



# IDD NEWSLETTER

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## Sudan launches universal salt iodization

Izzeldin Hussein ICCIDD Regional Coordinator for the Gulf and North Africa



Millions of Sudanese children will benefit from the new USI program

**Iodine deficiency in Sudan is widespread with less than 10% of the population having access to iodized salt. It is particularly severe in the mountains of Darfur and Nile State where goiter rates approach 90%.**

An IDD Control Program was initiated in Sudan in 1989 using iodized oil capsules and this program continues in highly endemic regions of the country. In 1994 Sudan adopted salt iodization as the long-term strategy to control IDD, but there was no order or decree prohibiting the sale of non-iodized salt. A recent household survey reported iodized salt coverage was only 9.3%.

The National Nutrition Directorate under the Federal Ministry of Health is the lead government agency responsible for monitoring the salt iodization program in Sudan.

### Salt production in Sudan

Salt is produced mainly in the Red Sea State where >95% of Sudanese salt is made by solar evaporation of Red Sea brine. Small quantities of rock salt is produced at Jabal Marra in western Sudan. Based on per capita consumption, Sudan needs about 140,000 tons of salt per year for edible use. Other requirements include about 30,000 tons of salt for production of caustic lye and 15,000 tons for other non-edible uses. Thus, the total annual requirements are about 185,000 tons. No salt is imported and salt produced in Sudan is exported to Ethiopia, Chad, and the Central African Republic. In Port Sudan there are 17 salt manufacturing units, of which two are in the government sector. Two major producers in the private sector account for ca. 130,000 tons of production.

### A new initiative

A major new initiative of ICCIDD, with funding from CIDA, plans to increase national awareness of IDD in Sudan at all levels. It will support the USI program in Sudan, define the steps needed to improve coverage of iodized salt and set up a rigorous quality control and monitoring system. The specific objectives are to conduct advocacy meetings and national level workshops; train the salt industry and develop a training manual for sustainable salt iodization and capacity building; conduct a situation analysis and identify the challenges and major constraints for universal iodization in Sudan; establish a robust QC/QA system with training of laboratory personnel; and, finally, establish a national multi-sectoral body to oversee implementation of the program and steer policy.

The ICCIDD team in Sudan, in close collaboration with Sudanese Federal Ministry of Health, is made up of the ICCIDD Regional Coordinator, Dr Izzeldin Hussein, a senior quality control and laboratory expert, Dr Husain Al Jawarnah, and the renowned Professor Mohamed A.



*New iodized salt packages produced in Port Sudan*

El-Tom, the ICCIDD national focal point in Sudan. Their main partners from Sudan are the salt industry, the Director of Primary Health Care, the Director General of Industry and the Director of the National Nutrition Program, as well as representatives from the UNICEF, WFP, MI and WHO offices in Sudan.

### Legislation on USI enforcement

As a first step, ICCIDD contributed to the

drafting of comprehensive salt iodization legislation in 2010 with the Ministry of Health, the National Nutrition Program and other regulatory bodies in the country. The legal provisions on monitoring covered two aspects. First, self-monitoring by the salt industry defined procedures for internal monitoring, where the industry routinely examines its own processes and procedures to identify and correct problems found. Second, external monitoring is

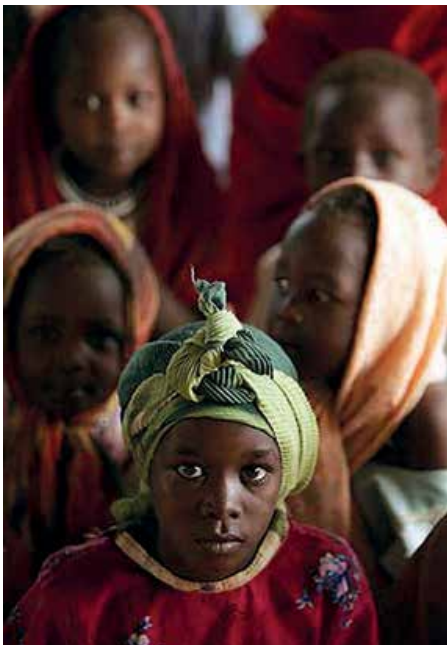


*At the launch, the Federal Minister of Health of Sudan, Dr Al Khair El Noor (R) and the Director of Primary Health Care of Sudan, Dr Talal El Fadil (L) are awarded a plaque of recognition from Izzeldin Hussein of ICCIDD (center).*

legislated by the government pursuant to its inspection and investigation powers. However, until 2012 the implementation of the law had not been formally approved and this remained a major obstacle.

### Launching USI

Therefore, the next step in Sudan was the launching of the new legislation and the national program on USI, a long-awaited event including all stakeholders. In an upbeat and festive ceremony sponsored by ICCIDD, the launch took place in the Red Sea State in June 2012 and was attended by more than 15 federal and state ministers, governors, head of localities and legislative authorities, director generals of various government departments, directors of the police and army, the directorate of measurement and specification and the school health and nutrition department leaders. Attendees included representatives of salt retailers and wholesalers, salt producers, health insurers, as well as representatives of UN agencies in Sudan, the humanitarian aid agencies, and FAO. Also participating were pediatrician and children's organizations, representatives from preventive medicine, pharmacology and laboratories, as well as artists and media representatives.



The ceremony included a moving carnival that started from the Ministry of Health and toured the city, then moved to the

governor's office and on to the exhibition site where the salt iodization plants are operated. The Health Minister and other stakeholders inaugurated the exhibition, and the launching program included speeches from the governor, ICCIDD, WFP, UNICEF. The new salt legislation was read to the public by the chair of the legislative council and officially brought into force. The event received wide media coverage and a full report and video of the activities is available online at: <http://www.youtube.com/watch?v=yNmSxG2MCV4&list=UUubZgznmnWnyJLihsqNsDwQ&index=1&feature=plcp>

### The future

The launching resulted in a consensus statement on actions needed and principles to follow to accelerate the progress towards USI. ICCIDD and the Nutrition Directorate in Khartoum agreed to draw up a Plan of Action for the 5-year period 2012-2017. The plan aims to increase the



to increase coverage of the population with adequately iodized salt. It will also continue to advocate at high levels to ensure continuing governmental interest in enforcing salt iodization to improve national health and economic development.



**Hussain Al Jawarana of ICCIDD demonstrates quality control measures during training of Sudanese salt producers on proper salt iodization**

knowledge and awareness of the population, increase coverage of iodized salt to 90% of the population, and conduct a national survey to track progress after the introduction of iodized salt. It includes social marketing, social mobilization and training of USI monitors across the country to establish a proper surveillance system. To ensure sustainability, ICCIDD coordinated the formation of the Sudan national IDD coalition and will support their efforts

# Iodine deficiency in the UK – the way forward

London meeting discusses iodine deficiency in the United Kingdom and recommends future action

**J Lazarus** ICCIDD National Focal Point for the United Kingdom

The impetus for the meeting on June 29, 2012 was the national iodine survey reported in *The Lancet* (1) that showed the median urinary iodine concentration (UI) in adolescent girls was 80 µg/l, indicating mild iodine deficiency, with low UI of <100 µg/l present in over two-thirds of the girls and a small number having very low levels <50 µg/l. Based on this representative survey, the UK is now among the top ten countries with low national UI medians worldwide in terms of numbers of iodine-deficient school-age children (2).

The meeting was organised by ICCIDD with the British Thyroid Association (BTA) and the British Thyroid Foundation (BTF). Participants included representatives from ICCIDD, the salt and baking industry, and medical, nutrition and public-health experts.

Professor Michael Zimmerman from Switzerland, Executive Director of ICCIDD, indicated that iodine repletion of pregnant women in areas of mild-to-moderate iodine deficiency, or replenishment of iodine stores before pregnancy, can improve maternal thyroid function and may benefit infant development. He referred to recent randomized controlled trials in children with mild-to-moderate iodine deficiency that have shown that iodine treatment significantly improves performance on tests of information processing, fine motor-skills, and visual problem-solving (3,4).



It is remarkable that iodized salt is hardly available in the UK because the major supermarket chains do not stock it, while at the same time British salt producers sell tons of iodized salt to export markets. There are no legislative barriers; supermarkets could provide a significant public service by simply offering iodized salt.

Professor Margaret Rayman (Surrey, UK) reminded the audience that the iodine contribution from food depends on the amount consumed. Although fish and eggs have the highest concentration of iodine they contribute only 11% and 5% respectively to UK iodine intake, whereas the high consumption of milk and dairy products accounts for their major contribution to iodine intake, at 38%. Winter milk has a higher iodine concentration due to supplements in winter feed. Organic milk has a 42% lower iodine content.

Dr Shiao Chan (Birmingham, UK) explained that the iodine requirement in pregnancy is greatly increased compared with the non-pregnant state and reviewed evidence suggesting that iodine supplementation preferably before conception or

early in the first trimester of pregnancy reduces the risk of pregnancy loss, infant mortality, preterm delivery and neurological deficits in women with severe iodine deficiency. Direct evidence of poor obstetric outcomes in women with mild-to-moderate iodine deficiency is more limited although there is evidence of mild neuro-developmental impairment (5).

Dr Sarah Bath (Surrey, UK) presented preliminary results from a UK study into the effect of iodine deficiency during pregnancy on offspring development (S Bath and M Rayman, unpublished data) which show that children of women deficient in iodine are more likely to have scores in the bottom quartile for total IQ, reading accuracy and mathematics.



**Participants at the meeting in the Royal College of Pathologists**

Professor Peter Laurberg (Aalborg, Denmark) described the corrective iodine program in Denmark. In the 1990s, more than 90% of the country was affected by mild or moderate iodine deficiency leading to a high prevalence of goiter and thousands of cases of nodular hyperthyroidism each year. Following an unsuccessful voluntary programme of iodizing household and bread salt in the 1990s a mandatory program was initiated in 2000 which has brought the iodine intake into the recommended range and reduced the incidence of thyroid disease. Professor Massimo Tonacchera (Pisa, Italy) gave examples of the potential application of iodine to agricultural soils and iodine fortification of crops. However, further work is needed to develop these.

Three speakers discussed public health aspects. Parallels were drawn with the public health implications of folic acid deficiency and strategies to correct this by Dr James E Haddow (Rhode Island, USA). Mr Wouter Lox (European Salt Producers' Association, Brussels, Belgium) commented on the significant challenges to salt producers due to the lack of an effective European public health policy regarding salt iodisation. He called for harmonised action in Europe.



**Prof. John Lazarus, ICCIDD National Focal Point for the UK, organized and opened the meeting**

Professor Kate Jolly (Birmingham, UK) outlined three main public health strategies for addressing iodine deficiency: population dietary supplementation, supplementation of girls and women before conception, and supplementation during pregnancy. She concluded that the evidence for an association between mild iodine deficiency and cognitive impairment is not as strong as for severe iodine deficiency, and that the initial consideration should be a trial into supplementation prior to or in early pregnancy.

In most countries, the strategy to control iodine deficiency in populations is by iodization of household, food industry or bakers' salt. The degree of iodine deficiency prevalent in the UK could be adversely affecting pregnancy outcomes and subsequently limiting school performance. During the panel discussion chaired by the meeting's organizer, Professor John Lazarus (Cardiff, UK), it was agreed that further monitoring of UK iodine status is essential to provide documentation of its extent and identify the prevalence of the adverse effects of iodine deficiency. The meeting concluded with the unanimous recommendation that a national strategy to correct this significant public health problem be developed.

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# Even giant pandas need a little iodine

**Milewski AV, Dierenfeld ES** Supplemental iodine as a key to reproduction in pandas? *Integrative Zoology*. 2012;7(2):175-82.

Pandas are endemic to iodine-poor environments and consume bamboo, a food rich in goitrogens. The authors suggest iodine deficiency could contribute to the poor reproductive rates of pandas.



## Background

The giant panda (*Ailuropoda melanoleuca*) is listed as critically endangered. This bear faces a high risk of extinction in the wild, with small populations, very restricted wild habitat and increasing reliance on breeding programs. Bamboos eaten by pandas are likely to be deficient in iodine and/or contain compounds known to be antagonistic to the thyroid (goitrogens). Low iodine status could also help explain the limited population density and slow pace of life of pandas, as well as other adaptations, such as their proportionately small neonates even compared to other bears.

Because of their iconic status and the great expense of conservation efforts, the rates

of growth of panda populations remain disappointing. However, there is an elementary approach of proven effectiveness in humans and livestock that might have been overlooked. This is based on the critical importance of dietary micronutrients, particularly iodine.

## Poverty of iodine in panda habitat

The natural habitat and diet of pandas (such as in Sichuan Province in China) are particularly poor in iodine because of altitude, distance from the sea and the flushing effects of monsoonal rains. Iodine deficiency in humans from Sichuan and adjacent provinces in China is well-known. The leaves of understory bamboo are poor in iodine even where soils are rich in iodine.

Furthermore, central Chinese bamboos are among the most goitrogenic of plants, because they are rich in cyanogenic glycosides, thiocyanate and/or glucosinolates. Thiocyanate competes with iodide in the thyroid and the mammary glands and crosses the placental barrier. In this way, circulating thiocyanate exacerbates environmental shortage of iodine. A combination of an iodine-poor environment and a goitrogenic diet can be expected to reduce reproductive performance in pandas.

## Iodine as a spur to reproduction?

Although it remains unknown whether reproductive condition and breeding success in pandas in their natural habitats are controlled by the supply of iodine, this seems possible by analogy with the situation in humans and livestock. Wild pandas can theoretically compensate to some extent for nutritional deficiencies by dietary choices and seasonal movements, but such options are limited in captivity. However simple it may be in principle to supplement the diet with iodine, the limited natural sources of iodine in panda habitat, and the failure of pandas to exploit either mineral licks or epiphytic lichens to any extent, might mean both a relative specialization for iodine poverty, and a particular sensitivity to excess iodine in the giant panda. Although we should be as wary of excess iodine as of insufficient iodine in the case of pandas, it seems feasible that achievement of the right balance could make a difference to their reproductive success.

# Iodized salt in China provides 2/3rds of dietary iodine and ensures iodine nutrition in the population

Excerpted from: **Y Wu, X Li, S Chang, L Liu, S Zou, D Hipgrave** Variable Iodine Intake Persists in the Context of Universal Salt Iodization in China. *The Journal of Nutrition*, epub July 24, 2012 (doi: 10.3945/jn.112.157982).

China was formerly severely affected by iodine deficiency, with 720 million people at risk. In the early 1970s, surveys identified 35 million individuals with IDD manifesting as goiter, and an additional 250,000 with typical cretinism. A meta-analysis of 36 studies from the affected locations showed a mean deficit in intelligence quotient of 11 points. China introduced a USI policy in 1995 with all edible salt (including table, food, and animal salt) iodized according to a national standard, most recently 35 mg/kg. This proved very effective; a national survey in 2002 found the virtual elimination of IDD. In 2010, household coverage of adequately iodized salt exceeded 95% and was <80% in only 33 of China's 2831 counties, most of them in western provinces with large salt lakes. However, coverage <90% prevails in 55 counties, including 23 in coastal areas.

In recent years, changes in the reported spectrum and incidence of thyroid diseases have been linked to the increased iodine intake resulting from USI. One recognized consequence of introducing USI is a transient increase in iodine-induced hyperthyroidism (IIH). More recent research in China's Liaoning province inferred that high iodine intake may drive thyroid function from a state of potential autoimmune impairment to overt hypothyroidism



*Millions of Chinese children learn better at school because of iodized salt*

and that iodine intake should be reduced. Danish scholars also demonstrated that iodine intake either below or above the recommended levels is associated with an increased population risk of thyroid disease. All researchers recommend careful monitoring of population iodine status.

In China, iodized salt is the main vehicle for iodine supplementation. Salt production is tightly controlled and the sale of non-

iodized salt is restricted. However, China was described by WHO as "at risk of IIH in susceptible groups" based on median UIE of 246 µg/L among children in 2005 and more recent assessments found higher levels of UIE in some surveyed areas. In addition, concerns about the thyroid health of populations in coastal provinces in the context of USI have circulated in the local media and international medical literature.

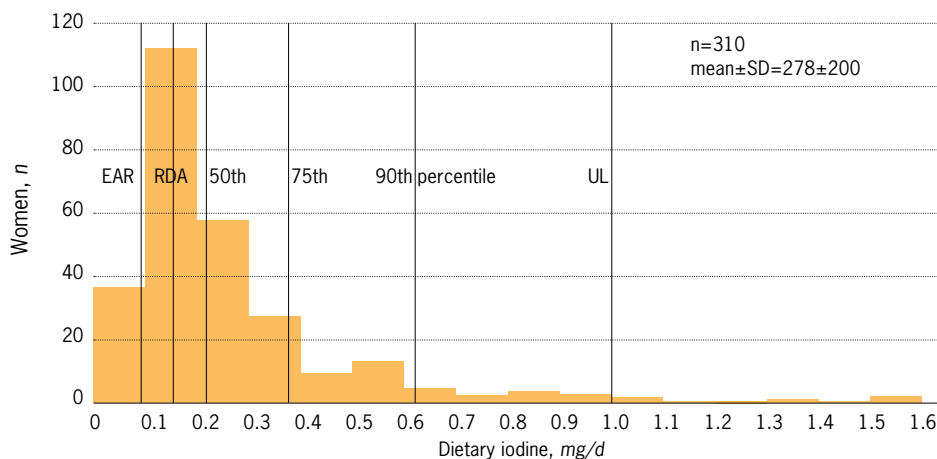
Some coastal cities have been unofficially allowing the sale of uniodized salt that formerly required a prescription and there were calls for liberalizing provincial control of such sales. Threats to USI in China raise the specter of recrudescence of IDD in a nation admired for its “world’s best achievements” in this area and might influence USI in many nations at risk of IDD. On the other hand, excess iodine consumption may also have adverse public health impacts. Given these threats, and in the absence of national, population-representative, and age-disaggregated data on UIE, China’s dietary iodine intake is thus highly relevant to policy on USI. Therefore, the aim of this paper is to report dietary iodine intake and the contribution from iodized salt among Chinese residents, including by age and sex among coastal populations, after more than a decade of USI.

The calculated iodine intake of a standard male in China averaged 425  $\mu\text{g}/\text{d}$  in 2007 and 325  $\text{mg}/\text{d}$  in coastal areas in 2009, well below the upper limit (UL) in all provinces. In 2009, iodine intake was above the UL in only 1–7% of age-sex groups, except among children (18–19%).

Importantly, a significant number of individuals consumed less than the WHO-recommended daily intake, including 31.5% of adult women (Figure 1). Salt contributed 63.5% of food iodine, and 24.6% of salt iodine was lost in cooking. Overall salt consumption declined between the surveys in 2007 and 2009.

The authors concluded that salt iodization assures iodine nutrition in China, where environmental iodine is widely lacking. The risk of iodine excess is low, but plan-

**Figure 1: Dietary iodine intakes by women aged 18–50 y in 4 coastal provinces in China in 2009 by percentile and relative to 3 intake standards.**



To document iodine intake and the contribution from iodized salt in China, the authors surveyed dietary iodine intake during China’s nationally representative 2007 total diet study (TDS) and during an additional TDS in 4 coastal provinces and Beijing in 2009. Iodine intake was broken down by age and sex in 2009. Mean daily iodine and salt intake and the contribution from different food and beverage groups (and in 2009, individual items) were measured. The iodine in food cooked with iodized and noniodized salt was also assessed.

ned decreases in salt iodization levels may increase the existing risk of inadequate intake. Regular monitoring of urinary iodine and more research on the impact of excess iodine intake is recommended.



# Iodized salt in bread increases iodine intakes in New Zealand

In 2009, mandatory iodine fortification in bread was introduced across New Zealand and Australia. Two new reports suggest this policy, aimed to correct mild to moderate iodine deficiency, is showing benefit in New Zealand.

Excerpted from: **SA Skeaff, E Lonsdale-Cooper.** Mandatory fortification of bread with iodized salt modestly improves iodine status in New Zealand schoolchildren. *British Journal of Nutrition* 2012 Jul 31:1-5.[Epub ahead of print]

In 2009, the New Zealand (NZ) government introduced the mandatory fortification of bread with iodised salt as a strategy to improve iodine intakes. The aim of the present study was to assess the impact of fortification on the iodine status of NZ schoolchildren. A school-based cluster survey was used to randomly select schools from two NZ cities. Children aged 8-10 years were administered a general questionnaire, and asked to provide a casual urine and finger-prick blood sample.

The median urinary iodine concentration (UIC) of the children (n 147) was 113 µg/l, which falls between 100 and 199 µg/l indicating adequate iodine status; 12% of children had a UIC < 50 µg/l and 39 % had a UIC < 100 µg/l. The median serum thyroxine concentration was 115 nmol/l. The median serum thyroglobulin (Tg) concentration was 10.8 µg/l and falls in the 10.0-19.9 µg/l range indicative of mild iodine deficiency, suggesting that these children still had enlarged thyroid glands.

When compared with the median UIC of 68 µg/l reported in the 2002 NZ Children's Nutrition Survey, the UIC of children in the present study had increased, which is probably caused by the addition of iodized salt to bread. However, the elevated concentration of Tg in these children suggests that the increase in UIC is not sufficient to ensure that thyroid volume has normalized.

Dr. Sheila Skeaff, the lead investigator on this new study, commenting in the Otago

Daily Times, said that although mandatory fortification of bread with iodine has been a success, adding the essential nutrient to more staple foods should be considered. The raised Tg levels in the study suggested some New Zealand children might still

improvements in children's performance in cognitive tests. The latest study showed fortification of bread had been a „success“, as before 2009 New Zealand had „pretty low iodine status“ compared with other developed countries. However, the results



*University of Otago researcher Dr Sheila Skeaff, with (from left) Meihana Schooner (11), William Fergusson (10) and Crystal Hooper (9), of North East Valley School, Dunedin, who took part in the study testing urinary iodine levels. Photo by Peter McIntosh.*

have enlarged thyroids because they were not getting enough iodine and showed there was still „room for improvement“. Dr Skeaff said iodine was an „essential nutrient“ and important for the development of the brain. This was shown in a 2009 study in which Dr Skeaff and colleagues revealed correcting mild iodine deficiency led to „small but significant“

were still low enough to suggest fortifying other staple foods, such as pasta or cereals, should be considered. Dr Skeaff said: „There are a lot of people who don't eat bread or who eat very little bread and ...they will still be exactly where they [were] in 2009.“

# The contribution of iodized salt in baked goods to iodine intakes in New Zealand

**Kacey Culliney** June 26, 2012, Bakeryandsnacks.com © William Reed Business Media

Mandatory use of iodized salt in bakery across New Zealand has improved iodine deficiency levels in children, according to a ministry report. A study conducted by New Zealand's Ministry of Agriculture and Forestry (MAF) has found that children's intake of iodine has 'significantly improved' since the mandatory bread fortification policy.

A sample of 530 breads was collected in April 2010 over three weeks from four New Zealand regions - Auckland, Central North Island, Christchurch and Dunedin. The sample was categorized into eight bread groups - white, fibre white, wholemeal, mixed grain, rye, fruited, organic and crumpets - and the sodium and iodine content was measured. Dietary intake of iodine in children aged 5-14 was then calculated using estimations of bread intake at this age. The research found that across New Zealand's food industry, bread is now the highest iodine contributor, followed by milk and dairy products, grains and pasta, meats and eggs.

Jenny Reid, MAF food science and risk assessment manager, said there has been a "tremendous improvement". "The percentage of children estimated to have inadequate iodine intakes has dropped from 30% to 4% because of iodine fortification,"

Reid said. "The survey results indicate that we are achieving our goal of ensuring that more than 70% of school-aged children reach the ideal iodine intakes," she added. The findings also showed that only 1% of children are consuming excessive levels of iodine and MAF said this shows that the fortification policy has been effective in ensuring a balanced intake among children.

The ministry is set to commence a follow-up study this year to continue

monitoring changes. A recent study conducted by researchers at the Swiss Federal Institute of Technology Zurich and the International Council for the Control of Iodine Deficiency Disorders called for a common European Union policy on use of iodised salt across the food industry. The study found that 44% of Europeans are deficient in the nutrient and lead author of the paper, Dr. Maria Andersson said "coordinated actions for a common EU policy are needed, particularly for sale used by the food industry."



# ,Smart salt' reduces iodine deficiency in Ghana

Madeleine Logan UNICEF

*BOLGATANGA, Ghana, 26 January 2012* – Joseph Opoku pointed to a plastic container in the local restaurant, called a chop bar, belonging to his grandmother, Gertrude Azasim. “That is the smartest salt in Ghana,” he said. Joseph, 14, is one of a growing number of children in Bolgatanga, capital of the Upper East Region of Ghana, educated about the benefits of iodized salt. IDD is easily and effectively prevented with the use of iodized salt use, but Ghana has persistently low iodized salt consumption.

In response, UNICEF is supporting a campaign to achieve universal salt iodization in the region. The campaign, led by the Ghana Health Service and supported by salt traders, chop bar owners, students and parents, has had a profound effect in Bolgatanga. In 2009, the municipal health service found only 24 per cent of tested households had adequate levels of iodized salt; by 2011, that number had risen to 63 per cent.



Municipal Health Director Joyce Bagina is leading the effort to promote salt iodization in Bolgatanga. In November 2010, she created a salt iodization committee that, with UNICEF support, conducted a radio campaign to teach the community – and especially parents – about the benefits of iodine. The committee also armed salt traders with iodine testing kits.



Patience Ayamga, assistant leader of the Bolgatanga Salt Traders Association, used to have no idea that the salt she heaped on her wooden table every day could prevent brain damage and mental impairment. She has since become a powerful advocate for the cause, persuading doubtful sellers to buy iodized salt and store it properly. “Before the program started, I used to pour all my salt on the table in the sun. Now I package it in plastic bags to stop the iodine from evaporating. We ask our customers to put it in a container with a lid when they get home,” she said.

She also makes sure traders know what’s in their product. “We were also given test kits, and if there was no iodine in the salt we wouldn’t buy it from the suppliers,” she said. “In the beginning, some salt didn’t have iodine. Now all salt does.”

Chop bar owners like Ms. Azasim were also crucial to the success of the campaign. Feeding thousands of Bolgatanga residents every day, chop bars were in a key position to influence public sentiment and increase iodine consumption. Ms. Azasim, a former nurse, quickly realized the food industry could affect the health of the entire community. “We use iodized salt in all our dishes,” she said. “Those who

come here to eat, we educate them about iodine. We tell them it develops the brain and prevents goitre.”

Her six grandchildren – three pairs of twins including Joseph – grew up eating iodized salt. They can all recite the benefits of iodine, and not just because of their grandmother’s work. Children have been at the center of the iodization campaign, with awareness-raising activities in schools and child welfare clinics throughout the city.

Achieving universal salt iodization throughout Ghana remains a challenge due to weak law enforcement; limited availability of potassium iodate, the compound used to iodize salt; and the large number of small-scale salt producers, estimated between 5000–10,000, who are difficult to monitor. But the Bolgatanga program has been a great success thanks to its focus on educating consumers, who demand iodized salt from suppliers. The community’s refusal to buy salt without iodine gave producers a commercial incentive to change.

And Joseph, for one, is happy more children are consuming iodized salt. “They will be the brightest person that they can be,” he said.

# Zambia zeroes in on IDD elimination

The Zambian National Food and Nutrition Commission has thoroughly examined iodine nutrition in a new national survey

*"I wish to reiterate that the government will remain committed to...guarantee the Zambian population with uninterrupted access to equately iodated salt so that IDD are eliminated by 2015."*

*C. Masi Executive Director, National Food and Nutrition Commission*

## Background

Zambia had previously in 2002 conducted an IDD impact survey as a follow up of the 1993 IDD baseline survey. The 2002 survey findings showed that remarkable progress had been made in the fight against IDD since 1993, when the Government of Zambia adopted the universal use of iodized salt as the main strategy to eliminate IDD. Between 1993 and 2002 the median urinary iodine concentration (MUIC) in school children increased dramatically from 49 to 245 µg/l and the percentage of the surveyed population with UIC <100 µg/l fell considerably from 72% to 4%. However the coverage of adequately iodized salt at household level (within the recommended range of 15–40 ppm of iodine as per the Zambian law) was estimated at only 20%. The remaining 64% of the household salt was above the upper limit of 40 ppm with an additional 16% being above double of the upper limit (>80 ppm).

These improvements towards Universal Salt Iodization were attributed to the government's commitment in enforcing the legislation that stipulates that all table salt entering and being distributed in Zambia must be iodated. However lack of sustained political commitment, weak national leadership and absence of a national budget for IDD resulted in a major decline in IDD related activities from 2002 onwards. Most recommendations made in



**Zambian salt iodization has major benefits for women and children**

2002 to sustain elimination of IDD hadn't been implemented and the salt monitoring and enforcement system quickly collapsed. Furthermore, there had been no monitoring of the iodine status of the population

since 2002. It is against this background that the present survey was conducted in May and June 2011 with the aim of assessing whether progress made between 1993 and 2002 had been sustained over time.

**Table 1: Proportion of Zambian school children by urinary iodine category**

Population's status of iodine Intake	UIC (µg/L)	Boys		Girls		Combined	
		%	%	N	%		
Severe iodine deficiency	Below 20	1.4	1.5	19	1.5		
Moderate iodine deficiency	20-49	1.9	4.2	38	3		
Mild iodine deficiency	50-99	8.9	10	123	9.6		
Adequate iodine nutrition	100-199	25.1	25.3	319	24.9		
Above requirements	200-299	21.2	21.9	278	21.7		
Excessive intake	300 and above	41.6	37.1	506	39.4		

**The 2011 study**

The main objectives of the survey were (1) to measure urinary iodine concentration in school children, and (2) estimate the coverage of adequately iodized salt in their households. Funding was from USAID and technical support from UNICEF. This survey was a cross-sectional national cluster survey in school children aged 7 to 12 years old. A total of 30 schools were randomly selected from the 8,863 basic schools of Zambia. The study included a total of 1,342 pupils for determination of iodine urinary concentration and 1,134 households for determination of iodine content in salt. Urine samples were analyzed at the National Resource Laboratory for Iodine located at the Tanzania Food and Nutrition Center.

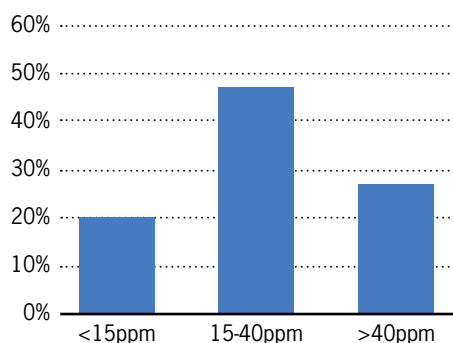
**Results**

The MUIC value among school children was 245 µg/L, which was higher than the recommended WHO range (100-199 µg/L) for adequate iodine nutrition and comparable to the 2002 survey result (245 µg/L). The proportions of pupils with UIC under 100 µg/L (14%) and under 50 µg/L (4.5%) were below the WHO thresholds of 50% and 20% respectively (Table 1). These results indicates that iodine deficiency is not any longer a problem of public health significance in Zambia and that progress made since 1993, when MUIC was estimated at 49 µg/L, has been sustained over the past decade. However, only 25% of the pupils fell within the recommended range (100-199 µg/L) while 22% were above requirements (200-299 µg/L) and 40% had an iodine intake exceeding 300 µg/L.

The situation was similar to that of 2002 with high MUIC and high proportion of individuals having iodine intake in excess of the amount required to prevent and control iodine deficiency.

There were positive correlations between the high UIC and high iodine content in the salt indicating that over-iodization of the salt beyond the recommended upper limit is likely to be responsible for iodine intake in excess of the recommended daily intake. The coverage of adequately iodized salt (15-40 ppm as iodine) at household level (Figure 1) was estimated at 53% which was below the recommended target of more than 90% but higher than the 30%

**Figure 1: Salt iodine content at household level**

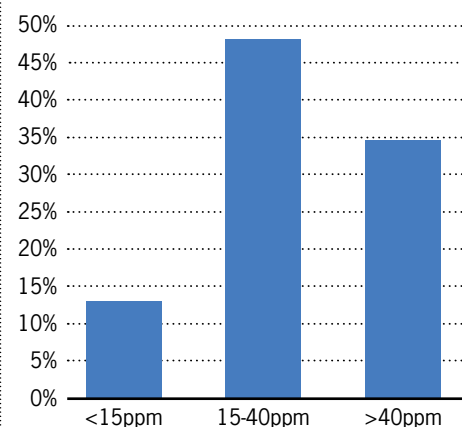


coverage in 2002. The remaining 47% of household salt was either under-iodated with iodine content below 15 ppm (20%) or over-iodated with iodine content above the upper limit of 40 ppm (27%).

The low household coverage of adequately iodated salt was explained by the low availability of adequately iodated salt. Only 48% of the traders were selling salt with adequate level of iodine of 15-40 ppm as per the Zambian legislation (Figure 2). Findings on salt under- and over-iodation followed a similar pattern at household and trader level with 15% of the trader salt being under-iodated (below 15 ppm iodine) and 36% over-iodated (above 40 ppm).

Packaging and labeling of salt was found to be inadequate along the salt distribution and marketing chain. About 89%, 45% and 22% of the salt sold by wholesalers, retailers and vendors respectively was labeled as iodated. Furthermore 60% of the wholesaler salt was packaged in polyethylene sacks while 85% of the salt sold both by retailers and vendors was packed in plastic bags of variable quality.

**Figure 2: Salt iodine content at trader level**



Knowledge on the health problems related to iodine deficiency was relatively low amongst households (44%), average amongst salt traders (54%) and high amongst teachers (95%) although some teachers included anemia and rickets into IDD (Table 2). A similar trend was observed on awareness on the existence of iodated salt, with 41% of the households, 67% of the salt traders and 89% of the teachers having heard of iodated salt. Furthermore, awareness on the existence of legislation on mandatory iodation of salt was not universal and was higher in wholesalers (88%) than retailers (57%) and vendors (45%).

### Conclusions

The survey showed that Zambia has maintained the remarkable progress achieved since the introduction of Universal Salt Iodization (Table 3). Only 14% of the individuals had low urinary iodine concentrations (below 100 µg/L), which confirms that iodine deficiency is not a significant public health problem in Zambia. However, like other countries in Eastern and Southern Africa, a trend of excessive iodine intake has been observed due to poor adherence to salt standards by salt producers and traders. This calls for an effective salt monitoring system specifically at the main ports of entry. The challenge in sustaining IDD elimination in Zambia is now twofold: to improve coverage of iodized salt where iodine intake is insufficient and to reduce iodine intake where it is excessive.

### Recommendations

Zambia needs to further strengthen its IDD control program in order to sustain elimination of IDD. Specifically, the country should make concerted efforts to implement the survey recommendations under the following IDD program components.



**Adequate iodine, along with improving health care, means a better future for Zambian infants**

#### Regulatory Monitoring and Law Enforcement

In order to address the issue of under- and over-iodization and ensure that all salt entering and being distributed in Zambia is adequately iodized, an effective salt monitoring system focusing on the ports of entry must be put in place. This will allow identification of imported salt brands and producers which do not comply with the Zambian legislation in terms of recommended range of iodization, and implementation of immediate corrective measures. To do so the Government must allocate sufficient human and financial resources for salt monitoring and law enforcement.

Further, major salt producers from Botswana and Namibia must be visited by a Zambian delegation in order to officially communicate the Zambian salt standards

revised in 2001 and assess the adequacy of internal quality control at the salt production sites.

#### Salt legislation

The current legislation on salt iodization must be reviewed for the country to qualify for achieving Universal Salt Iodization and to address the needs of the population groups vulnerable to iodine deficiency, such as pregnant and lactating women.

- The specification on the iodine content of salt must be revised and the regulation must include explicit specifications for the iodine level at production sites as well as the use of iodized salt in food processing and for animals.
- The regulation on salt packaging must also specify the type of packaging required and labelling requirements including iodine content, and date of expiry amongst others.

**Table 2: Knowledge of Iodine Deficiency Disorders**

Disorders due to iodine deficiency	Proportion of respondents		
	Households	Salt traders	Teachers
Goiter	34.5	52.3	84.4
Mental retardation	8.5	7.2	18.8
Miscarriage	1.1	0	0
Cretinism	0	0	4.7
Anemia	0	0	12.5
Rickets	0	0	7.8
Do not know	57.1	46.6	4.7

**Table 3: IDD elimination indicators in Zambia, 1993-2011**

Indicator	1993	2002	2011	Target
Median Urinary Iodine Concentration in school children	49 µg/L	245 µg/L	245 µg/L	100-199 µg/L
Proportion with UIC below 100 µg/L	72%	4%	14%	< 50%
Proportion with UIC below 50 µg/L	52%	0%	5%	< 20%
Coverage of adequately iodated salt at household level	Unknown	30%	53%	> 90%

**Communication**

A comprehensive communication strategy should be developed and implemented to maintain the demand for iodized salt in the general public. It should also increase awareness of salt traders in the benefits of iodization for the population and the need to comply with salt standards as part of their corporate social responsibility. Iodine information must also be included in the teacher training and school curriculum in order to increase awareness on importance of consuming adequately iodated salt.

**Program Monitoring**

The National IDD survey must be carried out every five years to assess progress towards sustained elimination of iodine deficiency. However, in order to draw final conclusions about IDD elimination in Zambia, a similar study looking at the adequacy of iodine intake must be undertaken in pregnant women.

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# The GAIN-UNICEF Salt Iodization Partnership Project: optimizing the production, distribution and use of iodized salt in India

Global Alliance for Improved Nutrition, Geneva, Switzerland. [www.gainhealth.org](http://www.gainhealth.org)

With funding from The Bill and Melinda Gates Foundation, the Global Alliance for Improved Nutrition (GAIN) and the United Nations Children's Fund (UNICEF) have partnered to support the reduction of iodine deficiency in 13 countries, as part of the global effort toward Universal Salt Iodization (USI). Since 2009, this collaboration has been committed to reaching more than 750 million people through sustainable, business-led and market-orientated efforts.

## USI in India

One of the 13 focus countries (*Table 1*) of the GAIN-UNICEF Salt Iodization Partnership Project, India has made significant investments in salt iodization and has momentum from the government and the private sector to deliver iodized salt to the country's population of 1.2 billion. As one of the largest salt industries and delivery networks in the world, the partnership works closely with representatives of salt producers, regional organizations, government officials and industry experts to accelerate progress to reach and sustain USI.

India is the only country in the partnership with the added benefit of a dedicated Salt Department headed by the Salt Commissioner positioned within the government. This department head acts as a champion for adequately iodized salt production, and is essential to the delivery, production monitoring, distribution and quality control. More recently, and with backing from the Salt Commissioner him

self, the partnership supported the introduction of an innovative online platform, which continuously monitors the quality of iodized salt across India. Using real-time data, the iodized salt industry can be effectively regulated to ultimately monitor India's coverage of adequately iodized salt.

***"It is the poor and those in geographically isolated communities who are most likely to suffer severe iodine deficiency," said Greg Garrett, Director of Large-Scale Food Fortification at GAIN.***

***"The partnership is focused on improving access and availability of adequately iodized salt nationwide but with a focus on these communities."***

## India: early to adapt to salt iodization.

The public health benefits of salt iodization have been long understood and accepted, in both developed and developing countries. In the 1960s, India was among the first countries in Asia to implement mandatory salt iodization practices with early fortification policies, forcing traders to sell only iodized salt. While it has made significant strides in increasing iodized salt production in recent years, this progress has not always been steady or straightforward. In 2000, and before the formation of the GAIN-UNICEF USI Partnership Project, the ban on selling only iodized salt was lifted – dramatically increasing consumption of noniodized salt. Iodized salt consumption decreased within five years with approximately half of Indian households consuming non-iodized salt.



As a result, the ban was reinstated in 2005. This, along with industry improvements in iodization practices and packaging, placed iodized salt firmly back on the market. To date, the partnership has helped improve the availability of iodized salt across the country, with a focus on equitable distribution to hard-to-reach populations. Particularly in rural areas, these communities are less likely to consume iodized salt. With increased availability and improvements in iodization practices and packaging, effective monitoring and heightened consumer awareness, at least 71 percent of households in India are now consuming iodized salt.

### **Building partnerships at the national and regional level for salt iodization.**

Prior to the formation of the partnership, India had already launched and implemented a coalition to monitor the progress of salt iodization and to advise the government on best practice for delivering the most sustainable approach to achieve USI. The GAIN-UNICEF USI Partnership Project strengthened this 'National Coalition for Sustained Iodine Intake'



**Most Indian salt producers now iodize their salt**

through creating regional hubs in 15 states to specifically engage with local governments and key stakeholders, build awareness and improve local monitoring.

To make the product more appealing and to create consumer demand in these regions, effective social marketing campaigns were introduced to specifically target hard-to-reach populations. With assistance from local partners, highly strategic com-



**USI provides millions of Indian women and children with adequate iodine**

munications efforts helped raise consumer awareness of iodized salt at the grassroots level. Schools and local health clinics, known as Anganwadi Centres, provided education sessions for the most vulnerable rural populations about the benefits of consuming iodine through iodized salt.

The GAIN-UNICEF USI Partnership Project has also helped to increase delivery of quality iodized salt to marginal populations through working with regional-level organizations and industry in India. It has supported the salt distribution network in Rajasthan, the country's largest state. Through targeting the delivery channels, the effort significantly increased the availability of iodized salt through the Rajasthan Public Distribution System. Meanwhile, the partnership also worked closely with industry in the southern state of Tamil Nadu. There, it supported the Tamil Nadu Salt Company, a regional salt enterprise owned by the state government, in the production and delivery of sufficiently iodized salt. To complement these efforts, UNICEF creates and strengthens long-term demand for iodized salt among consumers and the salt industry. It also reinforces government and public sector commitment through advocacy.

### **Improving quality control.**

Although mandatory legislation exists and supports adequate iodization of salt in India, this often is not enough to achieve sustainable elimination of iodine deficiencies. To ensure all iodized salt being consumed by households and food producers contains the appropriate amounts of iodine, robust quality assurance is required across the entire supply chain. Success requires active participation on many levels to ensure high quality iodized salt reaches consumers.

Problems are inevitable during such a large-scale effort and enforcing legislation is a key challenge in such complex environments. Leakage of non-iodized or inadequately iodized salt into the market does occur and can be attributed to a number of factors: from producers being unable to properly iodize their salt or refusing to iodize, to poor packaging diminishing iodine levels. From salt producers to retailers, all parties along the supply chain must remain committed to preserving the quality and effectiveness of the end product, so that adequately iodized salt ultimately reaches the consumer. To address this, the GAIN-UNICEF USI Partnership Project ensures the salt industry in India understands and uses effective iodization techniques, and that governments and industry are equipped with the necessary resources to monitor and maintain information about production quality.

In India, external quality control is conducted by the Salt Department. Officials collect salt samples for testing in 32 laboratories throughout the country. In 2010, GAIN conducted an analysis of laboratory capacity, and, through the Indian office of ICCIDD, provided technical assistance to establish a standardized monitoring protocol. This was the first time an outside agency gained access to data from government laboratories, and after the training, 76 percent of the samples analyzed met the appropriate standard – a figure higher than previous measurements.

### Improving data collection through an online system.

India has one of the largest salt industries in the world with over 13,000 salt producers and a complex delivery network. Therefore, monitoring is a key challenge in such an intricate environment. With 55 percent of edible salt transported by rail, rail transport clearance offers a built-in check for monitoring quality. Still, monitoring is a key challenge.

To effectively track production, quality, and movement of iodized salt, especially to rural regions, accurate and up-to-date information and statistics are essential. Historically, the Salt Department would manually collect data through its network of divisional offices that was then communicated up a chain of reporting channels to the Salt Commissioner. This process resulted in data duplication, redundancy, and gaps; it was also labor-intensive and costly.

With technological expertise close at hand in India, there was no need to look far for a solution to monitor quality and distribution. Recognizing the limitations of the manual data collection process and need for improved efficiency, the partnership joined other national partners to support development and installation of a state-of-the-art Management Information System for the Salt Department to track the iodine levels of salt being distributed across the country.

With support from the GAIN-UNICEF USI Partnership Program, the Salt Department is now implementing an online platform that records the quality of iodized salt across India. This allows officials to centralize data collection, and effectively follow the salt to ensure equitable access.

“With the introduction of the system, the efficiency of the department will increase exponentially,” said Mr. M.A. Ansari, the Salt Commissioner of India. “It will go a long way in professionally managing Salt Department processes.”

Formally launched in February 2012, this efficient Management Information System will complement improvements in quality assurance and quality control with the latest information on the iodized salt industry. For the Salt Department, it will dramatically increase its efficiency in decision-making and reporting.

“This investment will help future generations in India access adequately iodized salt and avoid irreversible mental and physical setbacks,” added Greg Garrett, Director of Large Scale Food Fortification at GAIN. “Based on India’s experience, our goal is to make available similar tools in other countries where we are implementing our universal salt iodization project in partnership with UNICEF.”

#### Table 1: Countries involved in the Gain-Unicef Universal Salt Iodization Partnership

**While over 120 countries have salt iodization programs in place, several of these still face challenges in monitoring iodized salt quality, enforcing legislation, distributing to remote areas, guaranteeing access to fortificant for salt producers, and improving consumer awareness.**

Bangladesh	Niger
China	Pakistan
Egypt	Philippines
Ethiopia	Russia
Ghana	Senegal
India	Ukraine
Indonesia	

#### The Future

Developing this system for India is a key achievement, and is just part of GAIN’s global work to improve the quality of iodized salt in the GAIN-UNICEF USI Partnership Project countries. To address the specific needs of individual countries, GAIN and partners Intertek and ICCIDD are developing a universal set of quality management standards, manuals and training tools. These tools as well as the Management Information System designed for India are easily customized for

any country or USI project. In light of this, industry regulators in India now have innovative tools available at their fingertips to monitor and accelerate salt iodization and reach the remaining 30 percent of consumers in India with adequately iodized salt.

## Meetings and Announcements

# Exhibition 'Salt of the earth: preventing IDD' celebrates Dr Basil Hetzel's 90th birthday

**P Stardust** Archivist, Bob Hawke Prime Ministerial Library University of South Australia

Dr Basil Hetzel, world renowned leader in public health celebrated his 90th birthday in June 2012. Dr Hetzel was crucial in the initiation of the ICCIDD, which he led as Executive Director from 1985 -1995, then as Chairman from 1995 – 2001. Dr Hetzel saw the need for an international non-government organisation to bridge the gap between available knowledge about iodine deficiency disorders and the application of this knowledge to programs within countries at risk. Dr Hetzel's success in this endeavour can be attributed to his multi-disciplinary background, his unrelenting passion for his work and his commitment to the cause. Dr Hetzel is also responsible for the term and concept 'Iodine Deficiency Disorders (IDD)', which was rapidly adopted internationally.

Dr Hetzel's work has not been limited to iodine deficiency. His research interests have encompassed public health, indigenous health, nutrition, epidemiology and health education. He has been involved in a range of scientific, government and community bodies nationally

and internationally. His significant roles include serving as the Director of the CSIRO Division of Human Nutrition (1975 – 1985), as Lieutenant Governor of South Australia (1992 – 2000) and as the Chancellor of the University of South Australia (1992 – 1998).



**Dr Ian Gould (Chancellor, UniSA), Dr Basil Hetzel and Associate Professor Pat Buckley (UniSA) Courtesy: UniSA Library**

Dr Hetzel received a Companion of the Order of Australia in 1990 in recognition of his work in public health and human nutrition around the world. This is only one of the many awards and honours he has received internationally in recognition of his tireless and ongoing commitment to public health.

To coincide with Dr Hetzel's 90th birthday the University of South Australia Library hosted an exhibition '*Salt of the earth: preventing iodine deficiency disorders*', May – August 2012. This exhibition highlighted the key achievements and successes of Dr Hetzel's career. The exhibition included posters, audio visual material, medical objects and awards. Dr Hetzel spoke at the exhibition launch, which was attended by his friends, family and colleagues as well as the general public. For more on the exhibition launch, see: <http://www.library.unisa.edu.au/about/exhibitions/saltearth.aspx>

## Media seminar on the use of iodized salt in Pakistan

**The International News** Lahore, Saturday, July 07, 2012

In a media dissemination seminar on July 6, 2012 in Lahore, Director General Health Services of Punjab, Dr Nisar Ahmed Cheema, said the health department would sensitize political parties, civil bureaucracy and religious clergy to pave the way for legislation on using iodized salt in food. Appreciating the role of media in significant progress achieved with regard to the Universal Salt Iodization (USI) goal, Dr Nisar Cheema underlined the need for relevant legislation and to create more awareness in this regard.

Dr Nisar acknowledged the role and vital importance of print and electronic media in increasing the awareness in the society and urged them to disseminate the importance of micronutrients, such as iodine, iron, vitamins and zinc, for improved physical and mental health. He also appreciated the efforts of health department staff and the technical and financial assistance of Micronutrient Initiative (MI).

The Health Services Punjab DG reiterated the commitment of the Punjab health department for health sector

improvement. According to him, tremendous achievement in the IDD/USI program would help children perform better in schools as the consumption of iodized salt leads to increased intelligence among children. "We shall also be able to control the adverse effects of iodine deficiency among pregnant mothers and reduce still-births, abortions and other congenital anomalies among the new-born", he added.

He said the household utilization of iodized salt had increased to 79 percent in Punjab while severe iodine deficiency in mothers had reduced from 37 to just three percent as depicted in the National Nutrition Survey 2011. Similarly, he said the mothers with normal levels of iodine had increased from 24 to 64 percent and severe iodine deficiency in children had reduced from 23 to 2 percent only. The children with normal level of iodine had increased from 37 percent to 64 percent, he claimed.

National Program Manager, Micronutrient Initiative, Dr Khawaja Masood Ahmad informed that salt proces-

sors in Punjab had produced approximately 2/3rd of the total edible salt used in Pakistan. He informed the participants in the seminar that USI in Punjab was being implemented through targeting more than 1050 salt processors. He said that more than 700,000 MT of edible salt had been iodized during the last four years. For the purpose, more than 35 MT potassium iodate (KIO<sub>3</sub>) had been provided to salt processors.

Dr Tausif Akhtar Janjua, Country Director Micronutrient Initiative (MI) Pakistan also lauded the role of media and said that, with the joint efforts of all stakeholders including media, elected representatives, parliamentarians and civil society, Pakistan would soon achieve goal of USI. The seminar was also attended by Dr Mahmood Ahmad, Program Manager Food & Nutrition Punjab, Munawar Hussain, Program Manager Punjab & AJK, as well as Muhammad Yasin, Saima Fuad and Tariq Aziz from Micronutrient Initiative.

## The importance of iodine deficiency discussed on World Thyroid Day in Macedonia

**Prof. S M Ristevska** Medical Faculty, Skopje, Macedonia

The Macedonian Society of Nuclear Medicine held a meeting on May 25-26, 2012 in Ohrid during annual Thyroid Week dedicated to thyroid pathology. The presentations at the meeting included ultrasound guided fine needle biopsy of the thyroid gland, thyroid carcinoma in pregnancy, minimal-invasive thyroidectomy, and Thyrosea – a new formula for preventing iodine deficiency. May 25-26 was World Thyroid Day, celebrated around the world.



**Participants at the meeting in Macedonia on World Thyroid Day on May 25-26, 2012 in Ohrid**

## Abstracts

### Iodine intake in Portuguese school children

The aim of the present study was to evaluate iodine intake in Portuguese school children in order to inform health authorities of eventual measures to be implemented. In Portugal there are no recent data on iodine intake in schoolchildren. Urinary iodine (UI) was measured in 3680 children aged 6–12 years of both sexes, from 78 different schools. The global median UI value was 106 µg/L; the percentage of children with UI <100 µg/L was 47.1%. The percentage of values <50 µg/L was 11.8%. Male gender, the south region of the country and the distribution of milk in school were significantly linked with a higher UI. The authors concluded iodine nutrition is marginal in Portuguese schoolchildren and recommended prophylaxis with salt iodization be considered.

*Limbert E, et al. Acta Med Port. 2012 Jan;25(1):29-36*

### Breastmilk iodine concentrations following acute dietary iodine intake.

Breastmilk iodine levels may vary temporally in response to recent changes in dietary iodine intake. Sixteen healthy lactating Boston-area women with no known thyroid disease were each given 600 µg oral potassium iodide (KI) (456 µg iodine) after an overnight fast. Iodine was measured in breastmilk and urine at baseline and hourly for 8 hours following iodine intake. All dietary iodine ingested during the study period was also measured. Mean age of mothers was 30.2 ± 4.1 (SD) years. Median (interquartile range, IQR) baseline iodine levels were 45.5 (IQR 34.5–169.0) µg/L (breastmilk) and 67.5 (IQR 57.5–140.0) µg/L (urine). Following 600 µg KI administration, median increase in breastmilk iodine levels above baseline was 280.5 (IQR 71.5–338.0) µg/L, and median peak breastmilk iodine concentration was 354 (IQR 315–495) µg/L. Median time to peak breastmilk iodine levels following KI administration was 6 (IQR 5–7) hours. Dietary iodine sources provided an additional 36–685 µg iodine intake during the 8-hour study. The authors concluded that following ingestion of 600 µg KI, there is a measurable rise in breastmilk iodine concentrations, with peak levels occurring at 6 hours. These findings strongly suggest that breastmilk iodine concentrations should be interpreted in relation to recent iodine intake.

*Leung A, et al. Thyroid. 2012 Jul 25.*

### Consumption pattern of iodised salt in households and serum TSH levels among 5-9 year old children in the plantation sector of Sri Lanka.

A cross sectional study was carried out in 20 randomly selected estates in the Ratnapura district of Sri Lanka in 2009. 1683 households with at least one child between 5–9 years were surveyed to determine patterns of salt usage. A salt sample from each household was tested for adequacy of iodine (concentration ≥30ppm). In phase two, 519 children were randomly selected from these households and serum TSH levels were assayed. The results showed salt powder (54.5%) was preferred to salt crystals. Salt crystals were washed before use in 20% households. Salt was kept away from the fire-place in 90.4% of households. Salt samples of 88.7% households had an adequate iodine concentration. Salt iodine concentration was significantly lower when salt was stored near a fire place and washed before use ( $p < 0.001$ ). The median TSH level of children from households with adequate salt iodine concentrations was significantly lower than that of children from households with inadequate salt iodine concentration ( $p < 0.001$ ). The authors concluded that consumption of salt low in iodine is associated with high serum TSH levels.

*Abey Suriya V, et al. Ceylon Med J. 2012;57(2):69-74.*

### Seasonal iodine deficiency in Latvian school children.

The authors did a cross-sectional interseasonal school-based cluster survey of 915 children aged 9–12 from 46 randomly selected schools in all regions of Latvia. The urine samples were collected in October 2010 ( $n = 504$ ) and April 2011 ( $n = 411$ ). The prevalence of TSH > 5 mIU/L from the Latvian Neonatal TSH screening ( $n = 31,274$ ) was also investigated as a recognized secondary indicator of iodine status in the population. The results showed the median creatinine-standardized urinary iodine (UIC) concentration was 107.3 (IQR 69.1 – 161.7) µg/g. Lower median UIC was detected during the spring sampling (78.3 µg/g Cr) in comparison to the autumn sampling (129.7 µg/g Cr). The prevalence of TSH > 5 mIU/L was 8.2% (95% CI: 7.8 – 8.7) in 2009 ( $n = 1343$ ) and 9.3% (95% CI: 8.8 – 9.7) in 2010 ( $n = 1390$ ), which indicates mild iodine deficiency. The frequency of elevated neonatal TSH in April was markedly higher than in September (8.3% vs. 4.1%,  $p < 0.001$ ). The authors concluded that in the absence of a mandatory salt iodization program, there is a persisting iodine deficiency in Latvia during the spring season.

*Konrade I, et al. Thyroid. 2012 Jul 5. [Epub ahead of print]*

### Investigation of iodine deficient state and iodine supplementation in patients with severe motor and intellectual disabilities on long-term total enteral nutrition.

Iodine concentrations of enteral nutrition (EN) formulae available in Japan are very low and long-term total EN (TEN) might result in hypothyroidism due to iodine deficiency (HID). The aim of this Japanese study was to determine the degree of iodine deficiency (ID) and need for iodine supplementation (IS) in patients with severe motor and intellectual disabilities (SMID) on long-term TEN. Thyroid function including urinary iodine concentration (UIC) was monitored, and powdered kelp was provided as a source of iodine supplement. Thirty-five SMID on TEN participated in the study. UIC less than 100 µg /L were detected in 97 % of them. Their TSH ranged from 0.5 to 90 µIU/mL. Thyroid function recovered in the five hypothyroidism cases, which were diagnosed as HID. The authors concluded that, in Japan, ID with thyroid dysfunction may be associated with long term TEN.

*Takeuchi T, et al. Endocr J. 2012 May 25. [Epub ahead of print]*

### Thyroid dysfunction during late gestation is associated with excessive iodine intake in pregnant women.

A cross-sectional study of 384 pregnant women was carried out in Tianjin and Haixing, China, from April to October in 2010. Morning urine samples and blood samples were obtained from all subjects. Serum levels of free T(3), free T(4), and sensitive TSH and urinary iodine concentration (UIC) were measured. The median UIC of pregnant women with excessive iodine intake was significantly higher than those with adequate iodine intake ( $P < 0.001$ ). The prevalence of thyroid disease, especially subclinical hypothyroidism, in pregnant women with excessive iodine intake was significantly higher than in those with adequate iodine intake ( $P < 0.05$ ). Living with high water iodine content and having urinary iodine concentration higher than 250 µg/liter were associated risk factors for subclinical hypothyroidism in pregnant women. The authors concluded excessive iodine intake during late pregnancy may lead to maternal thyroid dysfunction, particularly subclinical hypothyroidism.

*Sang Z, et al. J Clin Endocrinol Metab. 2012 Aug;97(8):E1363-9.*

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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, ETH Zentrum, Schmelzbergstrasse 7, LFW E19, CH-8092 Zürich, Switzerland, phone: +41 44 632 8657, fax: +41 44 632 1470, [iccidd.newsletter@hest.ethz.ch](mailto:iccidd.newsletter@hest.ethz.ch).

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