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Renewed commitment to iodized salt in Laos

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.

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IDD has long been recognized as a significant public health problem in Lao PDR. Surveys conducted in 1989–1990 in five northern and four southern provinces reported significantly elevated goiter rates in school-age children, and a nationwide survey in 1993 found that an astounding 95% of children were iodine deficient. In response, Lao PDR introduced Universal Salt Iodization (USI) in 1995, and by 2000 the goiter rate had dropped from 40% to only 9%. In 2006, the National Nutrition Survey confirmed that this achievement had been sustained: 90% of households in Lao PDR were consuming salt with some iodine (above 5 ppm by quantitative analysis) while 73.9% were using salt that was iodized adequately (with at least 15 ppm of iodine). In the same survey, the median urinary iodine concentration (UIC) in non-pregnant women aged 15–49 years was 205.4 µg/L, with 87% of UICs above 100 µg/L, clearly showing that the population had reached optimal iodine nutrition. But by 2011, the situation had taken a turn for the worse. The Social Indicator Survey, covering 18,674 households nationwide, reported that the coverage of iodized salt had dropped to 79.5%, below the coverage in 2006.

National survey of 2013

With support from UNICEF and the Iodine Global Network, a National School-Based Survey of Iodized Salt Use and Iodine Nutrition was conducted between November and December 2013. The survey included 2,858 children (51.1% girls and 48.9% boys), mostly from the Central region (49.7%), followed by the Northern (30.0%) and Southern (20.3%) regions. The majority of children (74.6%) lived in rural areas. The survey collected demographic data, information about salt purchasing behaviors in the household, and about the salt brands used in the home. All children brought a salt sample from home for rapid testing, and in a third of all samples iodine was quantified with a WYD Checker. Urinary iodine was measured in spot urine samples from 966 children.

Trends in population coverage, preferences, and quality of iodized salt

Almost 90% of the iodized household salt was bought in plastic (LDPE) packs labeled as "iodized salt." Salt was purchased either at a local shop (over 40%), a local market (30.1%), from traders coming to the house (16.8%), or at a distant market in another district (3%). Three-quarters of households purchased salt in small packs (0.5–1 kg), but some (16.5%) preferred the bulk, 12 kg bags. The eight producers from the Lao Salt Production Group (LSPG) dominated the national market (85.3%, compared to 89% in 2005). Other producers provided only 2.5% of salt, while 3.2% of the households used imported salt, almost always in the provinces bordering Vietnam.

Rapid testing showed that iodine was present in 89.1% of all salt samples, and in just two out of 17 provinces (Savannakhet and Champasak, both in the Southern region) less than 80% of salt tested positive for iodine. But the RTK results correlated poorly with the iodine levels quantified with a WYD Checker; the latter showed that as much as 34% of all salt was not iodized at all (0 mg/kg), 29% contained between 0.1 and 14.9 mg of iodine per kg of salt, and 26% contained 15 to 39.9 mg/kg. The mean iodine content in household salt was 15.9 mg/kg (95% CI 14.5–17.2), and the national coverage of adequately iodized salt was only 37% (95% CI 34–40%), compared to 68% in 2005, demonstrating yet another downward step change.

Only 70% of the salt from the LSPG producers was iodized (compared to 90% in 2005), and only 40% was iodized adequately. Interestingly, imported salt was much less common than in 2005 (3.2% compared to 8.4%), and more of the imported salt contained iodine. But overall, the proportion of salt samples with iodine levels below 15 mg/kg was universally high (ranging from 21% in Oudomxay to 87% in Vientiane, and 93% in Savannakhet), showing that also the quality of iodized salt has deteriorated since the surveys of 2005 and 2011–2012.

Iodized salt protects many Laotian women and children from iodine deficiency

Adequately iodized salt helps children reach their full developmental potential.

Iodine nutrition status of the Lao population

In 2013, the national median UIC was 103 μg/L, which is only half the median reported in 2006 (205.4 μg/L measured in non-pregnant women of reproductive age) and only just above the lower cut-off for adequate iodine status (100 μg/L).

The iodine content of household salt and urban/rural residence were the two strongest predictors of iodine nutrition in children. Adjusted for other factors, every additional 10 mg/kg of iodine predicted a 6.7% improvement in iodine status. The UICs of children from rural areas were on average 40% lower than their urban counterparts. Since this remarkable urban-rural divide was independent of brand and salt purchasing habits, it may exist due to different dietary patterns (e.g. higher total food intake and better nutritional quality of foods in the urban households).

Notably, although the median UIC suggests that iodine nutrition in Lao's population is technically sufficient, the cohort of children from rural households using salt with less than 15 mg of iodine per kg were at increased risk of iodine deficiency. Importantly, this subgroup included 51% of all children in this study, or 57% of all rural children. Controlling for other factors, especially household salt purchasing behavior, salt producer/brand, and child gender/age, the most affected provinces were in the Southern region of the country.

Why is the Laotian iodized salt program faltering?

Since iodized salt is the main source of dietary iodine in the Lao population, it is likely that this rather dramatic drop in UIC was caused by a problem within the supply chain. Indeed, salt iodization was all but suspended during the first 6 months of 2013 due to shortages of KIO_3, making it difficult for the population to remain iodine replete. A continuous supply of affordable potassium iodate (KIO_3) to salt processors is essential to ensure high-quality iodization. To meet this demand, a Potassium Iodate Revolving Fund (PIRF) was set up in 2006. Lao salt producers would purchase their KIO_3 supply from the stock buffer and pay a modest mark-up to the Fund to cover handling expenses. In return, the PIRF would replenish the buffer stock when needed against the funds accumulated from these payments. But the 2011 meltdown of the Fukushima nuclear reactor in Japan increased the price of KIO_3 worldwide, and the PIRF was confronted with the challenge of exploring cheaper sources of the fortificant.

After competitive bidding in 2012, the next purchase order was awarded to a new supplier in China. A new import permit and a safety guarantee had to be created, and eventually this switch caused a lengthy delay before the KIO_3 buffer stock could be replenished. In effect, the Lao salt producers ran out of their fortificant around January 2013, and the new supply did not become available until June or July. Naturally, this shortage period had a negative impact on the quality of iodized salt for all producers *(Table 1)*.

TABLE 1 Salt iodine content by salt brand, Lao PDR 2013

Salt brand	n	mean[a]	% <15 mg/kg	% ≥15 mg/kg
Oudomxay	23	52.5	5%	95%
Khoksaath	250	24.4	45%	55%
Veunkham	160	20.3	42%	58%
Other domestic	21	19.6	46%	54%
Boten	36	16.8	41%	59%
Vietnam import	31	13.1	70%	30%
Kengkok	158	9.9	81%	19%
Nateuy	140	7.2	84%	16%
Banbor	71	6.5	89%	11%
Songkhone	7	6.2	93%	7%

[a] *Weighted data*

In 2013, children from rural areas had 40% poorer iodine status than their urban counterparts.

The vast majority of salt factories in Lao PDR are well-equipped and have a strong capacity for quality assurance and quality control (QA/QC) of their iodized salt production and supply. The reason why salt iodization failed or was executed poorly was a temporary shortage of potassium iodate, which meant that the factories could not maintain their commitment to the USI mandate. The stockout was caused by an unfortunate set of circumstances, leading to a temporary disruption of salt iodization across the country.

At the same time, Lao's salt producers experienced temporary shortages of the WYD Iodine Checker solutions, showing how strongly they rely on the Provincial Health Office for their supply. Stellar examples of high-quality management and operations, solid collaboration among partners, professional QA data collection, and USI monitoring were found in some of the salt factories and Provincial Health Offices, but not everywhere. In provinces where performance had suffered (e.g. the Savannakhet Municipality and Province), the difficulties were not caused by a systemic failure, but rather by a weakened commitment to the expected roles in the partnership.

Concerned about these alarming findings, Lao's stakeholders (the Food and Drug Directorate within the Ministry of Health, the Commerce Department of the Ministry of Industry & Commerce, and the LSPG Secretariat) are now working together to strengthen the management and oversight of the Potassium Iodate Revolving Fund, and to streamline the surveillance and service provision for salt factories as part of the USI strategy. These improvements are expected to be completed by early 2015, when the IDD elimination efforts through USI will be fully integrated into the new national nutrition policy, inspired by the global Scaling Up Nutrition movement.

Salt boiling in the Veunkham factory, Ventiane Province

Global Scorecard 2014: Number of iodine deficient countries more than halved in past decade

Before 1990, only a handful of countries were iodine sufficient. As a result of remarkable efforts in the past two and a half decades, the latest global estimate of iodine nutrition looks more optimistic than ever. Here is a summary of the most important changes since 2012.

Using median UIC in school-age children as proxy for iodine status in the general population, and the same study inclusion criteria as in February 2012 update (see IDD Newsletter 1/2012), the UIC data have been updated for 40 out of the 194 WHO member states. Of these, 36 countries reported new surveys. In four cases, the median UIC was updated to reflect a change in previously reported data, or a pooled median UIC was recalculated after removing out-of-date surveys (from 2002 or older).

Between February 2012 and December 2014, 19 countries have changed their iodine status. Eight countries previously classified as mildly or moderately deficient have now reached sufficient iodine nutrition at the national level (these include Afghanistan, Australia, Ghana, Guatemala, Hungary, Mongolia, New Zealand, and Papua New Guinea). At the same time, Denmark slipped and is now mildly deficient (mUIC=83 mcg/L based on sub-national data from 2008–2010). This means that in 2015 only 25 countries remain iodine deficient, compared to 32 in 2011 *(Figure 1)*. This remarkable progress reflects a growing global awareness of IDD and the tremendous success of iodization programs.

Overall, global iodine status continues to improve *(Table 1)*. According to the available data, Haiti is the only country which changed status from mildly to moderately deficient. Remarkably, there have been no countries in the "severely deficient" category (i.e., with a median UIC <20 µg/L) for more than a decade, which is a testament to the countries' commitment to sustaining their IDD achievements.

In 2014 the UIC data cover approximately 97.8% of the world's population of school-age children, compared to 96% in February 2012. Countries that previously had no data that have new UIC estimates include South Sudan (a new WHO state), Sierra Leone, North Korea, South Korea, and Thailand. The proportion of the global population covered by national-level surveys has also increased, now at 71% (compared to 60% in 2012). National-level data were previously not available for Australia, Austria, Brazil, Ghana, Guatemala, Papua New Guinea, Qatar, and Venezuela. Yet, data is still missing for 41 countries. And although these include only 2% of the world's population of children, they also include countries with relatively large populations, such as Israel, Iraq, Syria and Congo.

The complete Global Scorecard for 2014 can now be downloaded from the IGN website, www.ign.org.

FIGURE 1 Number of iodine deficient countries in 2003, 2007, 2011, and 2014

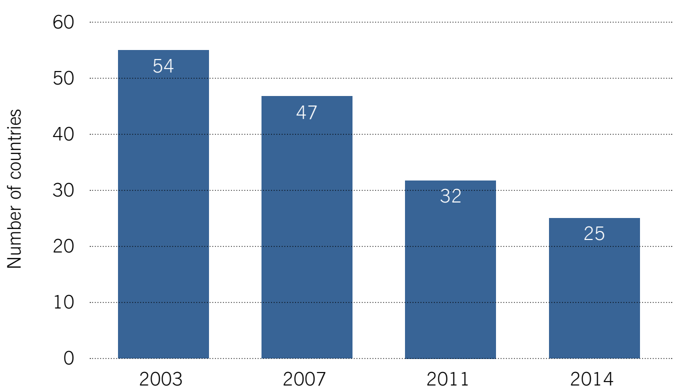


TABLE 1 WHO countries (number) by iodine status over the period 2003-2014.

Iodine intake	WHO median/ range of UIC in SAC (µg/L)	2003	2007	2011	2014
Insufficient iodine intake					
Severe deficieny	<20	1	0	0	0
Moderate deficiency	20-49	13	10	9	7
Mild deficiency	50-99	40	37	23	18
Sufficient[1]	100-299	67	76	105	116
Excessive	≥300	5	7	11	12
Countries with data		126	130	148	153
Total number of countries		**192**	**193**	**193**	**194**

[1] The WHO classifications for adequate and more than adequate have been combined into a single classification of "sufficient."

Country or territory	**Total population 2014** (000)	**Households consuming iodized salt** (%)[1]	**Median UIC** (μg/L)[2-4]	**Country iodine status**	**Iodine deficiency unprotected infants** (000)
Afghanistan	31‘281	20.4	171	Adequate	838
Albania	3‘185	75.6	86	Insufficient	10
Algeria	39‘929	60.7	27*	Insufficient	372
Andorra	80	–	–	N/A	–
Angola	22‘137	44.7	29	Insufficient	517
Antigua and Barbuda	91	–	–	N/A	–
Argentina	41‘803	–	136	Adequate	–
Armenia	2‘984	97	313	Excessive	1
Australia	23‘630	–	177	Adequate	–
Austria	8‘526	–	111	Adequate	–
Azerbaijan	9‘515	53.6	204	More than adequate	78
Bahamas	383	–	–	N/A	–
Bahrain	1‘344	–	247	More than adequate	–
Bangladesh	158‘513	57.6	163	Adequate	1‘336
Barbados	286	17.3	–	N/A	3
Belarus	9‘308	85.4	169	Adequate	15
Belgium	11‘144	–	113	Adequate	–
Belize	340	–	184*	Adequate	–
Benin	10‘600	86	318	Excessive	52
Bhutan	766	–	217*	More than adequate	–
Bolivia	10‘848	–	191	Adequate	–
Bosnia and Herzegovina	3‘825	62	157	Adequate	13
Botswana	2‘039	65.2	219*	More than adequate	17
Brazil	202‘034	95.7	304	Excessive	129
Brunei Darussalam	423	–	–	N/A	–
Bulgaria	7‘168	91.9	182	Adequate	6
Burkina Faso	17‘420	33.7	114*	Adequate	453
Burundi	8‘383	–	70	Insufficient	–
Cambodia	15‘408	–	222	More than adequate	–
Cameroon	22‘819	85.1	190	Adequate	122
Canada	35‘525	–	174	Adequate	–
Cape Verde	504	74.8	115	Adequate	3
Central African Republic	4‘709	64.5	21*	Insufficient	56
Chad	13‘211	53.8	213	More than adequate	268
Chile	17‘773	–	252	More than adequate	–
China	1‘393‘784	96.8	239	More than adequate	591
Colombia	48‘930	–	415	Excessive	–
Comoros	752	77.3	–	N/A	6
Congo	4‘559	73.2	–	N/A	44
Costa Rica	4‘938	–	314	Excessive	–
Côte d‘Ivoire	20‘805	30	203	More than adequate	512
Croatia	4‘272	–	248	More than adequate	–
Cuba	11‘259	88	176	Adequate	13
Cyprus	1‘153	–	120*	Adequate	–
Czech Republic	10‘740	–	163	Adequate	–
Denmark	5‘640	–	83	Insufficient	–
Djibouti	886	0.2	–	N/A	24
Dominica	72	–	–	N/A	–
Dominican Republic	10‘529	–	223	More than adequate	–
DPR Korea	25‘027	24.5	97	Insufficient	269
DR Congo	69'360	58.6	249	More than adequate	1'176
Ecuador	15'983	–	234	More than adequate	–
Egypt	83'387	77.7	187	Adequate	423
El Salvador	6'384	62	206	More than adequate	48
Equatorial Guinea	778	–	–	N/A	–
Eritrea	6'536	68	175*	Adequate	73
Estonia	1'284	–	65*	Insufficient	–
Ethiopia	96'506	19.9	25	Insufficient	2'470
Fiji	887	–	237	More than adequate	–
Finland	5'443	–	83	Insufficient	–
France	64'641	–	136	Adequate	–
Gabon	1'711	–	190*	Adequate	–
Gambia	1'909	22	42*	Insufficient	60
Georgia	4'323	99.9	321	Excessive	0
Germany	82'652	–	122	Adequate	–
Ghana	26'442	34.5	130	Adequate	520
Greece	11'128	–	202*	More than adequate	–
Grenada	106	–	–	N/A	–
Guatemala	15'860	–	144	Adequate	–
Guinea	12'044	–	139	Adequate	–
Guinea-Bissau	1'746	11.7	–	N/A	56
Guyana	804	10.3	169*	Adequate	15
Haiti	10'461	3	39	Insufficient	257
Honduras	8'261	–	356	Excessive	–
Hungary	9'933	–	228	More than adequate	–
Iceland	333	–	200	More than adequate	–
India	1'267'402	71.1	153	Adequate	7'411
Indonesia	252'812	57.6	215	More than adequate	2'008
Iran	78'470	–	141	Adequate	–
Iraq	34'769	29	–	N/A	736
Ireland	4'677	–	82*	Insufficient	–
Israel	7'822	–	–	N/A	–
Italy	61'070	–	91	Insufficient	–
Jamaica	2'799	–	–	N/A	–
Japan	127'000	–	287	More than adequate	–
Jordan	7'505	–	203	More than adequate	–
Kazakhstan	16'607	85.4	250	More than adequate	50
Kenya	45'546	93.4	118	Adequate	101
Kiribati	104	–	–	N/A	–
Kuwait	3'479	–	115	Adequate	–
Kyrgyzstan	5'625	76.1	114	Adequate	35
Lao	6'894	–	103	Adequate	–
Latvia	2'041	–	110	Adequate	–
Lebanon	4'966	74.8	66	Insufficient	16
Lesotho	2'098	79.4	215	More than adequate	12
Liberia	4'397	–	244	More than adequate	–
Libya	6'253	–	–	N/A	–
Liechtenstein	37	–	96	Insufficient	–
Lithuania	3'008	–	75*	Insufficient	–
Luxembourg	537	–	148	Adequate	–

Country or territory	**Total population 2014** (000)	**Households consuming iodized salt** (%)[1]	**Median UIC** (μg/L)[2-4]	**Country iodine status**	**Iodine deficiency unprotected infants** (000)
Madagascar	23'572	50.3	–	N/A	388
Malawi	16'829	62.1	175	Adequate	242
Malaysia	30'188	–	109	Adequate	–
Maldives	352	44	115	Adequate	4
Mali	15'768	74.4	69	Insufficient	180
Malta	430	–	–	N/A	–
Marshall Islands	53	–	–	N/A	–
Mauritania	3'984	7.3	179	Adequate	121
Mauritius	1'249	–	160*	Adequate	–
Mexico	123'799	91	235*	More than adequate	204
Micronesia	104	–	–	N/A	–
Moldova	3'461	44.3	165	Adequate	24
Monaco	38	–	–	N/A	–
Mongolia	2'881	69.9	171	Adequate	19
Montenegro	622	70.7	174	Adequate	2
Morocco	33'493	21.2	69*	Insufficient	582
Mozambique	26'473	25.1	97	Insufficient	745
Myanmar	53'719	68.8	124	Adequate	288
Namibia	2'348	57.4	216*	More than adequate	25
Nauru	10	–	–	N/A	–
Nepal	28'121	80	193	Adequate	119
Netherlands	16'802	–	154*	Adequate	–
New Zealand	4'551	–	113	Adequate	–
Nicaragua	6'169	96.8	196	Adequate	4
Niger	18'535	18.6	270*	More than adequate	699
Nigeria	178'517	79.8	130	Adequate	1'420
Norway	5'092	–	104*	Adequate	–
Oman	3'926	68.5	194	Adequate	23
Pakistan	185'133	69.1	124	Adequate	1'423
Palau	21	–	–	N/A	–
Palestinian State	4'436	76.6	193	Adequate	30
Panama	3'926	–	254	More than adequate	–
Papua New Guinea	7'476	91.9	170	Adequate	17
Paraguay	6'918	93.4	352	Excessive	11
Peru	30'769	88.3	262	More than adequate	70
Philippines	100'096	44.5	168	Adequate	1'322
Poland	38'221	–	112	Adequate	–
Portugal	10'610	–	106	Adequate	–
Qatar	2'268	–	341	Excessive	–
Republic of Korea	49'512	–	268	More than adequate	–
Romania	21'640	74	102	Adequate	58
Russian Federation	142'468	–	78*	Insufficient	–
Rwanda	12'100	87.4	298*	More than adequate	52
Saint Kitts and Nevis	55	–	–	N/A	–
Saint Lucia	184	45.5	–	N/A	2
Saint Vincent & the Grenadines	109	–	–	N/A –	
Samoa	192	–	–	N/A	–
San Marino	32	–	–	N/A	–
Sao Tome and Principe	198	64.8	–	N/A	2
Saudi Arabia	29'369	–	133	Adequate	–
Senegal	14'548	43.1	104	Adequate	298
Serbia	9'468	32.2	195	Adequate	64
Seychelles	93	–	–	N/A	–
Sierra Leone	6'205	62.6	158	Adequate	83
Singapore	5'517	–	–	N/A	–
Slovakia	5'454	–	183	Adequate	–
Slovenia	2'076	–	140	Adequate	–
Solomon Islands	573	–	–	N/A	–
Somalia	10'806	3.9	417	Excessive	435
South Africa	53'140	–	215	More than adequate	–
South Sudan	11'739	45.3	94	Insufficient	216
Spain	47'066	–	117	Adequate	–
Sri Lanka	21'446	92.4	153	Adequate	29
Sudan	38'764	9.5	66	Insufficient	1'143
Suriname	544	–	–	N/A	–
Swaziland	1'268	51.6	120*	Adequate	18
Sweden	9'631	–	125	Adequate	–
Switzerland	8'158	–	120	Adequate	–
Syria	21'987	79.3	–	N/A	110
Tajikistan	8'409	38.6	108	Adequate	163
Tanzania	50'757	55.7	204	More than adequate	841
TFYR Macedonia	2'108	94	241	More than adequate	1
Thailand	67'223	70.9	262	More than adequate	204
Timor-Leste	1'152	59.9	–	N/A	16
Togo	6'993	31.5	171	Adequate	168
Tonga	106	–	–	N/A	–
Trinidad and Tobago	1'344	27.9	–	N/A	14
Tunisia	11'117	96.7	220	More than adequate	6
Turkey	75'837	68.9	107	Adequate	394
Turkmenistan	5'307	75.3	170	Adequate	28
Tuvalu	10	–	–	N/A	–
Uganda	38'845	86.8	464	Excessive	210
Ukraine	44'941	20.7	90	Insufficient	392
United Arab Emirates	9'446	–	162	Adequate	–
United Kingdom	63'489	–	80	Insufficient	–
United States	322'583	–	215	More than adequate	–
Uruguay	3'419	–	310	Excessive	–
Uzbekistan	29'325	53.1	141	Adequate	292
Vanuatu	258	22.9	49	Insufficient	5
Venezuela	30'851	–	175	Adequate	–
Vietnam	92'548	45.1	139	Adequate	790
Yemen	24'969	29.5	173*	Adequate	530
Zambia	15'021	63.9	245	More than adequate	220
Zimbabwe	14'599	–	245*	More than adequate	–

Data sources:

[1] UNICEF. UNICEF Data: Monitoring the situation of children and women. http://data.unicef.org/nutrition/iodine [Accessed on 12 December 2014]. New York, United Nations Children's Fund

[2] Andersson M, Karumbunathan V, Zimmermann MB. Global iodine status in 2011 and trends over the past decade. J Nutr. 2012;142(4):744-50

[3] Zimmermann MB, Andersson M. Update on iodine status worldwide. Curr Opin Endocrinol Diabetes Obes. 2012;19(5):382-7

[4] Table updated on 31 January 2015

[*] Survey conducted before 2002

Introducing salt reduction strategies without jeopardizing salt iodization: a WHO workshop in South-East Asia

To harmonize national strategies to control iodine deficiency and reduce the burden of cardiovascular disease, the WHO Regional Office for South-East Asia and the All India Institute of Medical Sciences conducted a Regional Workshop on sodium intake and iodized salt on 29–30 September 2014 in New Delhi, India.

In South-East Asia, many countries have effective salt iodization programs while others are in the process of developing or strengthening salt iodization. But nearly all still lack legislative measures or strategies to reduce salt consumption. The workshop's objective was to help identify a path to successful integration of both strategies across the region. The rising prevalence of non-communicable diseases (NCDs) in South-East Asia is an escalating problem for the economy and population health. A recent UN Summit recommended reducing salt intake by 30% from current levels by 2025.

The WHO recommends reducing salt consumption to 5 g/day as a cost-effective way of preventing hypertension and the overall burden of NCDs in adults. In parallel, it promotes universal iodization of edible salt as an effective way to prevent and control IDD. Integration of both strategies by promoting their commonalities and complementarities is essential to ensure that they both succeed.

Stressing commonalities and removing barriers to harmonization

Over the past two decades, the iodization of edible salt has reduced the prevalence of iodine deficiency disorders around the world, with only 25[1] countries remaining iodine-deficient in 2015 compared to 131 countries in 1993. Country experiences have shown that iodization can be effective over a range of salt intakes, from 6–15 g/day. If salt intakes fall, salt iodine levels could be titrated upwards without technical or sensory barriers. And crucially, no evidence exists that adding iodine to salt increases salt consumption or impedes reduction in salt intake.

Workshop participants learned standard analytical methods for measuring urinary and salt iodine.

The United Kingdom is an example of a country which achieved a 15% reduction in salt intake (from 9.5 to 8.1 g/day over 7 years) through a well-designed and successfully implemented strategy. The UK program has several components which could serve as a model for South-East Asia, including strong leadership, policies and commitment, availability of population data regarding dietary salt intake (DSI) and common sources of dietary salt, setting progressively lower salt targets for different categories of food for voluntary adoption by the industry within a given time frame, technological support for reformulation of food products, food nutrition labeling, as well as promoting consumer awareness and monitoring progress by frequent surveys.

In developing countries, where salt reduction is still in its infancy, priority should be given to adopting strong policies, and to establishing the baseline salt intake in the population and the main sources of salt in the diet. Throughout South-East Asia, approximately 70% of dietary salt is added during cooking or at the table, which means that reducing salt in processed foods would have little impact. The importance of street foods in contributing to salt intake must not be overlooked, and innovative approaches may be needed to address this sector. The initial efforts should also focus on educating consumers, through a comprehensive public health strategy, about the adverse effects of excess salt. In parallel, efforts are needed to lower the salt content of convenience foods, introduce mandatory food nutrient labeling by multinationals, help small local companies with product reformulation, and monitor salt and iodine intake.

[1] *According to the latest estimate. Read more on page 5.*

Salt reduction efforts in Thailand and Indonesia

In promoting low sodium intake, Thailand has seen successes and failures. The traffic light system adopted to promote low-salt products was not effective due to low consumer demand. "Healthy choice" labeling of processed foods using a cut-off score system has been proposed as more appropriate and will be implemented by late 2014. Currently, the few low-salt products on the market are used by a select group of consumers. Behavior changes need to be promoted through nutrition education for consumers and the industry. Development of low-sodium seasoning sauces and seasoning powders for routine preparation of street and restaurant foods and home-cooking should be promoted. If salt consumption per capita decreases to the recommended 5 g/day, salt iodization may need to be increased by 59%.

Indonesia has policy and legislation on salt and has implemented some salt reduction strategies. A dietary survey identified monosodium glutamate as the highest contributor to sodium in the diet (80%) and as the food most associated with NCDs. Indonesian initiatives for promoting NCD reduction include mandatory food labeling and warning messages about salt on food labels. But at the same time as multisectoral support is being established to implement salt reduction, Indonesia also faces challenges in the implementation of its salt iodization program: USI has not yet been achieved and gaps remain to be addressed. There are also challenges in integrating the simultaneous promotion of iodized salt and low salt intake.

Key messages emphasize compatibility

The workshop's key message was that the twin strategies of reducing dietary salt and promoting intake of iodized salt are compatible but are often at different stages of maturity in terms of implementation. Therefore, programs for reducing dietary salt intake need to be moved forward rapidly throughout the South-East Asia Region.

Common areas of work for salt reduction and salt iodization strategies include policy development and implementation, monitoring and evaluation of programs, communication and advocacy, surveillance of sodium and iodine intake, as well as joint strategies and shared forums with the food industry. Salt reduction requires multisectoral efforts and cooperation among all stakeholders including health, education, science and technology, and trade and industry sectors as well as food manufacturers. The salt industry, who have been willing partners in salt iodization programs, should also be educated to become active stakeholders in salt reduction. Reducing sodium intake will not jeopardize delivery of iodine to populations through salt iodization as long as the levels of iodine in salt are monitored and adjusted when necessary. Joint monitoring of sodium and iodine intakes using the existing systems for monitoring iodine could be cost-effective.

Recommendations and next steps

- Public education and behavior change communication regarding salt reduction is the main strategy to reduce salt intake across the region.
- Countries should build capacity (i.e. increase the number of health workers and other workers) with regard to reduction of salt intake.
- Public health messages on dietary salt reduction should be clear and simple and not contradict or confuse the messages regarding promoting consumption of iodized salt.
- National-level committees should be set up to monitor and regulate dietary salt reduction and salt iodization programs, and to ensure cooperation and safeguard optimization of both strategies. This should be planned from the initiation of salt reduction programs.
- Iodine content in salt should be adjusted based on regular monitoring of salt consumption and urinary iodine to minimize problems that may ensue following dietary salt reduction, if salt is the main vehicle of iodine delivery to the population.
- Potential integration of salt intake assessments with National Health Surveys, Demographic and Health Surveys, and NCD risk factor surveys (STEPS) should be assessed.

References

WHO Regional Office for South-East Asia. Regional workshop on sodium intake and iodized salt in the Member States for South-East Asia Region: A Report. New Delhi, India, 29–30 September 2014. India: WHO; 2014.

The WHO Regional Workshop on 29-30 September 2014 was attended by more than 40 delegates from all countries in the WHO South-East Asia region.

If all Italian food salt is iodized, lowering salt intake is unlikely to affect iodine nutrition

Excerpted from: **Pastorelli AA, et al. Daily iodine intake and the impact of salt reduction on iodine prophylaxis in the Italian population.** EJCN. 2015; 69: 211–215.

The native iodine content of most foods and beverages is low and highly variable. As a result, iodine intakes vary across regions and countries according to local eating habits and national strategies for IDD control. Universal salt iodization has been remarkably successful in eliminating IDD in many countries. But to prevent the rise of non-communicable diseases, WHO recommends limiting salt intake to 5 g/day in adults and even less in children. In Italy, universal salt iodization was implemented in 2005. Iodine is added to coarse and table salt at 30 mg/kg as potassium iodate, and the use of iodized salt is permitted in the food industry and in communal eating areas. Nationwide monitoring of the USI program is led by the Italian National Observatory for Monitoring Iodine Prophylaxis (OSNAMI), which was established in 2009 at the National Institute of Health.

Estimating daily intake of iodine from food and iodized salt

The authors used food consumption data from a recent nationwide survey (1) to estimate the iodine content of around 300 foods highly representative of Italian eating habits. They used their estimates to calculate the total daily iodine intake in the Italian population, and the contribution of various foods with and without iodized salt to this total intake. For technical reasons, they assumed iodine bioavailability to be 100%.

Not including salt, the biggest sources of daily iodine were fish and seafood products (across all age groups) closely followed by milk (in children, adolescents, and women) or dairy products (in men). But even when taken together, these top three sources provided iodine in quantities considerably below the recommended intakes (RDA=150 μg/day in adults and adolescents and 120 μg/day in children, *Figure 1*). This highlights the importance of iodine provided through iodized salt. The consumption of milk and dairy products, two well-known sources of dietary iodine, was much higher in children and adolescents, which supports earlier evidence that this food group contributes to higher urinary iodine levels in Italian children (2).

The motto of the iodized salt program in Italy is:

POCO SALE, MA IODATE!*

**Little salt, but iodized!*

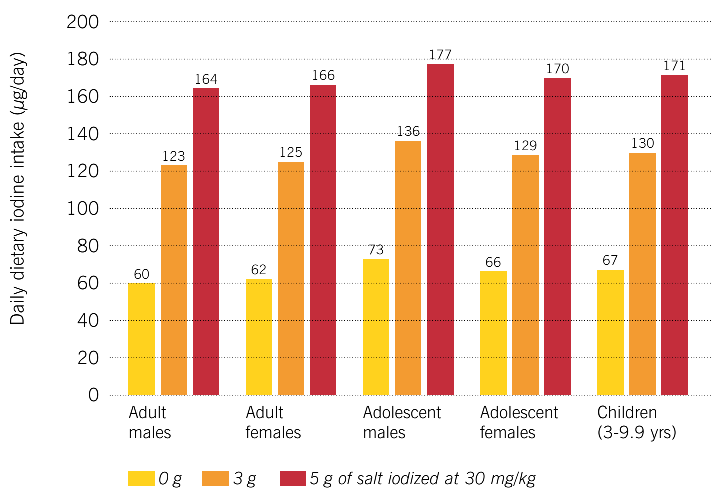
Iodized salt helps to achieve optimal iodine nutrition

As shown in Figure 1, consuming 5 g of salt iodized at 30 mg/kg would ensure optimal daily iodine intake in all age groups (3). In children, the recommended intake would be achieved with just 3 g of iodized salt. The study also reports that substituting iodine-enriched (biofortified) vegetables for non-biofortified ones could significantly increase iodine intake when combined with iodized salt (to 204 μg/day in adults; 209 μg/day in adolescents males; 200 μg/day in adolescent females; and 152 μg/day in children with 3 g of iodized salt).

Overall, these findings strongly suggest that the WHO-recommended quantities of salt, if iodized at 30 mg/kg, may be sufficient to achieve adequate iodine status in the Italian population. But in light of the higher iodine requirement during pregnancy and lactation (250 μg/day), the estimated iodine intake in adult women may be of some concern.

In Italy, only 3–8% of salt used by the food industry is currently iodized. While this implies that household salt is still a major contributor to iodine intake in Italy, convincing the food industry to use more iodized salt should be an important next step.

FIGURE 1 Projected median iodine by age and gender, from daily consumption of 0, 3 and 5 g of salt iodized at 30 mg/kg. 3 g of salt/day would provide adequate daily iodine to children (120 μg/day) and 5 g to adults and adolescents (150 μg/day).



References

1. Leclercq C, et al. The Italian National Food Consumption Survey INRAN-SCAI 2005–06: main results in terms of food consumption. Public Health Nutr. 2009; 12: 2504–2532.
2. Watutantrige FS, et al. Iodine status in schoolchildren living in northeast Italy: the importance of iodized-salt use and milk consumption. Eur J Clin Nutr. 2013; 67: 366–370.
3. Food and Nutrition Board of the Institute of Medicine of the National Academies. Dietary reference intakes: the essential guide to nutrient requirements. The National Academies Press: Washington, DC, 2006.

Palestinian children are solidly iodine sufficient but iodized salt coverage needs to be improved

Situated at the eastern end of the Mediterranean, Palestine is a small state with a population of around 4.5 million (1). Palestine's scarce natural resources combined with political unrest have adversely affected the socio-economic and nutritional status of vulnerable populations (2). In common with other transitional economies, Palestine is experiencing a rise in the prevalence of overweight and obesity, as it continues its efforts to tackle micronutrient deficiencies (3).

In 2005, the FAO reported that, although the median urinary iodine (UIC) in Palestinian school-age children was adequate (106 μg/L), almost 45% of the population had urinary iodine levels below 100 μg/L, and 15% had goiter (3). Despite important efforts made, the 2010 Palestinian Family Survey (PFS/MICS) reported that 76.6% of households were consuming adequately iodized salt (at ≥15 ppm), and 7.1% consumed salt without any iodine. In December 2012, the MOH issued a public health policy paper seeking to make the rights and health of Palestinian children a fundamental pillar of national plans for a healthy society (2). A National Nutrition Policy and Action Plan for 2011–2013 was formulated, which defined the elimination of micronutrient deficiencies as one of its key priorities and pledged to expand the salt iodization program until the household coverage reaches 95% of the population (5). To tackle the double burden of malnutrition, priority was also given to prevention and treatment of dietary-related non-communicable diseases.

In 2013, the Ministry of Health conducted a national Micronutrient Survey to assess the current nutritional status of Palestinian pre-school children (aged 6–59 months), primary school-children (7–12 years), adolescents (15–18 years), pregnant women (18–43 years) and lactating mothers (18–48 years). The survey received financial backing from UNICEF, the European Community Humanitarian Office (ECHO) and several national governments, and technical support from UNICEF and WHO. The organizers drew on the experiences of other countries in the region (Jordan Micronutrient Survey 2010, Iraq Micronutrient Survey 2007), and on the Palestinian MICS in 2010. As part of the survey, samples of household salt were tested for iodine content, and spot urine samples from school-age children (SAC) were collected to estimate their dietary intakes of iodine and sodium.

To make sure that children in Gaza remain iodine sufficient, all households should have access to adequately iodized salt.

School-age children are iodine sufficient

Preliminary results of the survey show that still only around 72% of households have access to adequately iodized salt iodized (68.9% in the West Bank and 75.1% in Gaza). In addition, only 5.9% of salt is iodized at a level required by national law (35–55 mg/kg, added as KIO_3). However, the median urinary iodine in SAC (UIC=193 μg/L) confirms that optimal iodine status has been sustained, and the proportion of children with UICs below 100 μg/L has decreased considerably (to 25.4%; 33.6% in the West Bank, and 17.3% in Gaza). Spot urine analysis also showed that 11.3% of school-age children had elevated (≥100 mmol/L) urine sodium excretion (8.4% in the West Bank and 14.1% in Gaza), and the consumption of table salt was estimated at 7 g/day.

Despite some remaining gaps in household coverage of iodized salt, these initial findings are optimistic, showing that children across Palestine are iodine sufficient. But this should not be interpreted as a reason to let up on the efforts to improve iodized salt coverage, particularly if there is a parallel push to maintain or reduce the current consumption of dietary salt. To prevent the recurrence of IDD and delay the onset of diet-related non-communicable diseases, future strategies will have to combine efforts that limit excessive consumption of salt and sustain optimal iodine status.

References

1. http://www.pcbs.gov.ps/site/881/default.aspx
2. MOH, State of Palestine. Public health policy for Palestinian Children: Palestinian child health priorities based on the child's right to health; 2012.
3. Food and Nutrition Division, FAO. Palestine Nutrition Profile. Food and Agriculture Organization of the United Nations; 2005.
4. Palestinian Central Bureau of Statistics. Final Report of the Palestinian Family Survey 2010. Ramallah, State of Palestine; 2013.
5. Nutrition Department, MOH, State of Palestine. National Nutrition Policy, Strategies & Action Plan (NNPSAP) 2011–2013. State of Palestine; 2012.

ATA proposes safe upper limits for iodine intake

Excerpted from: **Leung AM, et al., Potential Risks of Excess Iodine Ingestion and Exposure: Statement by the American Thyroid Association Public Health Committee.** Thyroid. February 2015, 25(2): 145-146

Some kelp supplements contain dangerously high amounts of iodine.

Iodine is a micronutrient required for normal thyroid function. In the United States, recommended daily allowances (RDA) for iodine intake are 150 µg in adults, 220–250 µg in pregnant women, and 250–290 µg in breastfeeding women. The U.S. diet generally contains enough iodine to meet these needs, with common sources being iodized salt, dairy products, some breads, and seafood. During pregnancy and lactation, women require higher amounts of iodine for the developing fetus and infant. The American Thyroid Association (ATA) recommends that women take a multivitamin containing 150 µg of iodine daily in the form of potassium iodide (KI) during preconception, pregnancy, and lactation.

Ingestion of more than 1100 µg of iodine per day (tolerable upper limit for iodine) is not recommended and may cause thyroid dysfunction. During pregnancy and lactation, when the risk of excess iodine is primarily related to the fetus and newborn infant, the recommendations for the upper limit vary and range from 500–1100 µg of iodine daily. In particular, infants, the elderly, pregnant and lactating women, and individuals with preexisting thyroid disease (such as autoimmune Hashimoto's disease, Graves' disease, nontoxic thyroid nodules, history of partial thyroidectomy, and other conditions) are susceptible to adverse effects of excess iodine intake and exposure.

The public is advised that many iodine, potassium iodide, and kelp supplements contain iodine in amounts that are up to a hundred times higher than the daily tolerable upper limit for iodine. The ATA advises against the ingestion of iodine and kelp supplements containing in excess of 500 µg iodine daily for children and adults and during pregnancy and lactation. Long-term iodine intake in amounts greater than the tolerable upper limits should be closely monitored by a physician. There are only equivocal data supporting the benefits of iodine at higher doses than these, including a possible benefit for patients with fibrocystic breast disease (1). There is no known thyroid benefit of routine daily iodine doses in excess of the U.S. RDA.

There are a limited number of medical conditions in which the short-term use of high amounts of iodine is indicated. These exceptions include closely monitored patients prescribed Lugol's solution or saturated solution of potassium iodide (SSKI) in their treatment of severe hyperthyroidism, such as thyroid storm and prior to surgery in patients with Graves' disease, and individuals in the vicinity of a nuclear power plant who are recommended to take KI in the event of a nuclear accident. SSKI is not indicated nor recommended in individuals with thyroid nodules. Finally, patients receiving the large amounts of iodine in iodinated contrast dyes, as required for radiologic studies, should be monitored for iodine-induced thyroid dysfunction if risk factors are present.

Key points:
- Pregnant and breastfeeding women should take a prenatal vitamin that contains 150 µg of potassium iodine daily.
- Given the tolerable upper limit of 1100 µg iodine daily, adults should generally not consume an iodine or kelp supplement containing in excess of 500 µg iodine.

References

1. Office of Dietary Supplements, National Institutes of Health. Dietary Supplement Fact Sheet: Iodine. Available at: http://ods.od.nih.gov/factsheets/Iodine-HealthProfessional (Last accessed May 24, 2014).

China: Improving USI to ensure optimal iodine nutrition for all

Prof. Qian Ming IGN Regional Coordinator for China and East Asia; **Karen Codling** IGN Regional Coordinator for Southeast Asia and the Pacific; **Prof. Yan Yuqin** IGN National Coordinator for China; and **Prof. Chen Zupei** IGN Board Member

Historically, many regions of China were iodine deficient and affected by endemic goiter and cretinism. This blocked economic development, because it limited intellectual capacity and learning potential, lowering IQ in children in affected areas by more than 10 points. The Chinese government's introduction of mandatory Universal Salt Iodization (USI) in 1994 has led to enormous progress, and the program is now a model for many countries. The government target of sustained elimination of IDD has already been met at the national level: national coverage of households with adequately iodized salt has been sustained above 90% since 2005, the median urinary iodine concentration (MUIC) of school-age children (SAC) has consistently been >100 μg/L, and the prevalence of goiter has remained well below 5%. This success is a result of ongoing, strong government commitment to maintain iodine sufficiency in the country through support to the salt industry, which has operated as a monopoly, as well as rigorous monitoring of the program to assure effective coverage and penetration throughout the country.

China's exemplary USI program continues to supply sufficient iodine to the country's vulnerable populations.

But as the program enters its next phase, new questions have emerged. To discuss them and develop future plans, the Bureau of Diseases Prevention and Control of the National Health and Family Planning Commission (NHFPC) held a national Workshop on IDD Prevention and Control Strategies in China on November 5–6, 2014. It was organized on behalf of the NHFPC by the Institute of Nutrition and Health and the Center of Endemic Disease Control of China, with support from UNICEF, GAIN and the Iodine Global Network (IGN). It brought together 160 participants, from central and provincial CDC offices, universities, public health institutions, and China Salt. Global experts on iodine nutrition and universal salt iodization were invited to share experiences from other countries. The following four questions were addressed:

1. Apparent lack of correspondence between iodine nutrition of SAC and pregnant women

The Chinese IDD Elimination Program is supported by a complex and detailed monitoring system that over the years has generated extensive data on the MUIC of school-age children, and recently also of pregnant women. By WHO definition based on MUIC in SAC, population iodine status is adequate or more than adequate in almost all provinces. In four provinces iodine intakes are excessive in children because of unusually high salt intakes in mountainous regions (Guizhou and Jiangxi provinces) or high iodine content of the ground water (Jiangsu and Anhui). Thus, excessive iodine intakes are not attributable to the salt iodization program. At the same time, pregnant women in six of China's 31 provinces are classified as borderline iodine deficient. This has raised questions whether the iodine intake in SAC may be slightly high in some provinces and how to achieve optimal iodine intake during pregnancy without exceeding optimal intake in SAC.

The workshop attracted 160 participants from central and provincial China CDC offices, universities, public health institutions, and China Salt, as well as global experts on iodine nutrition and USI.

- A multi-center study in 2013 (1), including children from China, suggested that the criteria for adequate iodine nutrition in SAC could be extended from 100–199 μg/L to 100–299 μg/L, based on the finding that there was no increase in the prevalence of elevated thyroglobulin (Tg) or anti-thyroid antibodies (i.e., indicators of thyroid dysfunction) in children across these ranges.
- The WHO range for adequate iodine in pregnancy is a MUIC of 150–249 μg/L. But WHO also suggested that, where high coverage of adequately iodized salt (HHIS) has been sustained for at least two years, women probably enter pregnancy with adequate stores and so do not need to achieve this level of intake through pregnancy and lactation (2). Since this scenario is true in most provinces in China, a MUIC of 100–150 μg/L may not be a cause for concern. Sufficient iodine stores in the thyroid, combined with dietary iodine, should be enough to maintain thyroid health in the mother and baby. Mothers and babies in such situations should be monitored and followed up to verify this assumption.
- It follows that iodine status in SAC may only be in excess of requirements in four provinces due to high iodine in drinking water, while pregnant women may only have inadequate iodine nutrition in three provinces where sustained HHIS coverage >90% for the last two years has not been achieved (Shanghai, Tianjin and Tibet).

2. Impact of increased iodine intake on thyroid disorders

Speakers in this session included Prof. Michael Zimmerman, Executive Director of the IGN, Dr. Peter Laurberg of the Aalborg University Hospital in Denmark, Dr. Teng Weiping, Chairman of the China Endocrinology Association, and Prof. Yan Yuqin of the Institute of Endocrinology, Tianjin Medical University. In their presentations, they addressed the question whether increased population iodine intake from salt has caused an increase in thyroid disorders, reported by some doctors and academics in China.

- Prof. Teng Weiping from China and Prof. Peter Laurberg from Denmark reviewed the links between iodine intake and thyroid disorders. When salt iodization is introduced in iodine deficient countries, some individuals may experience a small, transient increase in mild and subclinical hyperthyroidism. But after 5–7 years, the prevalence of hyperthyroidism decreases again, to levels even lower than before iodization. In parallel, there is a marked decrease in goiter and thyroid nodules and, in severely deficient areas, a reduction in risk for hypothyroidism. Overall, the benefits of iodized salt on thyroid disorders outweigh the small risks.
- Increasing incidence of papillary thyroid cancer has been reported in many countries, including China. However, this is occurring in countries with rising, stable, and declining iodine intakes (e.g., in the U.S., where intakes have fallen sharply). Most experts put it down mainly to improved diagnostic techniques, able to detect smaller cancers. There is no association between the overall incidence of thyroid cancer and dietary iodine intake (3), and the risk for the more aggressive forms of thyroid cancer is reduced by iodized salt. Overall, there is strong evidence that iodine deficiency, rather than excess, increases thyroid disorders in populations, and USI has been proven to effectively and sustainably reduce iodine deficiency and improve IQ (4).
- Ongoing monitoring of population iodine status is essential to ensure that the salt iodine levels are adjusted to protect against deficiency but not risk excessive intake and possible adverse effects. Countries like Denmark and Switzerland have used monitoring to modify salt iodine content and track changes in iodine nutrition. China, too, has demonstrated that population iodine status can be adjusted by changing iodine levels in salt, and the next national IDD survey is expected to reflect these recent changes.

3. Is >90% HHIS coverage necessary for adequate iodine nutrition?

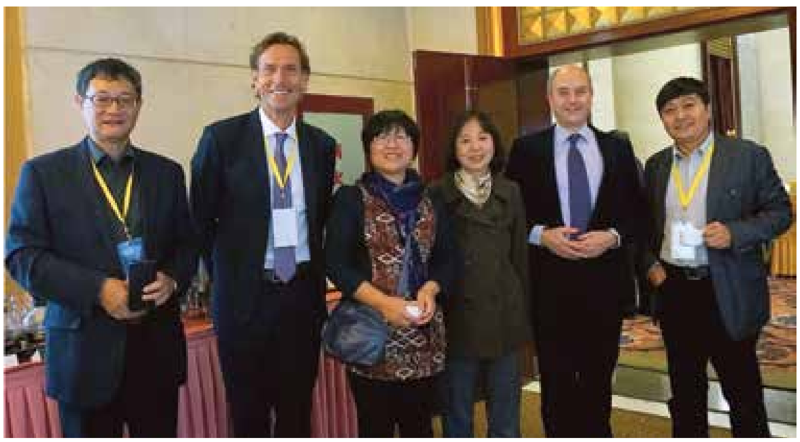
In a small number of provinces in China, iodine nutrition of SAC and sometimes pregnant women is adequate even though HHIS coverage is below 90%. This has led to assertions that such populations may be receiving iodine through natural foods, supplements, or other sources and do not need to achieve >90% HHIS coverage. Hence, some individuals have suggested that people should have the choice whether to consume iodized salt or not, particularly in urban areas with high levels of awareness. Xiaoguang Yang of the National Institute of Nutrition and Health, Karen Codling, IGN Regional Coordinator for Southeast Asia and the Pacific, Jonathan Gorstein, Global Project Coordinator for the BMGF USI Partnership Project and IGN Senior Advisor, and the Shanghai Municipal Centre for Disease Control presented data to inform this discussion.

- Many studies and analyses confirm that iodized salt provides the majority of iodine intake in China, including in coastal areas with suspected high seafood intake. Modeling has demonstrated that, reducing iodine intake from iodized salt (due to less iodine in salt or lower coverage) would lead to a significant proportion of the population falling below the recommended nutrient intake (RNI) level.

- High coverage with adequately iodized salt is also necessary to ensure equitable intake of adequate iodine at sub-national level. Thus, while MUIC may reflect adequacy at the national or provincial level, analysis of the MUIC of district or county populations or sub-populations has demonstrated that pockets of iodine deficiency may still persist exist if universally high coverage of adequately iodized salt is not achieved.

4. Changes in the salt industry

The success of the Chinese salt iodization program over the past 25 years can be attributed to the partnership and commitment of the national salt industry to ensure universal coverage of adequately iodized salt. In China, the industry is uniquely organized as a monopoly, with strong, centralized control by the government. It is possible that the structure of the Chinese salt industry will change in the future: the monopoly may be removed and privatized, which may affect the USI program. Worldwide, voluntary salt iodization models have generally not achieved universal HHIS coverage except in unique situations, e.g., when there is only a small number of salt producers who all choose to iodize salt despite a lack of legislation, or when the majority of iodine intake is through processed foods that utilize iodized salt.



The workshop was supported by GAIN, UNICEF and the Iodine Global Network, close partners with the Chinese government in the global fight against IDD. From left to right: Ming Qian (IGN, Regional Coordinator for China and East Asia); Michael Zimmermann (IGN, Executive Director); Qingzhen Jia (Institute for Prevention and Treatment of Endemic Disease, Shanxi Province, China); Suying Chang (UNICEF China), Robert Scherpbier (UNICEF China), Wanqi Zhang (Tianjin Medical University)

- The intake of table salt is decreasing due to rising salt intake through processed foods and parallel efforts to reduce total salt intake to prevent non-communicable diseases. Decreased salt consumption has been measured in national and small-scale studies across China. A decline in HHIS coverage will reduce iodine intake through table salt, potentially to levels that cause a re-emergence of iodine deficiency. Use of non-iodized salt in processed food may also lead to inadequate iodine levels, as the intake of processed food is increasing. Monitoring the relative contributions of HHIS and other sources of iodine and salt in the diet is imperative to make appropriate program adjustments.

Rizwan Yusafali of the Global Alliance for Improved Nutrition provided insights about experiences in countries where salt iodization programs implemented by private salt industry around the world. Lessons learnt from a study to visit and insights from the China National Salt Industry Corporation were also shared.

- Worldwide, most countries have salt iodization programs, and in most cases a private salt industry. High HHIS coverage is possible in this context, but only with government-led monitoring to ensure industry compliance with national salt standards. Many programs are currently not achieving national iodine targets because of weak regulatory/monitoring systems.

- Implementation of multiple salt iodization standards or exemptions is more difficult with a private salt industry.

Based on the wealth of data, global experiences, and expert guidance, the NHFPC were provided points for consideration in policy making. These included:

- the importance of maintaining or achieving household coverage with adequately iodized salt at >90%;

- the importance of regular systematic monitoring of the iodized salt program to avoid both iodine deficiency and excess;

- consideration of including regular monitoring the iodine status of women of reproductive age, in addition to pregnant women and children;

- as more data become available, consideration of the modification of the reference values for the median UIC in children and pregnant women to assist programs in covering all vulnerable groups.

References

1. Zimmerman MB et al. Thyroglobulin is a sensitive measure of both deficient and excess iodine intakes in children and indicates no adverse effects on thyroid function in the UIC range of 100-299 µg/L: a UNICEF/ICCIDD Study Group report. J Clin Endocrinology and Metabolism. 2013; 98(3)
2. WHO Secretariat on behalf of the participants to the Consultation. Prevention and control of iodine deficiency in pregnant and lactation women and in children less than 2 years: conclusions and recommendations of the Technical Consultation. Public Health Nutrition. 2007; 10(12A): 1606-1611
3. Feldt-Rasmussen U. Iodine and cancer. Thyroid. 2001 May; 11(5): 483-6
4. Aburto, NJ, et al. Effect and safety of salt iodization to prevent iodine deficiency disorders: A systematic review with meta-analyses. Geneva: WHO, 2014

Rebirth of Ghana's national iodine laboratory

Ebenezer Asibey-Berko IGN National Coordinator for Ghana and **Matilda Steiner Asiedu** University of Ghana

Entrance to the Noguchi Memorial Institute for Medical Research, where the new iodine lab is situated

Ghana's first iodine laboratory was founded in 1994 at the Department of Nutrition and Food Science, University of Ghana in Legon. It was funded by the Canadian International Development Research Center (IDRC) as part of a contract to conduct a nationwide baseline IDD survey in 1991–1994. Equipped to carry out analyses of urine iodine and serum TSH, among others, the lab quickly established itself as the regional service and research center for IDD and the University's training center in iodine analytical methods. Over the years, its services have supported the IDD programs of Ghana, Benin, and Togo.

Run by Professor Ebenezer Asibey-Berko from two small rooms next door to the Department of Nutrition for almost 20 years, the laboratory eventually outgrew its space. By 2012 it was time to move into bigger premises. In early 2012, a suitable space was secured at the University's Noguchi Memorial Institute for Medical Research, and plans were drawn up to reactivate the lab, by upgrading equipment, restocking reagents, and providing essential training to ensure a high standard of performance under the U.S. Center for Disease Control (CDC) EQUIP program for iodine laboratories.

With the assistance of Dr. John Egbuta (then ICCIDD Regional Coordinator for West Africa), the lab secured a grant for USD 13,000 from IGN that was sponsored by the Canadian International Development Agency (CIDA) to go ahead with the plan. After a successful relocation, a consultant from Tanzania's iodine laboratory visited the new lab in 2014 to witness its operations and work with the staff.

Professor Asibey-Berko retired from the University in 2013. His successor, Prof. Matilda Asiedu, has a strong background in nutrition, biochemistry, and public health and received her graduate training in Norway and the United States. She is the current Head of the Department of Nutrition and Food Science at the University of Ghana, and she is the recipient of the top African female scientist award in December 2012.

The new laboratory has established relationships with GAIN and UNICEF, and it has been contracted to perform urine and salt analyses in Ghana, Niger, and Sierra Leone. In November last year, Prof. Asibey-Berko and Prof. Asiedu both helped with the training of GAIN field staff in preparation for data collection in an upcoming national survey. The IGN's role in the upgrade project has been invaluable. With the new equipment and in the new premises, the laboratory is now better positioned to assume the role of a regional iodine lab for West Africa.

Prof. Asibey-Berko, Prof. K. Koram (Director of the Medical Research Institute) and Dr. John Egbuta, formerly ICCIDD Regional Coordinator for West Africa.

Niger: ensuring the quality of iodized imported salt

Boubacar Issa IGN National Coordinator for Niger

The first IDD survey in Niger was conducted in 1994. Led by Professor Hamani Daouda from the Faculty of Health Sciences, Abdou Moumouni University in Niamey, its objective was to determine the extent of iodine deficiency and its negative impact on the country's social and economic development. Conducted in a representative sample of 9000 students, the survey reported an alarming total goiter rate of 35.8%. Luckily, these findings resonated with policymakers, who issued a recommendation in February 1995 that all salt for human consumption should be fortified to deliver iodine to the deficient population. Later that year, the Ministries of Health, Trade, and Finance co-signed a decree which specified the conditions for production, import, and marketing of iodized salt in Niger. As a result, the coverage of iodized salt increased dramatically, and by 1998 almost two-thirds of households across Niger had access to adequately iodized salt. No doubt, this achievement was helped by the fact that 90% of salt consumed in Niger entered the country via a single route in Torodi (region in the far west of Niger), which made monitoring possible.

But this remarkable progress was not sustained. Unfortunately, the early achievements gradually eroded, and by 2010 only a third of households were consuming adequately iodized salt. Several factors may have been responsible for this situation:

- Weak policy implementation and control mechanisms of salt for human consumption;
- Inadequate support of salt importers;
- Lack of legislation to regulate salt for industrial use, which makes up a large proportion of all salt imports;
- Slow understanding that, although IDD is a public health problem, the solution lies in the cooperation with the commercial sector.

All children in Niger should be able to reach their full cognitive and developmental potential thanks to iodized salt.

To resolve these issues and ultimately ensure that all children in Niger are able to reach their full cognitive and developmental potential, new measures have been implemented. First, the inter-ministerial decree on salt has been revised to improve the control of salt imports (a revised decree was signed on 25 March 2014). Second, steps have been taken to extend the same iodization standards to salt produced locally (e.g., in the town of Bilma), so that a significant proportion of the country's population, who consume only local salt, can also reap the benefits of iodine.

The next challenge for Niger's fight against IDD will be adopting measures to monitor the quality of salt for industrial use, and in particular the salt imported from neighboring countries.

A thriving Ethiopian iodized salt co-operative

Ato Mengistu Shewit Iodized Salt Company, **Ato Beyene Birru** UNICEF/Mekelle, **Lorenzo Locatelli-Rossi** Global Alliance for Improved Nutrition (GAIN)

Shewit Salt Producers Co-operative

The success story of the Shewit Salt Producers Co-operative is unique. Situated in Mekelle, the capital city of the Tigray region in Eastern Ethiopia, Shewit has been successfully pursuing universal salt iodization for over 12 years, and it is committed to innovation and staying abreast of the latest technology. Most members of the co-operative are former servicemen who played an important role in the downfall of the Derg regime. In collaboration with the agricultural sector, Shewit is participating in a salt iodization program with the goal of bringing high-quality iodized salt to the public.

In Shewit's early days, production involved crushing slabs of amolecio salt and adding iodine, which created iodized salt fit for animal consumption. With UNICEF funding, a trailer was rigged with a jaw crusher, vibratory screen, and a diesel engine powerful enough to crush the slabs, producing a coarse salt ready for iodization.

The "happy donkey" has come to symbolize Shewit salt

Members of the Shewit Salt Producers Co-operative.

Training workshops were organized for the members to cover different aspects of salt iodization, general production management, and quality control and assurance. Soon after the launch of iodized salt for animal consumption, good quality salt from Lake Afdera came onto the market, and Shewit started to produce high-quality iodized salt for human consumption.

Despite many setbacks over the years, today the co-operative is growing from strength to strength. Its distribution network continues to expand, and Shewit is poised to enter the Addis Ababa market. The factory operates six days a week, meeting the high demand for high-quality, affordable, iodized salt. Shewit has received many awards and recognition for its accomplishments: cups, medals, and certificates from the regional, zone, and local administrative bodies. The co-operative currently employs 26 members on a full-time permanent basis, and 44 temporary workers, which supports the community and helps to fuel the local economy.

Salt as currency in ancient Ethiopia

from Pankhurst, R. 'Primitive money' in Ethiopia. Journal de la Societé des Africanistes. 1962; 32(2): 213–248

In Ethiopia, as in many other parts of Africa, salt was the principal article of exchange for at least a millennium and a half. The first known reference to salt was made by the Egyptian monk Cosmas Indicopleusters, who learned of its use around 525 AD. Alvarez, a priest who accompanied the first Portuguese diplomatic mission to Ethiopia almost exactly a thousand years later, said that the mineral was used as money throughout 'the kingdoms and dominions of Prester John,' i.e., the Empire of Ethiopia, and was so widely accepted that 'whoever carries it finds all that he requires.' The salt in question, according to the seventeenth century Jesuit traveler, Almeida, came from 'perpetual and inexhaustible supplies on the Dankil side of the borders of Tigre and Angot, where it was cut into blocks by axe.' Alvarez described the pieces thus produced as a span and a half long and almost three inches in the other two directions. But although they were virtually identical in shape and size, these bars of salt varied considerably in value from locality to locality in direct proportion to the distance from the mines. The salt was thus 'very cheap where it was obtained and very dear at Court,' while in the far-off region of Damot it was said to be worth almost its weight in gold.

MEETINGS AND ANNOUNCEMENTS

Chinese delegation visits Canada on a USI Study Tour

Lucie Bohac Coordinator, Micronutrient Forum Secretariat

On October 16–17, 2014, Micronutrient Initiative (MI), in collaboration with the Iodine Global Network, hosted at their Ottawa office a delegation of Chinese officials participating in a USI Study Tour. In 2016, China's state monopoly on the sale of salt may be removed, marking the end of a system with nearly 2,700 years of history. The purpose of the Study Tour, sponsored by UNICEF Beijing, was to learn how universal salt iodization functions in a market economy, with Canada as an example. The delegation included eight representatives from diverse government departments and institutions including the National Health and Family Planning Commission, the National Development and Reform Commission, Ministry of Finance, China CDC, Peking Union Medical College Hospital, and the Health and Family Planning Commission of the Tibet autonomous region.

During the tour, the delegates listened to and gave presentations on topics relevant to IDD and USI, with a focus on the role of the salt industry in salt iodization programs and regulatory aspects of USI as a public health strategy. The success of Canada's iodization program is evidenced by the country's high level of educational achievement (51% of Canadian adults have at least an undergraduate degree), which was discussed in relation to the employment rate and economic health of the country, making a clear economic case for addressing IDD. The presentations were followed by a stimulating discussion of some of the key issues facing China and how some of the learning from the study tour can be applied. Of particular interest to the delegation was the fact that, although Canada has very few salt processors, they produce a variety of salts. The industry does not receive government subsidies and yet iodized salt is sold at low cost. Consequently, people living in hard to reach areas or with low income are easily assured access to iodized salt. It was surprising that seemingly little attention is paid to monitoring of salt iodization and yet, compliance was evident and outcomes (iodine sufficiency) were supported by the findings of the Canadian Health Measures Survey. Much discussion took place around policy interventions such as subsidies and determination of iodization standards and which would be most effective strategy to ensure a reliable iodized salt supply, especially to the hard to reach or lower income populations.

The Chinese delegation to the MI offices in Canada included representatives from diverse government departments and institutions.

IGN Workshop on Sustainable Prevention of Iodine Deficiency, MENA Region

The first of two Middle East and North Africa ***Regional Workshops on Sustainable Prevention of Iodine Deficiency and Achievement of Optimal Iodine Nutrition*** will be held on 11–13 March, 2015 in the UAE. Countries including Yemen, Sudan, Egypt, Syria, Iraq, Kuwait, Libya, Saudi Arabia, UAE, Oman, Jordan, Lebanon, OPT, Qatar, Bahrain, and Iran will convene to discuss and tackle the challenges associated with sustainability of national iodization programs in the region.

The workshop is organized by the Iodine Global Network in partnership with UNICEF-MENA and in consultation with the Global Alliance for Improved Nutrition (GAIN), the regional WHO office, WFP and other partners engaged in efforts to improve iodine nutrition in the region. The key goals of the workshop will be: (1) to evaluate the progress of national strategies to ensure sustainable USI programs, (2) to review national action plans (including, where necessary, the formation of multi-sector national and/or regional USI coalitions of members representing all relevant stakeholders), (3) to review the current QA/QC procedures and enforcement of legislation, (4) to share lessons learned and good practices for sustainable USI among the countries in the region, and (5) to present and discuss the latest scientific and technical developments in IDD prevention.

The second IGN Workshop on Sustainable Prevention of Iodine Deficiency in the MENA region is scheduled to take place in Tunis, Tunisia, in May 2015 and will include Djibouti, Morocco, Tunisia and Algeria, and possibly some Francophone countries from northwest Africa.

ABSTRACTS

A study to assess the iodine deficiency disorder and salt consumption pattern in Lucknow

In India, about 200 million people live at risk of iodine deficiency. In this descriptive, cross-sectional study, the authors aimed to estimate the prevalence of goiter, measure urinary iodine concentrations, and investigate the salt consumption patterns in Lucknow district, India. They gave a structured questionnaire to a sample of 400 schoolchildren aged 6 to 12 years from urban and rural areas of Lucknow. The overall prevalence of goiter was high at 12.7%, and it was higher in rural (18%) than in urban areas (7.5%), and among girls (19.9%) than boys (6.8%). At the same time, 79.8% of the families were using iodized salt. The study shows that goiter is a public health problem in Lucknow district, and strict implementation and marketing of iodized salt is necessary to control the problem in hard-to-reach areas.

Gupta P, et al. Int J Community Med Public Health. 2015; 2(1): 29–32

Urinary iodine excretion in school children of the Andean region, Venezuela 2011

This cross-sectional study was conducted to determine the prevalence of iodine deficiency in schoolchildren of the Andean region of Venezuela. The study included 1197 children aged 7–14 years from 30 localities in the States of Tachira, Merida and Trujillo. Spot urine samples were analyzed for urinary iodine. The study reported a median UIC of 180 μg/L (range 89–369 μg/L), with 16.4% of children having UICs below 100 μg/L, and 15.2% above 300 μg/L. Only 3.4% of children had UICs below 50 μg/L. These results demonstrate that the iodine status is adequate among school-age children in the Andean region of Venezuela.

Caballero L and Cardenas L. Archivos Venezolanos de Puericultura y Pediatria. 2014; vol 77(1): 15–19 [Article in Spanish]

Iodine intake and status of UK women of childbearing age recruited at the University of Surrey in the winter

A cross-sectional study was carried out at the University of Surrey to assess the iodine intake and status of women of childbearing age. Total iodine excretion was measured from 24 h urine samples in 57 women; iodine intake was estimated by assuming that 90% of ingested iodine was excreted. The average iodine intake was also estimated from 48 h food diaries which the participants completed. The median urinary iodine concentration value (63.1 μg/L) indicated the group to be mildly iodine deficient by WHO criteria. By contrast, the median 24 h urinary iodine excretion value (149.8 μg/24 h) indicated a relatively low risk of iodine deficiency. The median estimated iodine intake, extrapolated from urinary excretion, was 167 μg/d, whereas it was lower, at 123 μg/d, when estimated from the 48 h food diaries. The intake of milk, eggs, and dairy products was positively associated with iodine status. The iodine status of this UK cohort is probably a best-case scenario, as the women were mostly nutrition students and were recruited in the winter when milk iodine content is at its highest. Further study in more representative cohorts of UK women is required.

Bath SC, et al. Br J Nutr. 2014 Nov; 112(10): 1715–23

Iodine status from childhood to adulthood in females living in North-East Italy: Iodine deficiency is still an issue.

This survey aimed to assess iodine status in an Italian female population at different ages, also investigating their eating habits. The authors measured urinary iodine concentrations (UIC) in 634 females at puberty, and in 361 fertile women and their children (134 daughters and 120 sons). Median UIC decreased from childhood to adulthood (median UIC: 107, 77, and 55 μg/L in the young girls, females at puberty, and fertile women, respectively). Using iodized salt improved the iodine status in all groups. Milk consumption significantly increased UIC at all ages. In mother-child (both daughters and sons) pairs, the children's median UIC was nearly twice as high as their mothers' (UIC 115 vs. 57 μg/L). Milk consumption varied significantly: 56% of the mothers and 76% of their children drank milk regularly. The children (both daughters and sons) and mothers who drank milk had UIC ≥100 μg/L in 59 and 34% of cases, respectively. Among the pairs who did not drink milk, 44% of the children and 19% of the mothers had UIC ≥100 μg/L. The authors concluded that dietary iodine status declines from childhood to adulthood in Italian females due to changes in eating habits, and particularly, milk consumption.

Watutantrige FS et al. Eur J Nutr. 2015 Feb 8. [Epub ahead of print]

Optimal and safe upper limits of iodine intake for early pregnancy in iodine-sufficient regions: a cross-sectional study of 7,190 pregnant women in China.

The authors investigated optimal and safe ranges of iodine intake during early pregnancy in an iodine-sufficient region of China: 7190 pregnant women at 4–8 weeks gestation were investigated and their UIC, and thyroid functions were measured. The prevalence of overt hypothyroidism was lowest in the group with UIC 150–249 μg/L, which corresponded to the lowest serum Tg concentration (10.18 μg/L). Prevalences of subclinical hypothyroidism (2.4%) and isolated hypothyroxinemia (1.7%) were lower in group with UIC 150–249 μg/L. Excessive iodine intake was associated with a 2.85-fold increased risk of isolated hypothyroxinemia. Moreover the prevalence of TPOAb positivity and TgAb positivity presented a U-shaped curve, ranging from mild iodine deficiency to iodine excess. The findings suggest pregnant women should achieve an iodine intake which allows them to maintain a UIC between 150–249 μg/L in order to reduce the risk of thyroid disorders.

Shi X et al. J Clin Endocrinol Metab. 2015 Jan 28:jc20143704. [Epub ahead of print]

Iodine deficiency and thyroid disorders

Iodine deficiency early in life impairs cognition and growth, but iodine status is also a key determinant of thyroid disorders in adults. Severe iodine deficiency causes goiter and hypothyroidism because, despite an increase in thyroid activity to maximise iodine uptake and recycling in this setting, iodine concentrations are still too low to enable production of thyroid hormone. In mild-to-moderate iodine deficiency, increased thyroid activity can compensate for low iodine intake and maintain euthyroidism in most individuals, but at a price: chronic thyroid stimulation results in an increase in the prevalence of toxic nodular goitre and hyperthyroidism in populations. This high prevalence of nodular autonomy usually results in a further increase in the prevalence of hyperthyroidism if iodine intake is subsequently increased by salt iodization. However, this increase is transient because iodine sufficiency normalises thyroid activity which, in the long term, reduces nodular autonomy. Increased iodine intake in an iodine-deficient population is associated with a small increase in the prevalence of subclinical hypothyroidism and thyroid autoimmunity; whether these increases are also transient is unclear. Variations in population iodine intake do not affect risk for Graves' disease or thyroid cancer, but correction of iodine deficiency might shift thyroid cancer subtypes toward less malignant forms. Thus, optimization of population iodine intake is an important component of preventive healthcare to reduce the prevalence of thyroid disorders.

Zimmermann MB et al. Lancet Diabetes Endocrinol. 2015 Jan 12. [Epub ahead of print]

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For further details about the IDD Newsletter, please contact: Michael B. Zimmermann, M.D., the editor of the Newsletter, at the Human Nutrition Laboratory, Swiss Federal Institute of Technology Zürich, idd.newsletter@hest.ethz.ch.

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