ICCIDD GLOBAL NETWORK

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IN THIS ISSUE:

In the UK and Australia, poor iodine intake in pregnancy predicts lower child IQ

Iodine deficiency early in life is a major cause of preventable mental impairment worldwide. Every year, in developing countries, 38 million newborns are born iodine deficient. But newborns in industrialized countries, such as the UK, USA, and Australia, are also vulnerable. As iodine deficiency has re-emerged in these countries, four recent reports have pointed to the perils of even mild deficiency during pregnancy.

THE INTERNATIONAL COUNCIL FOR CONTROL OF IODINE DEFICIENCY DISORDERS (ICCIDD) GLOBAL NETWORK is a nonprofit, nongovernmental organization dedicated to sustained optimal iodine nutrition and the elimination of iodine deficiency throughout the world. Its activities have been supported by the international aid programs of Australia, Canada, Netherlands, USA, and also by funds from UNICEF, the World Bank, Kiwanis and others.

1. Effect of inadequate iodine status in UK pregnant women on cognitive outcomes in their children: *results from the Avon Longitudinal Study of Parents and Children. SC Bath, et al. Lancet 2013; published online May 22.*

The authors assessed whether iodine deficiency during early pregnancy predicts child cognitive development. Mother–child pairs from a long-running prospective study in western England were analyzed. Urinary iodine concentration (UIC) was measured in stored samples from 1040 first-trimester pregnant women. Overall, the women were mild-to-moderately iodine deficient, with a median UIC of 91 μg/L (IQR 54–143). The women were divided into two groups: iodine deficient based on a UIC <150 μg/g creatinine or iodine sufficient (UIC ≥ 150 μg/g cr). The association between maternal iodine status and child IQ at age 8 years and reading ability at age 9 years was then assessed. After adjustment for confounders, children of deficient women were more likely to have scores in the lowest quartile for verbal IQ (60% higher risk), reading accuracy (69% higher risk) and reading comprehension (54% higher risk) than were those of sufficient mothers. The results emphasize the dangers of maternal iodine deficiency to the developing infant, even in a country classified as only mildly iodine deficient, such as the UK.

Watch videos related to the UK pregnancy study online on BBC: ***http://www.bbc.co.uk/search/news/?q=iodine***

2. Mild iodine deficiency during pregnancy is associated with reduced educational outcomes in the offspring: *9-Year Follow-up of the Gestational Iodine Cohort. KL Hynes, et al. J Clin Endocrinol Metab 98: 1954–1962, 2013.*

Similar to the above UK study, the authors of this study from Tasmania, Australia looked at whether 9 y-old children (n=228) born to mothers with UICs <150 μg/L during pregnancy have poorer educational outcomes in primary school than those whose mothers who were not iodine deficient during pregnancy.

After adjusting for potential confounders, children born to deficient mothers had reductions of 10% in spelling, 8% in grammar and 6% in English-literacy compared with children whose mothers were iodine sufficient during pregnancy. Differences in spelling remained significant after further adjustment for socioeconomic factors. The authors concluded that even mild iodine deficiency during pregnancy in Australia has long-term adverse impacts on child development.

3. Iodine status in pregnant women in the United States, NHANES 2005-2010.

K Caldwell, et al. Thyroid. 2013 Mar 14. [Epub ahead of print]

This report presents new iodine data in the U.S. population from the U.S. National Health and Nutrition Examination Surveys (NHANES) 2009-2010, and compares it to previous NHANES studies. Median UIC in 2009-2010 (144 µg/L) for the U.S. population was significantly lower (p=0.001) than in 2007-2008 (164 µg/L). In 2009-2010, median UIC for women of childbearing age (15-44 years) was 124 µg/L. The median UIC for pregnant women in NHANES 2005-2010 was less than adequate (<150 µg/L), at 129 µg/L *(Table 1)*. Intake of dairy products, but not salt, seafood or grains, was a positive predictor of median UIC in women of childbearing age.

Iodine intakes in the U.S. continue to fall and pregnant women are iodine deficient. And despite recommendations for supplementation by experts, iodine supplements are used by only 22% of U.S. pregnant women.

4. The prevalence of using iodine-containing supplements is low among reproductive-age women in the U.S.

JJ Gahche, et al. J Nutr. 2013 Apr 24. [Epub ahead of print]

This study estimated the prevalence of iodine-containing dietary supplement (DS) use and intakes of iodine from DSs among pregnant women and nonpregnant women of reproductive age in the U.S. NHANES 1999–2006 (n = 6404). Although 77.5% of pregnant women reported taking one or more DSs in the past 30 d, only 22.3% consumed an iodine-containing supplement *(Table 2)*. Pregnant women using at least one DS containing iodine had a mean daily iodine intake of 122 µg/d from supplements. Median UICs were similar for pregnant and nonpregnant women in the population aged 15–39 y: the median UIC was 148 µg/L for pregnant women and 133 µg/L for nonpregnant women. Among all women, the median UIC among nonusers of DS containing iodine was 127 µg/L, compared to 153 µg/L in women using a DS with iodine *(Table 3)*.

Table 1: Median UICs (µg/L) for U.S. women of childbearing age and pregnant women by trimester, NHANES 2005-2010.

Category	n	Median UIC (95% CI)
Total	***2233***	***129 (120-136)***
Pregnant	206	129 (101-173)
Non-Pregnant	2027	129 (119-136)

Table 2: Prevalence of use of dietary supplements and supplemental iodine by women 15–39 y, by pregnancy status: United States, 1999–2006.

Group	n	Percentage using any dietary supplement	Percentage using any dietary supplement with iodine
All women	6404	44.4	18.7
All pregnant	1250	77.5	22.3
All nonpregnant	5154	41.3	18.5

Table 3: UICs (µg/L) in reproductive-aged women by iodine-containing supplement use in the United States, 2001–2006.

Group	n	Median (25^{th}, 75^{th} percentile)
All women	1603	134 (72, 233)
Nonusers of DS with iodine	1372	127 (68, 217)
Users of DS with iodine	231	153 (85, 299)

Cambodian children have ample iodine intake but only 70% of households are covered by iodized salt

J Conkle, T Carton, S Un, V Berdaga UNICEF, Cambodia.

Background

IDD was once a major public health problem in Cambodia. In a 1997 national survey, 12% of primary school children were goitrous. The goiter rate was >20% in nine of 20 provinces and >30% in four provinces. The National Sub-Committee for the Control of Iodine Deficiency Disorders (NSCIDD) was established in 1996. The government committed to universal salt iodization (USI) by including a target of 90% coverage in national plans and policies. In 1999, small-scale production of iodized salt began in Cambodia. In 2001, USAID became involved in USI, and along with UNICEF, provided the majority of financial support for salt iodization over the past decade.

In 2003, the Prime Minister signed a decree that mandated that all salt produced, sold and distributed – for both human and animal consumption – must be iodized. In 2004, implementation began when the Ministries of Planning and Commerce outlined the specific procedures on how the decree was to be honored, including a clause stipulating that producers would take over the cost of fortification when subsidies were removed.

The salt industry

In 2004, with government support, 187 independent solar salt producers formed the Salt Producers Community of Kampot and Kep (SPCKK), which was responsible for the coordination, marketing and sale of raw salt.

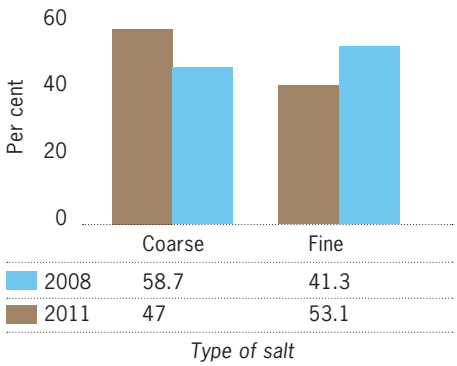
The SPCKK has sustained itself until today by ensuring a stable, high price and offering reasonable credit to small producers. The average production of the smallest producer is roughly 100 metric tons per year, with the largest producing roughly 6,000-8,000 metric tons per year. All salt must be iodized before leaving Kampot province. Mobile salt iodization plants are used on a rotating system in real-time to fill orders on market demand. Refined salt is produced by one independent factory and about 20 small-scale, independent salt boilers throughout the country. Boilers buy iodized salt in grades 1, 2, or 3 from SPCKK in Kampot, refine the salt by boiling, and then reiodize the salt.

The domestic price of iodized raw salt is currently ~$65 per metric ton for wholesalers and refiners, which compares to an international wholesale price of between $30-40 per metric ton. This price discrepancy provides an incentive for foreign traders, especially Vietnamese, to undercut the Cambodian domestic price by bringing cheaper, non-iodized and iodized salt into the country in trucks or boats that they already have loaded with fruits, vegetables and other market goods.

Salt is retailed in two types: refined and raw. All refined salt is promoted as iodized. Despite legislation that mandates iodization of all salt, raw salt is sold as iodized and non-iodized. At the retail level raw salt contains no branding at all because it is repackaged. Non-iodized raw salt is often used to cure meat or produce fermented foods in preference to iodized salt, because of a misperception that iodized salt alters the fermentation process and sometimes creates a bad smell.

Over the last decade, consumer demand for refined salt has increased steadily. Raw salt made up 70 per cent of the market in 2005, 58 per cent in 2008 and 47 per cent in 2011, according to school-based surveys. The boilers are taking an increasing share of the market from unprocessed salt sold directly from the SPCKK to wholesalers and traders. 2011 was the first year refined salt was used in a majority of households (*Figure 1*).

Figure 1: Type of salt used in Cambodian households.



Marketing of the program

Marketing campaigns began as early as 1999. An initial television campaign sought to increase knowledge of the importance of iodine and convince consumers to adopt iodized salt. IDD Day, a major media event, was held on 20 October 2004, and a high-profile visit by UNICEF Goodwill Ambassador Sir Roger Moore (aka Bond, James Bond, see photo) served to increase the visibility of USI. Over the last decade, bilateral agencies, the UN, NGOs and government have delivered messages to the public on the importance of consuming iodized salt. While knowledge and attitude towards iodized salt has not been directly measured, there is anecdotal evidence that iodized salt is well known by the general public.

Household coverage with iodized salt

Table 1 presents rapid test kit data on the coverage of iodized salt in Cambodian households. Coverage increased dramatically from 14% in 2000 to 73% in 2005. Since 2005, it has plateaued, with coverage fluctuating between 70 and 83% over the last six years. Before 2011, nearly all refined salt was iodized, but there is some evidence of a recent decline. According to the Cambodia Survey on Iodine Nutrition (CSIN) 2011, the presence of iodine in refined salt (not all households) decreased from 93% in 2008 to 75% in 2011. The decline may be associated with the removal of the subsidy for potassium iodate.

In 2005, after coverage surged above 70%, inequitable use of iodized salt emerged. In most provinces coverage of iodized salt has stayed above 70% and in some provinces coverage is greater than 90%, but there are also areas with low coverage. Kampot and Kep, the two salt producing regions, and Svay Rieng, which borders Vietnam, have the lowest percentage of iodized salt use in households. In Kampot and Kep, the low coverage is due to leakage of non-iodized salt from production areas, and in Svay Rieng it is due to illegal imports of non-iodized salt from Vietnam. Although there is some evidence that the coverage is increasing in border and production areas, it remains well below the national average. Wealth is another source of variation that emerged after 2005. In 2005, 87 per cent of households in the wealthiest quintile used iodized salt, compared to 65 per cent in the poorest wealth quintile.

Cambodian food markets often carry refined salt that is well-iodized

Table 1: Coverage of iodized salt in Cambodian households (tested by rapid test kits).

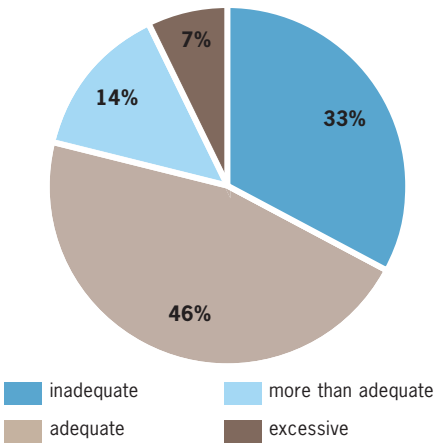
Year	Coverage (%)
2000	13
2004	28
2005	73-74
2008	74-78
2009	71
2010	83
2011	70

The Cambodian production standard of 50-60 ppm is higher than the international norm. Setting production levels at 50-60 ppm is intended to compensate for high iodine losses through storage, packaging and transport; the high level will ensure that salt at retail level contains at least 30 ppm of iodine. The main member of the NSCIDD with authority for monitoring and enforcing legal provisions is CamControl, a component of the Ministry of Commerce. But enforcement is still weak, with virtually no penalties being implemented to date.

Public health impact

The 2008 CSIN was the first survey to measure UIC in Cambodia and found the median UIC in Cambodian school children was 236 µg/L and 8% were <50 µg/L. The measurement was repeated in the 2011 CSIN and there was no significant change in the median UIC in children *(Table 2)*.

Figure 2: Levels of iodine in Cambodian household salt, 2011.



While iodine deficiency is no longer a significant public health problem, the proportion of children with UICs >500 µg/L went from 5.5% in 2008 to 16% in 2011. With no large changes in the coverage and quality of iodized salt, it is reasonable to assume that the increase may be caused by shifts in diet. Fish sauce has been shown to be an important source of iodine, and increased consumption of processed foods could be responsible for increased intake of iodine.

Roger Moore, who starred in many James Bond movies, tests salt for iodine content in Cambodia as part of UNICEF advocacy efforts

In 2013, food-consumption data will allow quantification of the sources of iodine in diet and will enable demographic disaggregation. This will provide insight into which population groups may be at risk for deficient and excess intakes.

Lessons learned and future questions

Overall, USI has been successful, both from public health and business perspectives. But in 2015, Cambodia's full entrance into the ASEAN Free Trade Agreement will increase competition by foreign salt companies. And after more than 10 years, salt iodization may not be reaching those who need it most; the overall effort has not succeeded in ensuring adequate iodine for the poorest. Another future question for public health will be how to inform the public of the chronic disease risks associated with over-consumption of salt while maintaining USI. But despite these challenges, overall, the Cambodian salt iodization strategy has been successful in raising iodine intakes across the population into the optimal range. This will have major benefits for the country's health and productivity.

Table 2: Urinary iodine concentrations in Cambodian school children in 2008 and 2011.

	Objective	2008 CSIN	2011 CSIN
Median (µg/L)	100-300	236	235.9
Proportion of s amples below 100 µg/L	<50%	17.2%	17.0%
Proportion of samples below 50 µg/L	<20%	8.4%	7.9%

Stephan Vanfleteren of Belgium has won first prize in the People - Staged Portraits Stories category of the World Press Photo Contest 2013 with the series ‚People of Mercy, Guinea'. The picture shows Makone Soumaoro, 30, who has a goiter. (Reuters)

Iodized baking salt improves iodine intakes in Australian pregnant women, but they still need iodine supplements to achieve sufficient intakes

To address the re-emergence of iodine deficiency in Australia, in 2009 it became mandatory for bread manufacturers to use iodized salt in the baking process at levels of 25–65 mg per 1 kg of salt, so that 100 g of bread contained 48 µg of iodine. Additionally, the National Health and Medical Research Council recommended all pregnant and lactating women take daily supplements containing at least 150 µg of iodine. Two recent studies looked at the effect of these two interventions on iodine intakes in pregnant Australian women.

I. The impact of iodine supplementation and bread fortification on urinary iodine concentrations in a mildly iodine deficient population of pregnant women in South Australia

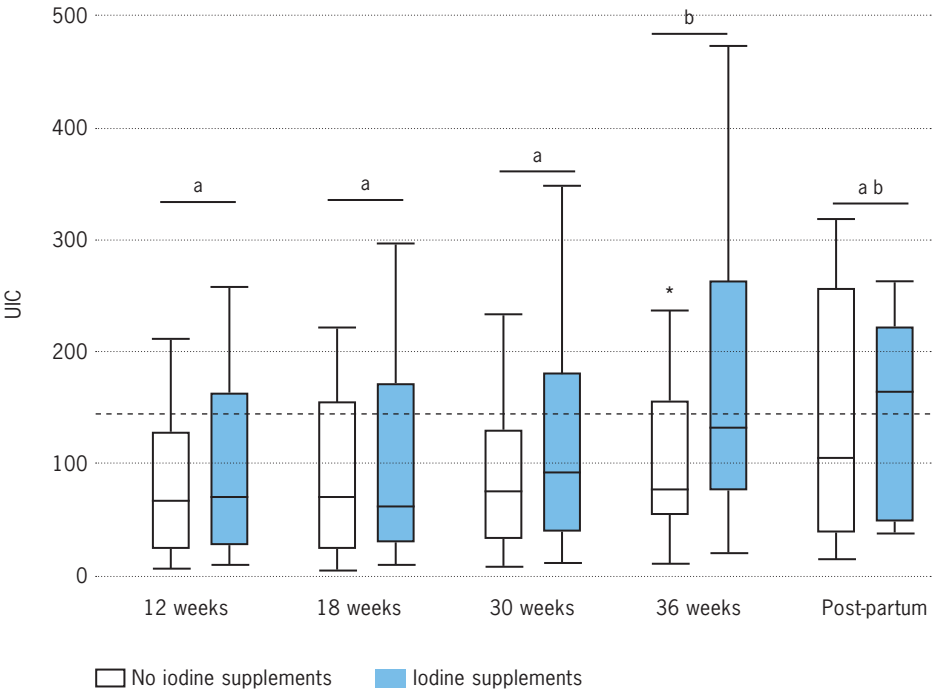
VL Clifton, Na Hodyl, PA Fogarty, et al. The University of Adelaide, Adelaide; The University of Western Sydney, Sydney; ICCIDD Global Network, Westmead; Robinson Institute, Lyell McEwin Hospital, Elizabeth Vale, Australia.
Excerpted from: Nutr J. 2013 Mar 15;12:32.

This prospective study assessed iodine status of South Australian women during pregnancy, the use of iodine-containing multivitamins and the impact of fortification of bread with iodized salt. Women (n = 196) were recruited at the beginning of pregnancy and urine collected at 12, 18, 30, 36 weeks gestation and 6 months postpartum. The use of a multivitamin supplement was recorded at each visit, and spot UICs were measured. Iodine-containing multivitamins were used by 47% of women during pregnancy, while 23% used no multivitamins and 30% used dietary multivitamins without iodine.

Use of supplements containing iodine predicted higher UIC at 36 weeks gestation and in the postpartum period *(Figure 1)*. The proportion of women with UIC above the WHO recommendations of 150 µg/L in pregnancy was assessed according to the use of supplementation at each time point. At 30 and 36 weeks gestation, more women who used iodine containing dietary supplements had UICs >150 µg/L (37 and 43%) compared to those not using iodine supplements (19 and 25%).

The median UIC for pregnant women was 82 µg/L indicating mild iodine deficiency. The consumption of iodine supplements was associated with a significantly higher UIC than nonconsumption (median = 89 vs. 75 µg/L). Overall, there was an improvement in iodine status after mandatory iodine fortification of bread. The median UIC of pregnant women not using an iodine-containing multivitamin during pregnancy was 68 µg/L prior to bread fortification, and 84 µg/L afterward.

Figure 1: Urinary iodine concentrations during pregnancy and 6 months postpartum according to the use of iodine-containing multivitamins in Australian women.



Groups that do not share superscript letters are significantly different.

The data indicates that overall women in this region of Adelaide are mildly iodine deficient in the absence of supplementation but iodine-containing multivitamins designed for pregnancy lead to iodine sufficiency in the 3rd trimester and postpartum for many women. Furthermore the fortification of bread significantly increased UIC but not to a level compatible with iodine sufficiency, suggesting that supplements are still required by most Australian women during pregnancy.

Both iodized bakers' salt and iodine supplements are important sources of iodine for Australian women

II. Improvement in iodine status of pregnant Australian women 3 years after introduction of a mandatory iodine fortification program

KE Charlton, H Yeatman, E Brock, et al. The University of Wollongong, Australia; University of Auckland, New Zealand; Illawarra Shoalhaven Local Health District; University of Western Sydney, Australia. Excerpted from: Prev Med. 2013 Mar 26 [Epub ahead of print].

This before–after study assessed changes in median UIC, according to supplement use, in convenience samples of pregnant women attending a public antenatal clinic in a regional area of New South Wales, Australia in 2008 (n = 139), 2011 (n = 147) and 2012 (n = 114), and knowledge and practices related to iodine nutrition were investigated in 2012 by questionnaires.

Post-fortification, iodine-containing supplements were being taken by 60% and 66% of women in 2011 and 2012, with the most common dosage being 250 μg/day (45%), followed by 150 μg/day (30%).

The mild iodine deficiency pre-fortification (median UIC = 88 μg/L) has steadily improved to 146 μg/L in 2011 and 166 μg/L in 2012 (n = 95) *(Table 1)*. However, only women taking iodine-containing supplements had an adequate median UIC (2011: 178 μg/L; 2012: 202 μg/L). While in non-supplement users, median UIC remained insufficient (2011: 109 μg/L; 2012: 124 μg/L).

Despite fortification of bread salt, dairy foods remained major contributors to total iodine intake. In 2012, most dietary iodine was provided from milk and dairy sources (58%), followed by breads and cereals (20%), tap water (8%), iodized salt (4.5%), seafood (3%), and eggs (3%). Overall knowledge regarding health implications of iodine deficiency was poor.

The study suggests iodine intakes have improved in Australian pregnant women following introduction of the mandatory iodine fortification of bread. But there is a need for public health education given the lack of knowledge regarding iodine nutrition among women. Ongoing monitoring of the iodine status of pregnant women is essential to ensure that fortification and supplementation strategies achieve optimal iodine intakes, without the risk of excess.

Table 1: Median urinary iodine concentrations (μg/L) of pregnant women in New South Wales, Australia.

	2008 *(Pre-fortification) n = 110*	2011 *(Post-fortification) n = 106*	2012 *(Post-fortification) n = 95*
All	88	146	166
Taking iodine-containing supplements	–	178	202
Non-supplement users	–	109	124

Iodine deficiency in Aboriginal teenagers

D Mackerras, GR Singh, CJ Eastman Charles Darwin University, Darwin, NT; Food Standards Australia New Zealand, Canberra; and the ICCIDD Southeast Asia and Pacific Region, University of Sydney, Australia.

In the 2003-4 Australian National Iodine Nutrition Survey, school children in the south-eastern states (where the majority of the Australian population live) had median urinary iodine concentrations (UIC) in the mild deficiency range. However, there was no specific sample of indigenous Australians in that survey. In this study, the participants (n=376) were part of the Aboriginal Birth Cohort Study and were aged 16-20 years at the time of the survey. They lived in urban (the city of Darwin) and rural areas of sparsely-settled tropical north of Australia.

In spot samples, the median UIC was highest in the boys living in Darwin (77 µg/L) *(Figure 1)*. Among the other groups – Darwin girls and rural boys and girls – median UIC was lower (47-55 µg/L). Median UIC in girls who were pregnant or had a young infant was similar to non-pregnant girls. Mandatory fortification of salt (45mg/kg salt) used in bread commenced in Australia in late 2009. Remeasuring iodine concentrations in this group will provide an assessment of whether this important initiative has had an impact on indigenous Australians living in remote areas.

Iodine status of populations is defined by categorising the median UIC. Because iodine excretion reflects recent intake, and high concentrations of iodine are found in a limited range of foods, the iodine concentration in a random urine sample, or even a 24-hour urine sample, may not reflect the habitual iodine intake of the individual. Therefore, a survey that collects a urine sample on a single day from each subject cannot be used to estimate the proportion of the population who have high and low intakes over the longer term, because the day-to-day variation within individuals expands the tails of the distribution outwards.

Collecting a second sample on a sub-set of participants permits a correction to the population distribution to remove the within-person variance. Therefore, a second spot urine sample was collected in a subsample of the rural participants *(Figure 2)*. After correction, the 10th percentile increased from 13 to 20 µg/L, the 90th percentile decreased from 101 to 77 µg/L and the highest value decreased from 470 to 234 µg/L. A greater proportion had concentrations <100 µg/L than would have been assessed using the spot urine data, but there were fewer with very low values. In a population with a median UIC in the sufficient range, this correction of the tails would lead to a decrease in the proportion at either extreme of the distribution.

Further reading: *Mackerras DE, Singh GR, Eastman CJ. Iodine status of Aboriginal teenagers in the Darwin region before mandatory iodine fortification of bread. Med J Aust. 2011;194(3):126-30.*

Figure 1: Median urinary iodine concentration (MUIC) and interquartile range, single spot urine samples in Aboriginal teenagers from the Darwin area

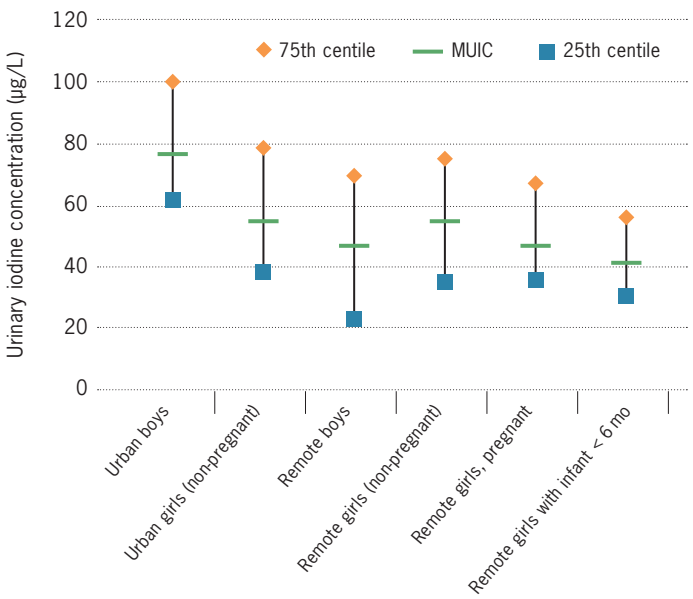
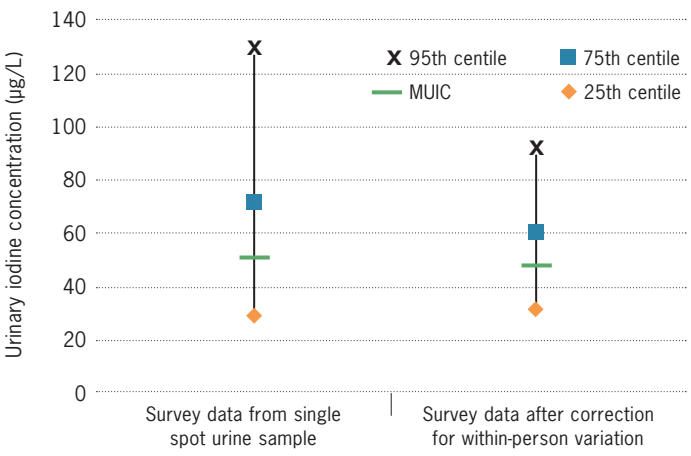


Figure 2: Impact of removing within-person variation on the spread of population urinary iodine concentrations, (boys and girls from remote communities around Darwin)



Awareness and household coverage of iodized salt in Afghanistan

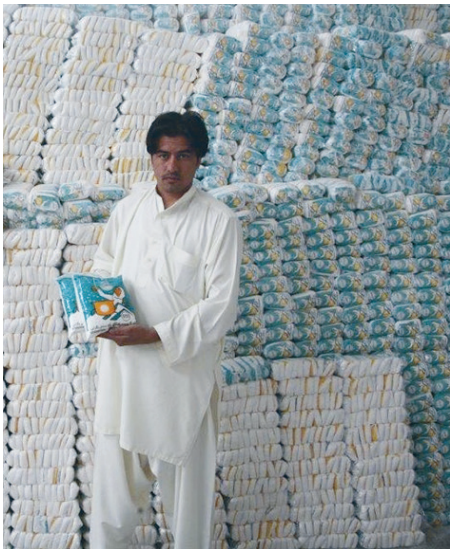
N Dodd, BA Hamid, MQ Shams and S Nasiri FAO, the Ministry of Public Health, WHO and UNICEF, Afghanistan.

Iodine deficiency is a public health concern in Afghanistan. The National Nutrition Survey (NNS) in Afghanistan in 2006 reported that the proportion of individuals with urinary iodine concentrations <100 µg/L was 72% among 7-11 y-olds, 75% among non-pregnant women and 79% among pregnant women, aged 15- 49 y. Iodization of cooking salt has been adopted as a strategy for combating IDD, and the salt iodization regulations were approved by the Council of Ministers of the Islamic Republic of Afghanistan in March, 2011.

The Joint Program on Child, Nutrition & Food Security in Afghanistan, Ministry of Agriculture, Irrigation and Livestock, in partnership with Ministry of Public Health and Agriculture and UN organizations (FAO, UNICEF, WFP, UNIDO and WHO) is implementing an integrated Food Security and Nutrition Program in the four most vulnerable provinces of Afghanistan: Badakhshan, Nangarhar and Bamyan (all three rural) and Kabul (urban).

As a part of this endeavour, in order to generate baseline data base for advocacy, social marketing and resource mobilization for nutrition interventions, a Nutrition & Household Food Security Survey was done. The survey used a cluster sampling design in eight randomly selected districts from the four provinces. A total of 3,564 households were assessed for demographic and socio-economic characteristics, infant and young child feeding practices, food consumption patterns and nutritional status of 6-59 mo-old children, pregnant women and lactating women.

In terms of food consumption score, 53% of households were in 'acceptable', 30% were in 'border line' and 17% were in the 'poor' categories. Only about a fifth (22%) of households were reportedly food secure, while 16% were mildly, 43% moderately and 19% were severely food insecure.



Better quality iodized salt means better health in Afghanistan

Awareness about iodized salt

The highest percentage of households reporting positive awareness of iodized salt were in Kabul *(Table 1)*. In Afghanistan, people in urban areas generally have more access to this type of information than those in rural areas. Remoteness and poor access in Bamyan and Badakshan led to their awareness being lower, with exception of households in the Waras district of Bamyan that had high awareness (81.5%).

Overall, 80% of the respondents were aware of iodized salt *(Table 2)*, with the major source of information being media including television/radio (60%), followed by health functionaries (19%), neighbors (13%) and salt

Table 1: Percentage of Afghanistan households that have heard about iodized salt, 2011.

Province name	District name	Yes	No	Total
Badakhshan	Khash	64.5%	35.5%	100%
	Yamgan	58.4%	41.6%	100%
	Total	***61.6%***	***38.4%***	***100%***
Bamyan	Panjab	58.2%	41.8%	100%
	Waras	81.5%	18.5%	100%
	Total	***69.9%***	***30.1%***	***100%***
Kabul	District 7	97.5%	2.5%	100%
	District 8	90.9%	9.1%	100%
	Total	***94.3%***	***5.7%***	***100%***
Nangarhar	Khewa	93.1%	6.9%	100%
	Surkh Rud	93.5%	6.5%	100%
	Total	***93.3%***	***6.7%***	***100%***
Overall		**79.6%**	**20.4%**	**100%**

traders (14%). Knowledge about the beneficial effects of consumption of iodized salt was found to be fair: nearly 50% stated that it prevents goiter and 30% said that it is cleaner *(Table 3)*. However, only a small proportion were aware that it makes people smarter (8%) or prevents cretinism (7%).

About 38% of the respondents stated that they checked the label on the salt packet for iodine. Overall 63% of household salt samples tested using spot testing kits were found to be adequately iodized (iodine levels of ≥ 15 ppm) *(Table 4)*. Thus, urgent efforts are needed to strengthen universal consumption of iodized salt by these communities.

Two-thirds of households in Kabul are covered with iodized salt

Table 2: Distribution (%) of respondents according to their source of awareness of iodized salt.

Province	Heard of iodized salt	Source of knowledge about iodized salt*					
		Television	Radio	Health Worker	Salt Trader	Neighbours	School Teacher
Badakhshan	61.6	7.0	24.0	22.8	21.0	16.6	9.4
Bamyan	69.9	21.0	10.1	27.3	11.7	20.2	13.9
Nangarhar	93.3	24.5	68.1	17.9	8.7	11.7	6.7
Kabul	94.3	74.6	16.5	8.4	13.7	4.3	2.7
Pooled	**79.6**	**30.3**	**29.8**	**19.2**	**13.7**	**13.3**	**8.2**

** Includes multiple responses*

Table 3: Distribution (%) of respondents according to their perceptions of benefits of iodized salt consumption

Province	Perceived benefits of consumption of iodized salt				
	Prevents Goiter	Makes Smarter	Prevents Cretinism	Prevents Mental Retardation	It is purer
Badakhshan	30.7	5.4	6.0	1.9	27.2
Bamyan	44.0	9.8	8.3	2.8	18.5
Nangarhar	66.6	7.3	2.7	1.6	38.5
Kabul	57.6	8.4	11.6	4.4	38.6
Pooled	**49.7**	**7.7**	**7.1**	**2.6**	**30.6**

Table 4: Percentage of households using adequately iodized salt (≥ 15 ppm iodine by rpid test kits)

Province				
Badakhshan	Bamyan	Kabul	Nangarhar	**Pooled**
27.4	68.1	67.0	89.6	**63.0**

Iodine deficiency in young Iraqi women

Alaa Shaalan Hussien, Saad alddin Hussien Ali, Sawsan Mohammed Ali hadi Nutrition Research Institute /Ministry of Health, Baghdad, Iraq

The aim of this study was to estimate the extent of iodine deficiency among non-pregnant women of childbearing age (15-49 years) attending primary health care centers in three Iraqi governorates (Baghdad, Basrah and Nineveh). The cross-sectional survey included 438 non-pregnant women attending eight health centers.

Results

The overall median urinary iodine concentration (UIC) in the sample was 59 µg/L, indicating mild-to-moderate iodine deficiency. More than 71% of women had a UIC of less than 100 µg/L and more than 38% had a UIC below 50 µg/L (Table 2).

Iraqi women and children urgently need more iodine

Conclusions

This study indicates iodine deficiency remains a problem in Iraqi women of childbearing age, with rural areas more affected than urban areas. Because iodine deficiency during pregnancy can impair cognitive and motor development of the offspring, it is important that women enter pregnancy with adequate iodine status. Thus, urgent measures should be taken to increase iodine intakes in this vulnerable group.

Table 1: Urinary iodine concentrations by sample characteristics in Iraqi women

Characteristics	n	Prevalence of UIC (%)			Median (µg/l)
		%<50 µg/l	%<100 µg/l	%≥100 µg/l	
Governorates					
Baghdad	138	24.6%	61.6%	38.4%	67
Basrah	150	24.7%	60.0%	40.0%	87
Ninevah	150	64.7%	92.7%	7.3%	44
Age group (years)					
15-21	95	40.0%	72.6%	27.4%	57
22-31	168	38.1%	72.6%	27.4%	58
32-41	114	39.5%	71.9%	28.1%	59
42-49	61	34.4%	67.2%	32.8%	68
Living Environment					
Urban	381	34.9%	68.8%	31.2%	67
Rural	57	61.4%	91.2%	8.8%	44
Educational level					
None	105	49.5%	73.3%	26.7%	50
Elementary	171	43.9%	78.4%	21.6%	56
Intermediate	72	26.4%	65.3%	34.7%	66
Secondary	35	25.7%	60.0%	40.0%	83
Diploma and above	55	23.6%	63.6%	36.4%	86
Total	**438**	**38.4%**	**71.7%**	**28.3%**	**59**

Ensuring potassium iodate for small-scale salt producers in Ghana

Chr. Guyondet, R. Spohrer, A Quashie The Global Alliance for Improved Nutrition (GAIN) and Environmental Processing & Associates, Geneva, Switzerland

Adequate potassium iodate (KIO3) for small-scale salt producers is a common challenge to achieving Universal Salt Iodization (USI). In Ghana, an innovative approach is providing affordable KIO3 for these producers.

The Model

The Global Alliance for Improved Nutrition (GAIN) began facilitating procurement of KIO3 in Ghana through a partnership established in 2009 with President's Special Initiative on Salt (PSI-Salt) under the Ministry of Trade and Industry (MoTI). In 2010, the partners established a system to improve supply to small to medium scale producers. GAIN provided an upfront supply of 5MT KIO3 to PSI-Salt under a consignment arrangement. PSI then sold the KIO3 to salt producers in scale-appropriate quantities. Revenues were used to fund a regular supply of the fortificant.

A restructuring of the Ghana MoTI forced PSI-Salt to unexpectedly close in early in 2010. To ensure supply of KIO3 would not be interrupted, GAIN investigated transitioning KIO3 management to a private company. This also offered improved efficiency in procurement and pricing decisions. The Environmental Processing & Associates Ltd (EPA), a Ghanaian company, was selected because of its strong familiarity with the country's USI program. EPA helps customers not only solve issues related to KIO3 supply, but also in production and marketing of quality iodized salt. Since 2011, this model has been operational, and in 2012, it became fully financially viable.

An overview of the procurement and distribution mechanisms that GAIN helped establish in Ghana is depicted in *Figure 1.* The price of KIO3 provided to EPA through the GAIN Premix Facility (GPF) was initially agreed upon through consultation with the National Salt Iodization Committee (NSIC).

USI is progressing in Ghana through support for salt iodization by small-scale producers

The price of KIO3 to salt producers factors in all related delivery costs such as port clearing, warehousing, and other expenses. The GPF through its network of certified KIO3 suppliers, supplies high quality KIO3 to EPA at cost in 1kg and 5kg packs to meet the needs of small and medium salt producers. The producers order KIO3 from EPA who then replenishes its stock on a regular basis in order to ensure continuous supply in the market.

Challenges and opportunities

The model has encountered and addressed several challenges. First, KIO3 was subject to import taxes of 27.5% (the import duty has been set at 10% and VAT at 17.5%, comprising of import VAT at 12.5% and import NHIL at 2.5%) which would burden salt producers if passed onwards. Taxes on the previous consignment through PSI-Salt had been reduced to 5%, however EPA did not qualify for the same benefit. Registration with the Minerals Commission of Ghana would allow the company enjoy 5% import tax, but this would cost $10,000 annually. The GPF and EPA calculated that this registration in the medium-term would be more cost effective than paying the taxes. EPA is now the only KIO3 distributor registered in the Minerals Commission in Ghana, making the company a preferred supplier. Cost of registration has been built into the resell price of KIO3.

Current reach

The flexibility offered by EPA to sell in small pack sizes has been important for the model's success: most of the KIO3 has been distributed to small-scale producers. To date, the system has supplied 5MT of KIO3 to 5 large producers, 30 small producers and 10 salt traders.

Monthly iodized salt consumption in Ghana is estimated to be around 7.3MT. EPA has been supplying on average 167kg of KIO3 per month over the past 2.5 years. Assuming 100% of the salt consumed in Ghana is adequately iodized, this would equate to about 27% of the total market *(Table 1)*. Although this estimation is not exact, it indicates that market penetration of the distribution platform has been relatively strong but there is room for expansion.

Next steps

GFP and EPA reviewed and analysed consumption patterns in late 2012/early 2013 in Ghana resulting in the issue of a competitive tender for import of 1,000kg of KIO3, or about six months' supply. This purchase is being supplied on consignment terms whereby EPA repays the GPF based on monthly sales of the product in-country. This ongoing exercise of forecasting and aggregating demand is critical for success of the commercial model. This mechanism established in Ghana is being used to inform the establishment of KIO3 distribution systems in other countries with similar contexts.

Figure 1:

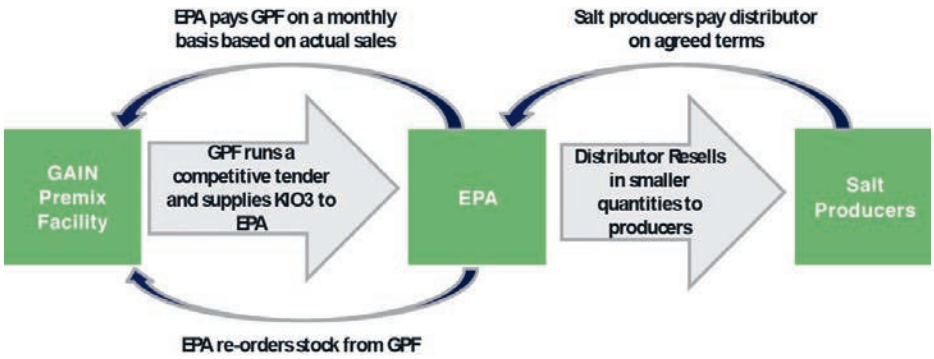


Table 1: Estimated Reach

Ghana Salt Consumption Patterns	
Total population	25'000'000
Average Yearly Consumption of Salt per Capita (kg)	3.5
Average Yearly Salt Consumption (kg)	87'500'000
Average Monthly Consumption (kg)	**7'291'667**
Distribution Model Performance	
Total Sales of KIO3 (kg)	5'000.0
Total Sales Period (months)	30.0
Average Monthly Sales of KIO3 (kg)	167
Incorporation Rate of KIO3 (kg/MT)	0.083
Average Monthly Salt Iodized (kg)	**2,012,048**
Average Percentage of Salt Iodized through the Model	**27.6%**

Iodized salt legislation in South and East Asia and the Pacific: an overview

F Bégin, K Codling UNICEF East Asia Pacific Regional Office

Introduction

Salt iodization programs have been in place for more than 2 decades in Asia, with the proportion of adequately iodized salt being much higher (88%) in East Asia and the Pacific than in South Asia (55%) (1). UNICEF undertook this review to describe in detail the current legal framework related to universal salt iodization (USI) in the South and East Asia and Pacific Regions. This review reflects an analysis of the legislation as written and did not attempt to take into consideration how well (or badly) the legislation is actually implemented. The situation in 25 countries was reviewed but since legislation was not available from Bhutan and DPRK, existing, draft and planned legislation from 23 countries was reviewed in total.

Timeline for salt iodization legislation

Bangladesh was the first country in the region to pass national legislation for universal salt iodization in 1989. Most countries passed their legislation in the 1990s, particularly the second half of the decade, following the 1990 World Summit for Children. Several countries passed legislation as late as the 2000s and the Maldives, Pakistan, Timor Leste and several Pacific Islands are yet to pass legislation. Although some provinces in Pakistan currently have province legislation the Review considered national legislation, and the Pakistani national "IDD Control Bill 2009" has been drafted but has not yet been passed. Two developed countries in the region, Australia and New Zealand, only passed legislation for mandatory iodization of salt for bread in 2009; prior to this salt iodization was voluntary (2). Four countries have recently updated their legislation (Afghanistan, India, Thailand and Viet Nam) and five countries are all planning to revise existing legislation to address loopholes (Bangladesh, Laos, Myanmar) or to make salt iodization mandatory (Malaysia, Viet Nam).

Types of existing national legislation

The countries reviewed were found to have several different types of legislation for salt iodization. Eleven have a ***stand-alone, comprehensive*** national Law, Act, Regulation or Presidential/ Government Decree. In most cases such legislation also has a number of supportive regulations, guidelines or implementing rules that detail how the legislation should be implemented. Countries with this kind of legislation appear to have established the salt iodization program as a vertical program; the legislation suggests that salt iodization was not necessarily integrated into existing systems for food production, control of imports, or registration of industry. Such legislation therefore tends to include a relatively large number of articles (and/or several supporting regulations) that guide the roles and responsibilities of various stakeholders for implementation and specifies penalties for non-compliance.

On the other end of the spectrum, six countries have simply ***amended their salt standard*** (technical regulation), usually under the Food Act, for 'food grade salt' or 'salt for human consumption' to specify the iodine content (in addition to other existing criteria regarding i.e. purity or moisture). Many of the countries that adopted this strategy import all of their salt but the list includes also Thailand, which produces the majority of its salt. Three other countries (Sri Lanka, India and Malaysia) have also used their ***Food Act/Law*** but have issued regulations for salt iodization under this Law/Act rather than simply changing their food standard.

Overall therefore, nine countries, plus Australia and New Zealand, have mandated salt iodization through their Food Acts

or food standards. The advantage of this approach is that salt iodization becomes part of the normal, routine food production and control system. Two countries, Afghanistan and Myanmar, have issued ***regulations under existing laws/acts*** other than the Food Act (or equivalent), which make them relatively similar to stand-alone legislation in other countries.

Mandatory or voluntary

Salt iodization is mandatory in all countries with existing legislation except in Brunei, Singapore and Viet Nam. In Viet Nam, mandatory legislation was downgraded to be voluntary in 2005 when targets of the national IDD control programme were reached due to a misunderstanding that salt iodization was no longer needed. Household coverage of iodized salt and urinary iodine levels have since fallen as a result and revised legislation is planned that will make salt iodization mandatory again.

Objective of salt iodization legislation

A related distinction which appears to influence the effectiveness of existing legislation is whether or not the legislation i) prohibits non-iodized salt or allows only iodized salt, ii) requires the iodization of all salt within the scope of the legislation or iii) guides the production of iodized salt but allows non-iodized salt. The difference between the first two is not immediately obvious as both achieve the same outcome – all salt is iodized. However the different intentions of the legislation significantly influence how it is implemented; in the former the focus is on identifying and removing non-iodized salt whereas in the latter the focus is on identifying all salt and ensuring it is iodized as per national standards. The table below indicates countries that fall into each category of legislation. For obvious reasons, legislation that bans non-iodized food grade salt or allows only iodized salt is the strongest one. The weakest legislation is that which sets conditions for iodized salt and its production but does not require all food grade salt to be iodized.

Scope and universal salt iodization

Another key aspect of salt iodization legislation is what types of salt are included in the scope of the legislation. WHO and UNICEF define universal salt iodization as "the iodization of all human and livestock salt, including salt used in the food industry (3). When one of these three types of salt is non-iodized, it can leak into the market for direct human consumption relatively easily as all are food grade salt. In addition, in several countries, the amount of salt consumed as salt in processed foods is becoming more important. If this salt is not iodized, it is highly possible that the consumption of iodine will be insufficient to achieve adequate iodine intake levels.

This Review estimates that 14 of all countries reviewed (Afghanistan, Bhutan, Cambodia, China, Fiji, Laos, Maldives (planned), Myanmar, Nepal, Pakistan (draft), PNG, Philippines, Solomon Islands, Timor Leste (draft)) have universal salt iodization by this definition. Countries whose legislation specify salt for human and animal use, and do not mention exclusion of salt for food processing were assumed to have USI. Bangladesh, India and Indonesia exclude salt for food processing and India, Malaysia, Mongolia, Sri Lanka and Thailand exclude salt for animals. Countries with voluntary legislation were not considered.

Salt iodization and salt standards

WHO/UNICEF/ICCIDD recommend salt iodization standards of 20-40ppm at production level in order to provide 150ug of iodine per person per day (3). Overall, existing iodization standards indicated in the legislation reviewed appear to be on the high side with several above 40 ppm. Levels in Bangladesh, Cambodia, DPRK, Nepal, Myanmar, PNG and the Philippines stand out in particular. Most legislation also specified additional standards for salt such as minimum sodium chloride content and allowable moisture levels as well as standards related to insoluble materials, contaminants or heavy metals.

Lessons learned

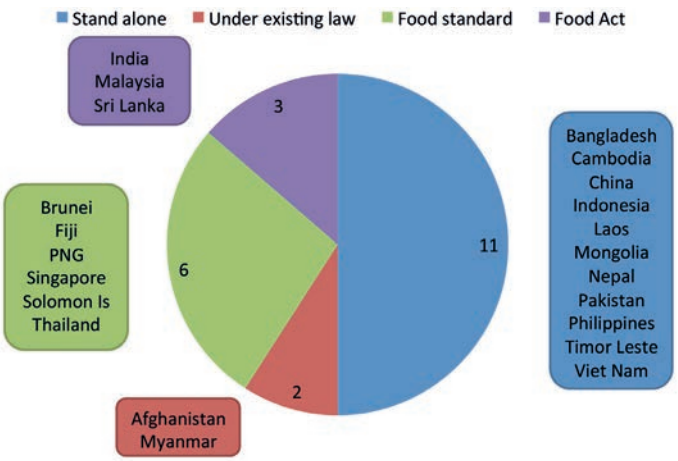
- It is clearly important to have legislation for salt iodization and all countries in the regions either have or are developing legislation. Moreover, almost all legislation is mandatory and a majority allows only iodized salt. The majority also require universal salt iodization although several countries specifically exclude either salt for animals or food processing.
- This Review raises the question of whether there are advantages to including salt iodization legislation under an existing Food Act or similar such that salt iodization becomes part of the routine food control system rather than being implemented as a vertical program.
- While legislation is essential, it needs to be monitored and enforced in order to be effective. Thus when legislation is developed, political will, institutional capacity and resources available to monitor and enforce it must be taken into account.

Supported with funds from Bill & Melinda Gates Foundation.

References

1. UNICEF. State of the World's Children 2012
2. Mu Li et al. Are Australian children iodine deficient? Results of the Australian National Iodine Nutrition Study, Medical Journal of Australia. 2006
3. WHO, UNICEF & ICCIDD. Assessment of iodine deficiency disorders and monitoring their elimination: A guide for programme managers. Third Edition. WHO 2007.

Type of salt iodization legislation



Excludes countries with no legislation (Bhutan, DPRK, Maldives). Includes categorization of draft legislation from Pakistan and Timor Leste.

Objective of salt iodization legislation

Non-iodized salt banned or only iodized salt allowed	All salt must be iodized	Non iodized salt is allowed
Bangladesh	Bhutan (interpreted)	Afghanistan
Cambodia	Laos	Indonesia
China	Maldives (planned)	Myanmar
Fiji	Nepal	
India	Philippines	***Voluntary iodization***
Malaysia	Thailand	Brunei
Mongolia	Timor Leste (draft)	Singapore
Pakistan (draft)		Viet Nam
PNG		
Solomon Islands		
Sri Lanka		

Meetings and Announcements

Srettha Thavisin receives the ICCIDD Global Network's Hetzel Award and vows to continue fight against iodine deficiency for children in Thailand

BANGKOK, 22 March 2012 –Mr. Srettha Thavisin, President and Managing Director, Sansiri Public Co. Ltd., was conferred the Basil Hetzel Award by the ICCIDD Global Network. Dr. Creswell Eastman presented the award that cites Srettha Thavisin as an outstanding individual who has made exceptional contribution to the worldwide elimination of IDD. "Mr. Thavisin has been an extraordinary advocate for protecting children in Thailand from iodine deficiency and has set an example of effective communication efforts to promote salt iodization to fight IDD," Dr. Eastman said.

"Receiving the Basil Hetzel Award is humbling and a true honor to me and to everyone in our organization," said Srettha Thavisin. "This achievement couldn't have been possible without the collaboration of all public and private parties committed to this cause and to the 'Iodine Please' campaign, and particularly, the work of UNICEF Thailand, the world's leading organization protecting children's rights."

"I'm also proud of Sansiri for creating a new model of corporate social responsibility, which we call 'Social Change'," added Srettha Thavisin. "This new model focuses on engaging all stakeholders in our program's cause. We start by jointly identifying a problem – in this case, iodine deficiencies in children in Thailand, then we collaborate on strategies for how to solve it and, finally, we enact these strategies – as a team."

"Iodine Please" is one of Sansiri's initiatives in partnership with UNICEF Thailand. The campaign organizes activities to prevent childhood iodine deficiency, which can inhibit brain development leading to a loss of up to 13 intelligence quotient (IQ) points.

ICCIDD's Basil Hetzel Award was established three years ago to recognize individuals who have made significant contribution to the fight against IDD via media and mass communication.

2013 Meeting of the Management Council of the ICCIDD Global Network, Bangkok, Thailand, April 3-5, 2013

The Management Council (MC) of the ICCIDD Global Network met in Bangkok, Thailand, April 3-5, 2013, hosted by the Thai Ministry of Health. A letter of welcome was received from the Thai Royal Family. The MC consists of the 10 ICCIDD GN Regional Coordinators, their Deputies, as well as the ICCIDD Global Network Executive. Four new Regional Coordinators were welcomed: 1) Prof. John Lazarus, Cardiff, UK: West and Central European Region; 2) Prof. Pieter Jooste, Cape Town, South Africa: Southern Africa; 3) Prof. Ming Qao, Tianjing, China: China and East Asia; and 4) Dr. Roland Kupka, Dakar, Senegal: West and Central Africa. Dr. Frits van der Haar and Dr. Jonathan Gorstein, as Senior Advisors, provided external guidance. The meeting included extensive discussions of regional work plans, as well as sessions dedicated to developing long-range strategy and applying science for improved programs.

The Management Council of the ICCIDD Global Network discussing regional program issues

Technical Meeting and Information Exchange Forum on Salt Reduction and Universal Salt Iodization; Sydney, Australia, March 25-27 2013

In Sydney, Australia, from March 25-27 2013, WHO, together with George Institute and the ICCIDD Global Network, hosted an Information Exchange Forum with the private sector and non-governmental organizations. This was followed by a Technical Meeting on the compatibility of salt reduction and iodine fortification strategies in public health.

The meeting concluded that these two important public health initiatives can and should collaborate and benefit from each other. Potential areas of cooperation include: a) joint surveillance of dietary sodium and iodine intakes; b) a joint approach to industry promoting universal iodization while reducing sodium content of processed foods; and c) advocacy with governments to coordinate both programs and regulate targets for industry. Potential next steps identified were: a) the preparation of a policy statement and a media release; b) organization of joint leadership through a global interdisciplinary committee under the auspices of WHO to define plan and goals; and c) promotion of collaborative research within ongoing projects.

Prof. Cres Eastman of the ICCIDD Global Network (right) and Godfrey Xuereb of WHO leading the discussion at the Sydney meeting

Pakistani health officials lauded for achieving salt iodization targets

LAHORE, The International News, March 31, 2013 - The Director General Health Services, Punjab, Dr. Nisar Ahmad Cheema acknowledged the hard work of district health management and the staff of the Punjab Health Department, in achieving USI program targets. He said that USI program in Pakistan has achieved a lot but still considerable efforts are needed to bring the iodine deficiency to minimum expected level. He was the guest of honor at the IDD/USI Program Review and Way Forward seminar held in Lahore.

Dr. Mahmood Ahmad, Program Manager F&N Punjab, welcomed the participants and said that USI is the only distinction among the large array of preventive health programs that has visibly made tremendous progress during the last 10 years. He said that according to the National Nutrition Survey (NNS) 2011, 79% people in Punjab province are consuming iodized salt compared to only 17% in 2001. He shared that district level by-laws notification on USI in all 36 districts helped to improve and sustain the edible salt iodization.

Dr. Khawaja Masuood Ahmed, NPM IDD/USI program from MI Pakistan, informed the participants that Pakistan is amongst those countries where IDD is still a public health problem. He said that according to NNS, the consumption of iodized salt at household level has increased from 17% in 2001 to 69% in 2011. The consensus of this seminar was that USI should be a national health priority program, and there is a continued need to propagate the message that the most effective strategy for elimination of iodine deficiency disorder is USI.

Students learn about the global impact of iodine

April 10, 2013, http://www.micronutrient.org/
In recognition of World Health Day, the Micronutrient Initiative (MI) visited students at Holy Spirit Catholic School in Stittsville, Ontario, on April 8, 2013 to talk about the big impact of a little bit iodine. The hands-on workshop let students take the role of field scientists checking salt for iodine. Students were given the opportunity to mirror how salt iodization takes place in the field, as well as testing salt to ensure it contained iodine. They were taught how MI, with the support of the Canadian International Development Agency, is able to work with salt harvesters to ensure that their salt is adequate iodized with potassium iodate – an intervention that helps children´s brains develop for pennies a year per child. "Proper nutrition can make a world of difference in children´s lives in children in Africa, Asia and here in Canada," said MI's Chris Dendys. "Micronutrients like iodine are often the first step. Children who get the proper amount are smarter, do better at school and go onto lead better lives."

Canadian students learn the importance of iodine for health

Abstracts

Iodine and mental development of children 5 years old and under: a systematic review and meta-analysis.

This systematic review examined the relationship between iodine and mental development of children 5 years old and under. The authors organized studies according to four designs: (1) randomized controlled trial with iodine supplementation of mothers; (2) non-randomized trial with iodine supplementation of mothers and/or infants; (3) prospective cohort study stratified by pregnant women's iodine status; (4) prospective cohort study stratified by newborn iodine status. Average effect sizes for these four designs were 0.68 (2 RCT studies), 0.46 (8 non-RCT studies), 0.52 (9 cohort stratified by mothers' iodine status), and 0.54 (4 cohort stratified by infants' iodine status). This translates into 6.9 to 10.2 IQ points lower in iodine deficient children compared with iodine replete children. Thus, regardless of study design, iodine deficiency had a substantial impact on mental development.

Bougma K, et al. Nutrients. 2013 Apr 22;5(4):1384-416. doi: 10.3390/nu5041384.

Beneficial effects of adequate iodine supply on characteristics of thyroid autonomy.

In this retrospective clinical study, records were reviewed of all patients referred for the first time in 1998 and 2009 to the Thyroid Department at the University Medical Centre Ljubljana. The results showed that in 1998, significantly more patients presented with thyroid autonomy than in 2009 (11·8% vs. 7·3%, P < 0·001). In 1998, the ratio between hyperthyroid and euthyroid patients was higher than in 2009 (6:1 and 2:1, P < 0·001). In 1998, patients were younger than in 2009 (mean 63·8 and 66·8 years, P < 0·004). In 1998, mean applied dose of radioiodine was significantly lower than in 2009. The authors concluded that in adequate iodine supply, thyroid autonomy is less frequent, patients are less often hyperthyroid, they are older and cured with lower doses of radioiodine than in mild iodine deficiency.

Gaberšček S et al. Clin Endocrinol (Oxf). 2013 Mar 29. doi: 10.1111/cen.12215. [Epub ahead of print]

Iodine supplementation during pregnancy and infant neuropsychological development: INMA Mother and Child Cohort Study.

The authors reported the association between iodine supplementation and the psychomotor development of infants in Spain. Neuropsychological development was assessed using the Bayley Scales of Infant Development in 1,519 infants (median age, 16 months) between 2006 and 2009. In multivariate analyses, maternal consumption of 150 µg/day or more of iodine from supplements was related to a nonsignificant 1.5-fold increase in the odds of a psychomotor score less than 85 (95% confidence interval: 0.8, 2.9) and to a 1.7-fold increase in the odds of a mental score less than 85 (95% confidence interval: 0.9, 3.0). The results of the present study suggest that in these regions of Spain, iodine supplementation does not improve infant neuropsychological development at 1 year of age.

Rebagliato M et al. Am J Epidemiol. 2013 Apr 1. [Epub ahead of print]

Iodine fortification of vegetables improves human iodine nutrition: in vivo evidence for a new model of iodine prophylaxis.

The aim of this study was to test the efficiency of a new model of iodine prophylaxis in a group of 50 healthy volunteers through the intake of vegetables (potatoes, cherry tomatoes, carrots, and green salad) biofortified with iodine. Each serving of vegetables consisted of 100 g of potatoes, carrots, tomatoes, or salad containing 45 µg of iodine (30% of the Recommended Daily Allowance), and the volunteers consumed a single serving of vegetables, as preferred, each day for 2 weeks. The UI concentration measured in volunteers before the intake of vegetables was 98.3 µg/L (basal value), increasing to 117.5 µg/L during the intake of vegetables. Seven days after the discontinuation of vegetable intake, UI was 85 µg/L. The authors concluded that biofortification of vegetables with iodine increases UI concentration and, together with the habitual use of iodized salt, may contribute to improve the iodine nutritional status of the population without risks of iodine excess.

Tonacchera M et al. J Clin Endocrinol Metab. 2013 Apr;98(4):E694-7.

Iodine status in schoolchildren living in northeast Italy: the importance of iodized salt use and milk consumption.

The aims of the study were: (i) to determine iodine status of schoolchildren living in northeast Italy; (ii) to assess dietary habits and iodine status and (iii) to investigate the level of knowledge concerning iodine sufficiency and ways to ameliorate iodine status. One thousand three hundred seventy-five consecutive 12-13 year-olds completed questionnaires collecting demographic data and information about the use of iodized salt and food frequency habits. Iodine concentration in urine samples (UIC) and in commercially available milk samples has been measured. The median UIC was found to be 81 µg/L. Median iodine concentration in milk was 264 µg/L. Only the combined use of iodized salt plus daily milk normalized UIC, resulting into a median value of 108 µg/l. A logistic regression model confirmed independent associations between low UIC and low intake of milk, use of non-iodized salt and geographical location. The authors concluded that northeast Italy is still characterized by mild iodine deficiency. An adequate iodine status was achieved only when iodized salt was combined with daily milk intake. The national iodine prophylaxis program has led to greater consumption of iodized salt and, it is now used in 60-70% of the Italian households.

Watutantrige Fernando S et al. Eur J Clin Nutr. 2013 Apr;67(4):366-70.

The effect of voluntary iodine prophylaxis in a small rural community: the Pescopagano survey 15 years later.

The objective of the study was to verify the effects of voluntary iodine prophylaxis in a small rural community (Pescopagano, Italy). The design of the study was the evaluation of the prevalence of thyroid disorders 15 years after a previous survey conducted before iodine prophylaxis. In 2010, 757 of 1148 subjects (65.9%) routinely used iodized salt, and the urinary iodine excretion was significantly higher than in 1995 (median 98 µg/L vs. 55.0 µg/L). The prevalence of goiter was lower in 2010 than in 1995 (25.8% vs. 46.1%), mainly due to the reduction of diffuse goiter (10.3% vs. 34.0%). In 2010 vs 1995, thyroid autonomy in subjects younger than 45 years old (0.5% vs. 2.5%) and nonautoimmune hyperthyroidism in subjects older than 45 years old (1.4% vs. 4.5%) were less frequent. The prevalence of hypothyroidism was higher in 2010 vs. 1995 (5.0% vs. 2.8%), mainly because of an increased frequency of subclinical hypothyroidism in subjects younger than 15 years old. Accordingly, serum thyroid autoantibodies (19.5% vs. 12.6%) and Hashimoto's thyroiditis (14.5% vs. 3.5%) were more frequent in 2010 than in 1995. The authors concluded that iodine intake affected the pattern of thyroid diseases, but the benefits of correcting iodine deficiency (decreased prevalence of goiter and thyroid autonomy in younger subjects and reduced frequency of nonautoimmune hyperthyroidism in older subjects) far outweighs the risk of development of thyroid autoimmunity and mild hypothyroidism in youngsters.

Aghini Lombardi F et al. J Clin Endocrinol Metab. 2013 Mar;98(3):1031-9.

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