

To better understand the trade structures linking supply and demand in the region, IGN and UNICEF partnered with The Broker, a think tank for sustainable development, to review the region’s iodized salt trade.

Through data and information gathered from country-level studies in Ghana, Senegal, Togo, Burkina Faso, and Ivory Coast, the report reviewed the dynamics, barriers, and opportunities presented by the flow of iodized salt in the region.

The report presented a broad overview of the iodized salt trade in the region, identifying knowledge gaps and promising avenues from a regional trade perspective, for combating iodine deficiency. Its aim was to spark discussion among relevant stakeholders at national level and stimulate a regional dialogue about what can be achieved together to facilitate the trade in iodized salt.

A regional workshop was then organized in Dakar, Senegal in November 2022 to identify a common way forward to facilitate the regional trade of quality iodized salt, with government delegates from the studied countries and salt industry representatives. An over-arching message from the meeting is the need for a strong collective and regional effort, and a commitment to salt iodization.
News

World Health Assembly passes resolution on micronutrient nutrition

A community of advocates focused on large scale food fortification with folic acid, spearheaded by the Global Alliance for the Prevention of Spina Bifida, initiated the development of a resolution by the World Health Assembly to reduce the presence of spina bifida and hydrocephalus worldwide. As one of many partner organizations who signed on to the resolution, IGN supported the initiative, with a senior staff member making a statement to the World Health Organization’s Executive Board’s 152nd session in February on including this resolution on the agenda for consideration and passage at the at the 76th WHA from May 21-30, 2023.

On 29 May, the delegates at the WHA adopted the resolution on accelerating efforts to prevent micronutrient deficiencies through safe and effective food fortification. The resolution urges Member States to make decisions on food fortification with micronutrients and supplementation and to consider ways of strengthening financing and monitoring mechanisms.

Micronutrient deficiency is a crisis that affects all communities globally, low-income or high-income, and there is still a large unfinished agenda on food fortification. The passage of the WHA resolution not only supports the work of organizations like IGN, but it will also bolster advocacy for large-scale food fortification programs that will positively impact the lives of millions.

IGN has a new website

IGN has launched a new website, aimed at effectively communicating our mission and our work, describing efforts to improve iodine nutrition as they happen. Information on partnerships, research, data, our blog, annual report and the IDD newsletter can be found on the site. Keep up to date with events, webinars and new stories and publications at ign.org, as well as signing up for our blog, the IDD newsletter and other updates.
WHO report on the problem of iodine deficiency in Europe to be published in 2024

Iodine deficiency is a widespread problem in Europe, increasing risk of thyroid disease and subsequent health consequences, as well as its potential negative impact on the developing brains and cognitive ability and school performance of children. While regulations for salt iodization exist in most European countries, iodine intake remains insufficient to ensure optimal iodine nutrition in all population groups. In many countries where persistent mild iodine deficiency exists, it is not recognized as a public health concern by health authorities.

A series of meetings with WHO, IGN, researchers and Kiwanis International identified the need for a report on the situation regarding iodine deficiency in Europe. Evidence that the situation in a number of countries is inadequate has been presented through various scientific channels as well as to the European Union, but has not led to action to address the situation. The partners agreed that an official WHO report on the situation in the WHO European Region, which would also explore potential courses of action to address the negative impacts of IDD, should be produced and presented to national policymakers from Ministries of Health as a means of eliciting action.

The last WHO report on iodine deficiency in Europe was published fifteen years ago. A wealth of new data on iodine status has become available since then, particularly in vulnerable population groups. This data needs to be critically reviewed in the context of new scientific advances as well as in the current landscape of changing food habits. The objective of this new report is to summarize national data on current iodine status and prevention measures in Europe, which will be used to provide evidence-based advocacy and program guidance for strengthening countries’ strategies to optimize iodine status.

The partners see the need to go beyond survey and study data to a more in-depth analysis of existing national policy and regulatory frameworks and guidelines, and industry perspectives, to make the case for necessary improvement as well as to identify efficient strategy and action points. The report will focus on the situation and impact description, and on regulations and strategies. Work is progressing and the report is expected to be published in the first quarter of 2024.