

IN THIS ISSUE:



India **1**



IDD on Islands **5**
UNICEF report **6**
Autism **7**



Cambodia **8**
Growth and IQ **10**
Israel **13**

Basil Hetzel **15**
West Bank **16**



Hidden Hunger **17**
Meetings and Announcements **18**
Abstracts **20**

IDD control in India: triumphs and challenges

India was one of the first countries to introduce iodized salt, but the national program has experienced setbacks along the way. This review looks at past efforts, highlights key challenges and proposes a future agenda for salt iodization in India.

JH Rah, AM Anas, A Chakrabarty, R Sankar, C Pandav, VM Aguayo; UNICEF, GAIN, ICCIDD Global Network, New Delhi, India; Salt Department, Government of India, Jaipur, India. *Excerpted from: Rah JH, et al. Towards universal salt iodisation in India: achievements, challenges and future actions. Matern Child Nutr. 2013 Jun 18 [Epub ahead of print].*



Indian USI ensures adequate iodine for these children in Kerala

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.

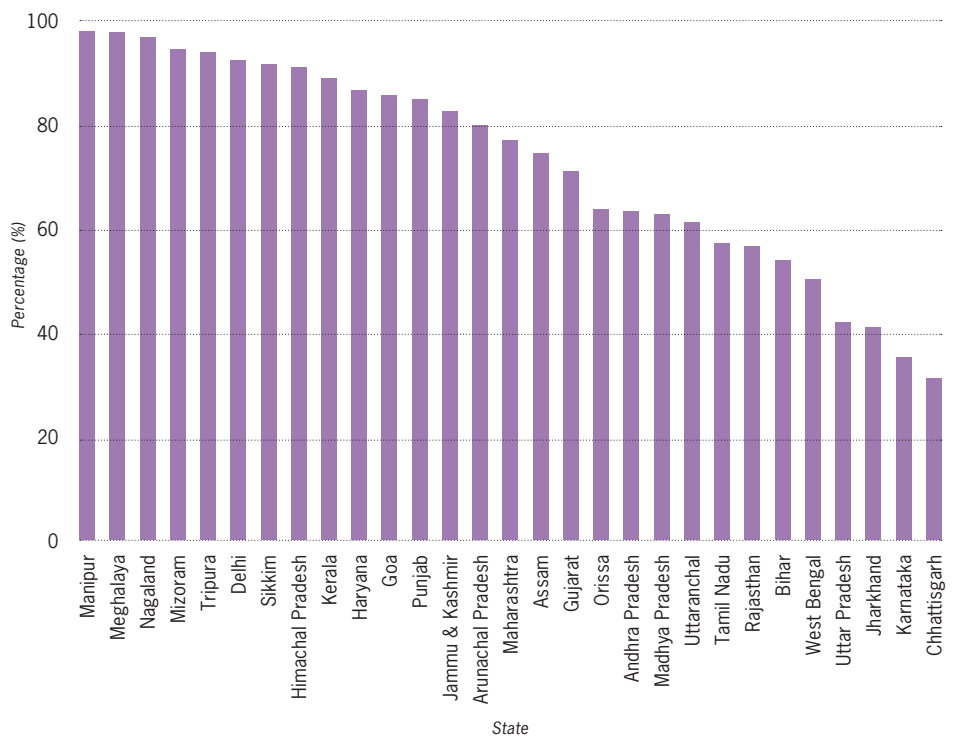
Background

India recognized iodine deficiency as a national health concern after independence and began supplying iodized salt to its endemic population as early as the 1960's. The Government of India launched the National Goiter Control Program (NGCP) in 1962, in an attempt to provide iodized salt to identified goiter endemic districts. A turning point came in 1983 when the eradication of goiter was included as 'Point Eight' in the Prime Minister's 20-point National Development Program. Consequently, in 1983, the government made a historic policy decision to strive for USI and permitted the commercial production of iodized salt by the private sector.

Efforts were made in a phased manner starting in April 1986, to increase the production, demand and supply of iodized salt. In 1986, the USI policy was announced and the 'smiling sun' logo, a voluntary certification of iodized salt, was developed. In 1992, the NGCP was renamed the National Iodine Deficiency Disorders Control Program (NIDDCP). In the past two decades, the national production of iodized salt has seen an eightfold increase – from 0.7MMT in 1985–1986 to currently ~ 6.2MMT. Also, the government of India's 11th Five Years Plan (2008–2012) reiterates the need to eliminate IDD and recommends USI as the best means to achieve this goal.

Yet, the implementation of the program has experienced some major challenges in the past two decades. The iodine level of the

Figure 1 The proportion of households using adequately iodized salt, by Indian State.



salt that moves by rail is monitored prior to shipment, while there is no monitoring of the quality of salt transported by road. The transportation of iodized salt by rail has been subsidized. However, the freight costs for iodized salt increased substantially from April 2002, thus reducing the cost advantage of rail shipment. Consequently, the unchecked movement of inadequately iodized salt by road has increased dramatically. In an effort to restore the transportation of iodized salt by

rail, the Ministry of Railways has provided for graded concessions in the freight costs of edible salt since 2003 depending on the distance of salt transportation.

In 1996, the salt industry was de-licensed, making it difficult for the Salt Department to regulate. In 1997, the Central Government enacted a national ban on the sale of non-iodized salt for edible purposes, under the Prevention of Food Adulteration Act. The Act stipulates the minimum iodine content of salt at the production and consumption levels at 30 and 15 ppm, respectively. However, due to the dissenting voices raised against USI, the central ban was lifted in 2000. While the majority of the states maintained the ban, Gujarat and Orissa revoked it. It took 5 years of intensive advocacy with the central government to reinstate a nation-wide ban on the sale of non-iodized salt in 2005. At present, all states have imposed a complete ban.

Household use of iodized salt and population iodine status

The household coverage of adequately iodized salt in India has undergone major ups and downs in the past two decades. Nevertheless, efforts to intensify USI activities, especially in the past few years, have led



Indian mothers and children benefit most from iodized salt

to a remarkable improvement in the consumption of adequately iodized salt, with the national coverage reaching 51% in 2005–2006 and 71% in 2009. Still, in 2009, nearly 20% of households were found to be consuming inadequately iodized salt and 9% were using salt that was not iodized.

The proportion of households using adequately iodized salt varied widely by state in 2009, ranging from ~ 98% in Manipur to ~ 30% in Chhattisgarh (Figure 1).

Interestingly, data indicate a clear urban-rural (Figure 2) and rich-poor differential (Figure 3) in salt iodization, with better coverage of adequately iodized salt in urban areas and richer wealth quintile, leaving the most disadvantaged population vulnerable to IDD.

Currently, there are no national data on the iodine status of the population based on urinary iodine concentration (UIC). The most recent weighted estimate pooled from subnational surveys indicated that the median UIC of the population was 154 µg/L. Although India is classified as a country with adequate overall iodine intake based on the median UIC, it is estimated that 249 million people including 8 million newborns annually are still unprotected from the lifelong consequences of IDD.

Current status of the USI program and challenges to overcome

Ensuring political commitment

The Government's commitment to eradicate IDD as an important public health issue has been confirmed at many national and international events. Yet, despite such political will, IDD is not recognized as a priority in the health sector, resulting in a weak strategy formulation and poor program implementation. In addition, weak enforcement of the legal ban on the sale of non-iodized salt for human consumption is an on-going challenge together with the ban only applying to salt for human consumption. Also, the dual standard for levels of salt iodization at production and household makes the enforcement at the production a real challenge.

Forming partnerships and coalitions

In April 2006, the National Coalition for Sustained Iodine Intake was officially launched with the objective of bringing key part-

Figure 2 The proportion of urban and rural Indian households using adequately iodized salt.

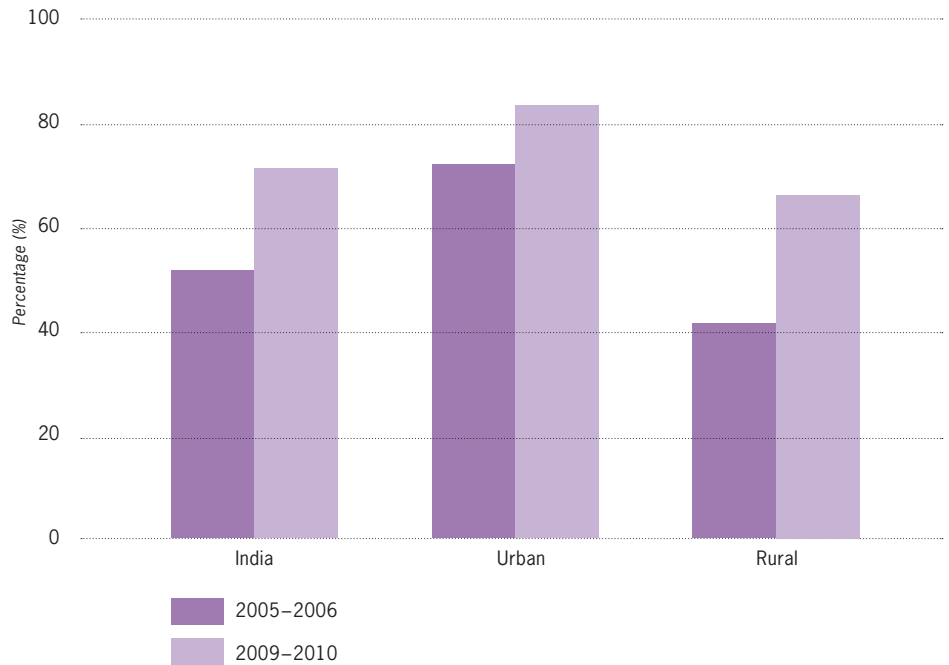
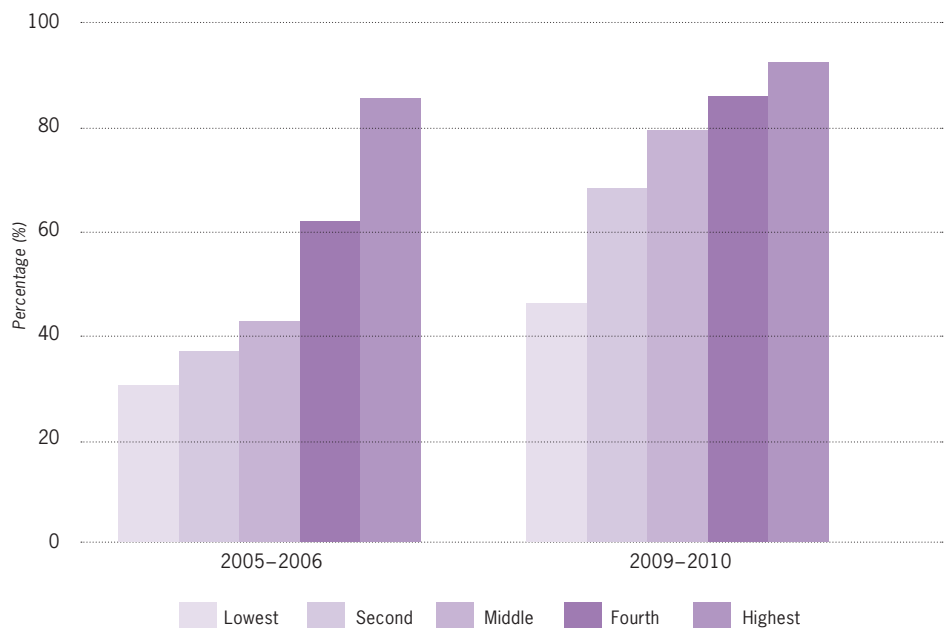


Figure 3 The proportion of Indian households using adequately iodized salt, by wealth quintiles.



ners together for regular dialogue and monitoring progress towards acceleration of USI. The coalition is also expected to serve as a platform for high-level advocacy, streamlined communication and to act as a pressure group to ensure timely action. The coalition has

held regular meetings and served as a platform for dialogue and exchange; however, its overall structure for coordination needs to be strengthened if the coalition is to fulfill its role fully.

Ensuring availability of adequately iodized salt

India is the third largest salt-producing country in the world after China and the USA, with an average annual production of ~18.6 MMT in 2010–2011. There are 13 000 salt producers and 90% of them are small producers. India has become self-sufficient in the production of iodized salt.

A significant barrier towards improving the distribution of affordable, adequately iodized salt is the lack of capacity and/or commitment of the medium and small producers and traders. Iodization is often viewed as an additional burden as they operate within narrow profit margins and commonly use less effective, poorly maintained equipment. Iodized salt is often procured by wholesalers who purchase the salt in bulk and subsequently repackage it. Salt procured in bulk is often non-iodized, but the wholesalers and retailers are not able to recognize it. Also, there is currently no mechanism in place to ensure stable pricing for potassium iodate or to ensure its quality.

Strengthening the monitoring system

Monitoring at the production level is a crucial component of the salt iodization program. Yet, the medium and small producers carry out limited and poor quality internal monitoring. External monitoring at the production level is done by the Salt Department but is restricted to major salt producers. In addition, many small producers and traders are not registered with the Salt Department. In terms of the regulatory monitoring, the Food Safety Officers collect samples of iodized salt from the production plants, as well as at the wholesale and retail levels, and send them for testing. But, guidelines are relatively weak and not properly implemented. With regards to tracking progress towards the elimination of IDD, India is one of the few countries with no national or

subnational data on the iodine status of the population available on a regular basis. Iodine deficiency indicators such as UIC and goiter prevalence are rarely included in national health surveys.



Salt vendors in Rajasthan

Maintaining continuous advocacy, education and communication

Communication and advocacy efforts have mainly targeted three audience segments; influencers of the USI policy, producers and suppliers of iodized salt and consumers. Advocacy has focused on generating political commitment for the program by informing the politicians and policymakers about the serious implications of IDD on mental health and the benefits of iodized salt. Public education and intensive social mobilization activities have been conducted through various channels including print media, television and radio and inter-personal communication to create consumer demand for adequately iodized salt. School-based sensitization programs are on going. However, the public awareness of IDD and its serious consequences remains low and there is a lack

of consumer demand for adequately iodized salt. Most importantly, consumers are unable to assess the quality of the salt they purchase, making them unable to demand only adequately iodized salt.

Future agenda

As the political and administrative leadership in the country continues to change, sustained advocacy at the national, state, and district level is required to ensure higher political commitment and prioritization of the USI program. Equally important to continuing the central ban on the sale of non-iodized salt for edible purpose is the establishment of an effective mechanism to ensure proper enforcement of both the national and state legal measures

Island populations may be iodine deficient despite their proximity to the sea: iodine deficiency on the islands of Madeira and the Azores

E Limbert ICCIDD Global Network National Coordinator of Portugal, and co-authors.

Excerpted from: Rev Port Endocrinol Diabetes Metab 2012;7(2):2-7

This study evaluated iodine intake on the islands of Madeira and Azores, in two populations – school children and pregnant women. It was decided to extend a recent iodine study, performed in continental Portugal to these regions. Urinary iodine concentrations (UIC) of 987 children, 6-12 years of age and from both genders

were studied; 311 were from schools of Madeira and 676 from schools of Azores. Iodine intake of 566 pregnant women on the two islands was evaluated.

Results

Among school children, in Madeira the median UIC was 81 µg/L; the percentage of children with an inadequate UIC (<100 µg/L) was 68% and 19% had a UIC <50 µg/L. In Azores, the median UIC was 73 µg/L, with 78% of children showing in-



The Portuguese island of Madeira

adequate iodine intake and 26% with levels lower than 50 µg/L. Iodine intake from both of these islands was significantly lower than those from continental Portugal.

Among pregnant women, in Madeira, median UIC was 69 µg/L, with 92% of pregnant women showing inadequate UIC (<150 µg/L) and 34% with UIC <50 µg/L. In Azores, median UI was 46 µg/L; the percentage of pregnant women with inadequate UI (<150 µg/L) was 99% and the percentage of UI <50 µg/L was 56%. Median UICs from

pregnant women of Madeira and Azores were significantly lower than those from continental Portugal. Iodine intakes in both women and children were significantly lower in the Azores than on Madeira.

Conclusions

Island populations are not protected against

IDD simply because of their proximity to the sea. This is a popular misconception. Considering the deleterious effects of inadequate iodine intake during pregnancy and childhood, it is urgent to implement iodine supplementation in pregnant women and iodine prophylaxis through salt iodization in the Madeira and the Azores islands.

New UNICEF report finds coverage of iodized salt varies considerably by region and by household income

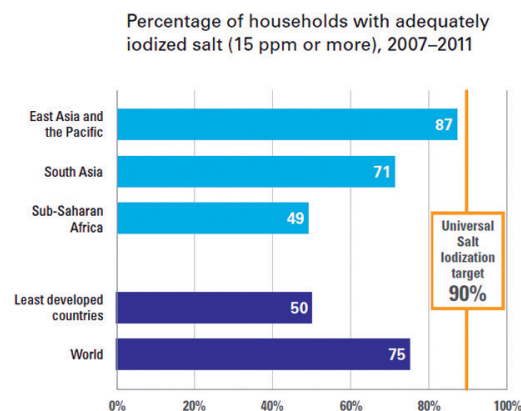
Globally, interest in nutrition has increased dramatically. Recurrent food shortages, rising food prices, strengthened evidence and rising obesity have created the impetus for widespread concern and action. More than ever, investing in nutrition is seen as a key development priority to benefit global welfare. The Group of 8 (G8) of the world's wealthiest countries has put nutrition high on its development agenda.

A new UNICEF Report: *"Improving child nutrition: the achievable imperative for global progress"* (available at: http://www.unicef.org/nutrition/index_68661.html) emphasizes that significant progress has been made in reducing the number of countries whose populations suffer mild to severe iodine deficiency, from 54 countries in 2003 to 32 in 2011. During this period the number of countries reaching adequate iodine intake increased by more than one third, from 43 to 69.

Globally, 75 per cent of households have adequately iodized salt (15 ppm or more), but coverage varies considerably by region (Figure 1). East Asia and the Pacific had the highest coverage, 87% in 2011, and as a region had nearly reached the universal salt iodization target of at least 90%. Coverage was lowest in sub-Saharan Africa, where less than half of households have adequately iodized salt. Coverage is generally higher among richer households than poorer households (Figure 2).

One fifth of countries reporting in 2011 had reached the 90% target of universal salt iodization. Most had reached only 50-70% coverage. Increased support of national salt iodization programs is needed, along with advocacy to increase awareness among

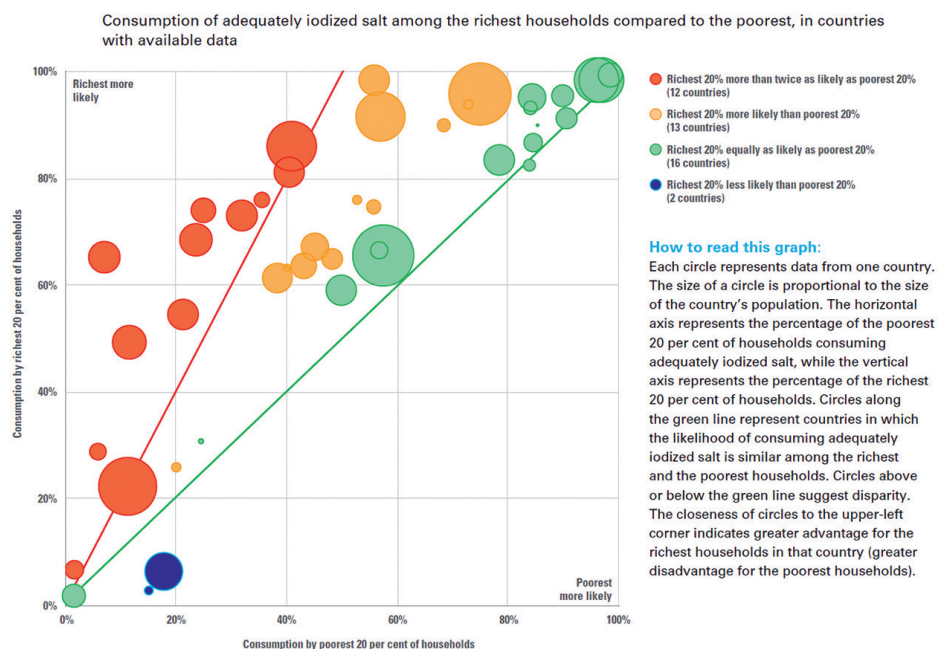
Figure 1: Globally, three out of four households consume adequately iodized salt



Source: UNICEF Global Nutrition Database, 2012, based on MICS, DHS and other national surveys, 2007-2011. Regional estimates are presented only where adequate population coverage is met.

country policymakers about the need to eliminate iodine deficiency, private-public partnerships to assist salt producers with sustained iodization and education of civil society to build demand for iodized salt.

Figure 2: Iodized salt consumption is more likely among the richest households than the poorest households



Increased risk of autism in children born to mothers with poor thyroid function

Aug. 13, 2013 — /PRNewswire-USNewswire/ -- Pregnant women who don't make enough thyroid hormone are nearly 4 times likelier to produce autistic children than healthy women, report scientists from the Houston Methodist Neurological Institute and Erasmus Medical Centre in the *Annals of Neurology*. The association emerged from a study of more than 4,000 Dutch mothers and their children, and it suggests some autism spectrum disorders can be caused by a lack of maternal thyroid hormone, which past studies have shown is crucial to the migration of fetal brain cells during embryo development.

„It is increasingly apparent to us that autism is caused by environmental factors in most cases, not by genetics,“ said lead author Gustavo Roman, M.D., a neurologist who directs the Nantz National Alzheimer Center. „That gives me hope that prevention is possible.“

The most common cause of thyroid hormone deficiency is a lack of dietary iodine -- because both the thyroid hormones, T3 and T4, contain that element. Iodine deficiency is common throughout the world, including in developed countries. The World Health Organization estimates nearly 1 in 3 people are affected globally.

The present work was based on the Generation R Study, conducted by Erasmus Medical Centre (Rotterdam, Netherlands)

doctors and social scientists, in which thousands of pregnant women were voluntarily enrolled between 2002 and 2006. Blood was withdrawn from the mothers at or around 13 weeks into their pregnancies to measure levels of T4. Six years later, mothers were asked to describe the behavioral and emotional characteristics of their children using a standardized psychology checklist.

Researchers identified 80 „probable autistic children“ from a population of 4,039 -- a

identified as mildly T4 deficient. The researchers found a weak association between mild T4 deficiency and the likelihood of producing an autistic child, but a strong association between severe T4 deficiency and autism (3.89 more likely, as compared with mothers with normal thyroid hormone).

Roman says he has advice for women who are now pregnant, or who are considering having children. „If you are planning to become pregnant, have your doctor measure urine iodine and thyroid function beforehand. If you have just become pregnant, have your doctor measure urine iodine, thyroid function, and begin using prenatal vitamins, making sure iodine is present.“

The study found a correlation between poor maternal thyroid function and autism, but it does not prove that the thyroid function of expecting mothers causes autism in their children. „The next steps are interventional studies,“ Roman said. „We must look at a large nationwide population of women in early pregnancy, to measure urine iodine and thyroid function. We must then correct thyroid deficiencies, if present, and provide prenatal vitamins with supplementary iodine.“



number consistent with the Dutch rate of autism spectrum disorders. 159 mothers were identified as being severely T4 deficient (defined as having 5 percent or less of normal T4, but with normal TSH), and 136 were

Read more:

Román GC, et al. Association of gestational maternal hypothyroxinemia and increased autism risk. *Ann Neurol*. 2013 Aug 13. [Epub ahead of print]. Sullivan KM. Iodine deficiency as a cause of autism. *J Neurol Sci*. 2009;276(1-2):202.

Personal Stories:

Seeing first-hand how iodized salt eliminates iodine deficiency disorders in Cambodia

Mr. Bona Khoy UNICEF, Cambodia.

In 1997, Bona Khoy was a UNICEF Communication Assistant documenting the impact of IDD in Cambodia. Now a Communication Officer, he recently revisited one family and saw first-hand how iodized salt had made a difference in their lives.

I first met Sorn Ratha, a girl in Toul Monorum village, Kratie province, north-east Cambodia, fifteen years ago, as a UNICEF film maker accompanying program colleagues as they conducted a comprehensive survey on IDD. Sorn Ratha looked younger than her thirteen years and had a large swelling on the right side of her neck. She had no idea

a happily married 28-year-old and the mother of two healthy children. Her life was transformed by her encounter with the IDD team in 1997. "I didn't know what the swelling was until a group of official people came to visit my family and told us about this problem. Since then, I realized that almost my whole family had goiter" says Sorn Ratha.

Watch the video:

<http://www.youtube.com/watch?v=UUn3Ag0vAQO>



Sorn Ratha, aged thirteen, with goiter

© UNICEF Cambodia/1997/Thearith TITH

what it was and neither did her sisters aged nine and six, her brother aged four, nor her mother, who all had similar swellings. Back then, many people used to think the swellings were caused by swallowing the hard seeds of certain fruit or by working too much.

In August 2012, I revisited Toul Monorum village and met Sorn Ratha again. She is now



Sorn Ratha, now 28 years old, is healthy and a happily married mother with two children

©UNICEF Cambodia/2012/Bona KHOY



Cambodian children benefit from iodized salt

Lack of iodine can cause brain damage, growth retardation and learning difficulties. Iodine is especially essential for women of childbearing age, because lack of it can cause miscarriage, stillbirth and mental retardation. Sorn Ratha and her family had developed goiter because in Toul Monorum village along the Mekong River, there is very little naturally occurring iodine in the soil or water. The area is exposed to heavy rainfall and periodic floods, which also leach iodine from the soil, so that its crops lack this vital micronutrient.

According to UNICEF Nutrition Officer, Un Sam Oeun, "When we came here in 1997...we observed that many middle-aged women and children had goiter. We could see them everywhere, on the street and in their communities."

The 1997 survey found that 17 per cent of people in Cambodia had goiter (almost two million) and over five million more were at risk. As an immediate response to the high incidence of IDD, the Royal Government of Cambodia adopted a strategy of Universal Salt Iodization (USI) and stepped up the supply of iodized salt throughout the country. With funding from United States Agency for International Development (USAID),

UNICEF has continued to support the government to encourage iodization of national salt production, enforce USI legislation, and promote the consumption of iodized salt. The strategy made a huge difference to Sorn Ratha. She cooks with iodized salt every day having learned that it will keep her family healthy and make her children smart.

Without iodine her life would have turned out very differently given the inevitable impact on her physical growth and development. "The team from the organization told us to use iodized salt in order to eliminate the goiter and we started to use it and the goiter disappeared. All of our family members got rid of goiter. I continue to use iodized salt for cooking because it makes us healthy and it improves our memory. It really caught my attention when I also heard on radio and TV that the use of iodized salt everyday makes us healthy and it makes our children smart." Sorn Ratha said.

I also learned a great deal from my meeting with Sorn Ratha and her family. Having seen and documented the difference 'before' and 'after' the use of iodized salt, I can personally attest to the benefits of iodine and have never failed to urge everyone I meet to use iodized salt.

Introduction of iodized salt in the 1920's linked to increased IQ and growth in the U.S. and Switzerland

The U.S. and Switzerland were the first countries to introduce iodized salt to their populations. Two historical studies looking at 100-year old army conscription data suggest this public health measure sharply improved growth and cognition in the 1920s.

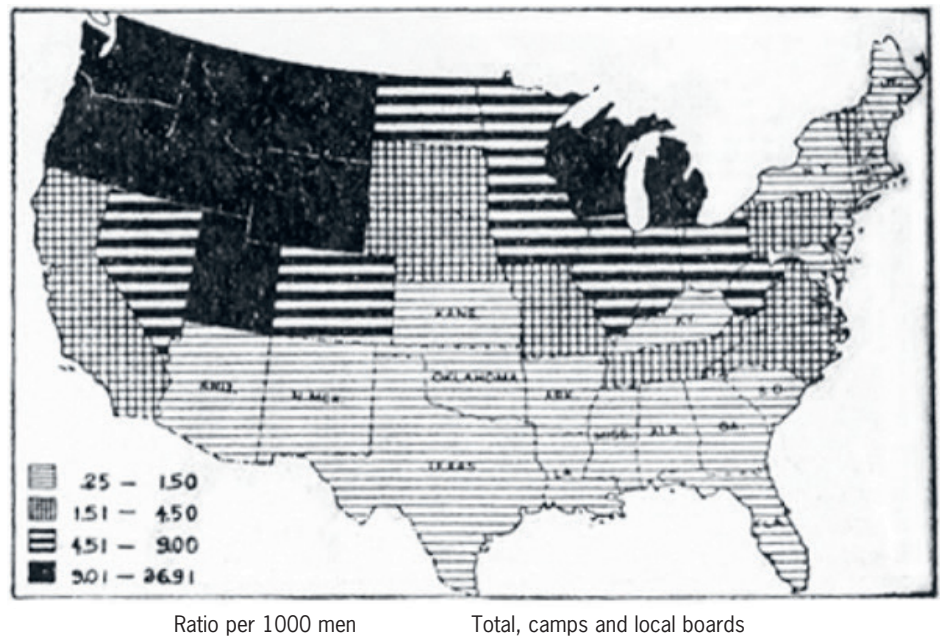
I. Correction of iodine deficiency and increased IQ in U.S. males

Excerpted from: J Feyrer, et al. *The Cognitive Effects of Micronutrient Deficiency: Evidence from Salt Iodization in the United States*. U.S. National Bureau of Economic Research Working Paper No. 19233, July 2013

Iodine deficiency is the leading cause of preventable mental retardation in the world today. In this paper, the authors study the long-term effects of iodine fortification in the United States. Because iodine deficiency affects mental development, the elimination of this deficiency is a candidate explanation for part of the Flynn Effect, the gradual rise in measured IQ over many decades that has been observed in developed countries.

Prior to salt iodization, endemic goiter and other iodine deficiency disorders were present in certain regions of the US and absent from others, depending on the iodine content of the soil and water. *Figure 1* illustrates the geographic distribution of goiter in the US as measured among World War I recruits. In 1924, iodized salt was introduced in the United States to reduce the goiter rate. This intervention rapidly reduced the incidence of iodine deficiency. The authors investigated whether there was a significant difference between those born before and

Figure 1: Goiter prevalence in young U.S. men, by state, in 1920.



after the introduction of iodized salt in locations with low levels of environmental iodine. Those living in high iodine regions provide a control group.

Military data collected during WWI and WWII was used to compare outcomes of cohorts born before and after iodization, in localities that were naturally poor and rich in

iodine. Two data sources were used to look at the effects of iodine deficiency eradication on cognitive ability. After World War I, statistics from draft physicals were compiled by geographic location. From this source, the incidence of goiter for 151 geographic regions before the introduction of iodized salt is known. This provides the measure of iodine deficiency prior to treatment.

The outcome measure was provided by an extensive data set of men who enlisted in the Army during World War II. The timing of the war generates a large sample of men born in the years 1920–1927, neatly covering the introduction of iodized salt. Upon enlistment, each recruit took an intelligence/aptitude test. Test scores were not available, but the authors made crude inferences about the test scores by examining which army branch the enlistees were assigned to.

Using information about average scores of recruits the authors infer that **for the one quarter of the population most deficient in iodine this intervention raised IQ by approximately 10 points.** The results can explain roughly one decade’s worth of the upward trend in IQ in the US (the Flynn Effect). The average level of iodine deficiency in the US was significantly lower than in the highest regions, so the overall effect in the US was much more modest.

II. Correction of iodine deficiency and increased height of Swiss young men

Excerpted from: Staub K, et al. 'From growth in height to growth in breadth': The changing body shape of Swiss conscripts since the late 19th century and possible endocrine explanations. General and Comparative Endocrinology 188 (2013) 9–15

Because Swiss army conscription has been mandatory and standardized since 1875 and measurement procedures for height and weight have not changed, recruitment data provide a solid measure of height changes of young men at 19 years of age in Switzerland over the past 140 years.

Prior to 1922, when a national iodized salt program was introduced, parts of the Swiss population was severely deficient in iodine, particularly in alpine areas and the foothills of the Alps, in cantons such as Appenzell. In contrast, the western part of the country (e.g., Geneva) was relatively iodine sufficient. The percentage of young men found unfit for service because of large goiters was smaller in the western cantons (Geneva), occurring in less than 4% of the conscripts, whereas they were very prevalent (15% and

more) in those of the Alps, the foothills, and the midlands stretching from the southwest to the northeast (Figure 2, left map). At the same time, conscripts from iodine-deficient areas were significantly smaller than the national average (Figure 2, right map). Around 1920, iodine prophylaxis was introduced in Zurich’s and Bern’s schools (where 60% of children had visible goiter) (Figure 3). The first iodized salt program in the Europe was introduced Appenzell in 1922, resulting in a decrease in goiter and elimination of cretinism. The difference in average height between very tall, iodine sufficient (e.g., Geneva) and very short, iodine deficient cantons (Appenzell) decreased with the Appenzell conscripts catching up, heightwise, with the national average during the 1920s (Figure 4). The average Swiss male body height increased markedly by 15 cm between the 1870s and the 1970s (from 163 cm to 178 cm). The positive trend started during the birth years of the 1870s, lost some of its momentum during World War I, was particularly strong during the interwar period, during the introduction of iodine prophylaxis (Figure 4).

Figure 2: Percentage of Swiss conscripts exempted from military service due to large goiter (left map) compared to average height of the same conscripts (right map) by district, 1884-1891

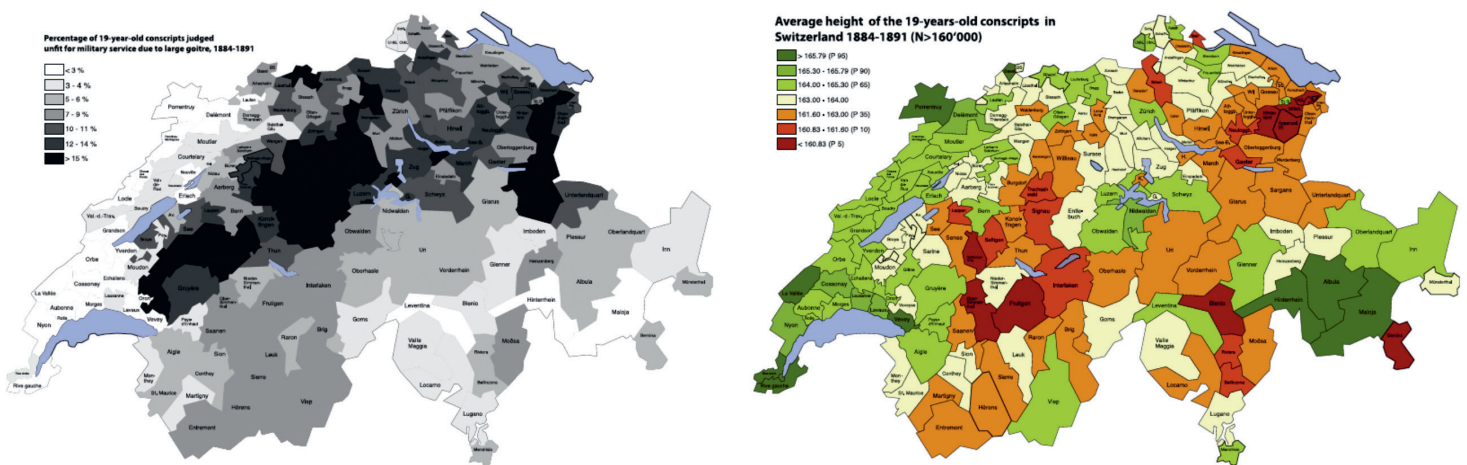
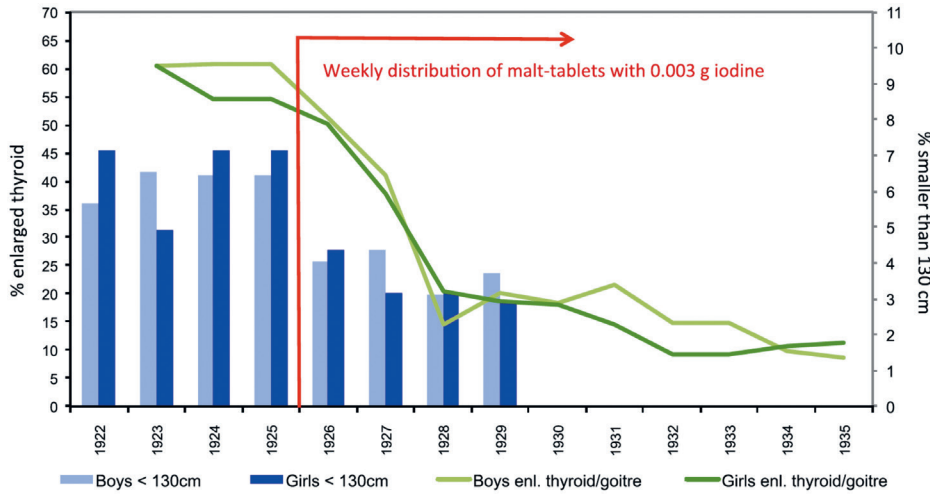
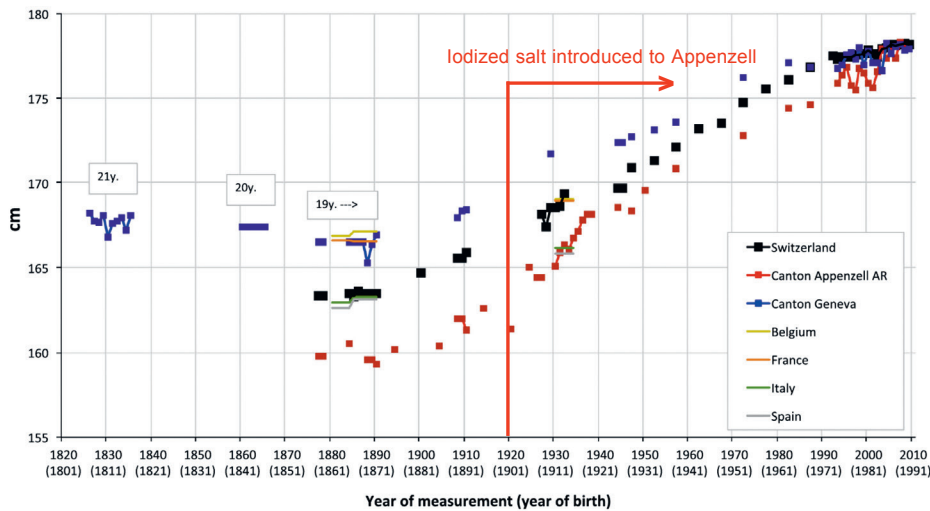


Figure 3: Medical examination of schoolchildren in the city of Bern: iodine prophylaxis, enlarged thyroid gland (goiter) and growth in all 5th graders (aged 10 to 11 years)



In conclusion, widespread iodine deficiency at the end of the 19th century helps to account for an overrepresentation of very short conscripts, for the low level of average height in Switzerland in general as well as for the tremendous regional variation in average height. **Public-health measures, such as the iodine-deficiency prophylaxis via weekly iodine tablets for schoolchildren and via iodized table salt, introduced in the 1920s, were likely to have been largely responsible for the dramatic increase in height during the interwar period.**

Figure 4: Published average height (cm) of 19 years-old conscripts in Switzerland and in the cantons Geneva and Appenzell Ausserrhoden, complete conscription years



Seawater desalination and iodine deficiency: is there a link?

Ovadia YS, Troen AM, Gefel D. Barzilai Medical Center, Ashkelon and School of Nutrition Science, The Hebrew University, Jerusalem, Israel.

Israel is one of the few countries that have no iodization policy and where a national iodine survey has never been done [1]. This is in part due to the unfounded but widespread belief that proximity to the sea prevents iodine deficiency. Of concern, between 2003–2010, the use of thyroid disease medication among Israeli adults increased from 2.9% to 4.7%. In many countries, iodine deficiency is a significant risk factor for thyroid disease.

Three of the largest seawater reverse osmosis (SWRO) desalination plants in the world were built along Israel's coast during the last decade and they now supply an ever-increasing proportion of Israel's drinking water. Such plants typically remove 90–98% of soluble minerals, including iodine, from seawater [2]. The possibility that the resulting reduction in available iodine contributes to increased risk for iodine deficiency has global relevance, given the growing use of SWRO desalinated water throughout the world [3].

One of the Israeli plants, the Ashkelon desalination plant (ADP) (*photo below*), is the major source of drinking water in the Ashkelon District. The aim of this study was to obtain data on iodine status in a small convenience sample of Israeli adults in the Ashkelon district without reported or known thyroid disease.



The Ashkelon desalination plant

The study showed that overall mean daily dietary iodine intake, as estimated by a food frequency questionnaire, was 101 µg/d, only two thirds of the Recommended Dietary Allowance (150 µg/d). The median serum thyroglobulin (Tg) was 21 µIU/mL, and 76% had elevated values (Tg ≥ 10 µIU/mL) [4]. Results are shown in Table 1. These findings challenge the prevalent belief that Israel is an iodine-sufficient country due to its proximity to the Mediterranean [5]. In addition, our finding of possible iodine deficiency (Tg ≥ 10 µIU/mL) among 76% of the participants is higher than that reported a decade ago.

The findings underscore the urgent need for reliable national data on iodine status in Israel. A nationally representative survey of school-aged children would provide crucial information on the extent of iodine deficiency in Israel and represent a first long overdue step towards routine monitoring of IDD as well as iodine prophylaxis in Israel. Moreover, it would illuminate the implications of SWRO desalination on health for populations in regions that are increasingly dependent on desalinated-water.

References

1. Andersson M, et al. Global iodine nutrition: A remarkable leap forward in the past decade. IDD Newsletter 2012.
2. Gabelich CJ, et al. High-recovery reverse osmosis desalination using intermediate chemical demineralization. J Membr Sci 2007;301:131-141.
3. Ramesh V, et al. Pretreatment in Reverse Osmosis Seawater Desalination: A Short Review. Environ Eng Res 2011;16(4):205-212.
4. Zimmermann MB, et al. Assessment of iodine nutrition in populations: past, present, and future. Nutr Reviews. 2012;70(10):553-570.
5. Zohar Y. Endemic goiter in a non-goitrogenic country. Harefuah 1994;127(3-4):75-8.

Table 1: Demographic characteristics, estimated daily dietary iodine intake and serum thyroglobulin in Israeli adults.

Characteristics	Result
n	34
Sex (Women, Men)	27, 7
Age (years)	55 ± 14
Range (years)	23-77
Estimated daily dietary iodine intake	
Mean (µg/d)	101 ± 59
Median (µg/d)	85
Range (µg/d)	12-263
Tg values	
Mean (µIU/mL)	23 ± 14
Median (µIU/mL)	21
Range (µIU/mL)	03-590
n (elevated values)^	26 (76)

± Plus-minus values are means ±SD.

^ Number of participants with Tg values above 10 µIU/mL (percentage in brackets).

Abbreviations:Tg=serum thyroglobulin.

Basil Hetzel: vanquishing iodine deficiency disorders

Excerpted from: *Lancet* 2013;9868:717.

The story of Basil Hetzel's fight against IDD begins in 1964, in the highland villages of Papua New Guinea. A medical scientist with an interest in thyroid disorders, Hetzel had been invited by the country's Public Health Department to investigate the goiter and cretinism that was prevalent in the mountain communities.



Witnessing the situation firsthand, Hetzel remembers, was unsettling: "I was astounded to see the severity of the problem." Cretinism had been described in Europe from the Middle Ages but it had declined in the 19th century. Now it was being reported not only in Papua New Guinea but also in mountainous regions in other countries, including India and China, and doubt remained as to whether it was related to iodine deficiency. It had recently been shown in Papua New Guinea that an injection of iodized oil could prevent goiter, but it was not clear if iodine deficiency was actually present, Hetzel recalls.

Studies by his group working with the Papua New Guinea Public Health Department confirmed that there was indeed substantial iodine deficiency and that it could be treated for up to 5 years by one dose of iodized oil. "We were able to demonstrate very severe iodine deficiency under the conditions in the mountains in New Guinea, where high rainfall leached the soil of iodine", he says.

In 1966, an intervention trial was undertaken in which families were alternately given injections of iodized oil or saline, and then followed up for the next 3 years. "This critical [follow-up] phase was undertaken double-blind with great skill and dedication by Peter Pharoah, an experienced Papua New Guinea medical officer who was seconded to this work by the Public Health Department at my request", Hetzel wrote. After the trial was complete, there was no doubt that giving iodized oil before pregnancy prevented mental disability. Soon after, an iodized oil injection campaign that covered about 120 000 people was undertaken for the people in the mountains of Papua New Guinea.

For Hetzel, addressing iodine deficiency became a passion. He led efforts to establish animal models of the condition, and helped reconceptualize the effect of iodine deficiency from goiter to brain damage, as part of a group of disorders that could be prevented by tackling iodine deficiency. On the world stage, Hetzel became a key figure in setting up ICCIDD.

Hetzel's dedication to establishing these programs and his groundbreaking research on iodine deficiency has led to many awards, including the Pollin Prize in Pediatric Research, the Prince Mahidol Prize, and the Companion of the Order of Australia. On awarding him the Pollin Prize, the then President of New York-Presbyterian Hospital Herbert

Pardes described how "Dr Hetzel has helped protect an estimated 80 million newborns from needless brain damage – a major public health triumph comparable to the campaigns to eliminate smallpox and polio."

"There is no doubt that he is an extraordinary person and one of the great figures in Australian medicine in the 20th century", agrees Professor Creswell Eastman of Westmead Private Hospital in Sydney. In Eastman's eyes, one of Hetzel's great attributes is his ability to influence those in power. "This is what sets him apart from many of his senior colleagues who have performed great work but were unable to translate that into worthwhile outcomes."

For his part, Hetzel puts much of his success down to chance. "I've been very fortunate to have congenial opportunities at the right time", he says. "I've been very, very fortunate. You've got to be lucky."

West Bank salt factory tackles iodine deficiency

The Dead Sea is one of the world's saltiest bodies of water, around eight times saltier than the ocean. A new salt factory is iodizing this salt for the benefit of the local Palestinian population.

Watch the video:

<http://www.youtube.com/watch?v=RCiCIdwO5I0>

Noora Faraj Al Arabiya with Agencies

The West Bank Salt factory has begun producing iodized salt after recent reports that many children from the Palestinian territories are iodine deficient. The factory is on the Dead Sea shoreline near the town of Jericho and became equipped with advanced machinery to speed up the manufacturing process and incorporate iodine into the production process of table salt.

The factory, owned by the West Bank Salt Company, was established in 1970. "The factory has been developed several times. In the last three to four months, we updated the machines in the factory, and we now have new production machines. We produce table salt and industrial salt. The factory produces 50 tonnes every day," says Ali Edais, who heads the factory's production department.

But it is located in a restricted Israeli military area and this causes difficulty for the company to obtain permits for workers. According to Ali Edais: "It is a closed military area. We enter it by getting permits from the District Coordination Office or the Israeli Civil Administration Office".

Despite economic adversity and recent Israeli-enforced bans on manufacturing products and restrictions on military areas such as the Dead Sea, this lone Palestinian-owned salt factory continues to cater to the local market by producing 25 kg bags of iodized salt.



A Dead Sea salt factory

(photo credit: Shay Levy/Flash90)

According to a 2005 report by the Food and Agricultural Organization, around 15 percent of Palestinian school children, predominantly from south of the West Bank and Jericho, were diagnosed with goiter.

The salt factory, which now specializes in iodized salt, not only supplies to the local market, accounting for 80 percent of consumption, but also exports some of the product to regional countries and beyond.

New Hidden Hunger map: Global distribution of iodine deficiency differs from other micronutrient deficiencies

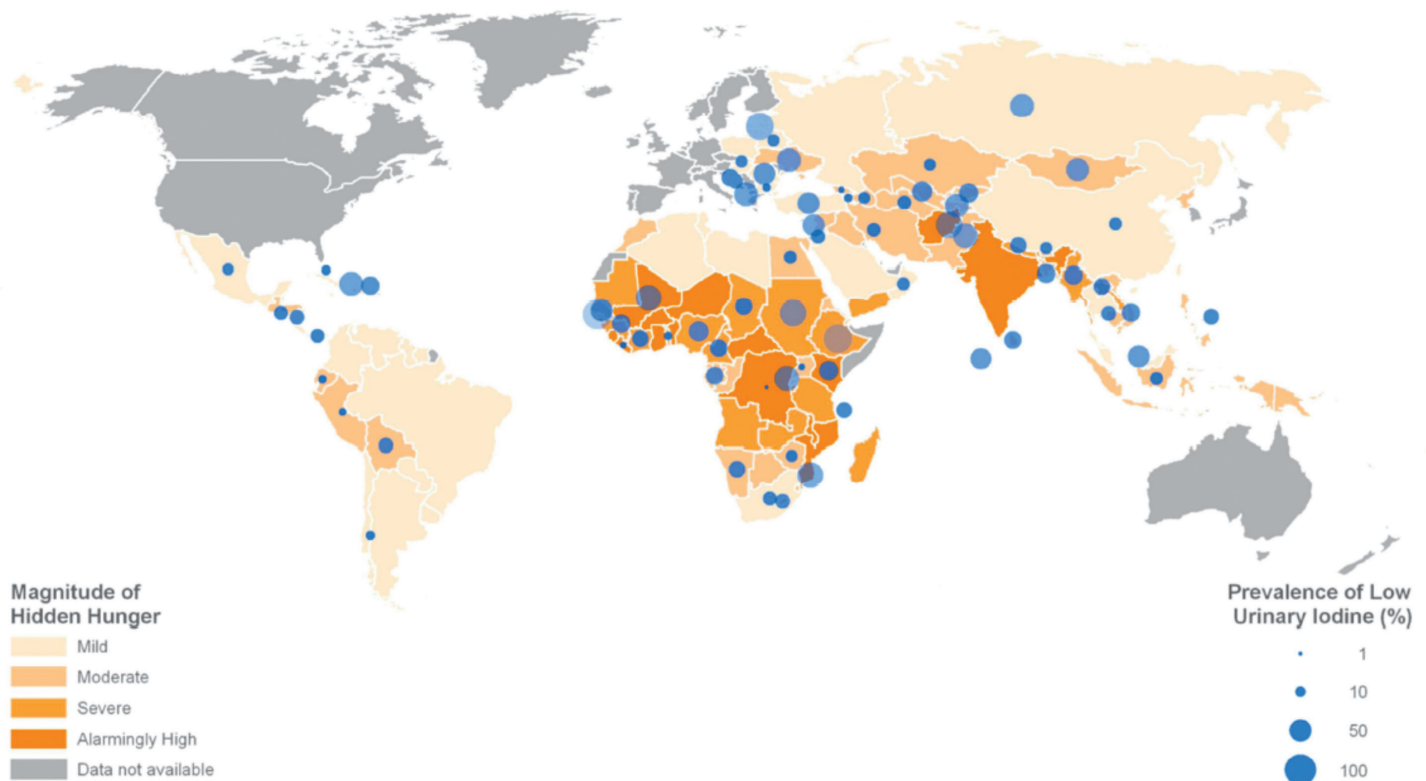
The unified global efforts to mitigate the high burden of vitamin and mineral deficiency, known as hidden hunger, in populations around the world are crucial to the achievement of most of the Millennium Development Goals (MDGs). Indices and maps of global hidden hunger are useful to help prioritize program assistance, and to serve as an evidence-based global advocacy tool.

A new global map of hidden hunger due to micronutrient deficiencies has been developed (Figure 1). A number of countries in sub-Saharan Africa, as well as India and Afghanistan, had an alarmingly high level of hidden hunger, with stunting, iron deficiency anemia, and vitamin A deficiency all being highly prevalent.

The pattern and magnitude of iodine deficiency did not conform to that of other micronutrients. The greatest proportions of children with iodine deficiency were in the Eastern Mediterranean (46.6%), European (44.2%), and African (40.4%) regions.

The current indices and maps provide crucial data to optimize the prioritization of program assistance addressing global multiple micronutrient deficiencies.

Figure 1: Magnitude of hidden hunger (zinc, iron and vitamin A deficiencies), prevalence of iodine deficiency (based on the percentage of children with a urinary iodine concentration <100 micrograms per liter)



Read the complete article:

Muthayya S, Rah JH, Sugimoto JD, Roos FF, Kraemer K, et al. (2013) The Global Hidden Hunger Indices and Maps: An Advocacy Tool for Action. PLoS ONE 8(6): e67860. doi:10.1371/journal.pone.0067860

Meetings and Announcements

Thailand: Ministry of Public Health observes “National Iodine Day”

BANGKOK, 26 June 2013 – The Department of Health, under the Ministry of Public Health held an event to commemorate the “National Iodine Day” on June 25. The event was held in Nonthaburi province under the theme “Wisdom builds the nation, Thai people must not lack iodine”.

Deputy Public Health Minister Chonlanan Srikaew presided over the opening ceremony of the event. It is estimated that over 20 percent of the Thai population do not consume iodine-added products, resulting in a high number of people with iodine deficiency. The trend continues to be a health problem

that must be solved with cooperation from all sectors, both public and private, the deputy minister said.

Sri Lanka: IDD stakeholders meeting in Colombo

The island nation of Sri Lanka has made remarkable progress in elimination of IDD. In 2010, median UIC among children and pregnant women was found to be 163 µg/L and 113 µg/L respectively. But household coverage with adequately iodized salt had declined from >90% to 68%. A meeting of stakeholders involved in USI and IDD was held in the Ministry of Health, Sri Lanka at Colombo to discuss the progress and challenges in sustainable elimination of IDD in Sri Lanka. This meeting was attended by representatives from the Ministry of Health, Sri Lanka, Medical Research Institute, Colombo, salt industry, ICCIDD Global Network, and UNICEF.

The following issues were clarified:

- It was decided that Ministry of Health will write to ICCIDD Global Network for external review of the IDD program.
- It was agreed that ICCIDD Global Network will develop the framework for development of a national database on IDD and share it with relevant stakeholders including Ministry of Health. The Ministry will take the lead in development of national database.
- There is no separate budget for IDD elimination program in Sri Lanka. It was requested that there is a need to impress upon the political authorities and policy makers to earmark the budget for the program.

- It was suggested that Ministry of Health can allow the use of its logo on the iodized salt packets as recognition for adhering to salt iodine content regulations.
- Representatives from Puttalam Salt Producers Cooperative raised the issue of problems faced by small scale salt producers in iodizing the salt. The salt producers reported it is difficult to maintain a level of iodine between 15–30 ppm as mandated by the law, and requested the law to be revised to increase the upper limit of iodine level to 40 ppm. But because of risk of iodine excess, it was agreed to review the technical issues related to salt iodization so that iodine level can be maintained between 15–30 ppm.



Participants in the Colombo meeting

American Thyroid Association (ATA) Statement on the Potential Risks of Excess Iodine

June 5, 2013 – The U.S. diet generally contains enough iodine to meet the needs of most of the population, with common sources being iodized salt, dairy products, breads, and seafood. During pregnancy and lactation, women require higher amounts of iodine for the developing fetus and infant. The ATA recommends that women take a multivitamin containing 150 µg iodine daily in the form of potassium iodide during preconception, pregnancy, and lactation to meet these needs.

Ingestion of greater than 1,100 µg of iodine per day (the Tolerable Upper Limit for iodine) is not recommended and may cause thyroid dysfunction. In particular, infants, the elderly, pregnant and lactating women, and individuals with preexisting thyroid disease are susceptible to adverse effects of excess iodine intake and exposure. The public is advised that many kelp supplements contain iodine in amounts that are up to



several thousand times higher than the daily Tolerable Upper Limits for iodine. The ATA advises against the ingestion of iodine or kelp supplements containing in excess of 500 µg iodine daily for children and adults and during pregnancy and lactation.

There are a limited number of medical conditions in which the short-term use of high amounts of iodine is indicated. Finally, patients receiving the large amounts of iodine in iodinated contrast dyes, as required for radiologic studies, should be monitored for iodine-induced thyroid dysfunction if risk factors are present.

National Quality Assurance and Control Manual to Improve the Quality of Iodized Salt in Bangladesh

Dhaka, Bangladesh 12 January 2013 -- The Bangladesh Small and Cottage Industries Corporation (BSCIC)-- with the financial and technical support of the Global Alliance for Improved Nutrition (GAIN) and the ICCIDD Global Network-- convened a two-day workshop in Dhaka among key

government and industry partners to solicit feedback on and approval of a national manual to improve the quality of iodized salt available in the country. The manual, which is aligned with internationally agreed-upon best practice and management and salt quality standards, will be adapted

to the Bangladeshi context. It will provide guidelines so salt producers and regulatory agencies can improve their iodization and testing practices.

Key partners participating in the workshop gave feedback on the manual:



Traditional salt industry in Bangladesh

- Dilip Barua, Honorable Minister, Ministry of Industries: “The manual will help ensure consistent availability of adequately iodized salt through engaging salt producers. I congratulate GAIN for this great initiative.”
- Chairman, BSCIC, Fakhru Islam: “Adaptation of the appropriate manual will help sustainably reach 90 percent of Bangladeshis with adequately iodized salt.”
- Project Coordinator, ICCIDD Global Network, Gregory Gerasimov: “Salt producers must make sure that iodized food grade salt is always safe and contains the right level of iodine.”

Abstracts

Public health policy in New Zealand to redress iodine insufficiency in pregnant women may widen sociodemographic disparities.

The objective of this study was to evaluate the impact of a mandatory bread fortification program on iodine intakes of childbearing women ($n=723$) postpartum across New Zealand. A questionnaire on supplement use, bread intake, iodized salt use and maternal sociodemographic and obstetric characteristics were obtained. Younger women, women with higher parity, single women and those with unplanned pregnancies were less likely to meet the pregnancy requirement for iodine. During pregnancy, iodine-containing supplement was non-uniform across sociodemographic subgroups, with the most disadvantaged women benefiting the least from this public health policy. The disparities in supplement uptake highlight the need for further efforts towards universal salt iodization, such as the mandatory fortification of additional processed foods with iodized salt.

Mallard SR, et al. Public Health Nutr. 2013 Jun 19:1-9. [Epub ahead of print]

High prevalence of thyroid disorders in Belgian pregnant women in a mildly iodine-deficient country

The authors conducted a national survey in Belgium of pregnant women in 55 obstetric clinics. Urinary iodine concentration and thyroid function were measured. They found the frequency of elevated serum TSH was 7.2%. Among those women, 13.8% were TPO-Ab positive. The frequency of low serum TSH was 4.1%. Globally, the prevalence of thyroid disorders (abnormally high or low TSH) or thyroid autoimmunity was 15.3% and 18.6% in first trimester pregnant women. Thus, 1 in 6 pregnant women in Belgium had thyroid dysfunction, and the iodine status of women needs to be improved.

Moreno-Reyes R, et al. J Clin Endocrinol Metab. 2013 Jul 11. [Epub ahead of print]

Mild iodine deficiency in women in the Czech Republic: prevalence and impact on reproductive health.

This non-randomized prospective follow-up study investigated the iodine status of women after spontaneous abortion (SpA) and evaluated their subsequent reproductive health. The authors compared urinary iodine concentration (UIC) in 171 women 2-8 weeks after an early SpA with age-matched controls, and then followed the women for 38 months. Women after SpA were almost twice as likely to suffer from mild iodine deficiency and had lower median UIC as compared to age-matched controls (medians UIC = 92 vs. 118 $\mu\text{g/L}$). There was no association between UIC and thyroid dysfunction or between UIC and rates of subsequent successful pregnancies or obstetric complications.

Jiskra J, et al. Clin Endocrinol (Oxf). 2013 Jul 27. [Epub ahead of print]

Iodine status in Korean preschool children

This cross-sectional study was performed in 611 healthy preschool children (302 from Seoul and 309 from Masan) aged from 2 to 7 in 2010. The median UI concentration was 439 $\mu\text{g/L}$. There were no significant differences in UI between different sexes and ages. Additionally, the median UI concentration was higher in children from Seoul (512 $\mu\text{g/L}$) than that in children from Masan (362 $\mu\text{g/L}$, $P < 0.001$). The authors concluded that Korean preschool children are at increased risk of excessive iodine intake.

Lee J, et al. Eur J Nutr. 2013 Jul 24. [Epub ahead of print]

Associations of noniodized salt and thyroid nodule among the Chinese population: a large cross-sectional study.

This cross-sectional study was conducted in Hangzhou, China, in 2010 and explored whether use of noniodized salt increased the risk of thyroid nodule among a Chinese population in 9412 adults. The prevalence of thyroid nodule among men and women was 24.1% and 34.7%, respectively. Adults consuming noniodized salt had an increased risk of thyroid nodule (OR: 1.36; 95% CI: 1.01, 1.83). Furthermore, those who consu-

med neither iodized salt nor milk had a higher risk of thyroid nodule (OR: 1.72; 95% CI: 1.21, 2.43) than did those who consumed both iodized salt and milk. These findings indicate that low iodine intake may increase the risk of thyroid nodule in a Chinese population, particularly in women. Hence, the salt iodization program is indispensable for a coastal Chinese population such as that living in Hangzhou.

Chen Z, et al. Am J Clin Nutr. 2013 Jul 10. [Epub ahead of print]

Iodine deficiency in Danish pregnant women.

The authors conducted a cross-sectional study in 2012 in pregnant women in an area of Denmark where iodine deficiency had previously been moderate. Among the pregnant women ($n = 245$), 84.1% reported intake of iodine-containing supplements, and the median urinary iodine concentration was significantly higher in this group, 109 $\mu\text{g/L}$ (25th-75th percentile: 66-191 $\mu\text{g/L}$), than in those not taking supplements, 68 $\mu\text{g/L}$ (35-93 $\mu\text{g/L}$). The authors concluded that iodine supplement intake during pregnancy in Denmark should be officially recommended.

Andersen SL, et al. Dan Med J. 2013 Jul;60(7):A4657.

Improved iodine status in Tasmanian schoolchildren after fortification of bread

The study examined schoolchildren's ($n=320$) iodine status in Tasmania in 2011 after mandatory iodine fortification of bread and assessed the magnitude of difference compared with results from a period of voluntary iodine fortification and prefortification. Median UIC in 2011 was 129 $\mu\text{g/L}$, and 3.4% of samples had a UIC under 50 $\mu\text{g/L}$. This was significantly higher than during the period of voluntary fortification (108 $\mu\text{g/L}$) ($P > < 0.001$), which was significantly higher than before fortification (73 $\mu\text{g/L}$) ($P < 0.001$). Iodine status in Tasmania can now be considered optimal in children.

DePaoli KM, et al. Med J Aust. 2013 May 20;198(9):492-4.

THE IDD NEWSLETTER is published quarterly by the ICCIDD Global Network and distributed free of charge in bulk by international agencies and by individual mailing. The Newsletter is also distributed to email subscribers and appears on the ICCIDD Global Network's website (www.iccidd.org). The Newsletter welcomes comments, new information, and relevant manuscripts on all aspects of iodine nutrition, as well as human interest stories on IDD elimination in countries.

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.

The ICCIDD Global Network gratefully acknowledges the support of Kiwanis International, Indianapolis, USA, and the Swiss Federal Institute of Technology Zürich for the IDD Newsletter.