Lebanon rallies to fight IDD

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Iodine deficiency in the UK: Grabbing the low-hanging fruit

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IODINE GLOBAL NETWORK (formerly ICCIDD Global Network) is a nongovernmental organization dedicated to sustained optimal iodine nutrition and the elimination of iodine deficiency throughout the world.
Background  
Historically, iodine deficiency has been a pressing problem in Lebanon. For decades, studies reported a high prevalence of inadequate iodine intakes across all age groups. In the early 1960s, a study showed that goiter was widespread among children from different socio-economic backgrounds in the capital city of Beirut (1). A few years later, several studies reported a similarly high prevalence of goiter and suboptimal iodine nutrition in several villages across the country (2,3). Although Lebanon is located on the Mediterranean Sea, the Lebanese diet, especially in mountain areas, is poor in fish and seafood, two common sources of iodine. A traditional diet in Lebanon is also rich in goitrogens (found in vegetables such as cabbage, turnips, or rutabagas), which may inhibit absorption and uptake of iodine when consumed in high amounts.

National surveys show that initial progress has stalled  
In response to reports about endemic goiter, a law requiring the addition of 10–200 mg of iodine per kg of all table and cooking salt was adopted in 1971. However, due to conflicts and political unrest, the law did not come into effect until 1995 when implementation first began with the help of UNICEF. Two subsequent studies, in 1996 and 2004, reported that 90% of Lebanese households were consuming adequately iodized salt, but more recent data suggests that the coverage has been in decline.  

This trend has been corroborated by three national surveys conducted over the same period to assess iodine nutrition among Lebanese school-age children. In 1993, the prevalence of goiter among children aged 7–16 years was 25%, and the median urinary iodine concentration (mUIC) was 60 μg/L, which confirmed the presence of iodine deficiency as a public health problem (4). In 1997, it seemed that success was finally on the horizon: two years after salt iodization was first implemented, the median UIC had increased to 95 μg/L (5). But the third study, conducted in 2013–2014 by the American University of Beirut and the IGN, showed that the median UIC had declined to 66 μg/L, almost as low as it had been pre-iodization. A subsequent analysis of 25 samples of salt available on the market revealed that more than a half (56%) contained less that 15 ppm of iodine, and 68% contained less than 35.6 ppm, the minimum required by the Lebanese law. To corroborate this data, the Ministry of Public Health conducted a parallel study, which confirmed that only 1 out of 38 samples of retail salt was adequately iodized. These findings serve to highlight gaps in the salt iodization program that are likely due to the weak implementation of the law by salt producers as well as the frail monitoring and evaluation systems.  

In 2007, the Lebanese Standards Institution (LIBNOR), a public institution attached to the Ministry of Industry, published a standard on food-grade salt. In 2011, the government passed a revised legislation modifying the amount of iodine added to salt, which narrowed the range to 60–80 mg of KIO3 per kilogram of salt.

Policy dialogue  
Earlier this year, Prof. Omar Obeid, IGN National Coordinator for Lebanon and Professor of Nutrition at the American University of Beirut (AUB), commissioned the K2P Center in Beirut (a designated WHO Collaborating Center for evidence-informed policy and practice) to develop a Policy Brief and organize a Policy Dialogue to inform changes in the iodization law to

The history of salt iodization in Lebanon

1963–1966
- High prevalence of goiter in children across all socio-economic strata in Beirut (1).
- High goiter rates and low urinary iodine among schoolchildren in a coastal mountain village (2).
- Very low iodine intake reported in a local study (3).

1971
- Law 178/1971 was adopted, requiring the addition of 10–200 mg or iodine per kg of table and cooking salt.

1995–1997
- Full implementation of salt iodization by the MoPH in cooperation with UNICEF.
- 85% of Lebanese households consumed adequately iodized salt in 1995, and 91% in 1996.
- A post-implementation survey showed marginal iodine deficiency in children (median UIC of 95 μg/L).

2004
- 82% of salt in the market contained more than 15 ppm of iodine.
- 92% of households consumed adequately iodized salt.

2011
- Law 178/2011 permitted the use of potassium iodide or potassium iodate as a fortificant.

2014
- Implementation decrees of law 178/2011 were published.
- National assessment of iodine status in children showed iodine deficiency (66 μg/L).
ensure optimal iodine nutrition in Lebanon. The Policy Brief was formulated in collaboration with the Center for Research on Population and Health (CRPH), and informed the meeting, convened in April. Attended by the Director General of the Ministry of Public Health, the policy meeting brought together different stakeholders and representatives from the Ministry of Industry, the Ministry of Economy and Trade, the Ministry of Education and Higher Education, LIBNOR, the Consumers Lebanon, the four largest salt producers in Lebanon, international non-governmental organizations, as well as physicians, experts, and academics. The key barriers to successful implementation of USI, identified in the Brief, include gaps in the iodization law and a lack of clarity among salt producers as to whether the law is in effect. In addition, the existing infrastructure and iodization capacity of salt producers is limited.

The Brief identified three policy aspects that need to be addressed in order to achieve the goal of optimal nutrition across Lebanon:

1. Amend or replace law 178/2011 to close the loopholes
   This could be achieved by: (i) establishing a national USI/IDD coalition; and (ii) clarifying the form and amount of iodine used in fortification. After 2–3 years of implementation, consider the need to extend the fortification law to include the salt used in food processing.

2. Strengthen the implementation of the existing universal salt iodization law by ensuring adequate standards, infrastructure, and capacity
   This can be achieved by (i) aligning the LIBNOR standard on salt with international and local evidence, making it mandatory and requisite in implementation decrees; (ii) supporting the salt industry to ensure adequate infrastructure and suitable equipment for salt iodization and packaging; (iii) training of salt industry managers and employers; and (iv) implementing a communication strategy with the industry.
3. Monitor and evaluate the implementation of the law

This could be achieved by (i) conducting a salt situation analysis to understand the structure of the overall salt industry and areas where monitoring may be needed, and (ii) monitoring salt iodine content at the production, retail, and consumer levels by building an efficient system for routine data collection.

Dialogue participants discussed the three elements and implementation considerations before collectively developing next steps that would address iodine deficiency in the Lebanese population.

Representing the IGN was Prof. Michael Zimmermann, Chair of the Iodine Global Network, who also visited, together with Prof. Obeid, Lebanon’s four largest salt producers, who contribute 90% of the salt consumed in the country. The salt producers’ main concern was the lack of their ability to quantitatively assess the iodine content of the salt they are producing. Over the next weeks, the IGN will provide financial and technical assistance to the factories to improve their internal monitoring systems, and allow them to perform systematic, quantitative quality control of salt iodine concentration.

References

Salt producers in Lebanon are ready to iodize salt

Ever since he came to the American University of Beirut (AUB) in Lebanon in 2001, Prof. Omar Obeid has been keen to tackle iodine deficiency in the Lebanese population. “Although iodization of all refined salt was mandatory, there was insufficient evidence that this was being done in practice,” he recalls. Data collected by his students consistently showed that salt purchased on the market contained little or no iodine, which meant that the country was at risk of iodine deficiency. “To attract attention to this issue, I decided that the best way forward was to generate evidence that would convince the government to act.”

In 2014, with his team at the AUB, he raised funds to implement a national survey of school-age children, which assessed the iodine status using urinary iodine concentrations. “In Lebanon, almost 96% of children go to school, and most children attend public schools. This means that the data we were able to collect was highly representative,” he explains.

The survey results demonstrated that more than a decade of efforts to implement salt iodization has not led to the expected improvement. With a median urinary iodine concentration of only 66 μg/L, the population was iodine deficient, which Obeid admits came as a surprise. To him it was a sign that, in the absence of regulatory monitoring from the government, the salt producers were falling behind.

“Even though the urinary iodine levels are slightly higher than they were before salt iodization, this increase could be put down to a general improvement in the diet, rather than to iodized salt,” he explains.

But the survey generated the interest Obeid was hoping for, and the recent Policy Dialogue meeting has opened the door to more discussions and action from both the government and the salt producers.

One of the areas to address will be the legislation itself, which according to the producers, has been unclear. As a result of the meeting, the Ministry will issue an amendment to clarify that the iodization range of 60–80 ppm refers not to iodine but to potassium iodate (KIO₃). In turn, the salt producers will formally apply for a licence to import iodine for the purpose of iodizing salt and will conduct internal quality checks to ensure a consistent high-quality output. The internal monitoring will be conducted using portable iCheck photometers donated by the IGN, and Prof. Obeid will oversee the training.

The impact of correctly implemented iodization could be enormous not just for Lebanon, but also for its neighbor Syria, which relies heavily on salt imports from Lebanon to meet its domestic demand. This has not escaped the attention of several international development agencies. UNICEF Lebanon is willing to supply KIO₃ to the Lebanese salt producers free of charge, on condition that they will take over the responsibility after one year. In addition, 1.5 million Syrians who are already living in Lebanon will benefit from adequately iodized salt.

To ensure that iodized salt is reaching the consumers, the Ministry of Public Health will need to invest more resources to support external monitoring at the production, market, and household level. Prof. Obeid hopes that the government and the salt producers will formalize their mutual responsibilities, and iodization can soon begin. “Now that the salt producers are aware of the important role they can play in preventing iodine deficiency in Lebanon, all stakeholders are on board and ready to iodize. In a year’s time, we hope to report that iodine deficiency in Lebanon is under control.”
Sustaining the elimination of iodine deficiency disorders

Progress Report submitted to the 69th World Health Assembly, 23–28 May 2016

As WHO finalizes the update of the Micronutrients Database in the Vitamin and Mineral Nutrition Information System (VMNIS), the Iodine Global Network has been tracking the progress of public health efforts to eliminate iodine deficiency disorders. Since 1993, tremendous progress has been made in reducing iodine deficiency globally. It was estimated in 1993 that the populations of 110 countries had inadequate iodine intakes; this has been steadily reduced over the years to 54 countries in 2003, 47 in 2007, 32 in 2012 and only 25 in 2015 (1). However, these data are based primarily on school-age children and it is now known that the adequate iodine nutrition status of school-age children may not indicate adequate iodine nutrition status among other population groups, such as pregnant women, who are particularly vulnerable to iodine deficiency (2). More surveys are starting to assess the iodine status of pregnant women but data from most countries are currently limited.

Although the number of countries where iodine deficiency is a public health problem has been reduced, the number of countries whose populations have excessive iodine intakes (median urinary iodine concentration ≥300 μg/L) has been rising— from 7 in 2007 to 13 in 2015 (1). Susceptible groups within these countries may be at risk of adverse health consequences, such as iodine-induced hyperthyroidism and autoimmune thyroid disease (3).

The preferred strategy for the control of iodine deficiency disorders remains universal salt iodization (USI). In 2014, WHO released updated guidance on salt iodization recommending that all food-grade salt, which is used in households and food processing, be fortified with iodine for the prevention and control of iodine deficiency disorders (4). It was recognized that strategies for salt reduction and salt iodization are compatible and that monitoring of both salt/sodium intake and iodine intake at the country level is needed to ensure that individuals consume sufficient iodine despite reductions in salt intake. The concentration of iodine should be adjusted by each country in the light of their own data regarding dietary salt intake. Data on household coverage with iodized salt are summarized each year by UNICEF in its annual reports on the state of the world’s children. According to the 2015 report (5), primarily reflecting data from the period 2009–2013, 75% of households worldwide are estimated to have access to iodized table salt.

In 2016, WHO will review the accuracy of commonly used biomarkers in screening and diagnostic tests for assessing the iodine status in different populations. These reviews are expected to inform updated guidance.

References

“Monitoring and evaluating the impact of programmes to control iodine deficiency disorders are crucial for ensuring that interventions are effective, safe, and equitable.”

Iodine supplementation is also an option for the control of iodine deficiency disorders, particularly for vulnerable groups such as pregnant women and young children living in high-risk communities who are unlikely to have access to iodized salt (6) or as a temporary strategy when salt iodization is not successfully implemented. WHO has commissioned an updated systematic review on the effects of iodine supplementation for women during the preconception, pregnancy and postpartum periods and is updating guidance on the use of iodine supplements as part of routine antenatal care in 2016 (7).

Monitoring and evaluating the impact of programmes to control iodine deficiency disorders are crucial for ensuring that interventions are effective, safe, and equitable. It is recognized that there is a need for updated guidance on the use and interpretation of biomarkers for assessing iodine status.
Iodine deficiency re-emerges in Cambodia as vigilance slips

Due to a lack of regular monitoring and enforcement from government agencies, salt iodization in Cambodia has gone from being well implemented to marginal within less than a decade. New data shows that iodine deficiency rates are nearing the levels reported in 1997, when 1.7 million Cambodians were estimated to suffer from iodine deficiency.

In 2004, fewer than one in three (28%) households in Cambodia were using iodized salt (1). This situation improved over the following decade thanks to the 2003 Sub-Decree No. 69 on mandatory iodization of salt. Coverage increased to approximately 70% in 2011. Unfortunately, this achievement was not sustained. In 2014, a survey reported that the proportion of non-iodized salt in the market had increased to 62% (2,3). This increase coincided with the Cambodian government and the salt producers becoming solely responsible for the supply of potassium iodate. But the levels of iodine added to salt appear to be inadequate, with 99.6% of the coarse salt and 82.4% of the fine salt tested having iodine levels outside the government standard of 30–60 ppm (2).

New national data confirms a decline in iodine status in pre-school children and their mothers

In 2014, the Cambodian Demographic and Health Survey (2014 CDHS) and the National Micronutrient Survey 2014 (CNMS-2014) presented the first opportunity in over a decade to collect nationally representative data on iodine status of women and children. The CDHS included a representative sample of 16,356 households in 611 villages (clusters). To provide data on iodine intakes, the micronutrient survey (CNMS-2014) revisited 1/6 of the main survey clusters and collected urine samples from women aged 15–49 years who had given birth in the five years preceding the survey and from their pre-school children (aged 6–59 months). The surveyed households were divided into wealth categories according to their socio-economic status. In total, 736 women and 950 children provided a urine sample. Of these, 21% were living in urban areas, and 79% in rural areas. Among the surveyed households, 42.6% were found to be in the “poorest” category, 17.8% in the “middle” category, and 39.4% in the “wealthiest” category.

Within the CNMS sub-sample, 75.6% of the household salt samples tested positive for the presence of iodine with a rapid test kit (RTK). The median UIC was found to be below 100 μg/L for both mothers and children, suggesting inadequate iodine intakes. The women’s iodine status was significantly associated with their socioeconomic status, urban or rural residence, and access to salt containing iodine. Mothers in the poorest households had the lowest median UIC (55 μg/L, IQR 27–90 μg/L), and those in the wealthiest households had the highest median (75 μg/L, IQR 43–121 μg/L). The prevalence of UICs below the WHO adequate level (<100 μg/L) was higher in rural areas, and in those households where salt tested negative for iodine. Similar trends were significant among the children (Table 1).
Iodine intake among pre-school children declines with age, which could be prevented with adequately iodized salt

It is thought that almost 40% of children under the age of five in low- and middle-income countries do not achieve their full mental potential, partly due to iodine deficiency (4,5). In Cambodia, the median UIC was shown to decrease with age, from 90 μg/L in the youngest children to only 55 μg/L by the age of five. This is a major concern, which could partly be explained by declining rates of breastfeeding after 6 months (from 85.8% among 6.0–11.9 month-olds to 57.6% among 12.0–23.9 month-olds), coupled with insufficient levels of iodine in salt (6). It is thought that breast milk and iodized salt alone may not provide enough iodine to meet a child’s needs from the age of 6 months, especially if the mother is only marginally iodine sufficient, unless complementary foods are also fortified with iodine (7). Foods that are naturally rich in iodine are scarce in Cambodia, and the limited availability of adequately iodized salt or other iodized processed foods (e.g., condiments) contributes to the lower iodine intakes in older children. The presence of iodine in household salt was a significant predictor of a higher median UIC among both children and their mothers, which shows that adequately fortified foods or condiments have the potential to improve iodine status.

 Ensuring equitable access to iodized salt is critical

Almost three-quarters of children in the poorest socio-economic group (compared with 48% in the wealthiest category) had UICs consistent with iodine deficiency. Even children in the middle wealth category had a 2.8-times greater odds ratio of having insufficient iodine intakes than the wealthiest households. Although Cambodia has a number of services and provisions targeting the poorest (for example, health equity funds), this may not be enough to combat iodine deficiency. The DHS rapid test kits demonstrated that three out of four household salt samples tested positive for some iodine, which suggests that a large proportion of the salt is iodized, but not well enough to have a significant impact on iodine status. Unpackaged and unlabeled coarse and refined salt is also available in the market and is often sold at a lower price, which probably compounds the problem for the poorest groups who need iodine the most.

Conclusion

The CDHS/CMNS results highlight the immediate need to strengthen the IDD program in Cambodia to prevent a further decline of iodine status in Cambodia and to protect vulnerable populations from the consequences of IDD.

References

1. Conkle, J et al. Cambodia children have ample iodine intake but only 70% of households are covered by iodized salt. IDD Newsletter 2013, 41, 4–7.

| TABLE 1 | Median urinary iodine (UIC) in pre-school children and their mothers from surveyed households in Cambodia in the 2015 CMNS shows inadequate intakes and a link between iodine status and wealth, residence, and child age. |
|------------------|------------------|------------------|------------------|
| Children         | Women            |                  |
|                  | Median UIC (µg/L) | 25th – 75th percentile |
| Total            | 72               | 36–136           | 63               | 33–101           |
| Living area      |                  |                  |
| Urban            | 112              | 52–172           | 78               | 45–130           |
| Rural            | 64               | 33–122           | 58               | 31–93            |
| Wealth category  |                  |                  |
| Poorest          | 51               | 27–106           | 55               | 27–90            |
| Middle           | 61               | 30–110           | 56               | 31–90            |
| Wealthiest       | 104              | 53–167           | 75               | 43–121           |
| Age (children)   |                  |                  |
| 6–11 months      | 90               | 50–179           | –                | –                |
| 12–23 months     | 72               | 40–139           | –                | –                |
| 24–59 months     | 72               | 34–129           | –                | –                |
| 60+ months       | 55               | 34–126           | –                | –                |
| Access to iodized |                  |                  |
| Yes              | 75               | 39–141           | 68               | 36–110           |
| No               | 62               | 30–101           | 49               | 21–77            |
| Packaging        |                  |                  |
| Labeled iodized  | 92               | 46–162           | 76               | 43–119           |
| Not labeled      | 60               | 29–117           | 53               | 26–89            |

Unpackaged or unlabeled salt, which may be inadequately iodized, can still be purchased in Cambodia.
Estimating inadequate and excessive iodine intakes from the distribution of urinary iodine concentrations


This study proposes a new approach to estimating the number of individuals with deficient or excess iodine intakes in a population based on the adjusted UIC distribution from spot urine samples.

Because both deficient and excessive iodine intakes can have adverse health consequences, it is important to assess habitual iodine intakes in populations. The urinary iodine concentration (UIC) is a reliable biomarker of recent iodine intake in populations at all levels of intake, because >90% of ingested iodine is excreted in the urine in the subsequent 24–48 h. But accurate dietary assessment of habitual iodine intake at the individual level is difficult because day-to-day variation in iodine intake is high. In iodine-sufficient countries where most iodine intake comes from iodized salt, UIC (both spot and 24-h urine collections) show an individual day-to-day variation of 30–40% (1).

UIC surveys in school-age children are the recommended method to monitor iodine nutrition in populations, and the median (mUIC) is a reliable population indicator of iodine status; a mUIC of 100–199 μg/L in school-age children indicates adequate iodine nutrition. Unfortunately, the distribution around the mUIC in surveys is often misinterpreted in an attempt to define the number of individuals who are deficient (those with a spot UIC <100 μg/L) or have excess intakes (those with a spot UIC ≥300 μg/L). In an individual whose average daily iodine intake is adequate to maintain euthyroidism, the expected daily variation will result in many individual days when a UIC value will be less than adequate. Thus, even in populations in which iodized salt ensures adequate thyroid stores, there will nearly always be individuals with a UIC <100 μg/L on the day of the survey, but they should not be classified as iodine deficient.

**Accounting for within-person variation using repeated urine samples**

Nutrient inadequacy of habitual dietary intakes is conventionally assessed by the Estimated Average Requirement (EAR) cutoff method, using the population distribution of intakes; the percentage of individuals with usual intakes below the EAR are at risk of nutrient deficiency, and intake is satisfactory when 97–98% of individuals meet the EAR. This method could be applied to the distribution of iodine intake calculated from UIC distributions. However, without accounting for within-person variation, the EAR cutoff method will usually overestimate the prevalence of deficiency. Thus, iodine intakes calculated from the UIC distribution need to be adjusted for within-person variation. Within-person variation can be calculated if repeat UIC samples from the same individual in a subset of the study population are collected, and its effect on the distribution can then be adjusted statistically to more closely resemble the distribution of habitual intakes. The prevalence of iodine deficiency could then be defined as the proportion of the population below the EAR from the adjusted distribution. A similar approach, applied to the upper tail of the UIC distribution, could be used to compare intakes with the Tolerable Upper Intake Level (UL) for iodine to estimate the prevalence of excessive intakes. The aim of this study was to use the EAR/UL cutoff method and internal within-person variance to develop a new approach to estimate the prevalence of deficient and excessive iodine intakes from distributions of UIC in school-age children.

**Estimating iodine intake from UIC**

The authors used unpublished data from 4 large national studies of school-age children in Kuwait (carried out in 2014), Oman (2014), Thailand (2012), and Qatar (2014), and a large regional survey in China. The ages of children in these studies were 6–12 y in Kuwait, 6–14 y in Oman, 5–13 y in China and Thailand, and 4–14 y in Qatar. The investigators at each site were asked to collect repeat urine samples in ≥10% of the subjects. According to the WHO classification, Kuwait, Oman, and China with mUICs of 131.6, 191.5, and 198.7 μg/L, respectively, would be classified as having “adequate iodine intakes,” Thailand with a mUIC of 261.5 μg/L as having “more-than-adequate” iodine intakes, and Qatar with a mUIC of 333.2 μg/L as having “excessive” iodine intakes. The study used the EAR and UL for iodine established by the US Institute of Medicine (IOM) (5). The EARs for iodine for girls and boys aged 4–8 y and 9–13 y are 65 and 73 μg/d, respectively. The ULs for iodine for girls and boys aged 4–8 y and 9–13 y are 300 and 600 μg/d, respectively. The authors used the following equation to calculate the daily iodine intake from a spot urine sample as proposed by the US IOM (5):
Iodine intake (µg/d) =

\[ \text{UIC (µg/L)/0.92 \cdot (0.0009 L \cdot h^{-1} \cdot kg^{-1} \cdot 24h \cdot d^{-1}) \cdot weight (kg)} \]

In this equation, 0.92 refers to 92% bioavailability and 0.0009 L \cdot h^{-1} \cdot kg^{-1} refers to excreted urine volume from studies in children (6).

The iodine intake distributions were extrapolated from the single spot urine sample using the Iowa State University method (2,7). An estimate of variance from the subsample in which repeated urine samples were collected was applied to the entire population. After this adjustment, the distributions were compared with the EAR and the UL cutoffs (demonstrated in Figure 1 using data from the Kuwait survey). The resulting proportion of children with daily iodine intakes below the EAR and above the UL are shown by age group and country (Table 1):

1. without adjustment, based on a single UIC sample,
2. after adjustment for internal within-person variance.

Improving the estimate of iodine intake in populations

This promising approach to improving iodine monitoring in populations may allow iodized salt program managers to estimate the average increase in daily iodine intake in the population needed to reduce the prevalence of usual iodine intakes below the EAR to <3%, indicating overall adequate iodine intake. Conversely, in countries that have high iodine intakes, a similar approach to compare the UL with the current 97.5th percentiles of intake could predict the decrease in dietary iodine needed to achieve only 2–3% of intakes above the UL. In addition, by accounting for intra-individual variation, it may be possible to reduce the required sample size in UIC surveys to less than the >500 samples now recommended for population assessment. Future studies should determine the minimum number of repeat urine samples needed to estimate within-subject variation. The relation between body weight and daily urine volume should be validated in different settings around the world. Finally, all of these questions need to be tested in other populations with different iodine status and different diets.

Key references


**TABLE 1** Prevalence of inadequate iodine intake by the EAR and UL cutoff method with the use of internal variance estimates to adjust the usual intake distribution in children aged 4–8 and 9–13 y in Kuwait, Oman, and China.

<table>
<thead>
<tr>
<th>Age group of children</th>
<th>Unadjusted prevalence below the EAR</th>
<th>True prevalence below the EAR, adjusted with internal variance</th>
<th>Unadjusted prevalence above the UL</th>
<th>True prevalence above the UL, adjusted with internal variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kuwait - 4-8 y</td>
<td>35.3 ± 1.7</td>
<td>19.4 ± 5.7</td>
<td>2.4 ± 0.5</td>
<td>0.2 ± 0.4</td>
</tr>
<tr>
<td>Oman - 4-8 y</td>
<td>24.3 ± 1.8</td>
<td>7.5 ± 4.7</td>
<td>2.7 ± 0.7</td>
<td>0.2 ± 0.5</td>
</tr>
<tr>
<td>China - 4-8 y</td>
<td>20.5 ± 2.5</td>
<td>10.1 ± 4.4</td>
<td>10.2 ± 1.9</td>
<td>8.2 ± 4.0</td>
</tr>
<tr>
<td>Kuwait - 9-13 y</td>
<td>30.9 ± 1.4</td>
<td>17.4 ± 3.6</td>
<td>0.7 ± 0.2</td>
<td>0.1 ± 0.1</td>
</tr>
<tr>
<td>Oman - 9-13 y</td>
<td>18.6 ± 1.1</td>
<td>10.5 ± 2.1</td>
<td>0.4 ± 0.2</td>
<td>0.2 ± 0.2</td>
</tr>
<tr>
<td>China - 9-13 y</td>
<td>24.0 ± 3.9</td>
<td>3.5 ± 7.3</td>
<td>1.7 ± 1.2</td>
<td>0.0 ± ND</td>
</tr>
</tbody>
</table>

EAR, Estimated Average Requirement; ND = SE not determined; UL, Tolerable Upper Intake Level.
Iodine deficiency in the UK: grabbing the low-hanging fruit

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In this era of global obesity and diabetes epidemics, simple solutions to public health problems seem almost inconceivable. And if such an easily solved issue were to arise, it might be expected that politicians and public health authorities would jump at the chance to respond, claim victory, and improve the health of the population.

The UK’s iodine-deficiency problem is one such issue. We’ve known since 2011 that the UK population is mildly iodine deficient. In fact, the country now ranks seventh among the ten most iodine-deficient nations in the world, one of only two high-income countries on the list.

Iodine deficiency is a particular issue during pregnancy and lactation, when the body’s demand for iodine escalates. Studies have shown that low maternal iodine concentrations during pregnancy are associated with reduced verbal intelligence quotient (IQ) and reading abilities in children. WHO now recommends that pregnant and lactating women increase their iodine intake from 150 to 250 μg per day. However, the UK Scientific Advisory Committee on Nutrition (SACN) has not updated the UK recommendations accordingly. And although the guidelines from the UK National Institute for Health and Care Excellence (NICE) for nutrition during pregnancy include recommendations about folic acid and vitamin D, iodine is not mentioned. SACN says that insufficient scientific evidence is available to justify updating UK recommendations for iodine requirements during pregnancy. True, few studies have investigated the effect of iodine supplementation on cognitive development in offspring, and the results are not unequivocal. Yet, faced with similarly mild levels of iodine deficiency and the same amount of scientific evidence, other high-income countries—including Germany, Switzerland, and the Netherlands—have taken swift action.

So what is the solution? WHO recommends that iodized household salt be the primary source of additional dietary iodine. But mandatory salt iodization is an unpopular idea in the UK. Iodized salt is manufactured in the country, but is produced almost entirely for export and is not widely available to the public. Part of the problem might also be a perceived conflict between the idea of promoting consumption of iodized salt and the UK’s successful salt reduction initiative, which contributed to the ethos that all salt is bad. But WHO has continued to stress that iodine fortification via salt does not require individuals to increase their consumption.

A related approach would be to mandate the use of iodized salt in processed foods that are consumed by a large proportion of the population. This was the approach taken in Australia and Denmark, where the government mandated the use of iodized salt in the manufacture of bread and other products.

If mandatory iodine supplementation proves to be too extreme a policy approach in the UK, we must at least ensure that iodine intake is sufficient in those who need it most: women of childbearing age, and those who are pregnant or lactating. This strategy could be easily accomplished by distributing commercially available prenatal vitamins containing iodine. Such a strategy also makes good economic sense: a cost effectiveness analysis published in 2015 showed that providing iodine tablets to pregnant and lactating women in the UK could potentially save money when the societal and economic costs of reduced IQ in infancy are taken into account. Educational campaigns are also essential to increase awareness of the importance of iodine during pregnancy, and to promote the consumption of iodine-rich foods, such as milk and white fish.

SACN is out of step on the issue of iodine deficiency, and immediate action, based on existing evidence, is needed before the problem gets any worse. Iodine deficiency is the low-hanging fruit of public health in the UK: it’s time to grab it.

Symposium presentations and photos are available at: www.ign.org/ukiodinemeeting.htm

Iodine and pregnancy was the subject of a symposium held on March 17 at the Royal College of Obstetricians and Gynecologists (London, UK), under the auspices of the Iodine Global Network. The symposium convened researchers, health professionals, and advocates to discuss the problem of iodine deficiency in the UK, and why this issue has failed to capture the attention of politicians and public health authorities.
IDD in Slovakia: 65 years of prevention

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History of IDD prevention in Slovakia
The history of IDD prophylaxis in Slovakia spans more than six decades. It began with a large national survey in 1949–1953, which found that 3% of the population suffered from endemic cretinism. In the three most affected regions, goiter was diagnosed in 70% of girls, 63% of boys, 80% of adult women, and 46% of men. The urinary excretion of iodine was found to be less than 25 μg in 24 h, consistent with severe iodine deficiency (1).

Prevention of IDD with iodized salt in Slovakia began in 1951. The amount of iodine in salt was gradually increased from 7 mg KI per kg of salt to 12 mg/kg in 1953. Since 1965, common salt contained 25 ppm KI (18 ppm of iodine), and in 2000 the more stable KIO3 was introduced. Since 1966, addition of iodine has been mandatory, which has yielded remarkably good results: iodine intake has increased 2–4 times, and endemic goiter and cretinism have been all but eliminated (2).

As the scientific direction and political situation changed in the 1970s, IDD prevention gradually slipped from the research and government agenda, and systematic surveillance became voluntary. In the decade of 1985–1995, only a few papers were published on the effectiveness of IDD prevention, and their findings were inconsistent: one research group stated that the existing iodine prophylaxis was insufficient (3), and another proclaimed its success (4). In 1994–1995, an international study to evaluate iodine deficiency in Europe confirmed that Slovakian school-children were iodine sufficient. At that time, Slovakia was one of only five countries with sufficient intakes, and the highest in Europe (5). Since 2000, Slovakia has stopped all domestic production of iodized salt and has been entirely dependent on imports, mainly from Austria, where the iodization standard is the same as in Slovakia.

New pilot study confirms optimal iodine nutrition
To determine current iodine status across all age groups in Slovakia, and in vulnerable populations such as pregnant women, a pilot survey was conducted from June 2014 to October 2015. Urine samples were collected from 426 volunteers aged 3–75 years from three regions: Bratislava in the southwest, and Orava and Liptov in the north, to measure urinary iodine. In pregnant women, iodine intake from pre-natal multivitamin preparations (typically containing 150 μg iodine) was also taken into account.

The median 24-h urinary iodine excretion was 218 μg/24 h, and all groups were found to have adequate iodine intakes. Among pregnant women, 60% had iodine intakes slightly below the recommended amount of 250 μg/day, which may put them at risk of mild iodine deficiency. Pregnant women who were taking a multivitamin were found to be iodine-sufficient, with a median UIE of 320 μg/24 h. The study also found a good correlation between 24-h urinary sodium and iodine excretion, indicating that iodized salt is the main source of dietary iodine for all population groups.

Conclusions
Despite the limited support that the IDD program has received since the 1970s and the impact of globalization on changing sodium and iodine consumption habits, iodine nutrition has remained optimal in Slovakia. Annual monitoring of table salt by regional public health officers has shown that more than 95% of imported salt contains adequate amounts of iodine.

WHO recommends that pregnant and lactating women should consume 250 μg of iodine daily. But increasing intake from 150 μg/day (i.e., recommended intake before pregnancy) to 250 μg/day through diet alone may be unrealistic. As shown in this study, pregnant women who took iodine-containing supplements had a better iodine status. Routine prenatal iodine supplementation is recommended by professional bodies in North America and Europe, but it is unlikely that this is systematically adhered to in many European countries. In Slovakia, pre-natal supplements may play an even more important role in the future as table salt consumption is expected to fall in the general population.

References
Fortifying bread with iodized salt improves iodine status in New Zealand

New Zealand has a history of iodine deficiency due to the naturally low levels of iodine in the soil. Thanks to early introduction of iodized salt, by the 1950s the iodine status in New Zealand had improved and goiter virtually disappeared. Iodine intakes further increased in the 1960s when the dairy industry began using iodophors as a sanitizer, which contaminated milk thereby increasing the iodine content of dairy products. However, the replacement of iodophors in the dairy industry and a change in consumer food habits (e.g., decreasing use of discretionary salt and rising popularity of non-iodized rock and sea salts) led to a decline in iodine intake (1). In response, Food Standards Australia New Zealand (FSANZ) mandated the use of iodized salt in bread in 2009. Standard 2.1.1 requires that “iodized salt be used for making bread where salt would otherwise be used.”

Thanks to fortified bread, children in New Zealand are iodine sufficient

A cross-sectional study was conducted from March to April 2015 in two New Zealand cities: Christchurch in the South Island and Auckland in the North Island. The study measured UIC and thyroglobulin (Tg) in 415 schoolchildren aged 8–10 years from 20 schools. All children completed a questionnaire consisting of socio-demographic questions and an iodine-specific food frequency questionnaire (FFQ).

The median UIC (IQR) was 116 (82–156) µg/L, which is almost double the median reported before the mandatory fortification (68 µg/L in 2002) (2). The Tg concentration prior to fortification was 12.9 µg/L (2), which declined to 10.8 µg/L in 2011, and in the current study was 8.7 µg/L, which indicates iodine sufficiency (Table 1). New Zealand is the only country that has sequentially measured Tg in children during the transition from iodine deficiency to sufficiency over a 15 year timespan. Together, the UIC and Tg data confirm that the iodine status of New Zealand children has improved since the mandatory fortification of bread.

Interestingly, socio-economic status, salt type, and consumption of fortified bread were not significant predictors of UIC, whereas ethnicity and sex were. The higher UIC in boys observed in this study is likely a result of boys having higher energy intakes than girls. According to the 2002 CNS, the main source of energy in this age group is bread (17%) (3). Therefore, not only are boys consuming more energy and thus more likely to have higher iodine intakes, but a higher proportion of their energy is likely to come from fortified bread. Of particular interest was that children of Asian ethnicity had the highest UIC, which has not been noted in previous studies. Little is known about the dietary patterns of Asian children, and the group is unlikely to be homogeneous. However, these children may consume more seaweed, fish, and seafood, which are rich sources of iodine.

Contribution of bread and salt to iodine intakes

The 2002 CNS estimated that only 1% of dietary iodine was supplied from bread, with milk and dairy products making the largest contribution (40%) to iodine intakes in children (3). FSANZ predicted that bread would supply ~48% of total dietary iodine after fortification. In 2011, 47% of the total iodine intakes was found to come from bread, which increased to 51% in this study. Of note was the difference between the mean iodine intakes from the food-only and food-plus-iodized salt models (65 µg/day vs. 101 µg/day) which suggests that iodized salt is still likely to be a key contributor to iodine in the diet, highlighting the importance of including a measure of iodized salt when assessing dietary iodine intake.

References


Mild iodine deficiency persists in districts of Odisha

Dr. Sourav Bhattacharjee UNICEF, Odisha and Dr. Radha Mohan Tripathy

Odisha is a mountainous state in eastern India. Only 15% of its 36 million inhabitants live in urban areas. Following the National IDD control program, the state of Odisha enforced universal salt iodization and banned the sale of non-iodized salt for human consumption. Despite these efforts, the first state-wide survey of iodine nutrition in school-age children (2003–2004) reported a total goiter rate of 8%, a median UIC of 85 μg/L, and a low household coverage of adequately iodized salt at 45% (1). Recently, the state government conducted a new survey to assess the current iodine status and IDD awareness across the districts where IDD has been endemic. The survey was carried out in collaboration with UNICEF Odisha Office and the Department of Community Medicine, MKCG College in Berhampur.

Study design
The survey employed a multi-stage sampling design with stratification by Northern, Central and Southern regions and selected three districts from each stratum (in total 9 out of the 17 districts recognized as endemic: Ganjam, Rayagada, Malkangiri, Cuttack, Nayagarh, Puri, Sambalpur, Keonjhar and Sundargarh). Nine villages were selected in each district with a total of 100 households per district (900 households in the study). Urine samples were collected from school-age children (aged 6–12 years) in every fifth household (180 samples in total). Selected households, as well as school-teachers, anganwadi workers (AWWs), retail shopkeepers, and members of village panchayat were surveyed about their knowledge, attitude, and practices toward iodized salt and IDD. Salt samples were collected from all households and tested for iodine content by iodometric titration. Urine samples were analyzed at the Department of Community Medicine, MKCG College using the Sandell-Kolthoff method.

Goiter has disappeared but many are not aware of the need for iodized salt
There were no cases of clinically palpable or visible goiter among the 180 children. However, nearly 70% of the surveyed population did not know about the benefits of iodized salt. Those who had some knowledge said it came from mass media and school. The level of knowledge about iodized salt was not related to the educational attainment of the head of the household. Predictably then, educational attainment had no influence on the type of salt consumed. Majority of respondents relied on the information provided by the retailer to identify iodized salt, and fewer than 10% mentioned the smiling sun logo. In most households, salt was stored inappropriately, i.e., either uncovered or in covered containers that were not tightly closed.

The use of refined salt was the highest in the Northern and Southern regions (86% and 80%, respectively). The exclusive use of Bargara salt (large-crystal salt that is difficult to refine and fortify) was the highest in the Central region (5.3%). Out of 16 retailer salt brands tested in the study, only three were adequately iodized. In the households, the mean salt iodine content was less than 15 ppm in most districts except Puri and Sundargarh.

Mild iodine deficiency persists in several districts
The median UIC was below the recommended 100 μg/L in four out of the nine endemic districts. Malkangiri, where the lowest overall median urinary iodine was recorded, remains one of the most vulnerable districts in the state. These findings highlight the need for a comprehensive strategy to generate more awareness about iodized salt and IDD across Odisha. The strategy should call upon Accredited Social Health Activist (ASHA), Anganwadi workers (AWW) and teachers to include appropriate IEC activities in their work to improve the use of iodized salt in the community. More effort should be made by the Food Safety Office to monitor salt trade, and more use should be made of the Public Distribution System (PDS) to distribute iodized salt to the population at subsidized rates. Media, both print and electronic, can play a role in providing the correct information to the majority who have no knowledge about iodized salt. There is also a pressing need to set up a state-level multi-stakeholder coalition to strengthen USI.

References
Do pregnant women in iodine-sufficient areas need iodine supplements?


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A guideline dilemma

Iodine requirements increase during pregnancy because of increased renal excretion of iodine and increased production of the thyroid hormone. The guideline on the assessment of iodine status advises that a median urinary iodine concentration (UIC) in the range between 100 and 199 μg/L measured in school-age children indicates adequate iodine nutrition in the population (1). However, pregnant women, in order to be iodine sufficient, should have a median between 150 and 249 μg/L. This leads to an important question: if the general population has a median UIC ≥100 μg/L but below 150 μg/L, should all pregnant women in this population be advised to take an iodine-containing supplement?

The Technical Consultation between WHO, UNICEF and ICCIDD (2) concluded that pregnant women do not need to take an iodine supplement if iodine intakes in the general population have been adequate and stable (i.e., a median UIC ≥100 μg/L for at least two years). In this scenario, it is expected that the iodine stores in the thyroid gland will be sufficient to cover the extra needs during pregnancy.

When does low maternal iodine intake lead to fetal brain damage?

Brain damage due to iodine deficiency is caused by insufficient thyroid hormone production in the mother in combination with late pregnancy fetal hypothyroidism, and is compounded by hypothyroidism during infancy. However, it is difficult to study the effect of maternal iodine intake in pregnancy on long-term subtle neurocognitive and behavioral abnormalities in the children. A simpler way to evaluate the risk of brain damage is to study the association between iodine intake and thyroid function in the mother and the offspring. In a study performed in Chile, thyroid function and urinary iodine excretion were measured in groups of pregnant women with different levels of iodine intake (3). The study found that a steep increase in the prevalence of maternal hypothyroidism occurred when urinary iodine excretion fell below 50 μg/day. A number of similar studies now suggest that the critical level of urinary iodine excretion at which thyroid dysfunction may start to develop in pregnancy is around 50 μg/L.

At the time of the study, the included women were by definition iodine deficient. Although this study did not investigate iodine supplementation, levothyroxine contains iodine (about 100 μg per dose in this study), which enters the body iodine pool. When the pregnant women’s children were studied at the age of three years, they did not have higher IQ than the children of women who did not receive LT4.

Conclusion

On balance of the available evidence, the current WHO recommendations remain a valid guide on individual use of iodine supplementation in pregnancy. As a rule, pregnant women living in populations with a median UIC ≥100 μg/L do not need iodine supplements if the population has been iodine sufficient for at least two years through high coverage of universal salt iodization.

References

Guinea-Bissau revives USI thanks to new technology

Lorenzo Locatelli-Rossi Universal Salt Consultant and Pita Correia Ministério da Saúde Publica Guinea-Bissau

Each year, more and more solar salt production sites are cropping up in Guinea Bissau. This positive trend has been possible thanks to flourishing private investment. More large-scale solar salt pans are planned in the coming years. A rise in solar salt production, which relies on the power of the sun and the wind to evaporate the brine and crystallize salt, may also precipitate a decline in the more expensive and environmentally harmful traditional technique of boiling the brine.

The annual production of salt in Guinea-Bissau approaches 3,640 tons, which meets just over 60% of the country’s needs, and the balance is covered by imports from the neighboring Senegal. The structure of the salt industry has been one of the biggest challenges for scaling up iodization in Guinea-Bissau: most producers are small, and only some are part of larger salt producers’ associations. Due to basic iodization technology, only 3% of domestically produced salt is iodized. But thanks to recent collaboration with UNICEF, it is hoped that this output will gradually increase (to more than 55% of iodized salt production by the end of 2016, and up to 100% in the following year).

New technology and support from partners
In 2014, UNICEF provided the salt associations and independent producers in Guinea-Bissau with new equipment and materials in order to produce and package iodized salt and achieve better progress toward USI. In October and November 2015, UNICEF and the Ministry of Health conducted a series of workshops and meetings designed to train the producers in the new technology and boost production of iodized salt throughout 2016–2017. All seven salt associations participated in a three-day workshop and practical training at the salt processing plant belonging to one of the associations, WLUTY, in the western region of Bimbo. The topics under discussion ranged from general small-scale business principles, factory “good practices”, quality control, and equipment maintenance. On the final day, the producers learned how to assemble the new equipment, organize iodized salt production teams, and produce a batch of high-quality iodized salt from raw salt to 1 kg bags. Following the workshop, the producers were individually visited by the training team, to assist with the assembly of the new iodizing machine, organizing their production teams, and starting production of high-quality iodized salt. The trained producers now have the capacity to iodize 7 tons of salt per hour, which is sufficient to cover the country’s entire annual output.

Another major milestone has been the formation of a National Network of Iodized Salt Producers, or RENPSI (Rede Nacional de Productores de Sal Iodado). A meeting was hosted by the Ministry of Commerce and attended by four of the seven producers’ associations, the National Food Fortification Alliance (ANFA), which includes the Consumer Protection Group, Nutrition Service, MoH representatives responsible for USI, and UNICEF. RENPSI appointed a provisional Board (see photo) which is currently working to establish its legal status. The first and most important issue RENPSI has to discuss with the government is the lifting of the ban on importing bags for packaging iodized salt. Once the iodization technology has been established, the network will collaborate with the government to support internal and external quality control and assurance. RENPSI will also work together with the Child Survival and Nutrition Department at the Ministry of Public Health, and UNICEF to continue supporting and innovating the national USI program.

RENPSI’s new Board members proudly pointing to the network’s mission statement: “We are the producers of quality iodized salt to fight iodine deficiency disorders.”
The IGN’s 2015 Annual Report:

Accelerating progress towards IDD elimination

Jonathan Gorstein IGN Executive Director

It is an honor to be elected to serve as the Executive Director of the Iodine Global Network. This is a continuation of a cycle which began in 1993 when, as a young intern at the World Health Organization, I worked with the original members of the IGN (then called the ICCIDD) to draft guidelines for program managers to support USI programs and establish the first global database on iodine status.

Over the past 32 years, there has been remarkable progress, and as the iodine landscape has matured, so has our appreciation of what is required to ensure that countries are able to eliminate iodine deficiency and sustain these achievements. The IGN is a unique and remarkable network which brings together all major stakeholders involved with iodine nutrition and serves as a model of how to best foster the collective action of multiple partners. It is a very exciting time to be involved with iodine work. While our focus remains fixed on supporting global efforts to improve iodine nutrition, we operate in a dynamic environment and should harmonize our work with other fortification programs and the broader nutrition agenda. We also need to work closely to align salt iodization with salt reduction strategies.

Over the past several months, the IGN has been collaborating with WHO and other partners to review the current guidance and indicators used to track the performance of national IDD programs. A consultation which took place in December 2015, with the participation of key experts from several major agencies, may lead to a global revision of existing guidance. With regard to regional activities, the IGN was responsible for the implementation of five regional workshops in Middle East & North Africa (Dubai and Casablanca), East & Southern Africa (Tanzania), Eastern Europe & Central Asia (Almaty), and South East Asia (Bangkok), conducted in collaboration with UNICEF, GAIN and MI. The workshops brought together representatives from 45 countries to reflect on their progress towards optimal iodine nutrition, identify challenges, and share emerging science and changes in iodine programs.

At the global level, the IGN has been able to make optimal use of the recommendation from GiveWell (a U.S.-based charity evaluator) and other donors subscribing to the effective philanthropy movement. To secure the recommendation, we were challenged to consider what our impact is as an organization, and what changes are exclusively attributable to the IGN. This has provided us with the opportunity to reflect on who we are, what our added value is and define how we can best provide leadership and facilitate cooperation.

In the regions, the IGN has carried out a remarkable breadth of activity as summarized below:

- The Regional Coordinator for the Americas, Eduardo Pretell, will retire later this year. The region is on the verge of eliminating IDD, and the IGN plans to celebrate this achievement at the upcoming Micronutrient Forum in October. Haiti remains a challenge in the region, however, iodine status appears to be adequate in part because of iodized salt used in bouillon cubes and seasoning powders. In addition, the region is leading efforts to better align salt reduction and salt iodization strategies.

- In China, there is a plan to modify the salt monopoly which will lead to changes in the overall USI program, which has been one of the most successful worldwide. The IGN has continued to provide advocacy work and generate supplementary evidence together with partners to ensure that the program stays strong during this transition.

- In East Africa, the IGN has worked to improve and standardize regional laboratory capacity for the analysis of iodine in salt and urine specimens. There are a lot of activities taking place to accelerate and strengthen national USI programs in the region and the role of the IGN with implementing partners should be strengthened in the region and throughout Africa.

- In East Asia in 2015, the IGN conducted a review of national legislation in the region and has played an important role in the re-establishment of mandatory iodization in Vietnam. The IGN also participated in the first regional SUN Business Network meeting and facilitated a regional workshop for all countries in East Asia and the Pacific.

- In Eastern Europe & Central Asia, the IGN has been advocating the adoption of an amendment to the food fortification law in Russia which would mandate the use of iodized salt in some processed foods. Work is also planned in Georgia and Armenia. Ukraine remains a difficult country due to a combination of factors such as lack of political commitment, economic instability and conflict.

- The Middle East & North Africa Region had considerable activity in 2015. Notably, the IGN was responsible for the implementation of two regional workshops. A five-year plan of action will help to consolidate salt production in the Red Sea province, including investment from Spain, which will go hand in hand with efforts to strengthen legislation across Sudan. Focus in 2015 was also on Djibouti, Morocco, Egypt, and Yemen. National surveys in Djibouti and Yemen were completed and results will help guide program revisions.
In Southern Africa, the IGN supported an iodine survey in Madagascar, which suggests moderate IDD in large parts of the country. The IGN hopes to help revitalize the program and stimulate discussions to develop a revised national plan, as well as provide an initial supply of KIO₃ to ensure the immediate iodine needs of the population are met. IGN has also been working with major salt manufacturers in Southern and West Africa, to advocate for the importance of iodine nutrition and promote iodization as compatible with the principles of corporate social responsibility (CSR).

In South Asia, the IGN together with partners, implemented the first ever national survey of iodine status and salt intake, which shows that 92% of HH salt is iodized, 78% with adequate levels of iodine. The survey also demonstrated that the iodine intake among women of reproductive age is optimal. The IGN has supported missions to Sri Lanka, Nepal and Bangladesh to review their national programs and identify opportunities to further strengthen program efforts.

West Africa has a new Regional Coordinator, Nita Dalmiya (Nutrition Specialist at UNICEF West & Central Africa). In 2015, the focus was on Ghana and understanding the salt situation in Burkina Faso, Togo, and Niger. This initial work led to the identification of the use of iodized salt in bouillon, a widely consumed condiment, as an important source of iodine in at least several countries of the region, and further work is being undertaken to better understand the situation.

In Western & Central Europe, the IGN has been active in national and international advocacy meetings, and participated in a number of publications. The goal has been to highlight that mild IDD persists in many relatively affluent countries, particularly in pregnant women, advocate for the use of iodized salt by major national and regional salt companies, and promote the inclusion of iodine in prenatal supplements.

In 2016, we plan to significantly accelerate our work to support initiatives in countries which have yet to establish functional USI programs, including Angola, Lebanon, Madagascar, Morocco, and Sudan. The focus of these efforts is to reinforce the inputs of implementing partners, together with national stakeholders. In each of the countries, the IGN is in a unique position to provide strong leadership and add considerable value. We are on the verge of achieving something remarkable, the elimination of a scourge that has long plagued the world’s population. The clinical manifestations of iodine deficiency, including goiter and cretinism have virtually disappeared, primarily to the successful deployment of USI programs. The next stage of our work is to ensure optimal iodine intakes in all population groups so that no single child is born with mental impairment.

Executive Director of the IGN since April 2015, Jonathan Gorstein has been working to support the design and implementation of large-scale nutrition programs, including USI, in developing countries for over twenty five years with a focus on strengthening capacity and monitoring and evaluation. He is currently a Clinical Associate Professor in the Department of Global Health at the University of Washington, Seattle.

The Iodine Global Network Board of Directors and the Management Council (Executive Director, Regional Coordinators, and Senior Advisor) at this year’s annual meeting on 16-20 March 2016 in London, UK. The meeting was an opportunity to reflect on our work in 2015 and plan for 2016.
Vietnam adopts a decree on mandatory food fortification

Viet Nam News, 4 February 2016

In February, Vietnam’s Prime Minister Nguyen Tan Dung approved a decree to mandate the addition of iodine, iron, zinc, and vitamin A to food in Vietnam. Decree 09/2016/ND-CP on food fortification, which came into effect on March 15, provides that the four micronutrients should meet national technical standards and regulations on food safety. Salt must be fortified with iodine, iron and zinc must be added to wheat flour, while vegetable oil that contains soybean oil, coconut oil, canola oil or peanut oil is required to have vitamin A. This integrated nutrition and food security strategy targets the most disadvantaged ethnic minorities and those living in poverty, and it seeks to reduce inequity with a goal to improve the nutritional status of more than 36 million women of reproductive age and 7.1 million boys and girls under five years. While statistics show that malnutrition has been significantly reduced, it still accounts for 45% of total deaths in children under five.

World Thyroid Day in the Philippines

To commemorate World Thyroid Day (WTD) and the International Thyroid Awareness Week (23–27 May), a Multi-disciplinary Grand Round was held in Quezon City, the Philippines on Saturday, 28 May. Organized in collaboration with the Thyroid Council of the Philippines, the meeting attracted medical professionals who see thyroid disease in their clinical practice: internists, endocrinologists, nuclear medicine physicians and surgeons, who were able to interact with epidemiologists, molecular biologists, geneticists, bioethicists and other professionals with the aim of improving the existing clinical care of children with thyroid disease. Following the theme of WTD 2016 “Thyroid Diseases in Children”, the meeting presented cases of thyroid diseases (benign & malignant) seen in children. The discussions were moderated by Teofilo San Luis, M.D., Chair of the Thyroid Council, and IGN National Coordinator for the Philippines.

Seminar on iodine and health held in Porto

On 30 March 2016, the University of Porto in Portugal hosted a seminar on “Iodine and Health”, organized by the Iogeneration project and featuring many national and international experts. The panel discussion topics included iodine status in Portugal, iodine needs at various stages of life, as well as iodine supplementation. An important goal of the seminar was to initiate public debate on the need to introduce mandatory salt iodization to reduce nutritional inequalities among children in Portugal, in the absence of robust data or relevant food policies. The Iogeneration team presented their preliminary findings from their regional survey of iodine status in school-age children. Among the attendees were researchers from Portugal, Brazil and WHO (to provide a more international perspective of the topic). For more information on the Iogeneration project, visit ign.org/portugal.htm
IGN at EAGxBoston global conference

On April 30th, Dr. Elizabeth Pearce (IGN Deputy Regional Coordinator for the Americas) represented the Iodine Global Network at the Effective Altruism Global (EAGx) conference held at MIT, Boston. This half-day conference featured talks, panels, and networking opportunities, seeking to inspire students to do the most good with limited resources. The program addressed the major effective altruism cause areas of global poverty and development, animal agriculture, and global catastrophic risk, as well as movement concerns like conducting research, building community, and choosing a career direction. Dr. Pearce, who is Associate Professor of Medicine at the Boston University School of Medicine, sat on a panel devoted to the issue of global poverty and development.

Sri Lanka gears up for a national iodine survey

On 15–16th February this year, Dr. Harshal R Salve (Assistant Professor, All India Institute of Medical Sciences, New Delhi) visited Colombo, Sri Lanka on behalf of the Iodine Global Network, South Asia Office. The meeting was held at the Medical Research Institute (MRI), Ministry of Health, where Dr. Salve met with Ministry officials and academic partners. Following the most recent national survey of iodine status, a decline in household coverage of adequately iodized salt was recorded from 91% (2005) to 61% (2010), which provides a rationale for conducting a new IDD status survey in Sri Lanka. An important purpose of this meeting was to provide technical inputs and share lessons learned from the recent National Iodine and Salt Intake Survey in India on methodology and laboratory quality assurance procedures. Dr. Salve also visited the institute’s IDD laboratory to discuss the possibility of setting up an external quality control mechanism in collaboration with the IGN South Asia laboratory in New Delhi.

Harmonizing salt iodization and sodium reduction strategies in Oman

Following fruitful talks with the IGN MENA, UNICEF, WHO, as well as national NGOs and the private sector, the Ministry of Health in Oman has included iodization of salt and sodium reduction into the new national nutrition strategy, as the first country in the Gulf Region. An upcoming national survey, supported by UNICEF Oman, will assess iodine and sodium nutrition based on their urinary concentrations measured in 24-h urine samples, and determine the sources of both iodine and sodium in the diet across Oman. Dr. Samia al Ghannami, Director of Nutrition at the Ministry of Health and IGN National Coordinator for Oman and Dr. Izzeldin Hussein, advisor to the Nutrition Office and the Gulf Nutrition Committee and IGN Regional Coordinator for MENA, will assist and oversee the process of policy integration and implementation, in collaboration with UNICEF MENARO.
Can desalinated seawater contribute to iodine-deficiency disorders? 
An observation and hypothesis

Over 300 million people rely on desalinated seawater and the numbers are growing. Desalination removes iodine from water and could increase the risk of IDD. This case-control study assessed the relationship between iodine intake and thyroid function in an area reliant on desalination. This prospective study took place between March 2012 and March 2014 at a hospital located on the southern Israeli Mediterranean coast. Subjects were 74 adult volunteers aged 21-80 y including 37 euthyroid controls. Thyroid function was assessed by clinical examination, ultrasound and blood tests, including serum thyroglobulin (Tg) and autoimmune antibodies. Iodine intake and the contribution made by unfiltered tap water were estimated by FFQ. The contribution of drinking-water to iodine intake was modelled using three iodine concentrations: likely, worst-case and best-case scenario. Among those with thyroid dysfunction, twenty-nine were classified with non-autoimmune thyroid disease (NATD) after excluding eight cases with autoimmunity. Seventy per cent of participants had iodine intake below the Estimated Average Requirement (EAR) of 95 μg/d. Participants with NATD were significantly more likely to have probable IDD with intake below the EAR (OR=5.2; 95 % CI 1.8-15.2) and abnormal serum Tg>40 ng/mL (OR=5.8; 95 % CI 1.6, 20.8). Evidence of prevalent probable IDD in a population reliant on desalinated seawater supports the urgent need to probe the impact of desalinated water on thyroid health in Israel and elsewhere.


Evaluation of the effects of iodized salt on the mental development of preschool-aged children: a cluster randomized trial in northern Ethiopia

A cluster randomized effectiveness trial was conducted in Ethiopia to examine the effects of iodized salt on mental development of children 4–6 years of age in an area with reportedly high levels of iodine deficiency. Sixty district clusters were randomized to receive iodized salt with a market mark with assistance from regular salt distributors or later as introduced by market forces. Pre- and post-iodization, 1602 children were given cognitive/language tests (School Readiness, WPPSI verbal reasoning, WPPSI Matrix reasoning), and their mothers were interviewed. Urinary iodine concentrations were significantly higher post-iodization in the intervention group than in controls but both medians were above the adequacy threshold. Overall, less than 5% were anemic. The contribution to iodine intake and the contribution made by unfiltered tap water were estimated by FFQ. The contribution of drinking-water to iodine intake was modelled using three iodine concentrations: likely, worst-case and best-case scenario. Among those with thyroid dysfunction, twenty-nine were classified with non-autoimmune thyroid disease (NATD) after excluding eight cases with autoimmunity. Seventy per cent of participants had iodine intake below the Estimated Average Requirement (EAR) of 95 μg/d. Participants with NATD were significantly more likely to have probable IDD with intake below the EAR (OR=5.2; 95 % CI 1.8-15.2) and abnormal serum Tg>40 ng/mL (OR=5.8; 95 % CI 1.6, 20.8). Evidence of prevalent probable IDD in a population reliant on desalinated seawater supports the urgent need to probe the impact of desalinated water on thyroid health in Israel and elsewhere.


Fortified iodine milk improves iodine status and cognitive abilities in schoolchildren aged 7-8 years living in a rural mountainous area of Morocco

All forms of iodine deficiency (ID) affect the mental development of the child. This study aimed to assess the impact of ID on the intellectual development of Moroccan schoolchildren and to evaluate the effect of consumption of fortified milk on reducing ID. In a double-blind controlled trial, children were divided into two groups to receive fortified milk (30% KDI of iodine) or non-fortified milk for 9 months. A dynam-ic cognitive test using Raven’s Standard Progressive Matrices to assess learning potential was performed at baseline and endpoint, and anthropometric assessment was done at baseline. The study included school-children who were severely iodine deficient. The prevalence of malnutrition was high in both groups; the study found improvements in iodine status and in cognitive abilities among Moroccan schoolchildren. In addition, consumption of fortified milk led to a clear improvement in iodine status (median UIC) and also appeared to have a favorable effect on the cognitive ability of Moroccan schoolchildren in a rural mountainous region.


Relationship between iodine concentration in maternal colostrum and neurobehavioral development of infants in Shanghai, China

It is well known that iodine plays an important role in the process of early growth and development of the brain. However, iodine concentration in the colostrum and its association with the neurobehavioral development of infants remains unclear. Colostrum samples from 150 women were collected, and their iodine concentrations were measured. The median colostrum iodine level was 187.8 μg/L. The Bayley Scales of Infant and Toddler Development-III test was performed when the infants were about 18 months. The mean cognitive, language, and motor composite scores were 105.3 ± 9.8, 105.2 ± 11.1, and 104.6 ± 6.7, respectively. And the mean scores on the 5 subscores were 11.1 ± 2.0, 9.3 ± 2.0, 12.4 ± 2.3, 11.1 ± 1.2, and 10.4 ± 1.2, respectively. No statistically significant difference was observed in cognition, language, or motor development of infants across different levels of colostrum iodine. After adjusting for a range of confounding factors, colostrum iodine concentration was a predictor of motor development, specifically gross motor development.

Wu M et al. J Child Neurol. 2016 Apr 4 [Epub ahead of print]

Assessment of iodine concentration in dietary salt at household level in Morocco

Morocco adopted universal salt iodization (USI) in 1995 as a strategy to prevent and control iodine deficiency disorders. In 2009, the permitted standard of salt iodine concentration was adjusted to 15–40 mg/kg. In this study, 178 household salt samples were tested for iodine using isometric titration. An empirical polling method was adopted, using a non-probability sampling method, across the different twelve regions in the country. The median (IQR) iodine concentration in salt was 2.9 (2.4-3.7) mg/kg and only 4.5% of salt samples contained 15–40 ppm of iodine. Only 25% of households had iodized salt. Bulk salt was used by 8% of households, all in rural areas. There was no significant difference in iodine concentrations between regions, between urban and rural areas, or between packaged and bulk salt. Two decades since USI legislation was first adopted, this study shows that coverage of iodized salt is far from universal. The use of bulk salt by households in rural areas is a major obstacle to the success of USI. The National IDD Control Program can only achieve if an internal follow-up and external quality control measures are put in place.


Iodine nutritional status in schoolchildren from public schools in Brazil as a cross-sectional study exposes association with socioeconomic factors and food insecurity

National program of salt iodization was implemented in Brazil to combat iodine deficiency. Currently, there is limited data on the nutritional iodine status in the Northeast region of Brazil, where children are vulnerable to malnutrition. The aim of this cross-sectional study was to assess the iodine status, household food insecurity, and the socioeconomic and demographic characteristics among schoolchildren attending public schools in the state of Bahia, Brazil. The study enrolled 1419 schoolchildren aged 6–14 years. The authors evaluated anthropometric parameters, urinary iodine concentration, and TSH. A median UIC of 221 μg/L indicates that children in the region are iodine sufficient. A BMI in the overweight or obese category was a protective factor against excessive iodine intake (OR=0.64; 95% CI 0.4–1.0; p=0.07). Urban areas (73%) had a mean urinary iodine concentra-tion of 213.1±80 μg/L compared with 176.2±76.1 μg/L in rural areas. Risk of excessive iodine intake increased in children living in a house with more than six people (OR=1.62; 95% CI 0.9–2.6; p<0.05) and consuming water from shallow wells (OR=1.70; 95% CI 0.9–3.1; p<0.05). The risk of iodine defi-ciency was 70% higher in schoolchildren who had moderate or severe food insecurity (OR =1.70; 95% CI 0.9–3.0; p>0.05).

Campor RO et al. Thyroid. 2016 May 16. [Epub ahead of print]