INTERNATIONAL COUNCIL FOR CONTROL
OF IODINE DEFICIENCY DISORDERS

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Reaching optimal iodine nutrition in pregnant and lactating women and young children

The groups most susceptible to IDD - pregnant and lactating women, and infants - may need iodine supplementation when universal salt iodization is not fully implemented.

A 2007 Joint Statement by **WHO** and **UNICEF**

Because this situation may jeopardize the optimal brain development of the fetus and young child, WHO and UNICEF held a joint meeting on 15-16 November 2005 at UNICEF Headquarters, New York, USA to address this issue. This statement presents the conclusions of the joint meeting. The primary strategy for sustainable elimination of iodine deficiency remains USI. In some countries, however, implementation of salt iodization programs may not be feasible in all areas, thus resulting in insufficient access to iodized salt for some groups within the population. In these cases, additional complementary

THE INTERNATIONAL COUNCIL FOR CONTROL OF IODINE DEFICIENCY DISORDERS (ICCIDD) 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 and others.

strategies should be considered. As the first step, countries need to assess and categorize the level of implementation of salt iodization programs and, based on this analysis, should revisit the strategy for the control of Iodine Deficiency Disorders (IDD), as necessary.

1. Categorization of country according to level of implementation of salt iodization programs.

Countries, or areas within countries, can be categorized into four groups based on the proportion of household use of iodized salt at the national level. It is preferable for highly populated countries to use disaggregated data and categorize areas of the country according sub-national (region, province, district, etc) data.

- Group 1: Countries, or areas within countries, in which more than 90% of the households have access to iodized salt.
- Group 2: Countries, or areas within countries, in which 50-90% of the households have access to iodized salt.
- Group 3: Countries, or areas within countries, in which 20-50% of the households have access to iodized salt.
- Group 4: Countries, or areas within countries, in which less than 20% of the households have access to iodized salt.

2. Guidelines for decision making on when and how to plan for additional iodine intake in pregnant and lactating women and children 7-24 months of age.

Group 1: The countries in this group should sustain the achievement of USI and periodically reassess the salt iodization program and population iodine status.

Group 2: The countries in this group should make efforts to accelerate salt iodization based on the existing operational guidelines. If no progress in scaling up is being made within two years, then the feasibility of increasing iodine intake in the form of a supplement or iodine fortified foods by the most susceptible groups – pregnant and lactating women and children 7-24 months of age - would need to be assessed, using the recommended strategy for the countries of group 3.

Group 3: The countries in this group will need to assess the feasibility of increasing iodine intake in the form of a supplement or iodine fortified foods by the most susceptible groups, as described in the following programmatic steps:

a. Assess population iodine nutrition status, household iodized salt coverage (preferably disaggregated) and salt iodization programs in order to identify a national or sub-national problem. An initial rapid assessment will be needed for advocacy and for future monitoring if no assessment has yet been made. The methodology of assessments is described in the WHO/UNICEF/ICCIDD guidelines on "Assessment of Iodine Deficiency Disorders and Monitoring their Elimination".

b. Develop new plans to strengthen salt iodization that include increasing political commitment, advocacy, capacity-building of the salt industry for production and quality assurance, adoption and enforcement of appropriate regulations/legislation, and an effective iodized salt monitoring system at production (or importation), retail and community levels.

c. If a country does not succeed in scaling up its salt iodization program within two years, the feasibility of increasing the iodine intake of susceptible groups by means of supplements or iodine-fortified foods will need to be explored as a temporary measure while strengthening the salt iodization program. In areas of moderate and severe iodine deficiency (median urinary iodine less than 50 μg/L or total goiter rate more than 20%), the objective should be to provide additional iodine in the form of a supplement to all pregnant and lactating women, and in the form of a supplement or complementary food fortified with iodine for children 7-24 months of age.

d. Assessing the feasibility of providing additional iodine should include: (i) costing of supplementation, (ii) existing channels for distribution to reach the target groups, (iii) likely duration of supplementation, and (iv) potential compliance.

Group 4: Each country in this group should assess the current situation of its salt iodization program to identify national or sub-national problems and to update its strategies and action plans. The most vulnerable groups, pregnant and lactating women, should be supplemented with iodine, and children 7-24 months of age should be given either a supplement or complementary food fortified with iodine until the salt iodization program is scaled up.

Table 1: WHO-recommended dosages of daily and annual iodine supplementation

Population group	Daily dose of iodine supplement (µg/day)	Single annual dose of iodized oil supplement (mg/year)
Pregnant women	250	400
Lactating women	250	400
Women of reproductive age (15-49 y)	150	400
Children< 2 y [a,b]	90	200

a ***For children 0-6 months of age, iodine supplementation should be given through breast milk. This implies that the child is exclusively breastfed and that the lactating mother received iodine supplementation as indicated above.***

b ***These figures for iodine supplements are given in situations where complementary food fortified with iodine is not available, in which case iodine supplementation is required for children 7-24 months of age.***

3. Guidelines for decision making on when and how to plan for additional iodine intake in pregnant and lactating women and children 7-24 months of age in specific situations.

Irrespective of where countries, or areas within countries, are categorized there are specific situations such as in emergencies, among displaced people, and geographically remote areas where additional iodine intake should be considered. If iodized salt is not accessible in these specific situations, increasing iodine intake is required in the form of iodine supplements for pregnant and lactating women, and a supplement or complementary food fortified with iodine for children 7-24 months of age. In cases where it is difficult to reach pregnant women, supplementation to all women of reproductive age is advised.

4. Recommended dosages of iodine supplement.

The consultation agreed on two main approaches for administering iodine supplements - either on a daily basis or on an annual basis using an iodized oil preparation - and an endorsement of the WHO-recommended dosages as described in Table 1.

5. Monitoring.

Monitoring of IDD prevention and control programs is crucial - whether they are based on fortification or supplementation - in order to ensure that additional iodine intake is effective in reducing the deficiency while preventing excessive intake that may lead to adverse health consequences. The monitoring process should include the assessment of coverage and iodine nutrition status. The detailed methodology of monitoring is given in WHO/UNICEF/ICCIDD guidelines. (WHO/UNICEF/ICCIDD, 2007)

IDD Elimination through Universal Salt Iodization in Kazakhstan

Kazakhstan has built a model USI program over the past decade that should ensure sustainable elimination of mental impairment and goiter due to iodine deficiency.

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Iodized salt will protect young women in Kazakhstan from iodine deficiency

Background

The Republic of Kazakhstan is located in central Eurasia. The size of its territory makes it the 9th largest country in the world and the population by January 2006 numbered 15.2 million. The urban and rural shares of the population are 57 and 43 percent, respectively. Almost one quarter of the population is less than 15 years old and the number of newborns each year is close to 200 thousand. During the past 5 years, GDP growth in Kazakhstan has been among the highest in the world at 9 percent on average, boosted by a growing production of crude oil and natural gas. Departing from a relatively low budget of less than 2 percent of GDP in 2003, the public expenditure for national health care services is projected to grow to 4 percent by 2010, including a sizable increase in budget allocation for preventive public health.

Prior to Independence, Kazakhstan was one of the USSR Republics. The Soviet historical record offers ample evidence that following a period of quick success in controlling endemic goiter and cretinism by the late 1960s, iodine deficiency made a comeback during the 1980s. Central oversight was abandoned and the changes in dietary iodine supply and consumption, as well as biological status, were no longer monitored for central consolidation and decision-making. The simultaneous reduction of funding for investments in maintaining the salt industry's capacity led to a serious deterioration in the amount and quality of iodized salt supplies throughout the Soviet territory by the time of the collapse of the USSR.

Emerging as a sovereign nation in 1991, Kazakhstan had to establish its own human, administrative and industrial basis for economic development. By 1996, the need for a national policy on nutrition, including IDD elimination, had become apparent. In the same year, the

AralTuz Company, which had been established in the 1950s, was provided with financial and technical assistance by UNICEF as a first act to build the national capacity to address the iodine deficiency problem in the population. Only 10 years later, the goal of Universal Salt Iodization (USI) has been reached, thanks to a series of joint collaborative steps by a range of national organizations with steadfast support of international agencies. Evidence from a country-wide population-representative cluster household survey in early 2006 showed that 92 percent of the Kazakh households were using adequately iodized salt. This is a quantum leap as compared to the situation in 1999 when the first DHS survey showed that iodized salt was present in less than one-third of the households in Kazakhstan. Moreover, 3 months later, in 2006, a National Micronutrient Survey demonstrated that the median urinary iodine concentration among women of reproductive age was 250µg/L as compared to 95µg/L in 1999. Further in-depth data analysis of the National Micronutrient Survey (Figure 1) revealed that the use of adequately iodized salt (≥15mg iodine/kg) in the households across Oblasts (Provinces) was closely correlated with the share of urinary iodine concentrations ≥100µg/L in the women living in these households. This affirms that the USI strategy is the underlying factor driving the alleviation of iodine deficiency in the population of Kazakhstan.

Legislation

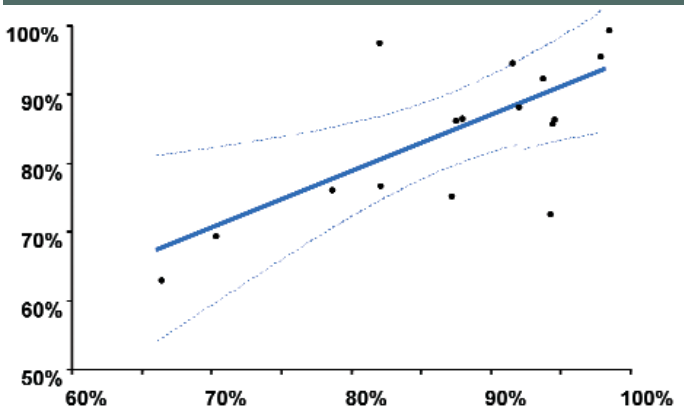
A Law "On Prevention of Iodine Deficiency Disorders" was enacted on 14 November 2003. It bans the sale or trade of non-iodized salt in Kazakhstan, thus making iodization compulsory for all the edible, food-grade and fodder salt accessible by the population, the food manufacturing industry and the cattle breeders. This principal law specifies also the exclusive use of potassium iodate (KIO3) as the salt fortificant and lays down the requirements for packaging, labeling and storage of iodized salt. The Inter-State agreement, signed in May 2001 by the Heads of State of the Commonwealth of Independent States at their meeting in Minsk, Belarussia, has been adopted for the normative iodine level in salt at production, import and trade, i.e., 40±15mg iodine per kg salt. The national legislation on IDD prevention is anchored in a comprehensive set of Decrees and Declarations by the President and the Government of the Republic of Kazakhstan. These aim to promote a healthy population as the basis for national development.

Salt production

The key domestic salt producers are:
- AralTuz (80-85 percent of domestic human consumption) near Aralsk in the eastern Kyzyl Orda Oblast
- SuzakTuz (±10 percent) in South-Kazakhstan Oblast
- PavlodarSol (<10 percent) in the northern Pavlodar Oblast

The salt companies are conducting continuous quality assurance of their iodized salt by overseeing the quality and use of KIO3 and its addition into food-grade salt during processing. This is combined with regular qualitative spot tests or quantitative measurements in a company-based laboratory. The salt producers and traders are united in a National Association of Salt Producers, which represents their interests and produces obligatory reports on the national salt production and supply. Salt inspections in the wholesale and retail markets and catering institutions are conducted by the Sanitary-Epidemiological Supervision (SES) authority. The results of inspections are summarized in obligatory quarterly reports to the Chief Health Inspector in the Ministry of Health.

Urinary iodine concentration: % ≥100 µg/L



Iodine content of household salt: % ≥ 15 mg/kg

Salt imports, which constitute approx. 15-20 percent of the total food-grade salt used in the country, are subject to a mandatory Certificate of Conformity. This is issued by the exporting country's food control authority and inspected by Kazakh Customs officials under the oversight of the Technical Regulation and Metrology Department under the Ministry of Trade and Industry. The three domestic salt companies must operate under the same rule for permission to release the salt products to their sales channels.

Recent progress in USI

Two landmark events were especially noteworthy for their influence in shaping the national IDD elimination effort in Kazakhstan, namely the Minsk agreement mentioned above and the Almaty Forum on Food Fortification in October of 2001.

■ The Minsk agreement among the Heads of State and Government of CIS countries stated the political will for adopting a coordinated policy and collaborating in setting uniform national iodization standards for the salt industry, as well as for the inspection of salt quality norms by the national SES authorities.

■ The Almaty Forum in 2001 was a summit gathering of multi-sector national delegations from the Central Asia region and Mongolia. They worked together with support of the Asian Development Bank (ADB) and UNICEF on program development and rules of engagement for a joint public-private-civic collaborative approach to tackle vitamin and mineral deficiencies through food fortification.

In immediate follow-up to the Almaty Forum, the Minister of Health of Kazakhstan entered into a cooperation agreement with ADB to stimulate the speedy achievement of USI and a significant increase in fortification of all the roller-mill wheat flour of premium and first grade. A national multi-sector coalition was formed (see photo) and started holding periodic meetings for collaborative oversight of progress and for making joint agreements on the actions required in each sector toward the fortification goals.

The ADB-managed grant project, funded by the Japan Fund for Poverty Reduction (JFPR), supported AralTuz and PavlodarSol in 2002 with equipment for salt iodization, packaging equipment and KIO3 against one-third reimbursement of the costs. In 2005, the AralTuz Company made an additional investment in five automatic packing machines and new iodization spray equipment. During 2006, the supply of iodized salt for domestic consumer use by AralTuz was almost 65,000 MT. The production of iodized salt by PavlodarSol has remained low and was initially of sub-par quality. Only by the end of 2006 did the internal laboratory record of the Company show that the appropriate salt iodization level had been attained. A third salt producer, SuzakTuz, emerged during 2004 in South Kazakhstan Oblast and it expects to have adequate capacity in place by the end of 2007 for modern quality assurance of its production, estimated at about 5,000 MT/y. The domestic salt supplies are complemented by imports of approx. 15,000 MT consumption salt per year mainly from the Russian Federation and Ukraine. The three domestic salt companies purchase their KIO3 from a domestic chemical import firm L-Pharma, which sources it usually in the Crimea, Russian Federation.

Data on the production, import, export and supplies of iodized and other types of salt have been included in the official annual State Statistical reports of the Agency on Statistics. The production, import and export statistical data indicate that the amount of iodized salt supplied for use by the households and the food manufacturing industries in Kazakhstan is sufficient for the size of the population.

The USI program reaches Kazakh families living in remote mountain regions

Communication of the IDD message

With technical and funding support from UNICEF and ADB, a comprehensive communications effort has been ongoing during 2002-2006 using a multitude of media, materials and channels. This is with full participation of a wide array of national stakeholders coordinated by the Kazakh Academy of Nutrition. The communications efforts quickly achieved an uncommonly high awareness that iodine deficiency is a significant threat to the intellectual performance of children and that regular use of iodized salt is the effective and sustainable remedy for prevention. Its success was due to:

- inclusion of a broad range of civic society organizations in delivering the communications drive "at the doorsteps" of the population
- keen attention to ensuring that the salt industry and its sales agents remain well-informed
- inclusion of food inspection and control bodies of SES and Customs in training workshops
- systematic targeting of key politicians with specific information and advocacy were important factors for the successful communications effort.
- various aspects of the dangers of IDD and the benefits of USI have been inserted in the ongoing training, education and awareness systems of the country
- technical and methodical learning has been assimilated in the basic and ongoing curriculums of the primary health care staff, institutions of academic learning and secondary schools. The insertion in ongoing educational curriculums of the essential knowledge about the permanent IDD threat and its dietary prevention has laid the basis for sustained acceptance of USI throughout society.

Financing

High-level political oversight of fortification policies is vested in an Interdepartmental Coordination Council on Food Fortification, headed by the Minister of Health and with members from the two Chambers of Parliament, relevant Government Departments, supportive international agencies, the NGO and scientific communities, and the food industry (salt and flour) associations. The Committee of State SES, chaired by the Chief Health Inspector, Ministry of Health, is ultimately accountable for ensuring technical progress. Practically all necessary financing of costs for USI and IDD elimination has become incorporated in the ongoing expenditures of the public and private entities involved.

The salt companies and traders have included the costs of iodization in the price of the product to their clients. The costs for inspections by SES and Customs authorities are carried in the State budgets of the respective agencies, as is the official annual reporting on national statistics. Research and surveys on iodine nutrition in the population are requested on a periodic tender basis by the Ministry of Health, with the Kazakh Academy of Nutrition among the contenders. It should be noted that the budget of the Ministry of Health has an item for iodine supplement entitlements that is no longer needed because the evidence in Kazakhstan indicates that the USI strategy alone is sufficient to ensure adequate dietary iodine supplies in the population. Thus, the entitlements of State-financed iodine supplements on a mass scale will be discontinued and are available for regular efforts to monitor the situation.

Starting in 2005, the Committee of State SES under the Ministry of Health has been building a national database to consolidate and track key performance indicators of USI for IDD elimination. The obligatory quarterly reports by the Republican SES of the salt iodine inspections, in combination with reports of the Customs Committee on iodized salt imports and the Committee on Technical Regulation and Metrology on the Certificates of Conformity are entered in the database. These data are combined and verified against information supplied by the Salt Producers Association to reflect the complete dietary iodine supply situation.

During 2006, the Ministry of Health introduced a report form for cases diagnosed in the clinics and hospitals with hypothyroidism or thyrotoxicosis with and without goiter. This data system is under review for replacement in the future with newborn TSH data from the new national newborn screening for congenital developmental disabilities, currently being introduced. The Ministry of Health recognizes the additional need for continuous surveillance of the iodine consumption, connecting the iodine supply data with iodine nutrition status indicators in pregnant women and a scheme for collecting these data is being developed.

Keys to success

The case of Kazakhstan illustrates important factors for the achievement of quick USI success.

■ The principal law made the iodization of all the salt supplies compulsory. It translated the evidence of highest political will into a commitment for national action.

■ The continued close collaboration among concerned leaders – captains of the salt industry, high officials of government, nationally respected academics, expert communicators, civic society leaders – formed a strong basis on which the consequent actions could thrive.

■ International collaboration and generous donor funding offered much-appreciated catalytic support.

■ Partly for historical reasons, but also because of the persistent leadership, advocacy and testimony by the President of the Kazakh Academy of Nutrition, IDD was widely perceived in Kazakhstan as a major nutrition problem.

■ The AralTuz Company, the major national salt producer, was among the early supporters of the national program. It has sufficient supply capacity to produce a sizable amount of salt that is also exported to the neighboring countries.

■ The Ministry of Trade and Industry recognized the importance of listing food-grade salt among the consumer goods for which a Certificate of Conformity had to be compulsory for any industry with customers in Kazakhstan.

■ The results of transparent inspections by the national food control agency in the sales channels and markets, followed by enforcement as and when needed.

■ A state-of-the-art national survey demonstrated the USI goal had been reached, which was followed by an affirmation a few months later that optimum nutrition was achieved in the population on basis of the USI strategy.

■ The Committee of State SES of the Ministry of Health is moving closer to developing a continuous food and nutrition surveillance system that can assist the concerned parties in ensuring that the success of USI in Kazakhstan will be permanent.

IDD National Coalition meeting in Astana, Kazakhstan, 2003

Azerbaijan closes in on elimination of IDD

While iodine nutrition in Azerbaijan has remarkably improved in children and pregnant women, only about 2/3rds of household salt is adequately iodized.

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IDD was historically present in almost all regions of Azerbaijan. A survey of 942 schoolchildren conducted in 1998-99 showed a high prevalence of goiter (86%), especially in the mountainous regions of the South Caucasus. Median urinary iodine (UI) excretion was 54 µg/L, with even lower levels (25-39 µg/L) in the mountainous regions [1].

In 2001 the Parliament of Azerbaijan passed the law on Prevention of Iodine Deficiency Disorders. This law provided the legal basis for introduction of nationwide system for IDD control and elimination through USI. Articles of this Law stipulate that production, import and sale of non-iodized salt on the territory of Azerbaijan shall be prohibited. Technical regulation requires salt iodization at the level of 40 ± 10 mg/kg.

Annual requirements for iodized salt for the population of Azerbaijan (8.1 million) amount to 30 to 40 thousand tons. About half of this amount is imported from neighboring countries (mainly from Turkey, Ukraine and Russia). Domestic iodized salt in Azerbaijan is produced by 15-20 small cottage type enterprises that are concentrated near Masazyr salt lake in the vicinity of the capital city Baku on the Absheron peninsula.

In March-May 2007, a national 30 cluster school-based survey was carried out in Azerbaijan covering all territory of the country except the Naxcivan Region – a small exclave bordering Armenia, Turkey and Iran. The survey was performed based on UNICEF/WHO/ICCIDD guidelines. Selection of survey sites were conducted with a two-step random proportional to population sampling (PPS) method [2]. Besides schoolchildren (age 8-10 years), in each cluster region a subgroup of ±10 pregnant women was surveyed either through local medical centers or by visiting households.

Urinary iodine (UI) was determined in 932 schoolchildren and 314 pregnant women. The survey results show adequate levels of iodine nutrition in the Azerbaijani population: median UI in both schoolchildren (204 µg/L) and pregnant women (200 µg/L) fall into the optimal range of 100 to 300 µg/L. Frequency distribution of UI patterns (Table 1) in both schoolchildren and pregnant women are skewed towards higher levels.

During the field part of the survey, 1,227 salt samples were tested for iodine by rapid MBI kits both for potassium iodate (KIO3) and potassium iodide (KI). No staining for iodine was recorded in 175 salt samples (14.2%) while 1052 samples (85.8%) were considered as "iodized". Most of these samples were fortified with KIO3 (n=1035); only 17 samples were fortified with KI. Iodine concentration was determined by titration in 560 salt samples that stained positively for KIO3.

Table 1: Frequency distribution of urinary iodine concentrations in schoolchildren and pregnant women in Azerbaijan in 2007

Groups	Urinary iodine levels (µg/L)						
	< 19	20-49	50-99	100-199	200-299	300-499	>500
Schoolchildren	0.4%	3.1%	9.8%	35%	26%	19.8%	5.9%
Pregnant women	0.6%	4.8%	12.1%	32.5%	21.7%	20.7%	7.6%

Table 2: Quality of salt iodization in Azerbaijan

Iodine levels in salt	Number of samples	Proportion
0	13	2,3%
1-14.9 mg/kg	116	20,7%
≥15.0 mg/kg	431	77%

While most of salt in Azerbaijan was iodized, only 77% of samples had iodine levels above 15 mg/kg (Table 2). When results were recalculated for the entire amount of samples collected and tested during the survey, the proportion of adequately iodized salt decreases to 65%. This proportion is still below the threshold of 90% recommended by WHO, UNICEF and ICCIDD for successful USI programs.

There were some differences in iodine nutrition between geographical regions of Azerbaijan. For the purpose of this survey, the territory of Azerbaijan was subdivided into 3 main geographical regions: the median UI for the Eastern (most populous) regions on Absheron peninsula, including Baku and its suburbs, was significantly lower (170 µg/L) compared to Northern mountainous regions (201 µg/L) and compared to the Southern mostly plain regions (252 µg/L). Median iodine concentration in salt (18.5 mg/kg) in Eastern regions (Baku and suburbs) was also significantly lower than in the two other geographical regions: 26.5 mg/kg in the Southern regions and 27.7 mg/kg in the Northern regions. The highest proportion of non-iodized salt was also found in Eastern regions.

Ample dietary iodine means healthier lives for these Azerbaijani girls

The results of this survey show that by 2007 Azerbaijan had virtually eliminated iodine deficiency in their population. Adequate iodine nutrition was confirmed both in schoolchildren (reflecting iodine status of the whole population) and in the most vulnerable group – pregnant women. While most of households in Azerbaijan (85.8%) have access to iodized salt, only 65% of were using adequately iodized salt. This, perhaps, reflects low quality of domestically produced iodized salt from small salt producers on Absheron peninsula near the Masazyr Lake. This is also the reason for the lower levels of iodine in salt in urine in the surrounding regions, including the capital city, Baku.

While iodine nutrition of the entire population of Azerbaijan, including pregnant women, is optimal, significant problems exist with quality of salt iodization that is negatively affecting sustainability of national program for control and elimination of IDD. The government of Azerbaijan and the national salt producers with UNICEF support should redouble their efforts to improve the quality of domestically produced iodized salt, specifically in the Absheron area and near the Masazyr Lake. Priority should be given to construction of a modern salt facility capable of production of high quality iodized salt to fully saturate requirements of the country.

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Worth the salt: Fighting iodine deficiency in Azerbaijan

Faiq Aleskerov is a young chess champion in Azerbaijan and is very active in his school and community, perhaps as a result of his mother's commendable attention to his health and welfare. He serves as a fine example of his generation's potential, and was one of the very few lucky ones who has continuously had iodine in his regular diet.

"My mother always bought iodized salt. She knew it was important for us", says Faiq, who is in secondary school in the town of Shaki. "Before it didn't taste good, but now it is quite tasty."

Shaki, nestled in the Greater Caucasus Mountains, served as a regional trading center for more than 2000 years, benefiting from its location as a crossroads between Europe and Asia. Where Shaki once hosted a healthy tourist trade and had access to goods and services through the Soviet system, today it grapples with a diminishing quality of life and poorer living conditions, a result of the difficult post-Soviet transition period.

During the early years of independence some iodized salt did find its way to Shaki. However, it was expensive, sometimes three times the cost of non-iodized salt. Some of these products were not high quality. Thanks to the country's Universal Salt Iodization program, iodized salt can now be found all around Shaki.

Some stores only sell iodized salt, a change from a few years ago. Soon all young people, as well as their families and neighbors, will be getting the salt and iodine that they need.

An old adage speaks of a man being worth his salt, harking back to a time when salt was a precious commodity. In Azerbaijan, the future depends on its young people. The youth who make up this precious commodity—Faiq and all the children of Shaki—are definitely worthy of the iodized salt that is being provided.

The successful USI program will allow Azerbaijani children to reach their full potential in school

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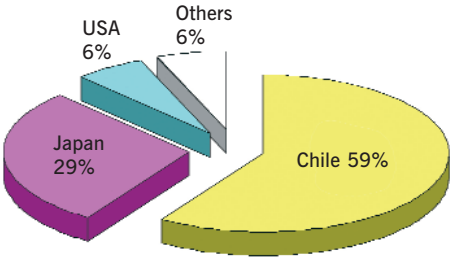
Industrial production and applications of iodine

About 1/3rd of the total iodine production in the world comes from Japan. Together, Chile and Japan produce nearly 90% of the world's iodine. Along with its widespread use in IDD control programs, iodine has many other important applications.

Tatsuo Kaiho Kanto Natural Gas Development Co., Ltd., Japan

Discovery of Iodine

The history of industrial use of iodine began in 1811 when Courtois in France found that a violet vapor with a strong smell was generated when producing niter from seaweed ashes and that, when the vapor cooled down, it turned into a purplish black flake (Figure 1). A little later, Gay-Lussac and Joseph Louis clarified that this material was a new chemical element similar to chlorine. This was the beginning of iodine and the name of this new purple chemical was derived from the Greek word 'iodes' or violet.



Others: China, Russia, Indonesia, Turkmenistan, Azerbaijan

Figure 2. World Iodine Production

Production of iodine

Iodine concentration in brown seaweed is so high that since the early 1900's it has been used as raw material for iodine production. Iodine is also found in seawater and soil, as well as in the air in the form of the iodide ion and other iodine derivatives, but only at low concentrations. Today, iodine production is conducted in areas where iodine concentration is high in brines from natural gas fields and oil fields, and in Chilean caliches deposits (Figures 2 and 3).

In Japan, iodine is sourced from the brine extracted along with natural gas. The brine in the Southern Kanto gas field, developed by Kanto Natural Gas and other manufacturers, contains approximately 100ppm iodine. This gas field has one of the largest reserves of iodine in the world (Figure 4).

Iodine product is supplied as a flaked, granulated or prilled solid, with a purplish black metallic luster. It is heavy in weight, similar to metal. Iodine liquefies even at a comparatively low temperature, and can also easily vaporize through sublimation. It has a distinctive smell. Iodine is unusual in that, unlike other materials, it can be a solid or can be easily be transformed into a vapor or liquid.

Figure 1. Iodine

Kanto Natural Gas (KNG) in Japan employs two methods in the manufacture of iodine:
1) the 'blowing out' method takes advantage of the easy vaporization property of iodine and it is ideal for processing huge amounts of iodine or for processing brine at high temperature
2) the 'ion-exchange resin' method uses resin that adsorbs iodine and it is suitable for both small and large plants. The ion exchange resin method is described in Figure 5.

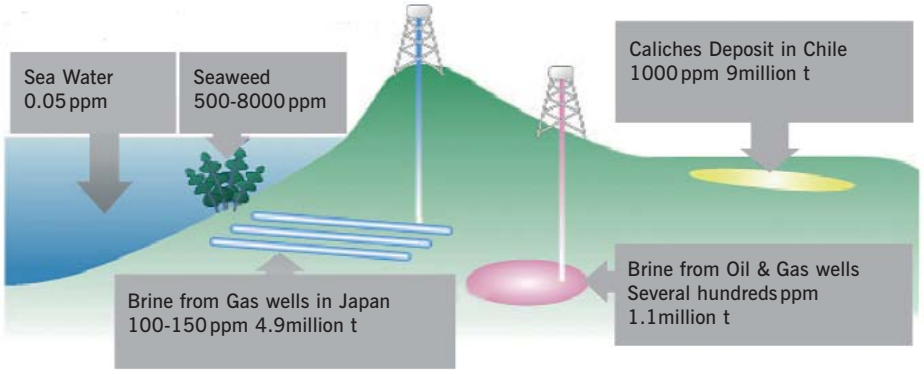


Figure 3. **Distribution of Iodine** **(t=tons)**

In contrast, iodine production in Chile is based on the mining and leaching of nitrate ores (caliches). Caliches contain lautarite, $Ca(IO_3)_2$, and dietzeit, $Ca(IO_3)_2 .8CaCrO_4$. The solutions from the leaching of caliches will carry iodine in iodate form. Part of the iodate in solution is reduced to iodide using sulfur dioxide, obtained by sulfur combustion. The resulting iodide is combined with the rest of untreated iodate solution to release elemental iodine. The solid iodine is then refined through a smelting process and flaked or prilled.

Applications of Iodine

Iodine use is intimately involved in our daily lives. Besides its use in iodized salt, iodine is found in a vast array of products and industries. These include X-ray contrast media, antimicrobial agents and industrial catalysts, to name just a few (Figure 6).

X-ray contrast media

X-ray contrast media (XRCM) are substances which cause soft-tissues to become visible during X-ray examination. All intravascular XRCM in use today are organic iodine derivatives. The iodine atoms function as the X-ray absorbers and their utility can be attributed to their high atomic weight. Many properties are required for an ideal intravascular XRCM. These include high opacity to X-rays, high water solubility, chemical stability, low osmolality, low viscosity and high biological safety. The nonionic XRCM, developed in the 1980's, which include Iopamidol, Iohexol, and Iopromide, offer a significant margin of safety, have fewer side effects and provide a high level of comfort to the patients, compared to ionic compounds.

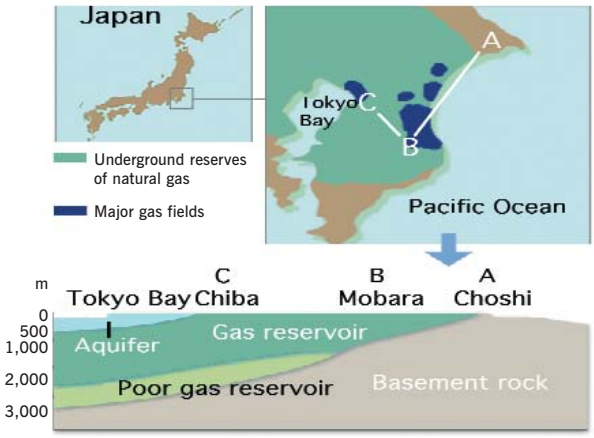


Figure 4. **Natural Gas Field in Japan**

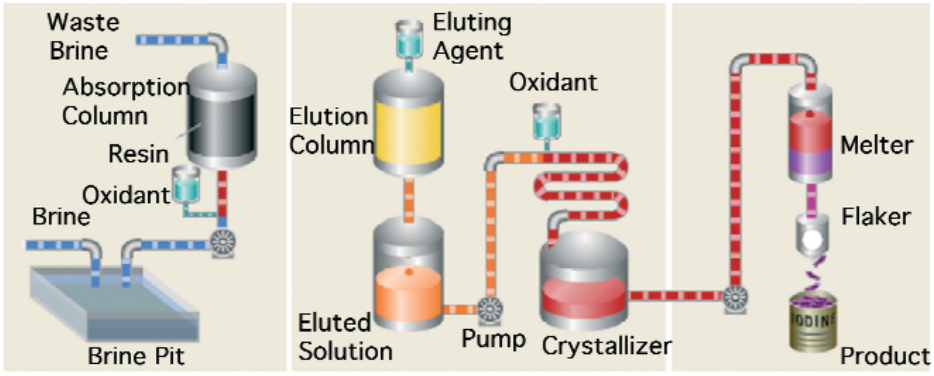


Figure 5. **Ion exchange resin method**

Antimicrobials
The use of the antimicrobial qualities of iodine for sterilization dates back to the early 1800's, shortly after the discovery of iodine by Courtois. The most effective tincture of iodine is an alcohol solution of iodine and potassium iodide. Iodophors are iodine complexes with surfactants that act as iodine carriers. They are water soluble and less irritating to the skin and other tissues than tincture. Iodine and iodophors have a wide range of antimicrobial actions against gram positive and negative bacteria, tubercle bacilli, fungi, and viruses. The most popular iodophore for surgical scrub and gargle is povidone iodine, which contains about 10 percent iodine, and release free iodine. These forms have almost completely replaced tincture of iodine as they do not cause any burning sensation when applied to human tissue.

Industrial catalysts
The industrial production process of acetic acid is currently dominated by the carbonylation of methanol. The process involves iodomethane as an intermediate, and it occurs in three steps. A catalyst, usually a metal complex such as Rhodium-iodine catalyst or Iridium-iodine catalyst, is needed for the carbonylation.

Nylon stabilizer
Nylons are an industrially important and useful material with use in multiple applications including their use as an engineering resin and fiber. Thermoplastic nylons are stabilized with copper compounds and synergistic halides such as bromide and iodide. Nylon fiber producers use potassium iodide for tier and airbag cord nylon. The potassium iodide reacts in situ with cupric acetate to form cupric iodide, which acts as a heat stabilizer.

Polarizer films
A polarizer having the function of transmitting and blocking out light is a basic constitutive element in liquid crystal displays (LCD), along with the liquid crystal that functions as a switch for light. LCD's are used in various instruments such as laptop computers, navigation systems for automobiles and liquid crystal TV. A polarizer absorbs light only in the molecular axis but allows light in the perpendicular direction to pass through. The most common material used as a polarizer film are stretched polyvinyl alcohol films treated with absorbing iodine or dyes.

Dye sensitized solar cells
Dye sensitized solar cells (DSC) consists of porous TiO2 covered with dye molecules and electrolytes containing iodine. The combination of nano-particulate TiO2 and iodine dramatically increases photovoltaic performance. In contrast to the classical solar cell, the dye absorbs the radiation, mimicking the process of photosynthesis. The electric circuit is completed by an iodide / tri-iodide redox couple in the electrolyte, which may be liquid or solid.

Clearly, iodine is not only essential for the thyroid but also for many other important applications (Figure 6).

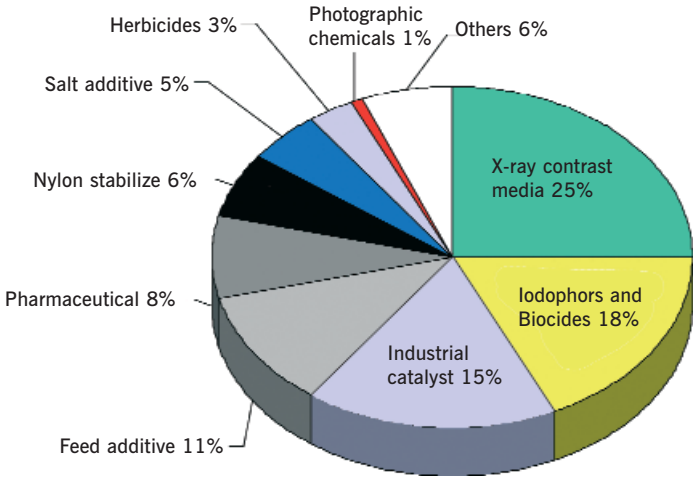


Figure 6. **Industrial applications of Iodine**

Major push for iodized salt planned for Guinea-Bissau in 2008

About 4% of children are severely malnourished and less than 1% of households consume adequately iodized salt in this small West African country.

Background

Guinea-Bissau is a small country located in West Africa with an area of 36,125 square kilometres; the territory is comprised of a continental part and some 90 small islands of which only 17 are inhabited. The country borders Senegal in the north, the republic of Guinea in the east and the south and the Atlantic Ocean in the west. Its total population is estimated at 1.5 million in 2007 of which 52,725 children are less than one year of age. The infant and under-five mortality rates are unacceptably high. A recent UNICEF survey indicated an increasing child mortality rate, with an infant mortality rate of 138 and an under 5 mortality rate of 223; the maternal mortality rate is as high as 1,100 maternal deaths per 100,000 live births; around 4% of children are severely malnourished and 19% suffer from moderate malnutrition. Less than 1% of households consume adequately iodized salt.

The country is just recovering from the armed conflict in 1998-1999 which has resulted in political instability, insecurity and stagnation of the economy, affecting the already weak governmental structures and private sector. The social sectors have been severely affected, and health infrastructures, cold chain equipment and transport have deteriorated. The country suffers a chronic lack of electricity, with patchy service in the capital city.

This young girl will gain lifetime benefits from the planned USI program

Addressing IDD is a priority for Guinea-Bissau and the consumption of iodized salt has been adopted by the Government as the key strategy

to address the IDD problem in the country. In this context, the country conducted a national baseline survey in 2005 measuring goiter prevalence. The results showed an overall goiter prevalence of 32% with the highest rates in the eastern regions of Gabu and Bafata (52 and 58%).

The effort to iodize salt in the country was initiated in 1992 but progress was slow. National legislation has been adopted. Implementation rules and regulations of the legislation on iodized salt were approved by the Council of Ministers on March 2004. Strong advocacy activities were undertaken with high level authorities (Government, parliament, costumers, traders) to ensure a wide diffusion of the law on iodized salt consumption. But the monitoring of the implementation of the legislation and the control of the quality of iodized salt were not ensured: non iodized salt entered Guinea-Bissau from neighboring countries.

Families in Guinea-Bissau urgently need more dietary iodine

The challenge of small salt producers

The biggest challenge to the salt iodization is that in Guinea-Bissau there are no big salt producers and salt is produced by individual women producers or small-scale salt producers associations. The majority of the 4,000 or so women salt producers produce salt mainly for their family's consumption and to barter for other necessities, such as rice. Only three salt production organizations are legally constituted for salt production. They are located in the regions of Oio: "AMPROSAL" (northern part of the country), Quinara: "APROSAL" (in the south) and Biombo: "Wluty" (in the centre of the country). Except in a few areas where the salt is produced by evaporation from seawater, the main strategy used is extraction from boiling salted water collected from a filtration process of salt-rich earth.

The armed conflict in 1998-99 stopped the salt iodization initiatives as the government and its partners focused on emergency programs. The UNICEF-Guinea-Bissau program of cooperation re-initiated the effort to iodize salt in 2001. In the following two years, the acceleration of the salt iodization process was aggressively pursued, mainly through strengthening the national program and working directly with the salt producers. In 2004, for the first time, the country finally began iodizing its salt. Within the framework of the country program 2002-2007, UNICEF supports the Government through the relevant Ministries (Ministry of Health, Ministry of Commerce and Industry) in pursuing the iodization of the salt produced in the country and promoting its widespread use.

The three womens' associations have received support from UNICEF for equipment (mainly iodization units and generators) and other inputs for the iodizing of locally produced the salt. Capacity building of the 3 associations was ensured through training of its members and intensive advocacy and social mobilization activities were undertaken.

The annual salt production in the country is around 1,000 tons against a national need estimated at around 6,000 tons, indicating that 85% of the country needs are imported. However, it is estimated the 2 associations of AMPROSAL and APROSAL provide 50-60% of the salt that is sold in the country to NGOs, the army and to the national Chamber of Commerce. The existing iodization units face difficulties in selling their production: nationally iodized salt is very expensive (100-150 FCFA per kg) compared to the non iodized or imported iodized salt (less than 50 FCFA per kg).

In October 2007, the Micronutrient Initiative provided technical assistance to the country to conduct a rapid situation analysis. A recommendation was made for an-in-depth analysis of the situation in 2008 to propose sustainable strategies for increasing the iodized salt consumption in Guinea-Bissau. These valuable plans are now underway.

Low levels of iodine reported in iodized table salt in the U.S.

According to the first survey of iodized salt from U.S. homes, more than half of iodized salt samples contained less than the recommended amount of iodine.

Rebecca Renner Science News, American Chemical Society, January 9, 2008

The results, by chemist Sandy Dasgupta at the University of Texas Arlington and colleagues, have implications for pregnant and nursing women as well as for children. The samples came from newly opened salt containers purchased by volunteers in 40 states. Forty-seven of the 88 samples had less than the FDA-recommended quantity of iodine (45ppm) and 6 contained more. The researchers also found that salt lost iodine when the humidity was high. "There is no guarantee that the salt even contains the amount of iodine stated on the label," says Dasgupta. "We found new containers of salt with almost no iodine at the top and four times more at the bottom. A pregnant woman or a woman nursing a baby could use that salt at the top for months and get next to no iodine," he adds. Richard Hanneman, president of the U.S. Salt Institute, a manufacturers group, contends that iodized salt should be homogenous and questioned the results because the sample collection relied on volunteers.

Public-health studies from the past 30 years suggest that iodine levels in the U.S. population, particularly for women of childbearing age, are getting too low, says epidemiologist Kevin Sullivan at Emory University. Urinary iodine has plummeted by almost 50% in adults, and the frequency of moderate iodine deficiency in pregnant women has jumped from 1% to 7%. Thyroidologist Robert Utiger of Harvard Medical School believes that everyone should increase their iodine intake and expressed these views in a recent editorial (N Engl J Med 2006, 354, 2819–2821).

Decreasing iodine levels reflect changes in American food and dietary habits. Several sources of iodine in the diet have been phased out. Iodine in milk has decreased because of changes in cattle feed and a phaseout of iodine dairy sanitizers. Commercial bakeries also have decreased the use of dough conditioners that contain iodine. The most significant change may be the

increasing trend of eating out and a growing reliance on processed foods. With very few exceptions, restaurants and fast-food outlets use noniodized salt, according to Hanneman.

Companies that process food also eschew iodized salt, according to a spokesman for the Grocery Manufacturers Association, judging that it can change the taste and flavor of food products. This is an oft-repeated myth, with no evidence behind it, says nutritionist Michael Zimmermann of the Swiss Federal Institute of Technology Zurich. A delegation of Moldovan food producers who recently visited Switzerland found that addition of iodine to Swiss bread, baked goods, and cheese causes no change in the taste of these foods. About 60% of Swiss processed foods are made with iodized salt.

Many countries with long-standing iodization programs, including the U.S., The Netherlands, New Zealand, France, and Switzerland, have reported declining iodine levels. To combat this decline, Swiss officials monitor iodine levels once every 5 years and adjust salt iodine levels accordingly. When the iodine level in salt was increased in Switzerland in 1998-9, urinary iodine rose and newborn infants had a more normal level of thyroid function, according to Zimmermann.

At a March 2007 meeting organized by WHO Europe, participants agreed that promoting iodized salt does not conflict with recommending reduced salt intake. "Everyone agrees salt intakes should be 5 grams a day or less, but all salt consumed should be iodized," says Zimmermann.

"The best way to address this issue is to at least assure that iodized salt contains the amount of iodine it should, ideally to raise the iodine content of salt, and get the food processors to use iodized salt," says Utiger.

Meetings and Announcements

Basil Hetzel is a recipient of the 2007 Prince Mahidol Award for his pioneering work on IDD

King Bhumibol Adulyadej of Thailand personally conferred Thailand's most prestigious medical award, the Prince Mahidol Award, on Prof. Basil Hetzel and two other recipients in Ananda Samakhom Throne Hall in Bangkok on January 30, 2008.

The Prince Mahidol Foundation was set up in 1992 to honor the centenary of Prince Mahidol, the father of King Bhumibol who was a doctor by training and is credited for helping to introduce modern medicine to Thailand. The Prince Mahidol Award has been granted to 47 medical innovators since 1992. They are conferred annually upon individuals or institutions which have demonstrated outstanding and exemplary contributions to the advancement of medical and public health services for humanity throughout the world. Each award consists of a medal, a certificate, and the sum of US$ 50,000. The three winners of the 2007 awards were picked from among 69 nominees from 35 different countries. The 2007 award was conferred on Professor Axel Ullrich, Director of Molecular Biology at the Max Planck Institute in Germany for the field of medicine, Professor Basil Hetzel, Chairman Emeritus of the ICCIDD, Australia for the field of public heath and Dr Sanduk Ruit, Medical Director of Tilganga Eye Centre, Nepal for the field of public health.

Prof. Hetzel receiving the award from King Bhumibol Adulyadej

Prof. Hetzel extensively studied the adverse effects of iodine deficiency upon human health, particularly on the development of the human brain. He showed that severe iodine deficiency can lead to maternal and fetal hypothyroidism, which causes endemic cretinism and mental retardation. His research clearly demonstrated that these disorders can be prevented by providing iodine to women during the reproductive period. Prof. Hetzel coined the term 'Iodine Deficiency Disorders', and was one of the founders and is Chairman Emeritus of the ICCIDD. Prof. Hetzel's extensive work against iodine deficiency has made a significant contribution to the proper development of human populations around the world, including Thailand. As quoted in the Thai press, Prof. Hetzel said it was a great honor to receive the award because it has been conferred on a person who worked for others in the field of public health. He said seeing patients recover and lead a normal life was the inspiration for him to conduct his work and research.

Her Royal Highness Princess Maha Chakri Sirindhorn presided over a gala dinner to honor the awardees in the evening.

GAIN launches global iodization program and premix fund at Clinton Global Initiative

New York, 29 September 2007 – The Global Alliance for Improved Nutrition (GAIN) announced the start of a global iodization program and a global premix fund to improve public health in developing countries at the annual meeting of the Clinton Global Initiative in New York.

"These two initiatives will promote and enable the large-scale addition of essential vitamins and minerals to commonly-used foods in developing countries that will lead to the cost-effective improvement of individual health," said Mr. Marc Van Ameringen, Executive Director of GAIN at the launch event. "The amazing fact is that these small nutrients have huge impacts: reducing vitamin and mineral deficiencies through food fortification pays back considerable returns in improved public health, reduced poverty and increased economic development," said Mr. Jay Naidoo, Chairman of the Board for GAIN and for the Development Bank of Southern Africa.

Increasing salt iodization

The global iodization program, jointly undertaken with UNICEF, aims to increase the percentage of households in the world who use iodized salt from 70% up to 85% by increasing salt iodization in 13 priority countries. While salt iodization is standard practice in many parts of the world, it is not yet implemented everywhere. Yet, salt iodization is a simple and safe method to resolve serious public health problems in developing countries: deficiencies of iodine lead to growth disorders and diseases, such as goiter, and limit intellectual capacity by 10 to 15 IQ points on average. "We are proud to work with UNICEF on this US$ 40 million program that will protect an additional 790 million people and especially 20 million infants from iodine deficiency over the next 5 years," said Van Ameringen.

Economic costs and benefits

Food fortification, including salt iodization, has demonstrated itself as a safe and cheap method with high returns on investment. For example, the benefits of iodine supplementation targeted to young women outweigh the costs by 9:1. The World Bank and the Copenhagen Consensus list the reduction of vitamin and mineral deficiencies as one of the best investments that have the highest benefits in terms of human wellbeing and economic growth.

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Reinforcing the global commitment to eliminate IDD

Lucie Bohac Coordinator of the Network for Sustained Elimination of Iodine Deficiency

On December 12th, 2007, the Network for Sustained Elimination of Iodine Deficiency held a side event at the High Level Commemorative Meeting on the Follow-up to a World Fit for Children +5 at the United Nations in New York. Hosted by ICCIDD, the side event was entitled 'A Triumph in the Making: The Untold Story of Preventing Iodine Deficiency and the Need to Complete the Promise'. Statements were made by country representatives from Bangladesh, China, Egypt, Ghana, India, Indonesia, Pakistan, and The Philippines. Representatives of other countries attending included Russia and Niger. In addition to reinforcing national commitments to eliminating iodine deficiency, speakers shared their country's experiences and lessons learned from their universal salt iodization (USI) programs. A common theme was the need for continuous awareness and education about iodine deficiency as a backdrop to sustaining the battle against IDD.

Speakers at the meeting in New York

Dr. Jerry Burrow, Chair of ICCIDD, was master of ceremonies. He reminded the audience of the urgent need to eliminate iodine deficiency because of its impact on the intellectual capacity of affected populations, with an estimated 38 million infants still born each year unprotected from the brain damage caused by IDD. Alan Court, Chair of the Network and Director of Programs at UNICEF spoke on global progress. Iodized salt is now consumed by 70% of the world's households and 34 countries world wide have reached the USI goal of 90% of households consuming adequately iodized salt; another 60 countries are well on their way to that goal.

Dick Hanneman, President of the Salt Institute, underlined the necessity of the private-public sector collaboration in USI programs. Statements were also made by Marc van Ameringen, Executive Director of GAIN (Global Alliance for Improved Nutrition) and Ernest Loevinsohn, Director General, Program Against Hunger, Malnutrition and Disease of CIDA (Canadian International Development Agency). Bob Moore, the former president of Kiwanis International, and champion of IDD elimination within Kiwanis also spoke.

In his last public appearance as Deputy Secretary General of UNICEF, Kul Gautam closed off the event, noting that the fact that it costs so little to iodize salt seems to belittle its importance; yet salt iodization contributes greatly to the achievement of several Millennium Development Goals. Because one of the objectives of the event at the UN was to focus media attention on the issue of iodine deficiency, a media firm was engaged. Numerous interviews took place, and the international coverage of the event was impressive. Over 24 international media outlets ran the story, including news agencies such as Associated Press, EFE (Spanish news service), and Asian News International (ANI), India. The message of the need to eliminate IDD went world wide, likely reaching every continent.

National IDD coalition established in the Philippines

As an adjunct to the 23rd Annual Convention of the Philippine Thyroid Association, a Memorandum of Understanding was signed establishing a national coalition to address IDD in the country. The new Philippines Thyroid Council now counts on participation and support in this national endeavor from 24 organizations comprising medical societies, professional associations, salt producers and importers, government agencies, non-governmental organizations, Kiwanis Luzon District and a representative from UNICEF. ICCIDD Focal Point, Dr. Theo San Luis spoke at the meeting held on January 20, 2008, at the Sofitel Philippine Plaza Hotel that was attended by more than 100 people and well-covered by the press.

The MOU was signed by the leaders of the organizations in the presence of the Assistant Secretary of Health, Dr. Elmer Punzalan, who delivered the keynote address and officially signed on behalf of the Department of Health of the Philippines. Theo San Luis delivered the plenary lecture on 'Iodine Nutrition: Getting Beyond Goiter" emphasizing that the major problems of IDD were graver and more extensive than goiter, which is only the 'tip of the iceberg' of mental impairment due to IDD. His presentation was an overview of the progress toward USI and IDD elimination in countries of the region. In the 2003 National Nutrition Survey, the Philippines had 56% household utilization of iodized salt, although more recent data indicate its rise to 75%.

ICCIDD Focal Point for the Philippines, Dr. Theo San Luis, a key member of the new coalition

The basis of ICCIDD policy support to national programs to achieve USI is the belief that country programs must be fully supported nationally for sustained success. All national partners must work towards that end. It is the combined, mutually supportive effort of national partners that will achieve USI, reach sustainable and affordable levels of iodine nutrition and permanently eliminate this ancient scourge. Thus, the formation of a national coalition among health providers, policy-makers and major concerned agencies was deemed very essential. The Government of the Philippines was one of 12 national delegations that attended the recent UNGASS II meeting at the United Nations.

Abstracts

Iodine intake before and after mandatory iodization in Denmark: results from the Danish Investigation of Iodine Intake and Thyroid Diseases (DanThyr) study. Rasmussen LB, et al. Br J Nutr. 2008 Jan 22;1-8 [Epub ahead of print]

In Denmark an iodine fortification program was introduced in 1998 and a monitoring program was established prior to iodization. This study reports the change in urinary iodine excretion caused by fortification. Iodine excretion in casual urine samples was assessed in 4649 subjects in 1997-8 and in 3570 comparable subjects in 2004-5 in Aalborg (western part of Denmark) or Copenhagen (eastern part of Denmark). These areas had moderate and mild iodine deficiency, respectively, before iodine fortification. Iodine excretion increased significantly in all age and sex groups. However, the iodine intake was still below that recommended in the youngest age groups in both cities and in women 40-45 years of age living in Aalborg. Intake of milk and salt had strong significant direct associations with iodine excretion. The authors concluded that although the median iodine intake in the whole study population is at the recommended level, some groups still have a low intake. It is important to have a moderate milk intake to obtain a sufficient iodine intake in Denmark.

Iodine deficiency and its association with intelligence quotient in schoolchildren from Colima, Mexico. Pineda-Lucatero A, et al. Public Health Nutr. 2008 Jan 21:1-9 [Epub ahead of print]

To determine the prevalence of iodine deficiency, its causes and its association with intelligence quotient (IQ), a cross-sectional study was done of thyroid size, urinary iodine excretion, IQ, and other variables in schoolchildren (n=303) in Colima, Mexico. Overall goiter rate was 21.4 %; low urinary iodine excretion was found in 19.5 % of the children, high urinary iodine excretion in 32.0 %. Ninety-two per cent of the population used iodized salt, but deficient iodine levels (<50 ppm) was found in 86.8 % of salt samples. Moderate iodine deficiency was associated ($P < 0.05$) with a 4.26 times higher risk of low IQ. The authors concluded that more attention is needed to ensure effective salt iodization in this region to reduce the negative effects of iodine deficiency on the intellectual development of children.

US Food and Drug Administration's Total Diet Study: Dietary intake of perchlorate and iodine. Murray CW, et al. J Expo Sci Environ Epidemiol. 2008 Jan 2 [Epub ahead of print]

The US Total Diet Study (TDS) is designed to monitor the US food supply for chemical contaminants, nutritional elements, and toxic elements. This study reports on intake estimates of iodine. Estimated average iodine daily intakes as well as the contribution of specific food groups to total intakes were estimated for 14 age/sex subgroups of the US population. The estimated average iodine intakes by the 14 age/sex groups revealed a lower bound (ND=0) and upper bound (ND=LOD) range of average intakes from 138 to 353 µg/person/day. Estimated iodine intakes by infants 6-11 months exceeded their adequate intake (AI), and intakes by children and adult age/sex groups exceeded their relevant estimated average requirement (EAR).

Determination of iodine in human milk and infant formulas. Fernández-Sánchez LM, et al. J Trace Elem Med Biol. 2007;21 Suppl 1:10-3.

The aim of this study was to develop a method to determine iodine in human milk and infant formulas using ICP-MS. About 27 samples of different infant formulas and 14 samples of human milk were studied. In the human milk the values found were between 144+/-93.2 ppm, whereas in the infant formulas the values were 53.3+/-19.5 ppm. For both types of samples the bigger amount of iodine was in the whey protein fraction, between 80% and 90%, whereas in the fat there was about 2% of the total iodine and in the casein fraction 5-10% depending on the type of sample.

Effects of light-to-moderate alcohol consumption on thyroid volume and thyroid function. Valeix P, et al. Clin Endocrinol (Oxf). 2007 Nov 19 [Epub ahead of print]

To examine a possible relationship between alcohol consumption and thyroid volume and function, French adults (n= 1493) 35-60 years old with no known thyroid disorders were studied. Daily dietary intakes and alcohol consumption in grams per day were based on five 24-h dietary records. Thyroid volume and structure were measured by ultrasonography. At baseline, TSH and free T(4) were measured. Alcohol intake was associated with higher thyroid volume in males and females independently of iodine status. Multivariate odds ratios (ORs, 95% CI) of thyroid enlargement in males and females who drank >/=45 g/day and >/=20 g/day, respectively, were 2.22 (1.10-4.47) and 2.1 (1.15-3.90) compared with low drinkers, and 11.75 (2.15-64.12) and 2.03 (1.04-3.96) compared with abstainers. An increasing dose-response relationship was found between alcohol intake levels and thyroid enlargement in both males and females.

Iodine intake of Slovenian adolescents. Stimec M, et al. Ann Nutr Metab. 2007;51(5):439-47.

Slovenia is classified as being iodine-deficient. The authors recently found that Slovenian adolescents are iodine-sufficient (median urinary iodine concentration of the population 140 µg/l) and the prevalence of goiter is low (0.9%). The objective of this study was to evaluate iodine intake, the prevalence of marginal, low and excessive intake (<50, 50-100 and >or=300 µg/day), as well as the main sources of iodine in the diet of Slovenian adolescents. The cross-sectional study included 2,581 adolescents (mean age 15.6 years) representing 10% of 15-year-old Slovenian adolescents. Iodine intake was determined using a food frequency questionnaire (FFQ) in the whole population studied (n = 2,485) and weighted 3-day dietary protocols (3DPs) in a subgroup of participants (n = 191). The median iodine intake determined from FFQ was 155.8 µg/day. Marginal, low and excessive iodine intake was observed in 3.3, 20.3 and 11.3% of the adolescents, respectively. The major food sources of dietary iodine included table salt (39% of the mean daily iodine intake), beverages (22%) and milk/milk products (19%).

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