10 Glorious years of Ensuring the Quality of Urinary Iodine Procedures (EQUIP) Program across the Globe

Countries/States participating in the EQUIP Program

Dr. M.G. Karmarkar with participants during Laboratory training in Pyongyang, DPR Korea, November, 2009

Dr. M.G. Karmarkar with participants from Thailand, Bhutan, Nepal, Sri Lanka and DPR Korea during the Regional Training, New Delhi, India, November, 2009
May auspiciousness be unto all
May peace be unto all
May fullness be unto all
May prosperity be unto all

Healthy Children,
Healthy Nations

Demand & Consume
Iodised Salt

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Ms. Smita Pandav
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New Delhi-110020
Ph.: 41616566, 26811313
Dear Colleagues,

The Universal Salt Iodisation (USI) program has seen tremendous progress over last two decades with more than 70% households level globally consuming adequately iodized salt. I have been associated with the IDD control and USI program since 1960s and the successful evolution of the program over the years has been highly rewarding and gratifying for me.

The laboratory monitoring has contributed significantly to success of USI and national IDD at national and global level. Establishing quality assurance networks for urinary iodine estimation is essential as laboratory procedure for estimation of iodine in urine are very sensitive and require constant supervision. Ensuring the Quality of Urinary Iodine Procedures (EQUIP) program has been instrumental in successful implementation of Urinary Iodine Estimation Monitoring Program across the globe. The EQUIP program which at present covers more than 50 countries involving more than 120 laboratories, has set benchmark for other public health programs across the globe. The Iodine Monitoring Regional Laboratory (IMRL) at New Delhi has been associated with EQUIP program right from the inception of the program in year 2001.

It has to be clearly highlighted that Spot Urinary Iodine concentration is only to be used as population level indicator and not for assessing individual’s iodine nutrition. Urinary iodine levels are an important monitoring indicators for population iodine nutrition, however other monitoring indicators like salt iodisation levels and total goitre rates should also be factored in while assessing the IDD status in a population/country/region. The laboratory networks need to be further strengthened to generate regular, robust data on iodine status so that we can achieve USI (greater than 90% adequately iodised salt coverage) at global level in near future. On the 10th anniversary of the EQUIP program while celebrating the success of EQUIP we have to make initiatives towards establishing similar quality assurance programs at regional and national level.

Also covered in this issue are laboratory trainings conducted in Bangladesh and India, updates of current IDD status from Nepal and Pakistan and introduction to the Food Safety and Standards Act, India.

Dr. Madhu G. Karmarkar

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**ICCIDD Vision, Mission & Dedication**

**Vision:** The vision of ICCIDD is a world virtually free from Iodine Deficiency Disorders. This includes national endeavors to maintain optimal iodine nutrition primarily through consumption of iodized salt, which should be made easily available and affordable for all people for all times.

**Mission:** The mission of ICCIDD is to provide a focused advocacy for iodine nutrition to governments and development agencies. This is done by providing technical expertise in a multi-disciplinary approach on a regular basis.

**Dedication:** ICCIDD dedicates itself to programmes fully supported at the national level for permanent, sustained success and works with all partners and national entities towards that end.

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**Editorial**

Prof. Dr. Madhu G. Karmarkar
Senior Adviser - ICCIDD
Room No 29, CCM Building,
Old OT Block, All India Institute of Medical Sciences,
New Delhi 110029, India.
On 31 September 2011, the EQ UIP Program (Ensuring the Quality of Urinary Iodine Procedures) completed ten years of its successful existence and contribution to the goal of worldwide IDD elimination. The program which was the brain child of the US based Centre for Disease Control and Prevention (CDC) was established to help laboratories worldwide assess the accuracy of their urinary iodine analysis and provide them with technical support. The program was initiated after a felt need to have a higher body which could validate the urinary iodine estimation for national fortification efforts. Collectively, EQ UIP members have conducted UI analysis on tens of thousands of specimens to support iodine sufficiency monitoring and public health interventions affecting billions of people throughout the world.

Iodine deficiency disorders affect more than two billion people worldwide. Accurate laboratory tests can detect iodine deficiency. Urinary iodine (UI) analysis is the most common method used, worldwide, for assessing the iodine status of a population. Quality assurance in laboratory testing is particularly relevant in resource limited countries and EQ UIP has been providing unquantifiable support to iodine laboratories in these countries.

The EQ UIP program offers three critical services:

-It provides matrix-matched secondary reference material to laboratories measuring UI. The CDC uses Inductively Coupled Plasma Mass Spectrometry (ICP-MS) to ensure that UI concentrations are assigned to reference materials with a high degree of accuracy and precision. CDC, in turn, uses the National Institute of Standards and Technology (NIST) reference standard materials (SRM2670a, SRM3668 Level 1 and Level 2) to assure the accuracy of its own testing.

-EQ UIP maintains a rigorous performance testing program. Three times a year, CDC sends participating laboratories three to five urine samples that have been spiked with iodine (in a range of 10 to 300 µg/L) for UI analysis. Laboratories are asked to report their test data, along with the limit of detection for their analytical method. CDC then returns a comprehensive statistical report allowing each individual laboratory to compare its performance with individual and composite data from all other participating EQ UIP laboratories, whose identities are withheld.

-It provides laboratories with analytical guidelines, technical training and consultation upon request. CDC maintains proficiency with iodine spectrophotometric methodologies that are similar to the methods commonly used for UI analysis in laboratories around the world. As a result its scientists are able to help laboratories eliminate bias and precision problems in their assay systems.

EQ UIP member laboratories span the globe, covering every continent except Antarctica. They include governmental, academic and private-sector laboratories, as well as regional and international laboratories. Many of these laboratories provide training and technical assistance to scientists based in other institutions within the country or in other countries, extending the reach of health promotion activities related to IDD. They also provide their government officials with critical information needed for national fortification efforts. Collectively, EQ UIP members have conducted UI analysis on tens of thousands of specimens to support iodine sufficiency monitoring and public health interventions affecting billions of people throughout the world.

EQ UIP is a key tool used to support laboratory quality assurance in an effort to eliminate iodine deficiency in the world. EQ UIP's participants utilize the programs inter-laboratory comparison as an effective tool for laboratory performance improvement. To date, 121 laboratories (11 national and 110 international) have participated in EQ UIP; and currently, 92 laboratories are active participants.

Iodine Monitoring Regional Laboratory, ICCIDD (South Asia), New Delhi, India-

In India, the ICCIDD Laboratory in New Delhi is in existence for last 20 years and has analyzed thousands of samples from various states in India as well as other countries of the region. The Iodine Monitoring Regional Laboratory (IMRL) was established at the Centre for Community Medicine, All India Institute of Medical Science. Prof Madhu G Karmarkar, Senior Advisor, ICCIDD has been the in charge of the laboratory since its inception. Professor Madhu G Karmarkar, the internationally renowned IDD expert has been working in the field of IDD since 1960s. The IMRL team continued the pioneer work carried out by Professor V Ramalingaswami and helped establishing a network of Iodine Monitoring Laboratories in many countries of the South East Asia Region.

The IMRL, ICCIDD (South Asia) is widely recognized as the reference laboratory in the South Asia region. The IMRL, ICCIDD (South Asia) team over the years, has visited several countries to establish Iodine Monitoring Laboratories in Sri Lanka, Bhutan, Nepal, Myanmar, DPRK and few countries in Middle East namely Iran and Yemen. The IMRL, ICCIDD (South Asia) has also analysed urine samples generated during the national/sub national surveys of the neighbouring countries (eg. Nepal, Bhutan & Bangladesh).
In addition, Urinary Iodine Laboratory training programmes for delegates from countries from South Asia were also held at ICCIDD’s South Asia Office.

Table 1: Urinary Iodine Laboratory Training held at IMRL, ICCIDD, South Asia Office

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Dates</th>
<th>Topic</th>
<th>Countries to which delegates belong</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1st to 12th Sept, 1997</td>
<td>Training course on laboratory aspects of “Iodine Deficiency Disorders Control Monitoring”</td>
<td>Bhutan</td>
</tr>
<tr>
<td>2</td>
<td>4th to 13th Oct, 1999</td>
<td>Laboratory Techniques on IDD Elimination Programme</td>
<td>Bhutan</td>
</tr>
<tr>
<td>3</td>
<td>3rd to 13th Dec, 2001</td>
<td>Training course on Laboratory Techniques on IDD Control programme</td>
<td>Bhutan</td>
</tr>
<tr>
<td>4</td>
<td>17th to 24th Sept, 2002</td>
<td>Inter-country workshop on ‘Iodine Monitoring, Laboratory Procedures and National IDD Programmes’</td>
<td>Sri Lanka, Bangladesh and India</td>
</tr>
<tr>
<td>5</td>
<td>15th to 18th Apr, 2003</td>
<td>Second Inter Country Training Workshop on Iodine Monitoring, Laboratory Procedures and National IDD Programme</td>
<td>Bhutan, Indonesia, Maldives, Myanmar, Nepal, and Thailand</td>
</tr>
<tr>
<td>6</td>
<td>22-26th July, 2008</td>
<td>ICCIDD Training courses for Laboratory Technicians</td>
<td>Bhutan</td>
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<tr>
<td>7</td>
<td>15th to 19th June, 2009</td>
<td>Training on Laboratory procedures for iodine content analysis</td>
<td>Myanmar</td>
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<tr>
<td>8</td>
<td>1st to 11th Nov, 2009</td>
<td>Regional Training on Laboratory and Quality Control/Quality Assurance Procedures for Universal Salt Iodization Programme</td>
<td>Thailand, Bhutan, Nepal, Sri Lanka and DPR Korea</td>
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</table>

The IMRL, ICCIDD (South Asia) has been associated with Ensuring the Quality of Urinary Iodine Procedures (EQ UIP) program right from the inception of the EQ UIP network. Dr Chandrakant S Pandav, and Dr Madhu G Karmarkar met Ms Caldwell and others in international conference held in Bangkok, Thailand in May 2001 where the structure and early goals of the IRLI Network were determined. During the meeting, EQ UIP program for EQA of urinary iodine estimation was discussed in detail. ICCIDD South Asia Laboratory team agreed to be part of the program and welcomed such a step and joined the group.

The major benefit of EQ UIP was to get authentication of results for our laboratories. Our laboratory is in existence since 1996 but before EQ UIP started there was no International External Quality Assurance (EQ A) program with any of the laboratories in the world. EQ UIP network has helped the IMRL ICCIDD to assure investigators who get the urine samples analysed in IMRL laboratories regarding the credibility of the results.

Problems of conducting I-131 thyroid uptake studies at high altitude in Nepal- 1968

- Dr M G Karmarkar

In earlier years, the survey of endemic goiter (IDD) included radioactive iodine (I-131) thyroid uptake studies along with goiter survey and urinary iodine estimation. In 1968, a team from All India Institute of Medical Sciences (AIIMS) went to Nepal to study the problem of endemic goiter under the auspices of World health Organisation (WHO). The team included Professor V Ramalingaswami, Dr M G Deo, and myself. The team conducted IDD surveys in Trishuli (central Nepal) and Jumla (north-western Nepal) region of Nepal. Trishuli is close to Kathmandu and Jumla is at the height of 13,000 feet in north western region of Nepal. The team was using specially designed neck counter (battery operated) supplied by Bhabha Atomic Research Centre, Mumbai to measure the radioactive iodine uptake by thyroid gland. There was no problem when I- 131 uptake studies were done in Trishuli. In Jumla, however, despite repeated attempts, the research team was unable to carry out the radioactive iodine uptake studies. The specially designed neck counters were showing a very high background activity. The research team came back to Kathmandu, disappointed and wondering whether the counters have malfunctioned in the extreme environment or were they damaged during transportation.

The mystery of Jumla remained unresolved for another decade or so. However in year 1977-78 it was revealed that parts of Nepal (especially higher regions bordering China) were being clandestinely used for surveillance of radioactivity originating from China. One of the explanations for the high background activity encountered by the research team from AIIMS in Nepal way back in 1968 could have been the radioactive surveillance being conducted in the region. The observations similar to our team were also reported by a team from New Zealand which accompanied the Everest pioneer Edmund Hillary and conducted radioactive iodine (I-131) uptake studies in the Namche Bazzar region of Nepal during the same time.
Historical aspects in methodology for determination of iodine in urine - Dr. M.G. Karmarkar

Before the advent of radioimmunoassay, there were no direct methods of estimating hormones in serum/plasma. For assessing of thyroid hormones levels in circulation, the method used was estimation of protein bound iodine (PBI). As the thyroid hormones are circulated bound to protein fraction (thyroxin binding globulin/albumin), the protein bound fraction of serum was separated by precipitating proteins. The precipitated protein fraction was digested to convert organic iodine into inorganic iodide which was then estimated using Sandell Kolthoff reaction. Sandell Kolthoff reaction involved reduction of ceric ions to cerrous ions in presence of arsenious ions and the reaction is catalysed by inorganic iodide (I⁻).

The Sandell Kolthoff reaction has been extensively used for estimation of iodine in biological fluids and materials. Barker method for estimation of PBI describes digestion of protein bound iodine into organic iodide by use of dry ashing (incineration of protein bound iodine fraction in muffle furnace at 6000 C for 2 hrs). Dry ashing method was initially used for estimation of urinary iodine with modification of using alkali during ashing to prevent losses of iodine during ashing. Zak et al introduced method of wet ashing by using chloric acid digestion in the year 1952. This method was extensively used for number of investigators and perhaps still used in many laboratories in the world. This method has one disadvantage of producing a huge amount of toxic waste which is harmful for human health. Since iodine in urine is already in inorganic form there was a debate whether digestion either using dry ashing or wet ashing is required at all!

Subsequently it was found that digestion of urine samples is necessary as it destroys thiocyanate, nitrites and ferrous ions which either react with ceric or cerrous ions affecting Sandell Kolthoff reaction. Recently in the year 1996, Pino et al has introduced a nonhazardous, non explosive method for digestion: Ammonium per sulphate digestion. This method has been extensively used by many investigators with reliable results. All these methods use test tubes for digestion and hence a limited number of samples per day can be analysed. To overcome this problem, a new method using microplates for determination of urinary iodine has been introduced in the year 2000. This method is simple rapid quantitative method incorporating both steps, digestion with ammonium per sulphate and carrying out Sandell Kolthoff reaction on a microplate format. It can analyse 80 unknown samples along with standards and known samples in one 96 well microplate. The digestion time is also short and in a day 4 to 5 microplates can be digested. This means 320 to 400 urine samples can be analysed in a day with the help of a technician and a helper. This method is slowly becoming popular and is used by many laboratories in the world.
Obviously this was all done in camaraderie spirit with the “provider” charging nothing from the “recipient” for the favor. The IDD researcher had to issue strict directions that henceforth all urine sample collections will be directly observed and supervised by the respective class teacher.

The strict implementation of this rule had another fall out. The IDD survey team was labeled as “the disciples of Morarji”. The strict disciplinary Prime Minister of India, Shri Morarji Desai is well known for his championing of Urine Therapy. According to his own admission he was advised to try drinking his own urine when in his 40s to cure piles (hemorrhoids), and he got immediate results. Thereafter he continued the practice and was quite open about it, saying that you should not do anything you would be ashamed of.

So whenever the IDD research team visited the schools they were welcomed with jibes of “Morarji ke chele” (Disciples of Morarji)!!

Dr Madhu G Karmarkar has been associated with IDD control program in Nepal since the late 1960s. The mountainous terrain of Nepal predisposes it to iodine deficiency and the country is known endemic region for iodine deficiency disorders. The beautiful Himalayan Kingdom of Nepal is also a world famous tourist destination and home to the highest peak in the world, Mount Everest.

In 1970s foreign made goods were scarce in India and a huge network for smuggling these goods from Nepal, where these goods were freely available, existed along Nepal-India border. To check this infiltration of foreign made goods in India, the custom officials on Nepal-India border were very strict and every box and package used to be stringently checked.

After his first visit to Nepal, Dr Karmarkar was on his way back to India and was carrying a huge metal box containing urine samples collected as part of IDD survey in mountainous regions of Nepal. The urine samples were to be tested for iodine content in the IDD laboratory in All India Institute of Medical Sciences (AIIMS), New Delhi. Just as he was about to clear the Indian customs checkpoint at New Delhi International airport carrying the huge metal box along with his other luggage, Dr Karmarkar was stopped by a burly Indian customs official. “Yes Sir, Where do you think you are going?” asked the official and “What is in here?” he asked pointing towards the huge metal box with his finger. Dr. Karmarkar who was tired lugging the huge box replied, “Nothing, absolutely nothing!”

The skeptical Custom Official ordered Dr. Karmarkar to open the metal box which he did obediently. The Custom Official bent down and opened the lid of the box and was confronted with the powerful smell of urine. He slammed the lid shut and shouted “What is this?” Dr Karmarkar replied sheepishly, “I had told you sir, do not open the box. It does not contain anything of value to you. It only contains urine samples from a survey we conducted in mountains of Nepal.” “And as I assured you these are 100% MADE IN NEPAL!”

The Custom Official clinging on to his nose waved the IDD team past the customs checkpoint. During a subsequent visit Dr Karmarkar again encountered the same Customs Official and a mere mention of “MADE IN NEPAL” ensured that all his luggage was cleared by customs people in a jiffy.

Reminiscences from the past

“IDD survey and Disciples of Morarji”

Being an Iodine Deficiency Disorder (IDD) investigator/researcher has its own professional pitfalls presenting themselves in most humorous manner. The IDD research team of All India Institute of Medical Sciences (AIIMS), New Delhi comprising of Dr Chandrakant S Pandav and Dr N Kochupilai was involved in conducting IDD survey in schools of New Delhi in 1980s. The survey involved collection of urine samples for iodine estimation in urine from school children.

Much to their surprise the team noted very high number of “urine samples” with clear transparency and lack of typical yellow coloration of urine. On detailed interrogation of “suspects” it was discovered that students were filling the urine sample bottles with ordinary tap water. Another frequently encountered problem was “sharing of sample”, very frequently few indulgent “suspects” filled urine sample bottles of other students also.

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The Custom Official shouted “Do you know only MADE IN NEPAL items can be carried from Nepal to India and in case this box contains any foreign made goods you are in big trouble Sir. You will have to go to jail also!”

Dr Karmarkar in his characteristic manner replied “Sir, I assure you there is nothing of value in this box. At least nothing that is of value to you at least, it might be of some value to me though. And I assure you that the contents of this box are 100% MADE IN NEPAL”.

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Iodine Deficiency Disorders (IDD) still remains a public health problem in Bangladesh. The third National IDD Survey undertaken in 2004-05 revealed that the Total Goitre Rate (TGR) was 6% among children and 12% among women. The survey showed that while only 51% households were using adequately iodized salt; 81% of them were using iodized salt, and prevalence of iodine deficiency (Urinary Iodine Excretion (UIE) <100 mcg/L) in school aged-children and women were 34% and 39%, respectively. Another survey conducted by the International Centre for Diarrhoeal Disease Research (ICCDDR,B), the Institute of Public Health (IPHN) and the National Institute of Population Research and Training (NIPRO RT) in 2004-05 showed that the prevalence of iodine deficiency (as per UIE levels ) was 37% in adolescent girls and 56% in pregnant women. It is also estimated that 1.7 million newborn in Bangladesh (ICCIDD Global Scorecard 2010; data from 2008) are born unprotected from IDD every year.

Salt iodization became mandatory by law (Bangladesh Gazette, Iodine Deficiency Prevention Act 1989) and the Bangladesh Small and Cottage Industries Corporation (BSCIC) undertook the task of monitoring the salt iodization process through the CIDD Project. Bangladesh Small and Cottage Industries Corporation (BSCIC) under the Ministry of Industries have eight salt testing laboratories to monitor the quality of iodized salt at production level. These laboratories are situated at Dhaka, Narayanganj, Chittagong, Patiya, Jhalokati, Khulna, Chandpur and Cox’s Bazar. At the request of BSCIC, MI upgraded the laboratories with necessary laboratory equipment and re-established the utility services with other logistics including provision of consumable chemicals to keep it functional. At the same time, MI also facilitated to organize hands-on training for the salt inspectors and monitoring officers to strengthen the internal and external quality assurance (QA) and thereby ensuring effective monitoring.

With support of Micronutrient Initiative, Bangladesh a two member team of ICCIDD visited Bangladesh. The objective of the visit was to upgrade the knowledge and skills of the Micronutrient Initiative (MI) Extenders for quality control and quality assurance. The ICCIDD, New Delhi team, comprising of Prof. Sandip K. Ray and Prof. M. Godbole conducted a three day training programme on laboratory and quality control/quality assurance procedures for universal salt iodization programme in Bangladesh. The ICCIDD, Bangladesh and INFS team led by Prof. Mohiduzzaman provided the logistics for laboratory training and were also involved as resource person for the training. The program was attended by 12 participants from MI and the BSCIC. The inauguration of the training was attended by Mr Abu Taher Khan, GM, Bangladesh Small & Cottage Industries Corporation, Prof. Nazma Shaheen, Institute of Nutrition and Food Sciences (INFS), Prof. M. Mohiduzzaman, INFS and Ms. Cadi Parvin Banu, Principal Research Associate, INFS.

The scientific sessions conducted by the ICCIDD team included iodine metabolism and the role of iodine in human body,
epidemiology of IDD, principles of the prevention of IDD, IDD Monitoring/Evaluation and IDD survey methodology. This was followed by a lecture on the theory of salt iodine content analysis by Prof. G. Godbole.

The second day of the program focused on laboratory procedures for salt iodine estimation. Prof. M. Mohiduz zaman, INFS and Dr. Madan Godbole conducted the sessions on the preparation of reagents for salt iodometric titration, the demonstration of procedure of salt iodine analysis and the hands on training of procedure of salt iodine analysis.

The third and final day of the training program saw Prof. M. Godbole elaborating the role of quality assurance in USI, principles of internal and external quality assurance and the protocol of QA/QC of salt iodine estimation. He then went on to give hands on training on QA/QC protocol of salt iodine estimation. This was followed by a session on the laboratory procedures needed for estimation of strength of Potassium iodate solution.

In order to clarify all doubts and queries of participants a Question and Answer (Q & A) session was held on the final day of the training. The session was chaired jointly by Prof. M. Godbole, Prof. K. Sandip Ray and Prof. M. Mohiduz zaman. The training program was deemed to be a success as all members present and all of them made commitment to whole heartedly strive towards sustainable elimination of IDD in Bangladesh.

Recommendations to strengthen quality assurance at production end salt iodine monitoring laboratories in Bangladesh:

1. Ensure supply of standard laboratory equipment: A set of auto burettes, auto-dispenser, pipette controllers and three decimal open pan balance as given in training manual be provided to these laboratories. Provision of plastic weighing boats for salt weighing (even for reagent weighing) to be also made.

2. Ensure supply of de-ionised water: A feasible way be devised to ensure that these laboratories get a supply of de-ionized water on a continuous basis.

3. Standard Operating procedures and Good Laboratory Practices: A poster of standard operating procedures for salt iodometric titration needs to be prominently displayed in the laboratory. A one page note on Good Laboratory Practice be devised by ICCIDD and be sent to these trainees via MI office (specially Do’s and Don’ts).

4. Regular External monitoring and Supervision: Once the above provisions are made, it is desirable that an on sight inspection be conducted to check the correctness of procedure being followed.

This should be done as soon as these laboratories start functioning. This will help to take timely corrective action and to avoid perpetuation of errors.

5. External Quality Assurance program: They be encouraged to participate in external quality assurance program.
Nepal has battled with iodine deficiency disorders (IDD) for decades, but over the years several programmes have been put in place by the country's Ministry of Health (MOH), and at one point the disorder had virtually been eliminated. However, recent data suggest that not only have IDD’s not yet been fully eradicated, but also that previous progress might have even reversed. This is primarily due to Nepal’s geographical conditions (mountain, hill and terai). A national IDD survey in 2007 reported the percentage of children having urinary iodine excretion (UIE) < 100 µg/L was 26.1% in the mountain region, 18.9% in the hills and 9.1% in the terai region of Eastern Nepal. The fundamental problem of Nepal causing iodine deficiency is the geochemical structure rises steeply from a few metres above the sea level in the southern plain to the high Himalayas. This is responsible for the erosion of iodine from the soil. People living in mountainous and hilly regions do not have easy access to adequately iodized salt because of long transportation time from the point of production, less coverage of these areas by roads, easy availability of crystal salt at the lowest price and poor storage condition in households.

In 2010, iodine status in Eastern Nepal was assessed by measurement of UIE among the school children. A total of 829 urinary samples, 829 salt samples and 199 blood samples were collected in the Tehrathum and Morang districts of Nepal. At the end of the study, all of the primary school age children were supplemented with iodized salt with the “two child logo” from the Salt Trading Corporation, Nepal. The results show that 90.3% of school children from Tehrathum and Morang have adequate iodine intake and optimum iodine nutrition (UIE > 100 µg/L). The median UIE for Tehrathum and Morang was 333 µg/L (IQR 195-460) and 257 µg/L (IQR 151-354), respectively.

Two types of salt were collected from the school children during the survey. One type was crystal salt available in 50 kg open containers and sold openly by the retailers. Another type of salt was packet salt available in 1 kg packs, distributed by the Salt Trading Corporation, Nepal. A total of 17.7% (n=147) of school children consumed open crystal salt, including 36.9% (n=127) from Tehrathum and 4.1% (n=20) from Morang. A total of 82.3% (n=682) school children consumed packet salt, including 63.1% (n=217) from Tehrathum and 95.1% (n=465) from Morang. Most of the people of the hill and mountainous regions purchase crystal type of salt in the winter season and store it for the entire year for consumption.

As part of the study, awareness programs were conducted in different schools of Tehrathum and Morang districts with active participation of the school children, teachers and parents. These focused on the importance of iodine in health and consequences of its deficiency. Active teaching and learning activities were conducted along with pamphlet distribution and interactive sessions. Adequately iodized packet salt (Salt Trading Corporation, Nepal) was also distributed to all school children of primary school age with the help of their teachers and in the presence of their guardians.
Pakistan is rated the 6th most populous country with 70 percent of the total population in the country at risk of IDDs (UNICEF 1998). To top it, around 50 million people are already suffering from iodine deficiency, 6.5 million of whom are facing a severe type of deficiency.

Pakistan is historically iodine deficient, one of the causes being the heavy monsoon rains that cause regular flooding and erosion that leaches iodine from soils. The worst floods in the country’s history occurred in 2010 and 2011, further depleting already iodine-poor soils. The current median urinary iodine concentration (UIC) in school-age children is only 75 µg/L, with 64% of children having insufficient iodine intake. UNICEF estimates that only 17% of Pakistani households are consuming iodized salt.

The Pakistani National Nutrition Survey (NNS) revealed a high level of knowledge about iodized salt but a low level of use because of price, availability and adverse propaganda. Testing of the domestic salt for iodine also revealed a high level of ordinary salt being sold as iodized salt. In a recent study carried out by the University of the Punjab in pregnant women during first trimester (n = 254) in Lahore, UIC ranged from 34 to 142 µg/L with a median value of only 67 µg/L, indicating clear iodine deficiency.

Among all pregnant women, 31.5% had slightly visible goiter and only 34.2% were currently using iodized salt. The severity of iodine deficiency among Pakistani pregnant women is likely one reason why 1/3rd of babies born in the country have low Birth weight.

In the NNS, the prevalence of goiter among women in Pakistan was found to be 21% at the national level: 24% in rural areas and 16% in urban areas. The prevalence of goiter among school-age children was also at a high of 6.7%. UIC measurements further revealed that 36.5% of mothers are severely iodine deficient, and the problem is more acute in rural areas where 41% of mothers were severely iodine deficient, compared to 27% in urban areas.

Iodine Deficiency Continues to Plague Pakistan
- Excerpt from IDD Newsletter, November, 2011
The modern and safe practices in manufacture, storage, distribution, retailing and consumption of food was much desired, and the scientific principles adapted in framing standards based on risk analysis, assessment risk communication etc were key determinants in designing an integrated Food Law for the teeming 120 crore multicultural population with diverse food eating habits, in India, much to the chagrin of observers.

The historical processes of prolonged trials and penalties have given way to the new and bold system under which graded penalties are provided. Compounding of petty offences will make a more transparent system for the law enforcer and the enforced. Since legal processes were slow, implementation lacked definite machinery; the offender could get away with. For effective enforcement, dedicated regulatory machinery at Executive and Judicial level has been put in place. Penalties as well as punishment up to Rs 25 Lakh and life sentence respectively are a few deterrent features.

The new food law besides just being a set of processes covers basic aspects of Human health as most gastrointestinal disorders and other sickness result due to poor quality of food, water or presence of adulterant, contaminant. The law makers, therefore, considered it appropriate to bestow the responsibility of its enforcement to a statutory regulatory authority, “Food Safety and Standards Authority of India, (FSSAI)” under administrative control of the Union Ministry of Health and Family Welfare, New Delhi.

Indians are witness to traditional type of cooking with ingredients in our homes by ladies or cooks and therefore laying standards for all such type of food is a challenge. Further the trade in food globally is to be harmonized for free flow of commodities. The new law aims towards bringing about a scientific assessment by experts and involves almost all facet of food Industry in arriving at standards and procedures which can be accepted as well as implemented in a simple manner.

Almost every day a new or novel health food, supplement, nutraceuticals, etc is launched in the market making claims which are rarely based on scientific studies and therefore cause doubts in the mind of consumers. Regulating such misleading claims is a challenge and it is the duty of every citizen to report about it. Further regulation of issues related to transgenic crops/genetically modified food, alcoholic drinks, caffeinated beverages, packaged drinking water, trans fatty acids are areas which the new law will have to settle by scientific and industrial research.

Since little data is available on the number of food establishments small or big and also the type of direct and indirect human resources involved, the Government of the Food Industry is the aim of the new law and the Governments at Centre and States are determined to bring about a distinct shift from traditional methods to modern IT based processes for issue and monitoring of licenses, reports and e-governance up to Panchayat level.

Modern and sophisticated laboratories are underway to test and later report results in a short period of time as well carry out complicated test including Microbiological testing.

For the first time the globally accepted Food Safety Management System (FSMS) has been adapted towards Good Manufacturing Practices (GMP), Good Agricultural Practices (GAP) for improving the quality of services desirable in the entire food chain.

Food law aims towards participation and benefits to various stakeholders viz the farmers/fishermen, consumers, industry, local bodies like Panchayats, small towns and petty food sellers/distributor who are constantly involved in consultation process before framing of any rule or regulations.
A new era in food safety has begun and the goal is to make it simple, acceptable and easily enforceable. For more: login at fssai.gov.in, or call at toll free Food Safety Helpline: 1800-11-2100.

Petty Food Manufacturer-

Means any Food manufacturer, who, manufactures or sells any article of food or a petty retailer, hawker, itinerant vendor or temporary stall holder, such other industries including small scale or cottage or or tiny food businesses with an annual turnover not exceeding 12 lakhs and whose:

- Production capacity of food (other than milk and milk products and meat and meat products) does not exceed 100 kg/lt per day
- Production or procurement or collection of milk is up to 500 litres of milk per day
- Slaughtering capacity is 2 large animals or 10 small animals or 50 poultry birds per day or less

Enlisting the Army to end IDD!

- by David P. Haxton
  Ex-Executive Director, ICCIDD

**Consumption of Iodised Salt in the Army can go a long way in reducing IDD and creating more efficient soldiers**

In another encouraging note for those working towards IDD elimination, it has been noticed that the Indian Army has been procuring only iodised salt for its troops. Iodised salt has known to go a long way in improving concentration and agility of humans which are crucial elements of a combat ready soldier.

Ensuring the procurement of iodised salt for the army has also been one of the important endeavours of ICCIDD. Dr. David P Haxton, the ex Executive-Director of ICCIDD shares one of his experiences while promoting the consumption of iodised salt among armed forces in Paraguay when he was with the UNICEF.

At a meeting with the President of Paraguay many years ago, the President was in a jocular mood and during the long discussion after Dr.Haxton had reported on the potential impact of cognitive growth, the president mentioned at some point that most of the soldiers he knew and fought with in the War of the Chaco with Bolivia were uncoordinated physically and were bad shots. Dr.Haxton took the opportunity to suggest that perhaps one reason was their diet... iodine deficient... etc etal.

Dr.Haxton then asked him if the Department of Procurement of the Army of Paraguay insisted on buying only iodized salt.

The President was unsure, but, picked up the telephone and asked the General of Procurement about the case! He uttered a couple of 'slang' words in Spanish which gave a clue as to the discussion and hung up!

Later in the day, there was a courier from the chastised official waiting for Dr.Haxton at the hotel who wanted to know what to do to set things right and have the army consume iodine!!

The decision, of course, that the army would buy only iodized salt for human and animal consumption, had a very positive impact on the market and that led the way to near universal production/import of iodized salt. Most of the salt in fact is imported to assure national needs are met.

Years later Dr.Haxton also met with the Director of Procurement of the Army for Pakistan and suggested the same thing and he expressed surprise that it was not a requirement!

In both cases, the producers were happy of course.

Is there a lesson here for the people STILL approaching the national solution as a “health” problem best left to “professionals”? When will we grasp the essence that success depends on quality production of a product readily available at acceptable cost and the demand of consumers for that product?
As part of its efforts in addressing micronutrient deficiency in India, Micronutrient Initiative and ICCIDD have been conducting refresher training sessions aimed at Strengthening the Quality Control in Laboratories across India. This year it conducted three such training programs in Ahmedabad (8th, 9th November), Chennai (15th, 16th November) & Nawa (28th, 29th November).

The Refresher Training at Ahmedabad was conducted by Dr. Sirimavo Nair, from ICCIDD and also had the attendance of Ms. Kejal Joshi from M.S. University and the National programme officer and State Programme officers of MI. The specific objectives of this training program were to standardize and calibrate the lab equipments; provide hands on experience to the lab and field staff; improvise the quality control/quality assurance protocols; Assessment of salt iodine content and technical assessments and cross checking for salt samples.

The first day stressed on the need of Levy- Jennings (LJ) by conducting training on upgrading estimation of salt iodine content at field based laboratory of MI, followed by technical inputs being provided to the senior chemists and field extenders to improve the methods and approaches for titrations. Quality checks were also maintained throughout which also included best practices for maintaining precision.

On both the days various queries regarding concentration of solutions, checking end points, use of starch as an indicator and corrective approaches were adequately addressed. They in turn led to interesting recommendations such as-

1. One electronic balance with sensitivity of three decimal places needs to be purchased at the PU level for the purpose of preparing KIO₃ solution for calculating the factor of sodium thiosulphate.
2. Each of the labs should measure 10 gms of salt samples keeping tissue paper or aluminum foil below it so that the salt does not stick to the lid of the balance.
3. The guidelines for the preparation of sodium thiosulphate should be changed to read that water should be added to 1.24 gms of sodium thiosulphate and it should be made upto 1 litre in a volumetric flask.
4. While titrating, once the solution turns colourless, sodium thiosulphate should not be added further, though any colour precipitation occurs even after 15-20 minutes post titration.
5. Only reagents graded as Analytical Reagent grade should be purchased for the lab.
6. The chemist should be given half a day for testing the External Quality Assurance salt samples so that all procedures are followed and precision analysis is done.
7. Each of the labs should have white porcelain tiles on which auto burette can be placed as this will facilitate differentiating colour to identify the end point of iodometric titration.
8. The factor of sodium thiosulphate varies each time it is prepared, even if the reagent is prepared using the same lab apparatus and protocol. On the second day, sodium thiosulphate was prepared by the senior chemist twice, keeping the apparatus and protocol same. The factor for both the solutions varied by 0.3. The guidelines from ICCIDD stated that the factor be constant at 10.58 for the calculation of parts per million (ppm) level. The difference in the factor, has implication of the final ppm level of the analyzed sample and its comparison with the EQA result. ICCIDD will be requested to provide guidance on the issue.
9. The electronic balance needs to be cleaned by the chemist, using medicated cotton to prevent corrosion.
10. The resource person was requested to suggest an indicative test for checking the chemical impurity such as bromate in KIO₃.
11. Instead of mineral water, double distilled water should be used. (Though it an RO filtered, Gujarat water has high salinity. This may interfere with reactants.
12. If possible- all labs should be air conditioned-Due to excess heat there can be instability in the solutions and reagents.

Extreme Right: Dr. Siri Nair and Ms. Kejal Joshi demonstrating titration during the training at Ahmedabad
As part of its efforts in addressing micronutrient deficiency in India, Micronutrient Initiative and ICCIDD have been conducting refresher training sessions aimed at Strengthening the Quality Control in Laboratories across India. After Ahmedabad, it conducted a training program on 15 & 16 November, 2011 in Chennai.

In Chennai, the session was conducted by none other than Prof. M.G.Karmarkar who before beginning outlined the main objective of the program, this was followed by the first presentation of the day on “IDD and current status of IDD in Tamil Nadu” by Dr. Nalin Mehta. The presentation was interactive and well received. It was followed by a question-answer session, wherein the chemists specially had issues they wanted to sort out regarding the basics of iodine availability, metabolism and effects of its deficiency.

This was followed by an open house discussion on the questions that had been mailed to ICCIDD regarding the salt titration method. Prof. Karmarkar and Dr. Nalin Mehta fielded the questions at length and proceeded to address additional issues that were raised by the chemists - both technical and procedural. The house was appraised of the basics of the entire procedure with a revision of the theoretical principles involved in very simple terms so as to make them adept at understanding the process comprehensively and identifying errors. Concepts of Sensitivity, Specificity, Accuracy and Precision were revised with lucid examples to ensure clear comprehension.

Dr. Nalin Mehta then proceeded to divide the entire group of participants into two groups (each comprising of 6 and 7 persons that included chemists, a senior chemist and so on) to sit down for an interactive session and to identify problems at their end, discuss with their senior chemists and make a list of issues that they felt need clarification. This session lasted for half an hour, helped break the ice as all the chemists spoke their minds freely, without any hesitation or apprehension. One representative from each group was then asked to make a brief presentation on the issues that were raised during their discussions. The session proved extremely useful as new problems at ground zero were identified, many of them common to both the groups, and sorted out to the complete satisfaction of all concerned.

The rest of the day was devoted to hands on practical session on Salt Titration Method and IQA - Preparation of Known-Value samples & Levy-Jenning (LJ) Plot. At the end of the hands on session, deliberations were undertaken on specifics that emanated from the practical exercises and clarifications were provided.

To sum up the day - it was also decided that all the chemists would estimate the salt in duplicate as was the practice but use the ‘auto-zero’ for the burettes each time after titration rather than take continuous/cumulative readings as was the practice with many of them. Also, 10 g of salt was optimal for estimation as against a proposal of using 50 g, as was suggested since the trials with both the quantities that were undertaken by a senior chemist showed no significant advantage in using 50 g. It was also decided that the practice of averaging the results be discontinued and two separate values of individual tests be submitted.

The next day was devoted to hands-on practical session and External Quality Assurance after the initial presentation and detailed discussion on Quality Assurance results presentation for the 2010-11 for the state Laboratories.
As part of its efforts in addressing micronutrient deficiency in India, Micronutrient Initiative and ICCIDD have been conducting refresher training sessions aimed at Strengthening the Quality Control in Laboratories across India. This year it also conducted a training program, on 28 & 29 November in Nawa.

In Nawa the two-day program was conducted by Dr. Vivek Lal. The participants included Mr. Tauseef Niazi (Project Manager, MI) and chemists from Rajasthan, Mr. Pawan Kumar, Mr. Rajender Kumar, Mr. Deepak Kumar, Mr. Tej Singh and Mr. Mukesh Kumar Jangid.

The objectives of the workshop were- to appraise the participants of the problem of IDD in the country and the status of salt iodization as reported by various surveys; provide hands-on training on the procedures involved in IQA and EQA and suggest recommendations for improvement.

The first day of the workshop saw an overview of the IDD and salt iodization status followed by a preparation of known value samples by the participants. Three one kg salt packets were purchased from the market. Samples from these were coded and divided randomly among the participants for preparation of known value sample. All the reagents were freshly prepared. There was consistency of results among the participants.

Next Levy-Jenning (LJ) Plot was discussed along with its interpretation. In addition, normality of sodium thiosulphate was also checked which revealed no change in normality.

The next day saw IQA samples from Tuticorin being analyzed by each participant in duplicate and the results were found to be comparable among participants.

Six samples sent by ICCIDD as part of EQA were also analyzed and results were compared. Throughout the training program, the emphasis was on participatory approach, providing hands-on practical training to the participants. All the laboratory procedures were undertaken by the participants under supervision of the Resource Persons.

The recommendations based on the observations made during the sessions were:

1. Use distilled water instead of Reverse Osmosis water.
2. Accuracy in weighing of salt. Instead of the recommended 10 gm salt, the participants weighed to 10.07 gm; the reason being that some salt particles remain stuck to the paper. Weight balance available had a precision up to two decimal places.
3. Calibration of instruments.
4. Auto-dispensers should be labeled and separate pipettes be used.
5. Importance of freshly preparing sodium thiosulphate.
6. Importance of pumping to ‘0’ each time in the burette while titrating. The laboratory was using 25 ml burette instead of the recommended 10 ml.
7. Careful titration and observation of colour changes.
8. Treat chemicals properly- maintain ambient temperature and moisture to ensure stability of reagents.
9. Utilize excel sheet for Levy-Jenning (LJ) Plot. This would help to decrease errors in calculation.
10. Standardization of Procedures (SOP). It was advised that SOPs should be put on display in the laboratories.
11. The participants reported delay in reporting on results of EQA. EQA results to be shared with the chemists on a regular basis.
12. There should be an opportunity for centralized hands-on training at ICCIDD, Delhi.

At the conclusion of the program the participants raised important queries like whether gloves should be used when working with sulphuric acid; Is there a possibility for change of factor due to change in normality?; what procedures need to be followed to obtain permission to use ICCIDD logo on salt packets? What is the duration of stability for the various prepared reagents and how stable was sodium thiosulphate in dry form? All these queries were promptly addressed by the resource persons Dr. Vivek Lal and Mr. Ranjan Jha.
A one day workshop was held in Bhubaneshwar, Odisha to bring together departments and stakeholders linked to supply and use of iodized salt in the state and to deliberate on ways to improve supply and universal consumption of adequately iodized salt.

Smt Anu Garg, Commissioner cum Secretary, Health and Family Welfare Department, Government of Odisha; Smt. Sujata Kartikeyan, Director, Social Welfare and Additional Secretary to Govt of Odisha; Dr. U.K. Sahoo, Director, Health Services; Prof. Sandip Roy, Head, Department of Community Medicine, KPC Medical College, Kolkata; Shri. Laxminarayan Nanda, Child Protection Specialist, Unicef; Shri. H K Aggrawal, Salt Superintendent, Odisha; Department Officials from Food Supplies and Consumer Welfare Department, Department of School and Mass Education; Salt Traders from various parts of Odisha and Media personnel attended the workshop. They discussed strategies for better implementation of National Iodine Deficiency Disorder Program (NIDDCP).

She further emphasized on heightened monitoring to prevent entry of non-iodized salt into the state. She also welcomed the suggestion for the inclusion of salt iodization through the Public Distribution System (PDS) and reiterated the government's commitment to deliberate over the issue taking into consideration costs and logistics factors. Smt. Sujata Karthikeyan, Director, Social Welfare shared that Department of Women and Child Development promotes and ensures the use of adequately iodized salt through Supplementary Nutrition Program and Emergency Feeding Program.

Prof. Sandip Roy highlighted the importance of universal salt iodization in reducing preventable brain damage. Smt. Anu Garg, Commissioner cum Secretary suggested that micronutrient deficiency is a major point of concern which needs to be addressed on a priority basis and in a convergent mode. It is a doable intervention which prevents brain damage among young children.

Convergence between the Departments of Health and other departments like Women and Child Development, School and Mass Education will lead to improved use of iodized salt in government programs like Mid-day meals and school feeding programs. Similarly, capacity building of frontline functionaries, sustained Behaviour Change Communication (BCC) campaigns and nutrition counseling are effective strategies to improve consumption of adequately iodized salt at community and household levels.

Several critical issues like the importance on use of iodized salt were stressed upon by dignitaries on the dias. The consequences of use of non iodized salt and its impact on community in terms of physical and mental damage were also discussed at the multi-sectoral workshop.
Ensuring the supply of adequately iodized salt

Global Alliance for Improved Nutrition (GAIN) holds Consultative Meetings with iodized salt wholesalers/traders across the country to address supply gaps

In order to address the demand-supply problems of iodised salt in the country, GAIN in close consultation with the Salt Department of India held consultative meetings with local iodized salt wholesalers/traders in eight priority states of Uttar Pradesh, Odisha, Rajasthan, Tamil Nadu, Uttarakhand, Madhya Pradesh, Karnataka and Andhra Pradesh.

The meetings were held in Cuttack, Vijayawada, Indore, Jabalpur, Coimbatore, Kota, Bikaner, Berhampur, Mangalore, Dehradun and Kanpur.

In all the cities, the meetings were attended by wholesalers & traders of iodized salt, representatives from Salt Commissioner’s Office, Departments of Health, Women and Child Development, Food and Drug Administration, Civil Supplies and the Academia. The meetings also witnessed the participation of the South Asia ICCIDD, Micronutrient Initiative and UNICEF.

The main objectives of these meetings were to:
- Sensitise wholesalers and traders to ensure the supply of adequately iodised salt
- Encourage use of salt testing kits by wholesalers and traders to strengthen quality control along the supply chain
- Advocacy with the district administration to increase vigilance in order to strengthen the regulatory monitoring
- Assurance by the salt department to strengthen quality control in the production centres
- Advocate with the health department to strengthen the iodine deficiency disorders control program and with partners advocate to increase demand for adequately iodised salt

The meetings mainly tried to discuss the gaps in procurement and distribution of adequately iodized salt and role of wholesalers and traders of iodized salt as an important link in the trading of salt. A copy of the legislation, mandating the standards of iodized salt was also handed over followed by a demonstration of a salt testing kit. At all the meetings, Salt traders & wholesalers were urged to procure and supply only adequately iodized salt which in turn would send the correct signals to the suppliers to produce salt with iodization of adequate quality.

(L-R) Dr. Neelam Bhatnagar, Nutritionist, UNICEF, Rajasthan; Mr. M. P. Sharma, CEO, Zila Parishad; Dr. Arijit Chakrabarty, GAIN, New Delhi; Dr. G. S. Sisodia, Chief Medical & Health Officer, Kota; Mr. R.K. Jaiswal, RAS, District Officer, Food & Civil Supplies Department, Kota; Mr. O. P. Meena, Assistant Salt Commissioner
On 27th November, UNICEF India hosted the Tenth Meeting of National Coalition for Sustained Iodine Intake (NCSII). The meeting which was chaired by Dr. Chandrakant S. Pandav had the attendance of Mr. S. Sundaresan, Former Salt Commissioner, Mr. M.A. Ansari, Salt Commissioner; Mr. Suvabrata Dey, Micronutrient Initiative (MI); Ms. Sucharita Dutta, Micro Nutrient Initiative (MI); Dr. Arijit Chakrabarty, Global Alliance for Improved Nutrition (GAIN); Ms. Kajali Paintal, United Nations Children’s Fund (UNICEF); Dr. Shariqua Yunus and Ms. Manasi Shukla, World Food Program (WFP); Dr. Kapil Yadav, Dr. Rakesh Kumar and Dr. Abhishek Wahi, Indian Coalition for Control of Iodine Deficiency Disorders (ICCIDD).

The meeting began with Dr. Pandav felicitating Mr. S. Sundaresan on his superannuation as Salt Commissioner of India and the participants thanking Mr. Sundaresan for his valuable contribution to Universal Salt Iodisation (USI) program in India over the years. The participants further requested Mr. Sundaresan to continue his long association with USI and hoped to benefit from his experience and expert advice in future also.

The felicitation ceremony was followed by a welcoming of Dr. M.A. Ansari, the new Salt Commissioner. Dr. Ansari reiterated his faith in the partnership and synergistic approach being adopted by the Coalition for promotion of USI in India. He also expressed his desire to reach more than 80 percent of adequate salt iodization by year 2014 with the help of all stakeholders of USI program.
"If food and nutrition policies go wrong, nothing else will have a chance to go right"
- Dr. M. S. Swaminathan, Member of Parliament, India

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