PROMOTION OF IODIZED SALT
IN THE EASTERN MEDITERRANEAN,
MIDDLE EAST AND NORTH AFRICA

Report of an intercountry meeting

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World Health Organization
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CONTENTS

Executive summary ............................................................................................................ i
Consensus statement ....................................................................................................... i
Recommendations ........................................................................................................... i

1. Introduction ................................................................................................................ 1
   1.1 Opening session .................................................................................................. 1
   1.2 Overview of universal salt iodization ........................................................... 3

2. Technical discussions ................................................................................................... 7
   2.1 Iodine deficiency in the Region ................................................................. 7
   2.2 Monitoring quality in salt iodization and iodized salt transit .......... 10
   2.3 Salt situation analysis in the Middle East, North Africa and Eastern Mediterranean ......................................................................................... 13
   2.4 Salt situation analysis of Sudan ................................................................ 19
   2.5 Appropriate technologies for salt purification ................................... 22
   2.6 Importance of standards and legislation for the iodization of salt ........ 23

3. Group work ................................................................................................................. 24
   GROUP A: Promotion of salt iodization/ creating demand for iodized salt ............................................................ 24
   GROUP B: Social and economic aspects of salt iodization including the economics of potassium iodate, its production, availability and cost .................................................................. 25
   GROUP C: Strengthening partnerships between salt producers and suppliers and programme managers of national IDD control programmes .................................................. 26

4. Recommendations ....................................................................................................... 26
   4.1 To all countries in the Region ....................................................................... 39
   4.2 To WHO/UNICEF ......................................................................................... 41

Annexes
   Agenda ..................................................................................................................... 29
   List of participants ................................................................................................. 30
   List of countries .................................................................................................... 39
Executive summary

Consensus statement

The participants in the Regional Meeting for Promotion of Iodized Salt in the Eastern Mediterranean, Middle East and North Africa Region, who included salt producers, national IDD programme managers and representatives of the Regional Iodized Salt Producers Association, held in Dubai, United Arab Emirates, from 10 to 12 April 2000, recognized that:

- Iodine deficiency disorders (IDD) are an important public health threat in countries of the Region.
- IDD is the most important cause of preventable brain damage, impaired school performance and lower IQ.
- IDD has been known to exist in the Region for the past decade. Most countries have established programmes to prevent and control IDD.
- Iodization of salt is the most effective measure to control and prevent IDD.
- Governments throughout the Region have taken steps towards USI and the elimination of IDD. Efforts have already been made to raise the awareness of the general population and the salt industry about the importance of iodine in preventing brain damage.
- Salt producers are the most important stakeholders in the successful implementation of salt iodization programmes in the Region.
- In spite of the progress, the level of iodization remains unsatisfactory and significant quantities of salt continue to remain uniodized in several countries of the Region.

The participants reviewed the factors contributing to this situation and agreed it stems from a combination of several factors. These include:

- Infrastructure necessary for iodized salt production is often lacking.
- Political will and interest are flagging in some countries.
- There is inadequate quality assurance to the commerce in salt iodization.
- There is insufficient attention to small producers in some countries.
- Awareness and communication among some producers is lacking.
- Legislation and standards concerning salt iodization exist in many countries in the Region, but the magnitude and extent of enforcement and implementation vary widely. Existing trade practices in the Region allow unhindered commerce in non-iodized salt.
- Communication and information dissemination to consumers and producers on the importance of iodized salt have been insufficient.
- Communication and information dissemination to salt producers on all technological aspects of salt iodization has not received proper attention.

Recommendations

The participants called for a renewed effort to accelerate universal salt iodization in the Region, in order to achieve sustainable elimination of IDD. They committed themselves to spearheading this effort, and made the following recommendations for action.

To all countries in the Region

1. Universal salt iodization (i.e. all salt intended for human and animal consumption is adequately iodized) [USI] should be implemented in accordance with WHO/UNICEF/ICCIDD guidelines.
2. In view of its importance for human health and brain development, potassium iodate should be exempted from customs levy and taxation.
3. To provide encouragement to salt producers, taxation on iodized salt should be reduced to a minimum.
4. The legal level of iodine should be standardized at 30 ppm (allowing for a margin of 10 ppm), as recommended by WHO/UNICEF/ICCIDD (reference document WHO/NUT/96.13). This regional standard will assist in harmonizing trade in the Region.
5. The Executive Board of the Health Ministers’ Council for Gulf Cooperation Council States should take immediate action in enacting legislation for a single salt iodization standard in accordance with WHO/UNICEF/ICCIDD recommendations.

6. To ensure sustainable USI, an effective monitoring system should be established encompassing the different stages of salt production, distribution and consumption at the household level. This needs strong partnership between producers, health authorities and regulatory bodies.

7. To promote universal coverage of salt iodization, an import/export certification system should be established for iodized salt in accordance with the set standards and the Codex Alimentarius guidelines.

8. Ongoing national surveys and national surveys conducted at regular intervals should include suitable questions to obtain information on the IDD situation and salt processing and iodization activities. This information should be shared between countries as part of a regional network coordinated by WHO/UNICEF.

9. Training in different aspects of salt production, proper iodization of salt and appropriate techniques in monitoring and quality control of iodized salt should be organized at the local, national and regional levels. International organizations like WHO, UNICEF, the Micronutrient Initiative (MI), International Council for Control of Iodine Deficiency Disorders (ICCIDD) and regional level bodies like the Regional Iodized Salt Producers Association (RISPA) may provide the necessary technical assistance.

10. Agencies providing emergency food aid should ensure that salt provided as part of the food basket conforms to the required level of iodization.

11. To promote the participation of small-scale salt producers in salt iodization activities, it is necessary to provide incentives to such producers and form cooperatives for easy accessibility to items of iodization, including potassium iodate.

12. Countries are encouraged to document the status of their achievement in USI in order to be declared IDD-free.

13. A universal IDD day should be declared and celebrated by all countries in the Region.

To WHO/UNICEF

14. In order to move towards USI, the Regional Directors of UNICEF/MENARO and WHO/EMRO should write to all the Ministers of Health of the Region, urging them to:

   • adopt the standard iodization level recommended by WHO;
   • exempt iodate and iodization equipment from import taxation and duties; and
   • minimize taxation on iodized salt.

15. Findings from the recent WHO/UNICEF/MI salt situation analysis conducted in countries of the Region should be provided to the national governments. Where adequate information is lacking, UNICEF/WHO/RISPA should work jointly to fill the gap and update the information base on a regular basis. As the agency responsible for compiling information on IDD and related control and prevention activities, WHO/EMRO will send a questionnaire to countries requesting necessary data on IDD prevalence and salt iodization activities.

16. UNICEF and WHO should, at the regional level, establish a system to declare if a country has achieved the elimination of IDD. The Regional Directors are requested to issue a joint statement of congratulation to countries having achieved IDD-free status. The Islamic Republic of Iran and Tunisia will be the first to be addressed in view of their achievement of satisfactory iodine status, according to WHO/UNICEF/ICCIDD indicators.

17. The success of the Islamic Republic of Iran and Tunisia should be treated as a standard/model for emulation and a mechanism established for other countries of the Region to receive relevant information/input from these and other successful programmes.
1. Introduction

1.1 Opening session

The Regional Meeting for the Promotion of Iodized Salt in the Eastern Mediterranean, Middle East and North Africa Region was held in Dubai, United Arab Emirates, from 10 to 12 April 2000. The meeting was organized by the World Health Organization (WHO) Regional Office for the Eastern Mediterranean (EMRO) and the United Nations Children's Fund (UNICEF) Regional Office for the Middle East and North Africa (MENARO). Extensive technical collaboration was provided by the Regional Iodized Salt Producers' Association (RISPA). The Micronutrient Initiative (MI) of Canada provided financial support towards the preparation of a background document for the meeting and the participation of the WHO secretariat staff. Participation of programme managers and technical experts involved in national control of iodine deficiency disorders (IDD) was facilitated by MENARO.

The objectives of the meeting were:

- to assess progress made in the universal iodization of salt in countries of the Region\(^1\) in order to develop an overview of the magnitude of interaction between the health sector and the salt industry;
- to determine the successes and constraints and share intercountry experiences in the commercial iodization of salt;
- to develop a mechanism for ensuring sustainability in salt iodization in order to maintain elimination of iodine deficiency disorders (IDD) in the Region.

Dr. Mahmo ud Fikry, Assistant Undersecretary for Preventive Health Affairs, Ministry of Health, United Arab Emirates, welcomed the participants and delivered a message on behalf of His Excellency Mr. Hamad Abdel Rahman Al Madfaa, Minister of Health, United Arab Emirates. Dr. Al Madfaa described the development by the Ministry of Health of the United Arab Emirates of an integrated food/nutrition programme, focusing on ensuring the availability of micronutrients, including iodine, in food products. The Ministry of Health, in close collaboration with the Ministry of Agriculture and the General Secretariat of Municipalities, had also made considerable progress towards the development of standards and criteria for organizing and controlling the availability of micronutrients. In follow-up to the outcome of the various WHO consultancies for assessing the magnitude of the iodine-deficiency problem in the country, a committee had been set up, the membership of which comprised physicians and professors specialized in nutrition, endocrinology, biochemistry, etc. The committee would also undertake field studies to identify more accurately the problem of iodine deficiency in the country, the causative factors and the best methods for addressing it.

The Ministry of Health gave priority to the promotion of health awareness among consumers, including the importance of using iodized table salt, of adopting sound nutritional patterns that strengthen and promote health and of avoiding negative dietary habits that make food a source of harm rather than of health and well-being. This approach underlined the importance of cooperation and joint efforts to develop an integrated plan that would ensure the inclusion of a sufficient quantity of iodine in salt. It also underlined the importance of developing an effective monitoring system that would begin with salt factories and end with consumers. This called for participation and for close collaboration among health authorities, food manufacturers and salt manufacturers to ensure the preservation of the health and safety of consumers.

The Minister concluded his message by expressing his deep thanks to the international organizations concerned for all the efforts they were making in supporting micronutrient-related activities, including iodization of salt.

Dr. Anna Verster, Director, Health Protection and Promotion, WHO/EMRO, delivered a message on behalf of Dr. Hussein A. Gezairy, WHO Regional Director for the Eastern Mediterranean. After welcoming the participants and thanking the Minister of Health of the United Arab Emirates for hosting the meeting, Dr. Gezairy pointed out the historic nature of the meeting, which gathered together all the key players involved in the control of IDD in the Region: UNICEF, MI, WHO and RISPA. He also thanked the salt producers and suppliers who were attending the meeting at their own expense.

\(^1\) The Region refers to countries of the Eastern Mediterranean Region of WHO and countries of the Middle East and North Africa Region of UNICEF, many of which are the same (see Annex 3).
Iodine deficiency disorders, he noted, remained a major health problem. Iodine deficiency was the single most important cause of preventable brain damage, and resulted in reduced learning capacity as well as reduced physical activity. The only obvious sign of this deficiency was the goitre, or swelling in the neck, that was familiar to all. Prevention of IDD depended on the availability of iodine in the diet consumed by the population. Since the early 1960s, countries in the Region had been aware of the existence of goitre, but it was only in the 1990s that countries also became aware of the hidden effect of iodine deficiency, brain damage. The most recent estimate was that iodine deficiency affected about 170 million people in the Region.

Unlike most other diseases, Dr Gezairy noted, IDD affected rich and poor, old and young alike, and both urban and rural areas. Because the problem was mostly due to the lack of iodine in the environment and thus in the food, the best possible control measure was to introduce iodine through food. Several decades ago, the unique solution was found to be the fortification of salt with potassium iodate. All humans, in all communities and from all walks of life, consumed salt in their diets. However, although iodization of salt was a simple technique in itself, the process through which salt was manufactured, iodized, distributed and consumed by the population was complex.

WHO/EMRO had been keeping Member States informed and involved regarding iodization of salt for over a decade. In close collaboration with UNICEF, it had promoted large-scale and small-scale salt iodization activities in Member States. Countries of the Region had now accepted that universal salt iodization (USI) was the single most effective means for the control and prevention of iodine deficiency disorders. A recent assessment of IDD in the Region by WHO had shown that 17 countries had recognized IDD as a public health problem; and 13 of these countries had initiated control programmes at the national level, especially the universal iodization of salt. So far six countries had achieved universal iodization of salt and two had demonstrated that IDD was under control.

USI strategy, emphasized Dr Gezairy, required that various partners played their roles effectively and in harmony to ensure continuity in programme implementation. Harmonizing policies and standards for USI would ensure the elimination of IDD within the Region. There was a need to ensure constantly that all salt was adequately iodized so that people continued to receive the appropriate amount of iodine. This was the joint responsibility of salt producers, ministries of health and the people themselves. The purpose of the meeting was to assess progress made in USI in countries of the Region and to determine the extent of cooperation between the health sector and the salt industry and how universal salt iodization could be sustained.

Dr Ahmed Magan, Regional Adviser for Health and Nutrition, UNICEF/MENARO, delivered a message on behalf of Dr Ibrahima Fall, UNICEF Regional Director for the Middle East and North Africa, in which Dr Fall expressed his sincere thanks to the Government of the United Arab Emirates for hosting the meeting, which would review progress towards achieving the goal of sustainable elimination of IDD in the countries of the Region. UNICEF, he said, greatly valued the partnership for USI and regarded the regional meeting as an excellent opportunity for exchange of experiences, best practices, and technical knowledge between salt producers, national managers, WHO and UNICEF staff and other stakeholders. Dr Fall said that UNICEF firmly believed that a strong multisectoral partnership was essential in achieving the common goal.

The World Summit for Children in 1990 had pledged the virtual elimination of IDD by 2000; all affected countries in the Region now had IDD control programmes and the progress towards achieving USI had been substantial over the last decade. Several countries: Algeria, Islamic Republic of Iran, Lebanon, Libyan Arab Jamahiriya and Tunisia had achieved over 90% for the rate of households consuming effectively iodized salt. Other countries were also making progress and had attained various levels over 50%. However, while overall progress was being made, several key challenges remained. Some of the specific obstacles to achieving the sustainable elimination of IDD as a public health problem in the Region included:

- continued lack of political commitment in a few countries;
- occasional consumer resistance in some countries and poor communication concerning the importance of IDD, communication being an essential part of IDD control programmes and a key factor in sustainability;
- difficulties in organizing the many small producers for effective iodization in some countries;
weak or non-existent systems for salt monitoring, resulting in salt not being regularly checked at the
critical stages in the distribution network;
both the technology and its application needed improvement;
inadequate enforcement of legislation; while legislation has been passed in many countries, not all
had the capacity to actively implement or take remedial action;
variations in legal requirements for iodized salt in different countries, which posed an obstacle to
freetrade in salt.

Dr Fall emphasized that UNICEF globally, and in particular in the Region, would continue to be
committed to the goal of sustainable elimination of IDD. UNICEF field offices would continue to work
closely with national governments, salt producers, WHO and all other partners and contribute towards
advocacy to build awareness and maintain political commitment, communication, monitoring and
evaluation, resource mobilization, facilitation of intercountry and regional cooperation and
coordination.

Dr Izzeldine Shereif Hussain, Secretary-General of the Regional Iodized Salt Producers Association
(RISPA), expressed his thanks to the Government of the United Arab Emirates and to the WHO Regional
Office, UNICEF and MI for their generous support in making the gathering a success. He also thanked
his colleagues in the salt industry in the Region for their participation.

Dr Hussain highlighted the activities of RISPA since its inception five years ago, which included
meetings in several countries of the Region to enhance the quality of and introduce proper iodization
techniques, a comprehensive market survey in the United Arab Emirates, interaction with investors to
establish more modern salt processing units for meeting the local demands of iodized salt and
production of information materials on salt iodization and problems of IDD. Dr Hussain added that all
these activities had been carried out in the face of severe financial and logistical constraints. The
forthcoming Salt 2000 meeting scheduled for May 2000 in the Netherlands would see the participation
of over 500 salt producers from all parts of the world. This meeting would enable salt producers to
highlight their work in combating public health problems such as IDD.

Dr Kunal Bagchi, Nutrition and Food Safety Unit, WHO/EMRO, described the mechanics of the
meeting, which was being organized as a follow-up to a similar meeting conducted with salt producers
and national IDD control programme managers in 1995. In addition, the meeting was also intended to
enable all stakeholders to obtain an overview of the prevailing situation with regard to universal salt
iodization in the Region. Such an overview would be useful for discussions in the upcoming Salt 2000
meeting.

Dr Mahmoud Fikry (United Arab Emirates) was elected as Chairman for the meeting. Mr Riaz
Mahmood (Pakistan) and Ms Deena Alasfoor (Oman) were elected as Rapporteurs.

The agenda and list of participants of the meeting are attached in Annexes 1 and 2.

1.2 Overview of universal salt iodization

Dr Verster delivered the following message on behalf of Mr Venkatesh Mannar, Executive Director
of the Micronutrient Initiative.

It is well known that, once established in a country, salt iodization is a permanent and long-term
solution to the problem of iodine deficiency disorders. It eliminates iodine deficiency, continues to give
each individual his/her daily iodine needs and prevents recurrence. Within 1 year of a community
regularly consuming salt containing the required level of iodine, there will be no further birth of
children with subnormal mental and physical development attributable to iodine deficiency. Goitres in
primary school children and adults will have started to shrink or even disappear altogether. Children
will be more active and perform better at school.

There have been a number of noteworthy achievements in IDD elimination over the past decade.
By 1998, more than 170 countries had committed themselves to universal iodization of salt. Many
countries have provided resources for IDD elimination in their national financial budgets and are
progressing towards the goal of universal salt iodization.

Salt iodization has witnessed a remarkable growth in application. According to UNICEF reports,
most of the populations in more than 87 countries—at least 68% of the world’s population—already
have access to iodized salt. Forty-five countries have achieved more than 75% coverage.
Investment (public and private) in the iodized salt industry over the past decade exceeds US$ 1 billion and continues to grow.

More than 12 million cases of mental retardation in infants are prevented annually.

Success with salt iodization had given governments a new confidence to address other more complex micronutrient problems through food fortification to deliver essential micronutrients to their populations.

In many developing countries, salt iodization is the first large-scale experience in national fortification of a commodity to eliminate a public health problem. It has taught valuable lessons in collaboration between government, industry, nongovernmental organizations, the media, the community-at-large and other sectors. It has also offered insights into building and sustaining an intervention politically, technically, managerially, financially and culturally.

The key role of the salt industry in iodization programmes

The specific objective of iodization programmes is to integrate iodization into the prevailing salt production and distribution system in a country with minimum cost and disruption. The salt industry has obviously been a key player in enabling this major public health achievement; however, the production process and scale vary over a wide range in this most ancient of industries. Salt manufacturing techniques and product quality vary over a wide range from cottage-scale units producing a few hundred tonnes a year to very large fully automated plants producing several million tonnes. Some countries depend entirely on mining of underground rock salt deposits; others depend on the extraction of salt from seawater or saline lake/underground brine by solar drying. In a few countries they produce both forms. For units that produce over 10000 tonnes per year and are well-organized with quality control systems, the integration of iodization has been easy. Such large producers account for nearly 75% of all salt for edible consumption in these countries. However, many small units along coastlines or lake shores produce salt as a semi-agricultural operation. These units often operate with a minimum of organization and almost no quality control. They are scattered along the coast or lakeshores and do not lend themselves to regulation by the government. Very often precise figures regarding their location, extent of holdings and production statistics are not available. These producers tend to have limited financial means and lack access to technical or financial assistance to begin quality iodization processes and to monitor quality. As a result the salt produced in these units is of poor quality. This has complicated USI programmes. In addition, these producers have poor packaging practices or do not package the salt at all, yet they are often the main salt suppliers to the communities most at risk of IDD.

As a second phase of USI, governments need to pay special attention to small producers. The producers need to be convinced that they can and should have a role to play in the USI programme. Governments might accomplish this by illustrating the benefits for the producers, including economic returns. Ultimately, the production of iodized salt must benefit the producers economically in order for their efforts to be sustainable. As a long-term aim, they should also be supported to upgrade their facilities in general. In order to remain economically viable, small salt producers will have to change with the times. The trend will inevitably be towards better quality, iodized salt. To work towards this, they may need to form cooperatives with other producers. A shared iodization machine may be the starting point for such a cooperative. The next step may be a packing machine. Alternatively the small producers also could be supported in supplying their salt to a larger producer, who would undertake the task of iodization and packaging and perhaps purification.

Technical training and assistance is often needed, for example in establishing production, quality control sampling and analytical procedures. In some cases, appropriate technology for salt purification needs to be provided. Simpler quality control and analytical techniques, such as test kits, may also be needed.

A further problem experienced in some countries is multiple levels of iodization and packaging. In this situation, raw salt producers supply their uniodized salt to multiple small re-packagers who take on the task of iodization and packing the salt into consumer-size bags. As with small salt producers, these facilities often do not have the capacity to consistently produce good quality iodized salt and to monitor its quality. Where this practice occurs, governments should encourage raw salt producers, especially if they are large, to iodize the salt at source. These raw salt producers can thereafter supply
large sacks of iodized salt to re-packagers for packaging into small bags. By encouraging iodization at source, the number of facilities that need to be monitored is reduced and large producers can take advantage of economies of scale to implement more dependable and uniform iodization techniques.

The stability of iodine in salt and levels of iodization are questions of crucial importance to national planners and salt producers as they have implications for programme effectiveness, safety and cost. High humidity results in rapid loss of iodine from iodized salt, ranging anywhere from 30% to 98% of the original iodine content.

By refining and packaging salt in a good moisture barrier, such as low-density polyethylene bags, iodine losses can be significantly reduced during storage periods of over six months. Over the past decade there have been significant investments in salt refining capacity in several countries. This augurs well for iodization, since refined salt in watertight packing retains up to 80% of iodine for 12 months.

Requirements for achieving and sustaining USI

In addition to programmes being in place, the key requirements to achieve and sustain USI include:

- Continued and strong government commitment and industry motivation are essential to eliminate IDD. The problem of sustainability after withdrawal of foreign aid has not yet adequately addressed. Programmes should continue after external inputs are withdrawn with more national resources in firm and permanent budgets to sustain progress. Political commitment to IDD elimination needs constant renewal. The economics of the salt industry and the food processing industry need to be more fully understood by the health and scientific community in order that recommendation for national consideration makes good business sense as well as good public policy. Elimination of IDD will reduce preventable mental retardation annually, but this must be made into a socially positive political goal.

- A clear communications strategy should be implemented to expand and sustain consumer awareness and demand for iodized salt. The message should be that children have the right to reach their genetic potential and that people have the right to demand fortified products like salt at convenient locations, in appropriate packages, at fair prices...and forever.

- There is an immediate need to cover those who currently do not receive iodized salt. A managerial overview of national resources dedicated to this effort requires priority attention. In so doing we must avoid the danger of thinking of IDD as a problem mainly for rural or mountain populations. It is a major urban problem, as well. Countries with limited resources, or smaller problems need more help; others need support to accelerate existing plans.

- The salt industry should have the mandate and resources to ensure effective iodization. Producer compliance, quality assurance, logistical problems and bottlenecks need to be addressed through effective advocacy and social communications.

- Sustained management input and quality assurance of product, process and progress.

- Training of personnel is a vital, continuing component. Every country needs constant vigilance to assure that (a) the producers are fully up to date and have good personnel for packaging, monitoring, reporting and analysis; (b) the country is inserting knowledge about iodine into learning channels, training courses, public communication and schools; (c) responsible agents such as ministries of health have adequate trained personnel for their vital role of surveillance and assessment of progress in human nutrition, including laboratories and other support measures.

- Monitoring systems should be in place to ensure specified salt iodine levels and coordinated with effective regulation and enforcement.

- National training schemes in micronutrient malnutrition are priority needs. The need for constant attention to this aspect cannot be overstated. These need to be multidisciplinary in composition and scope. All stakeholders in success must be kept up to date.

- The final proof of impact and successful elimination of iodine deficiency is reflected in the reduction in prevalence of iodine deficiency disorders, which need to be monitored and tracked at periodic intervals.
New frontiers

Over the past decade there has been a worldwide movement by consumer groups to raise private sector consciousness to participate in tackling social and environmental problems. Viewed from this angle, IDD control presents an opportunity for the salt industry to derive economic and social benefit for itself while simultaneously providing a social benefit to the community by fortifying the salt they produce and sell. The salt industry and trade can play an important role at the global, regional and country level in terms of social advocacy and by providing the vitally needed technical and financial input to eliminate several nutrient deficiencies from the face of the earth.

Significant lessons learned

As significant as these achievements are and as exciting as their potential might be, there is much to be done. The goal of universal iodization of all salt for human and animal consumption is close to being achieved; however, the challenge does not end there. There is evidence of declining IDD prevalence but the goal of elimination has not yet been achieved. Experience over the past decade has provided several valuable lessons, which point to future strategies to expand and sustain the universal iodization of salt.
2. Technical discussions

2.1 Iodine deficiency in the Region

Dr Anna Verster

Iodine deficiency causes abortions, stillbirths, motor skill disturbances, impaired growth and impaired cognitive development, with a possible reduction in intelligence of 10-15 IQ points. Iodine deficiency from the public health point of view is the single most important preventable cause of brain damage. In the Eastern Mediterranean Region, 170 million people are at risk of iodine deficiency.

*TGR: Total goitre rate

Figure 1 Iodine deficiency disorders in the Eastern Mediterranean Region, 1999

Eighteen countries of the Region have recognized IDD as a public health problem requiring urgent attention, 16 have enacted legislation and 17 have implemented universal salt iodization programmes. Universal iodization of salt has been achieved in 6 countries, and 2 countries have declared that IDD is under control.

Figure 2 Activities related to IDD and universal salt iodization

In the World Summit for Children in 1990, the International Conference on Nutrition in 1992 and the World Health Assembly in 1993, governments of all Member States pledged to eliminate iodine deficiency by 2000. In order to accomplish this, two steps are required:

- Iodine needs to be provided to the entire population, regularly and forever;
The best way to provide iodine is through universal salt iodization (USI); this means that all edible salt must be iodized.

The first step towards achieving USI was a tri-regional travelling seminar organized between the WHO Eastern Mediterranean, South-East Asia and Western Pacific Regional Offices, which was organized in India and Nepal in November 1991 to observe salt iodization and iodized oil distribution in practice. This seminar showed that salt iodization was simple and feasible. Subsequently, the Islamic Republic of Iran and the Syrian Arab Republic started salt iodization programmes.

In 1995, the First Regional Meeting of Salt Producers was held in Jordan. WHO and UNICEF jointly organized this meeting, the main objective of which was to raise the awareness of the salt producing sector to the important role played by iodine in the prevention of brain damage. The Regional Iodized Salt Producers Association (RISPA) was created at this meeting. The meeting also resulted in the formation of a partnership between governments, the salt industry, consumers and United Nations agencies.

The decade goal of virtual elimination of IDD received new impetus from the establishment of a mid-decade goal by UNICEF, which stated that universal salt iodization should be achieved by the end of 1995.

For the next steps, all partners must carefully monitor progress to ensure that: all salt is adequately iodized and continues to be so for the future generations; consumers receive and continue to receive sufficient iodine to satisfy their requirements; and that the iodine status of the population concerned improves with the consumption of iodized salt.

It is important to balance the iodine levels in salt with the consumption pattern of the population concerned. While the IDD control programme unit of the Ministry of Health acts as the pivot, there are also other important partners. This complicated relationship has been graphically represented in Figure 3, shown below.

![Figure 3: Relationship between iodine levels in salt and in the human population](image)

**Discussion**

More salt needs to be iodized properly in the Region. The fortification level for iodine is outlined in the WHO/UNICEF/ICCIDD guidelines at a range of 20–40 ppm. However, countries should set the limits at a single value within the range and allow for a ±10 ppm margin, for control purposes. The decision must be made collaboratively with concerned stakeholders such as the industry, ministries of health and bureaux of standards. Producers will be protected by the fact that there is a margin of ±10 ppm.

Some countries iodize only table salt. Other food commodities that contain salt are available to the public, therefore WHO recommends that all salt used for human and animal consumption should...
be iodized. Iodization of salt used for animal consumption increases the meat production, milk yield and quality of hides.

As it will not be possible to achieve the iodization goal of the World Summit for Children, which was to achieve USI for all countries by 2000, renewed commitments and goals should be identified. Governments need to continue efforts towards salt iodization and its monitoring.

WHO and UNICEF are committed to working with the governments and MI/ RISPA to continue IDD control efforts. The Salt 2000 meeting will discuss salt iodization and will be a good chance for renewed commitment by the salt producers of the world. Also, renewed commitment by countries is a key element of maintaining salt iodization efforts, and countries are requested to investigate the causes of non-achievement of salt iodization and to learn from the success stories in the Region (i.e. the Islamic Republic of Iran and Tunisia). Consumer awareness is an integral component of the success of salt iodization.

Target iodine levels should be set to satisfy both ends of the intake ranges. The levels actually needed are very low, but additional intakes are excreted in the urine. Although very high levels of iodine have negative effects for people with severe goitre, deficiency of iodine has serious consequences for the entire population. Iodine fortification levels up to 100 ppm have been used safely; however, there is no need to burden the industry and the population with unnecessarily high amounts of iodine.

In determining iodization levels, it is essential to consider all factors such as consumption patterns, prevalence of IDD, expected losses through cooking, transport, packaging and whether the iodine is available through other vehicles. The determining factor should be that those most at risk of IDD should be able to consume enough iodine. National IDD committees are responsible for setting the iodization levels in the country and reviewing the progress of IDD elimination.

It is important to recognize the difference between iodate and iodine; 100 ppm potassium iodate should be divided by 168 to get iodine. All WHO/ UNICEF standards refer to iodine.
2.2 Monitoring quality in salt iodization and iodized salt transit

Dr Robabeh Sheikholeslam

General principles

Collection of data and information at each level, their analysis and timely feedback to all stakeholders are the key in the universal iodization of salt (USI). The best way to collect the required information is to administer and implement guidelines and regulations for data collection within the framework of existing bodies and structures.

The first step of implementation is to identify the potential resources and structures existing at the district, provincial and national levels. These include:

- Departments dealing with inspection and food quality control
- Food laboratories
- Salt producers
- PHC system and its functions at different levels
- Schools
- Volunteer groups
- Means of access (roads and transportation systems)
- Mass media, cooperatives and wholesalers.

Once the potential resources and structures and their possible functions in the implementation of salt iodization have been identified, guidelines and data sheets must be prepared. Emphasis should be put on assuring that they are user-friendly and easily integrated within the existing structures. In addition, the guidelines should effectively use existing personnel at all levels. The private sector should be regarded as an important partner, and support and adequate in-service training should be provided to it.

Data should be analysed at all levels (district, provincial and national) and feedback on the data obtained should be provided to all stakeholders, including salt producers.

An overview of factors that are important for a successful universal salt iodization programme at the different levels (production, distribution, household and national level) is given below.

At the production level ensure that:

- The iodine content of salt at the factory level is adequate.
- The factory abides by governmental standards of production, packaging and labelling.
- Production standards are followed for iodization of salt.
- Quality specifications for iodide or iodate are available at the factory.
- Routine iodine assays based on national standards are carried out at the factory.
- There is adequate supervision from the responsible governmental body.

At the distribution level ensure that:

- Iodized salt samples are taken at appropriate intervals from different outlets and sent to the responsible food laboratories.
- Imported salt contains adequate levels of iodine.
- Wholesalers and retailers purchase only iodized salt with adequate levels of iodine.
- Shopkeepers in rural and urban areas have only iodized salt for sale.

At the household level ensure that:

- All households, both in urban and rural areas, have access to salt with adequate levels of iodine.
- There is awareness of IDD and the benefits of iodized salt, to ensure that all households prefer consuming iodized salt to other salts at their disposal.

At the national level ensure that:

- Everyone has access to iodized salt.
- Everyone uses iodized salt and the intake of iodine in the population is adequate.
- All salts are checked for iodine level regularly at different levels.
- The price of iodized salt is controlled from the production level down to the household level.
Quality monitoring of iodized salt in the Islamic Republic of Iran

Under the national IDD Elimination Committee, a subcommittee for production and distribution of iodized salt devised guidelines and regulations for USI activities; identified related bodies and their functions; defined guidelines and activities for each section and the tasks required at different levels; developed training materials; and conducts the required training for salt producers, laboratories and health care workers.

At the production level, daily sampling of a continuous line of iodized salt is carried out between 8–10 times a day in each factory. The level of iodine is analysed by the titration method and registered in a logbook. The Food Inspection Department inspects the salt factories for appropriate manufacturing techniques, labelling, potassium iodate, storage of iodized salt and the accuracy of laboratory notebooks. Random samples of iodized salt are taken from factories and dispatched to the provincial food laboratories for additional assessment.

The results of iodized salt analysis are recorded on special iodized salt evaluation forms (ISEFs) and sent to the national recordkeeping level through the provincial IDD committee. Use of the titration method for iodine analysis at the factory level is always carefully monitored.

In order to maintain quality control at the distribution level in urban areas, salt sold in the open market is sampled every three months by staff from the environmental health department and analysed in local food laboratories. Provincial IDD committees send the results, recorded on the ISEF, through the provincial laboratories to the national level.

In addition, iodized salt is also inspected at all sites where food is provided (restaurants, hospitals, day care centres and cafeterias). If tests indicate an absence or deficient amount of iodine, IDD awareness-raising activities are conducted and the source of iodine-deficient salt is traced. The information is also forwarded to the national level.

At the national level, all data received on ISEFs are entered into a computer. Half-yearly reports are generated and feedback is sent to the IDD committees, local and provincial laboratories, salt producers, food inspection departments, environmental health departments and national food laboratories. A similar procedure is followed with market salt, and feedback is sent to the appropriate bodies.

Quality assurance and quality control in distribution in the rural areas comprises testing iodized salt at the local retail shops, schools (every six months) and all households (once a year) by the behvarz (community health worker) at the Health House. Results of iodized salt utilization at the household level are registered. Health technicians supervise the activities of the behvarz.

The National Food Laboratory sends blind samples of iodized salt to the provincial laboratories to check the accuracy of the work of these laboratories. This exercise is done every two years. Where necessary, appropriate training is provided to the provincial laboratories to improve performance.

Monitoring of USI is also carried out through different types of surveys. Questions on IDD are incorporated into general public health surveys, and small-scale salt surveys assess iodized salt utilization in households in rural and urban areas. In surveys that also investigate goitre prevalence, urinary iodine levels of all schoolchildren aged 8–10 years is tested.

Discussion

The uses and limitations of field test kits were discussed, as illustrated in Figure 4. Various methods are available for qualitative testing of iodine in salt samples. Several locally produced iodine testing kits available in the Region were demonstrated and later put up for display for the benefit of the participants.

Differences between iodine and iodate levels in salt create difficulties for salt producers and consumers alike. This issue was to be addressed while developing the recommendations for the meeting.
Salt contains iodide, not iodate. Take sample to titrate and use iodide test kit next time.

Kit is old. However, the salt may contain iodine. Take sample and titrate in laboratory.

Salt contains iodine. This test will not indicate the exact quantity of iodine in salt. Titration test will be necessary to determine exact level of iodine.

No change in colour*

Salt contains no iodine. Take sample and titrate.

Purple or dark blue colour develops

*If no colour change is seen after adding iodine test solution, always take a sample and use titration test as benchmark before taking any enforcement measure.

Figure 4 Uses and limitations of the field test kit
2.3 Salt situation analysis in the Middle East, North Africa and Eastern Mediterranean
Dr Izzeldine S. Hussain

Iodine deficiency affects a broad swath of the North Africa, Middle East and Eastern Mediterranean Region and is particularly severe in Islamic Republic of Iran, Iraq, Pakistan, Lebanon, Sudan and Syrian Arab Republic.

A salt situation analysis was made based on visits to three countries in the Region: Pakistan, Syrian Arab Republic and Lebanon. Field visits were made to salt plants and information about the process of salt preparation and iodization was obtained. Data on other countries were obtained directly from producers and salt traders and from the RISPA database. The analysis focused on modes of production, capacity, iodization techniques and information on packing, pricing and enforcement of legal requirements.

The Region is generally characterized by multiple salt production sites, inadequate distribution of iodized salt and wide variation both in types of salt available in the market and in salt distribution patterns. Moreover, salt producers in the Region are a diverse group of mostly private companies and industries, large and small, some of which operate outside any legal administrative framework.

Primary salt production and processing in the Region

The main sources of raw material in the Region are rock salt mines, found primarily in Islamic Republic of Iran, Iraq, Morocco, Pakistan and Syrian Arab Republic (Table 1). A few modern salt operations are found in Egypt, Jordan, Libyan Arab Jamahiriya and Saudi Arabia. Some salt producing plants are government-owned (Egypt and Syrian Arab Republic).

Iodine deficiency disorders affect an estimated 32% of the Region’s population. Based on an annual rate of salt consumption of 4 kilograms per person, it is estimated that nearly 2,500,000 tonnes of refined iodized salt are required to satisfy the iodized salt demand in the Region.

Secondary salt processing in the Region

Despite the sizeable raw salt deposits only a few modern salt refineries exist in the Region. Salt is still produced by large numbers of traditional processors, which yield a low quality and low-priced type of coarse salt. In general, secondary salt processing in the Region includes coarse salt wash plants, dry process refining plants and vacuum extraction and crystallization of salt (Table 2).
Table 1  **Total raw salt production in the Eastern Mediterranean, Middle East and North Africa, 1999**

<table>
<thead>
<tr>
<th>Country</th>
<th>Rock salt (tonnes/year)</th>
<th>Lake, sea and subsoil salt (tonnes/year)</th>
<th>Imported salt (tonnes/year)</th>
<th>Total salt (tonnes/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Afghanistan</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Algeria</td>
<td>NA</td>
<td>173 000</td>
<td>NA</td>
<td>173 000</td>
</tr>
<tr>
<td>Bahrain</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Djibouti</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Egypt</td>
<td>-</td>
<td>2 000 000</td>
<td>-</td>
<td>2 000 000</td>
</tr>
<tr>
<td>Iran, Islamic Republic of</td>
<td>500 000</td>
<td>-</td>
<td>-</td>
<td>500 000</td>
</tr>
<tr>
<td>Iraq</td>
<td>100 000</td>
<td>-</td>
<td>-</td>
<td>100 000</td>
</tr>
<tr>
<td>Jordan</td>
<td>-</td>
<td>1 000 000</td>
<td>-</td>
<td>1 000 000</td>
</tr>
<tr>
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<td>-</td>
<td>40 000</td>
<td>-</td>
<td>40 000</td>
</tr>
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<td>Lebanon</td>
<td>-</td>
<td>3 000</td>
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<td>23 000</td>
</tr>
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<td>-</td>
<td>50 000</td>
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<td>85 000</td>
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<td>55 000</td>
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<td>NA</td>
<td>NA</td>
</tr>
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<td>Saudi Arabia</td>
<td>-</td>
<td>1 000 000</td>
<td>-</td>
<td>100 000</td>
</tr>
<tr>
<td>Somalia</td>
<td>-</td>
<td>27 000</td>
<td>-</td>
<td>27 000</td>
</tr>
<tr>
<td>Sudan</td>
<td>-</td>
<td>80 000</td>
<td>-</td>
<td>80 000</td>
</tr>
<tr>
<td>Syrian Arab Republic</td>
<td>120 000</td>
<td>-</td>
<td>-</td>
<td>120 000</td>
</tr>
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<td>Tunisia</td>
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<td>NA</td>
<td>NA</td>
<td>NA</td>
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<tr>
<td>United Arab Emirates</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Yemen, Republic of</td>
<td>100 000</td>
<td>20 000</td>
<td>-</td>
<td>120 000</td>
</tr>
<tr>
<td>Total raw produced yearly</td>
<td></td>
<td></td>
<td></td>
<td>4 584 000</td>
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NA: Information not available
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<thead>
<tr>
<th>Country</th>
<th>Method of secondary processing</th>
<th>Total raw produced</th>
<th>Quantity refined</th>
<th>Quantity iodized</th>
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<tr>
<td>Afghanistan</td>
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<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Algeria</td>
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<td>173 000</td>
<td>80 000</td>
<td>63 000</td>
</tr>
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<td>Bahrain</td>
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<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Djibouti</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Egypt</td>
<td>Wet process, washing plant</td>
<td>2 000 000</td>
<td>1 000 000</td>
<td>200 000</td>
</tr>
<tr>
<td>Iran, Islamic Republic of</td>
<td>Dry process and washing plant</td>
<td>500 000</td>
<td>300 000</td>
<td>250 000</td>
</tr>
<tr>
<td>Iraq</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Jordan</td>
<td>Wet process, vacuum crystallizing</td>
<td>1 000 000</td>
<td>300 000</td>
<td>50 000</td>
</tr>
<tr>
<td>Kuwait</td>
<td>Vacuum processing</td>
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<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Lebanon</td>
<td>Vacuum crystallizing</td>
<td>20 000</td>
<td>13 000</td>
<td>11 000</td>
</tr>
<tr>
<td>Libyan Arab Jamahiriya</td>
<td>Vacuum crystallizing</td>
<td>50 000</td>
<td>40 000</td>
<td>20 000</td>
</tr>
<tr>
<td>Morocco</td>
<td>Wet processing</td>
<td>166 000</td>
<td>96 000</td>
<td>56 000</td>
</tr>
<tr>
<td>Oman</td>
<td>Wet processing and vacuum crystallizing</td>
<td>40 000</td>
<td>33 000</td>
<td>9000</td>
</tr>
<tr>
<td>Pakistan</td>
<td>Vacuum crystallizing and dry process</td>
<td>450 000</td>
<td>250 000</td>
<td>60 000</td>
</tr>
<tr>
<td>Qatar</td>
<td>NA</td>
<td>NA</td>
<td>20 000</td>
<td>NA</td>
</tr>
<tr>
<td>Saudi Arabia</td>
<td>Wet processing and vacuum crystallizing</td>
<td>100 000</td>
<td>40 000</td>
<td>20 000</td>
</tr>
<tr>
<td>Somalia</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Sudan</td>
<td>Crushers (dry process)</td>
<td>80 000</td>
<td>20 000</td>
<td>8000</td>
</tr>
<tr>
<td>Syrian Arab Republic</td>
<td>Wet processing and vacuum crystallizing</td>
<td>NA</td>
<td>109 000</td>
<td>77 000</td>
</tr>
<tr>
<td>Tunisia</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>Yemen, Republic of</td>
<td>Crushers and wet processing</td>
<td>50 000</td>
<td>24 000</td>
<td>NA</td>
</tr>
</tbody>
</table>

NA: information not available
Promotion of iodized salt

Table 3 Iodized salt prices and major brands in the regional market

<table>
<thead>
<tr>
<th>Salt brand</th>
<th>Country of origin</th>
<th>Package sizes</th>
<th>Retail price in US$</th>
</tr>
</thead>
<tbody>
<tr>
<td>American Garden</td>
<td>USA</td>
<td>700 g</td>
<td>1.00</td>
</tr>
<tr>
<td>Fairco</td>
<td>USA</td>
<td>700 g</td>
<td>1.00</td>
</tr>
<tr>
<td>Gulf Salt</td>
<td>USA</td>
<td>700 g</td>
<td>1.00</td>
</tr>
<tr>
<td>SFZ</td>
<td>Islamic Republic of Iran</td>
<td>1 kg</td>
<td>1.00</td>
</tr>
<tr>
<td>NEZO</td>
<td>Netherlands</td>
<td>700 g; 1 kg, 25 kg</td>
<td>0.75</td>
</tr>
<tr>
<td>MAX</td>
<td>Egypt</td>
<td>700 g; 1, 25, 50 kg</td>
<td>1.00</td>
</tr>
<tr>
<td>National Salt</td>
<td>Pakistan</td>
<td>1 kg</td>
<td>0.50</td>
</tr>
<tr>
<td>SASA</td>
<td>Saudi Arabia</td>
<td>700 g; 1 kg; 25 kg</td>
<td>0.15</td>
</tr>
<tr>
<td>SASI</td>
<td>Jordan</td>
<td></td>
<td>0.75</td>
</tr>
<tr>
<td>SAFI</td>
<td>Jordan</td>
<td>1 kg, 25 kg</td>
<td>0.65</td>
</tr>
<tr>
<td>Neptune</td>
<td>Lebanon</td>
<td>1 kg, 25 kg</td>
<td>0.50</td>
</tr>
<tr>
<td>Safa</td>
<td>Oman</td>
<td>700 g</td>
<td>0.65</td>
</tr>
<tr>
<td>Mermaid</td>
<td>Oman</td>
<td>700 g; 1 kg, 25 kg, 50 kg</td>
<td>0.50</td>
</tr>
<tr>
<td>Hotace</td>
<td>Oman</td>
<td>700 g; 1 kg, 25 kg, 50 kg</td>
<td>0.40</td>
</tr>
<tr>
<td>Al Jamil</td>
<td>UAE</td>
<td>1 kg</td>
<td>0.50</td>
</tr>
<tr>
<td>BME</td>
<td>UAE</td>
<td>1 kg</td>
<td>0.50</td>
</tr>
<tr>
<td>Serami</td>
<td>UAE</td>
<td>25 kg, 50 kg</td>
<td>0.30</td>
</tr>
<tr>
<td>Supra</td>
<td>UAE</td>
<td>1 kg</td>
<td>0.30</td>
</tr>
<tr>
<td>Neo</td>
<td>UAE</td>
<td>1 kg</td>
<td>0.30</td>
</tr>
<tr>
<td>Aftco</td>
<td>USA</td>
<td>700 g</td>
<td>1.00</td>
</tr>
</tbody>
</table>

The maximum retail price of each iodized brand varies between countries and locations (Table 3). The price depends on actual cost of production and import charges. In turn, the cost of production depends on the efficiency of the plant, the losses at refineries and presence of total quality management.

The price that the consumer pays for salt is based on a free market strategy that relies on supply and demand. No government intervention is practised in the Region. However, the modern refineries suffer from low revenues for salt that is not refined and iodized.

It is important that the governments in the Region establish clear rules for packaging units and fix certain standards for iodized salt in the market in order to safeguard the interests of both the public and the salt refineries in the Region.

Distribution and marketing of iodized salt in the Region

Most countries in the Region enjoy a well-developed distribution chain in the big cities only. The chain is composed of supermarkets, self-service stores and large groceries, all with good storage systems. The salt in most countries of the Region except Afghanistan, Islamic Republic of Iran and Syrian Arab Republic is distributed through wholesalers to reach grocery stores, where it is purchased by consumers. The wholesalers also go directly to the public and end users, such as school canteens, hospitals, military camps, hotels and labour compounds. Salt is also sold through mobile markets.
Promotion of iodized salt

Challenges for the salt industry

Success of the fortification of salt with iodine depends on ensuring a steady and uninterrupted flow of salt from the conveyer belt. However most refineries still are unable to adjust the iodine level. This is mainly because salt workers are not trained in proper iodization procedures, quality assurance, and maintenance of iodization equipment. Jordan has optimized its procedures for salt workers and consolidated laboratory and other quality control measures.

Salt producers in the Region almost universally use potassium iodate. The cost of iodine fortification varies from US$ 1.75 to 3.50 per tonne of salt iodized. Variations in prices paid by producers for potassium iodate cause difficulties for the industry in some countries like the Syrian Arab Republic, where potassium iodate is centrally procured and distributed through a government-owned pharmaceutical company. Interruption in the supply of potassium iodate has been experienced, making the actual quantity of iodized salt available in the market less than the amount required.

A further complicating factor is that some countries in the Region specify their requirements as potassium iodate content, while others stipulate the iodine content. The difference between these two specifications is not fully understood by all producers and traders and often leads to confusion. It would benefit the salt industry to harmonize the terminology of the requirements. In addition, variation in the permitted range between upper and lower limits is a problem for the salt industry. Some countries in the Region specify only the required iodine content without indicating permissible tolerances.

Potassium iodate flow into the Region is also a great concern to salt industry. Larger producers import their supplies directly from the manufacturers, whereas smaller producers obtain their annual requirements from chemical brokers, often at a higher price. There should be a mechanism for making potassium iodate affordable in the Region. Central procurement for the entire Region would lead to a sustainable reduction in prices.

Main issues

Quality assurance

- There is a significant variation across the Region in the infrastructure for quality assurance.
- Less than 25% of the salt refineries validate the continuous mixing process to ensure constant, consistent mixing and 32% of the industry have their own laboratories on site with qualified technicians to do iodine analysis by titration.
- Small producers who have not been covered in this assessment have no internal quality control system.
- Only three refineries in the Region have compiled a quality assurance manual or have had assistance from government laboratories (central laboratories) in the implementation of their quality assurance system.
- No quality assurance infrastructure exists within the salt importers in the Region who repack salt. There is also no infrastructure at entry or importation levels (quantities).
- The current capacities of the salt industry in the Region to produce high quality iodized salt and of the government authorities to inspect, sample or analyse iodized salt are often limited, and proper training is needed.

Iodized salt packaging and labelling

- The heat sealed polyethylene bag is the predominant type of packaging in the Eastern Mediterranean, Middle East and North Africa, as it is the most economical. The industry also uses woven polyethylene lined bags.
- It is a common practice in most countries of the Region for traders and salt suppliers to purchase salt in bulk bags and dispense salt into small containers at the point of sale to consumers. Logo and iodine content of salt are indicated only by salt refineries and original producers. Repackagers and traders provide no logo or iodine content information.

Transport and storage conditions of iodized salt

- Transport of iodized salt takes place by road and sea, with road transport the most common method of transport used by salt producers. Sea transport is also used by importers and in cross-border trade.
The largest importers of salt in general and iodized salt in particular are the countries of the Gulf Cooperation Council, followed by Djibouti, Lebanon and Afghanistan.

Iodized salt is generally stored under favourable conditions in warehouses. However, in rural areas salt is often stored outside and under unfavourable conditions, especially bulk packed salt.

Demand creation, social marketing and awareness

Since the salt industry is the key player in the iodization project, its motivation and involvement are essential prerequisites. All salt industry personnel in the Region need technical education in aspects of salt production and iodization.

The Region lacks technically trained workers for production and quality control, and lacks strong advocacy with the salt manufacturing and trading community. More understanding is needed of the economics and logistics of the salt trade and of the knowledge, attitudes and practices with respect to IDD, iodized salt and effective dissemination of messages through appropriate channels to target communities.

Legal environment

Ministries of health are the bodies responsible for salt inspection in most countries of the Region, but ministries of trade and industry as well as bureaux of standards are also involved (i.e. Egypt, Jordan, Lebanon and Oman).

In most countries the present legislation depends on external control (monitoring). The legal provision does not always cover internal monitoring by the industry.

Iodized salt legislation which makes provisions for numerous exemptions from iodization (animal, food, industry, etc) creates problems for salt producers and encourages circulation of noniodized salt for public consumption.

Liability of salt traders in respect to salt legislation has not been considered particularly where re-packaging of salt is involved.

Conclusion

The salt industry in the Region has generally been successful in meeting the IDD challenge, but often under very difficult conditions.

Salt iodization is not simply a matter of passing legislation. Poor quality control during production, lack of knowledge and trained workers are the most immediate constraints for further progress of USI in the Region.

It is estimated that nearly 2,500,000 tonnes of refined iodized salt are needed in the Region. From the primary range of 4,584,000 tonnes yearly, only 1,965,000 tonnes are perfectly iodized. In order to increase the availability of iodized salt for the consumer, new refineries would have to be built to increase their present production capacity.

Government monitoring systems in the Region are insufficient. This makes the oversight of the IDD programme and the enforcement of salt iodization legislation difficult.

In some countries of the Region (Pakistan, Lebanon, Sudan, Afghanistan, United Arab Emirates and Saudi Arabia), the salt industry and IDD-related partners are not involved as full partners in the planning and management of national IDD programmes.

Suggestions

To meet the policies of salt iodization (USI) adopted by the governments of the Region, the Region needs to increase the present production capacity of iodized salt either by installing new refineries and/or encouraging national investors to invest in the abundantly available raw material in the Region.

The Region lacks a proper strategy for creating demand for iodized salt. This is necessary in order to have a sustainable monitoring process and ensure acceptance of iodized salt in the long term. Social marketing for IDD is needed; establishment of a salt training centre would be beneficial. Such a centre could deal with the major components of the regional programme to eliminate IDD, such as:
- Training of salt workers in the Region
- Advocacy, education, and social marketing
Promotion of iodized salt

? Intervention, design and implementation and establishment of an overall system of total quality management and assurance.
? Making potassium iodate centrally available and distribute iodized salt to areas with no iodine means.

Ministries of health in the Region, with support from WHO/UNICEF/RISPA, should urge the ministries of finance and economy to have the import tax on potassium iodate and iodizing equipment and plants withdrawn and should secure flow of iodate to industry.

The governments in the Region should prohibit production of salt by unauthorized groups and motivate the private salt industry to increase productivity. Exemptions for industrial salt should be based on legitimate premises only.

The governments in the Region should formulate a plan of action to address the question of iodization of animal salt and encourage discussion with veterinary departments, the salt industry and the communities.

The governments in the Region should mobilize all segments of regional society to include policy-makers, health professionals, religious leaders, schoolteachers, household members and the salt industry to strengthen efforts towards eliminating IDD and make iodized salt affordable, simple and sustainable.

With immediate effect the salt industry in the Region is recommended to introduce internal quality assurance and total quality management and to establish a quality control laboratory and assign a technician to operate the laboratory.

The salt industry in the Region should ensure proper iodization techniques in the existing production lines.

The salt industry in the Region is recommended to form national associations in an effort to achieve uniformity of quality, exchange information and liaise with the regional association.

Discussion

Quality of salt is an essential factor in homogeneous salt iodization. However, only 50% to 60% of salt in the Region is refined. Imitation brands are a concern in some cases.

Some countries, such as Egypt, have increased their iodization level as per previous guidelines of WHO. It should be noted, however, that the recommended level has changed and countries need to review their legislation accordingly. Even with a relatively low level of iodization, for example, Switzerland was able to eliminate IDD.

2.4 Salt situation analysis of Sudan

Mr Lorenzo Oscar Maria Locatelli-Rossi

Background

Studies on iodine deficiency disorders (IDD) in Sudan indicate that every state in the country has an IDD problem of public health significance. A technical committee for IDD control was set up in 1991 and assigned the short-term strategy of distributing iodized oil and the long-term strategy of iodizing salt. A ministerial decree was issued in 1994 confirming that salt iodization was the national goal for IDD control.

Salt production and the universal salt iodization programme

Production

Sudan’s main source of salt comes from a 56-kilometre stretch on the coast of the Red Sea. Smaller-scale production also occurs north of the coast but there are no major production sites. There are also small-scale excavations of rock salt deposits in North Darfur, Kurdufan, Jabal Marra and northern regions. The production in these areas is considered insignificant and mostly used for livestock consumption.

In the Port Sudan area there are 11 salt producers, of which Baaboud Salt Company and Sudan Salt Company are the major producers. A twelfth producer, south of Port Sudan, is Haggar Holding Company Ltd. In the past year, the Haggar Company has completed the first phase of building a new
Promotion of iodized salt

Salt pan. The salt pan will have its first harvest this year, estimated at 630 tonnes, and plans to harvest four times a year (the first phase should produce an estimated 2520 tonnes).

The production estimates for Sudan are as follows:

<table>
<thead>
<tr>
<th>Company</th>
<th>Production (tonnes/year)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baaboud Salt Company</td>
<td>125,000</td>
</tr>
<tr>
<td>Sudan Salt Company</td>
<td>80,000</td>
</tr>
<tr>
<td>Others</td>
<td>35,000</td>
</tr>
<tr>
<td>Total (year)</td>
<td>240,000</td>
</tr>
</tbody>
</table>

Pricing

Coarse salt that is found in the informal market is commonly packed by the shopkeeper in a polyethylene bag weighing either 200 or 500 grams. The price in Khartoum for 500 grams is SD 50 (US$ 1 = SD 258). It was reported that at Port Sudan, producers sell 500 grams for SD 15. It is not clear if the coarse salt is milled either by the wholesalers or by the shopkeeper. Coarse salt is mostly bagged by salt producers in 70-kilogram bags.

Distribution

Salt is mainly transported by road from Port Sudan to Khartoum and other centres. There is a rail link but it is rarely utilized for salt. As in all developing countries, distribution to rural and mountainous areas is a serious problem, particularly in terms of cost. A study has been undertaken with regard to salt distribution and marketing in these areas.

Iodization

Following a WHO feasibility study in 1993, UNICEF supplied the two major producers with 11 iodizing machines (6 for Baaboud Salt Company and 5 for Sudan Salt Company). Generators, laboratory equipment and reagents were also supplied. The Federal Ministry of Health received 150 tonnes of iodate for distribution. It was estimated at the time that these producers would supply 80% of the country’s need for iodized salt.

The equipment and material was supplied to the producers in 1995 via the Federal Ministry of Health. No technical arrangements were made to assist the producers during this phase of installation and startup. Due to the poor quality of the salt, the machines had problems and the producers were faced with production difficulties from the start. Two of the main problems were:

- High levels of moisture in the coarse salt that was fed into the machines, which restricted the flow into the feeding unit and necessitated manual feeding.
- Large crystal size created difficulties and slowed output capacity, which was supposed to be 7.5 tonnes/hour, to barely 4.5 tonnes/hour. The large crystal size also put stress on the machine, causing malfunctions and work stoppages.

As a result of these problems, Sudan Salt Company requested that the machines be removed, resulting in a loss of the potential iodization of 80,000 tonnes of salt.

Baaboud Salt Company instead took another strategy, and invested in a new salt refinery. The refinery has a screw type washer, centrifuge and fluid bed dryer. Iodization has been integrated into the refining process. The plant capacity is estimated at 3.5 tonnes per hour. The company will start production in the coming months. They will pack salt in 500 and 1000 gram polyethylene packs.

In 1996, the Federal Ministry of Health was approached by Buskam Trade and Development Company in Nyala, South Darfur State. The company was interested in buying coarse salt from the Red Sea producers and iodizing it in Nyala. In November 1997 iodization of salt started in Nyala, using the same machines supplied to the Red Sea companies. By January 1998, 303 tonnes had been produced, and a year later production of iodized salt had doubled. Production is quality tested using the rapid test kit and titration, and iodized salt is bagged in 70-kilogram polyethylene woven bags.

In addition to the production of iodized salt, the company has introduced very effective distribution and promotion methods. Iodized salt is sold directly to the public in the streets by means of trolleys similar to ice cream trolleys. The trolleys also advertise that interested customers may seek additional information on IDD from the trolley vendors, who are well-informed and prepared to provide such information. This is a remarkable marketing idea and the Buskam Company should be commended for its efforts and innovation.
Internal and external monitoring of iodized salt

A 1994 ministerial decree stipulates that salt must be iodized at 50 ppm. Laboratory facilities have been set up in both the private and public sectors. Training was undertaken by the Federal Ministry of Health in 1995. Fifteen technicians were trained; 2 from the private sector and 13 from the public sector.

The salt companies were also trained, in laboratory management and use of the titration method. Since the rapid test kit is only a qualitative test, titration should be done at least once a day to ensure that correct iodine levels are maintained.

Public awareness survey

Because of the success in Nyala, the National Nutrition Department of the Federal Ministry of Health conducted a survey at the state, mass media and household levels. Those interviewed were asked about their knowledge of IDD and attitudes towards iodization of salt.

At the state level, which included community leaders, respondents were well informed about IDD and had a positive attitude towards the use of iodized salt as a solution. Their conclusions were that:
- There is a need for more political commitment
- More financial support is needed for further developing the project
- Assistance is needed in distributing the salt to retailers in remote villages by creating an iodized salt distribution centre
- Local legislation should be issued to prohibit the sale of non-iodized salt.

Those involved in mass media (television, radio, news agencies and the Health Education Department) also responded positively and were well informed about IDD and its consequences. They were aware that iodized salt was produced in Nyala and had already become consumers of iodized salt. Their comments were:
- Raising community awareness via the media is important
- The media could play a role in facilitating social mobilization and local legislation on iodized salt.
- The Federal Ministry of Health must participate in the public awareness campaign as it is a public health issue
- The Federal Ministry of Health should conduct training courses for mass media personnel and educational material should be made available to them.

At the household level, two surveys were conducted; one in the south and one in the north. For South Darfur, the survey showed that 40% of households used iodized salt; 40% used non-iodized salt; and 20% used both. In North Darfur, 95% of households used non-iodized salt and 2%-5% used both types.

Government commitment

The National Nutrition Department in Sudan has devoted a great deal of effort and energy to ensuring that iodized salt is produced and distributed in the country, but the government must give more support to the programme to make it a total success. Legislation is needed to ensure that only iodized salt is consumed; in addition, the current taxation rate on salt (22%) should be reviewed. The IDD problem is a serious public health issue, and production and sale of iodized salt should be tax-free.

Furthermore, the government-run media should allocate time for enhancing public awareness on IDD and the importance of consuming iodized salt.

The USI programme in Sudan is in need of revision and follow-up. Five machines are at present lying abandoned; they are still valuable equipment that can and should be used. Although much effort and expense went into making the machines available, no consideration was given to proper maintenance and use of the machines during production. Port Sudan has many other salt producers and the machines must be put into use. Further suggestions were that:
- All non-utilized material and equipment should be collected from the salt producers. They should be restored if required and kept in a safe and secure place until further use.
- A technical and business-oriented meeting should be held with all the salt producers on the Red Sea and their views heard as to what could be done with the machines. The baseline survey figures must be shared among the producers so that they can understand the importance of their work.
- The producers should be given guidelines as to the formation of a co-operative in which they would all have access to iodizing machines, iodate and a quality control laboratory.
Buskum Company of Nyala should be invited to share its successful experience and possibly form partnerships with other producers.  
Government should review the seriousness of the 22% tax on salt, and the tax should be withdrawn for iodized salt. This would act as an incentive for producers.  
Government should consider passing legislation for the sale of only iodized salt.  
The National Nutrition Department and the National Chemical Laboratory must maintain their ongoing close working relationship with producers. They are Sudan's keys to success.  
Social awareness campaigns should be given free air time on the government-owned media network and these campaigns must only start once iodized salt has been widely distributed, hence is readily available to the public. The public concerned is primarily the informal markets in the rural areas.  
Salt producers, both small and large, should form a Sudanese Salt Association so that future needs for iodate can be dealt with. The association would also be an important working group that could be more effective in dealing directly with the government, such as with taxation issues.  
United Nations agencies (UNICEF/WHO) should continue to assist the National Nutrition Department of Public Health and the National Chemical Laboratory of Health in their quest to implement USI in Sudan.

Discussion

Prices in Sudan are higher for iodized salt because of the taxes on potassium iodate. However, the cost of iodization itself is negligible and should not result in a price increase.  
In the presence of legislation, non-iodized salt should not be present in the market, except in pharmacies for medical cases. Some countries in the Region have only iodized salt in the market, and especially formulated non-sodium-iodized salt for medical cases.  
Information, education and communication (IEC) campaigns are essential for promoting iodized salt and creating consumer awareness.  
A situation analysis is a prerequisite for determining the iodization levels in countries, therefore they are urged to conduct such analyses.

2.5 Appropriate technologies for salt purification  
Mr Lorenzo Oscar Maria Locatelli-Rossi

Primary washing

It is important to wash salt immediately after harvesting it. While salt is “fresh”, insoluble impurities can easily removed. If the salt is allowed to dry up in the sun, however, these impurities can become difficult to remove.

There are many ways of washing salt. Two of the most common types of washers are:

a) Scrubber type: This is the typical river stone washery. It consists of a large screw conveyor placed in an inclined tank. Salt is fed into the tank from the bottom section and as the salt is transported by the screw transporter upwards, clean brine is sprayed on the salt. Once the salt is washed, it falls into a centrifuge.

b) Vibrating washing screen: This process starts with the tipping of the coarse salt to be washed into a very large feed hopper. The feed hopper feeds a venturi system which pumps saturated clean brine onto the salt. Once the brine and salt are mixed, the mixture (slurry) is pumped through a pipeline to the washing tower. This pipe can be 100-200 metres in length. During this transfer, salt starts to be washed. The slurry is pumped into a hydrocyclone which separates salt and brine. Brine is sent back to the settling pond while the salt is flushed on to a vibrating screen. The screen has a shower of clean brine that separates physical impurities from the salt. Clean coarse salt is then put through a centrifuge, ready for stockpiling.

Stockpiling

Washed salt is then stockpiled for the refinery. Appropriate stockpiling is important; the area should be well designed and accessible, and close to the salt refinery if possible.
Refining

The hydro-milling method is a cost-effective method of refining coarse salt. The system is closed circuit, meaning that all the brine used to purify the salt is recycled, purified and sent back into circulation.

Using a cone shaped washery, salt is conveyed into the cone which, having an upstream of clean brine, eliminates physical and chemical impurities. During this process of transfer, the salt goes through a wet mill (hydro-milling). The mill can be set to grind fine, medium or coarse grain size according to the needs of the industry. After the hydro-mill, the salt goes through the last step of washing after which the salt is fed into a continuous centrifuge.

From the centrifuge (<5% moisture), the refined salt is fed into a dryer. The rotary dryer is the type most recommended. It is a simple piece of equipment with fewer problems than the fluid bed dryer and is very economical to run. Before entering the dryer, potassium ferro-cyanide can be added (sprayed) at a level of 10 ppm. Potassium ferro-cyanide gives a protective coating to the salt and helps to make it less hygroscopic.

From the dryer, a bucket elevator transports the salt to a vibrating screen which separates the various crystal sizes into fine, medium and coarse grade. The screen is placed on top of a series of silos which hold the various grades of salt. Depending on what grade will be iodized, a series of screw conveyors may be placed on top of these silos. The iodizing system is then placed in the appropriate position.

Iodization

Most industries use the wet spray method. The method is appropriate and effective as long as the different components of the process have the necessary capacity. The wet spray method includes basic equipment such as:

a) Iodate solution tank, possibly equipped with a stirring device. The tank should be made of plastic or stainless steel.

b) Peristaltic pump for compressed air that transfers the iodate from the tank to the spray nozzle. The dosing of the iodate is done either by rheostat on the pump, or valve in the case of compressed air.

Once the iodate is sprayed onto the salt, the mixture (salt/iodate) should then go through a mixing chamber. It is important that the mixing chamber be appropriately designed for producing a homogeneous product.

Discussion

Not all countries in the Region have the systems outlined in the presentation. In Saudi Arabia, for instance, the screen is not an appropriate method to be used, as it would cause high losses of salt produced. Each country situation should be individually assessed and appropriate technology custom designed to ensure production of high quality salt that is suitable for iodization.

The method most widely used for appropriate mixing of salt and iodate is a mixing tank for iodate and water, and a pump or compressed air to transfer the liquid to a spray nozzle. The nozzle vaporizes the liquid solution and sprays it onto the salt. Screw conveyers are used for the mixing of iodine and salt. It is essential that enough time be allowed for the salt to be homogeneously mixed.

2.6 Importance of standards and legislation for the iodization of salt

Dr Ahmed Magan

Participants were challenged to identify key constraints in relation to situations existing in the different countries of the Region. The following issues were highlighted:

- Legislation is not an end in itself. Implementation of legislation is an important factor, as are appropriate standards, packaging and labelling.
- The role of inspection and enforcement has to be clearly defined and practised. Standards and legislation that are unrealistic or very difficult to implement serve no purpose.
- Countries will need to harmonize their standards and legislation. This is especially important for countries that carry out extensive cross-border trade in salt.
Council countries could establish a single range of legislation and standards dealing with the level of iodine in salt, indicators for monitoring and quality assurance and establishing prices.

Monitoring is an important component of ensuring that trade practices adhere to the established standards and legislation. Monitoring should continue at all times to ensure that the staff responsible for quality control and maintaining standards are adequately trained and supervised. Monitoring of imported salt is also very important.

Small-scale salt producers and packers of salt should also be addressed in the legislation and monitoring.

In addition, every country will need to inform and educate the public, salt manufacturing sector and the health sector about the existing laws and regulations concerning salt iodization in the country as well as the standards for salt iodization.

### 3. Group work

**GROUP A: Promotion of salt iodization/creating demand for iodized salt**

The group was instructed to develop a strategy for creating demand for iodized salt, as well as to identify the possible constraints in implementing such a strategy and potential means of overcoming the constraints, including the messages that should be conveyed to the various stakeholders.

<table>
<thead>
<tr>
<th>Objective</th>
<th>Strategy</th>
<th>Constraint</th>
<th>Solution</th>
<th>Message</th>
</tr>
</thead>
<tbody>
<tr>
<td>Increase use of iodized salt</td>
<td>Develop awareness</td>
<td>Funding</td>
<td>Governments to undertake generic campaigns</td>
<td>Such a serious problem, such a simple solution: “use iodized salt”</td>
</tr>
<tr>
<td></td>
<td>Sustainable trials</td>
<td>Workforce skills</td>
<td>Communication subsidies to industry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Achieve conversion</td>
<td></td>
<td>Central body (NGO) to develop databank and provide support and technical input</td>
<td></td>
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<tr>
<td></td>
<td>Appropriate pricing</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Engage policy-makers</td>
<td>Agencies to exert influence</td>
<td>Time and commitment</td>
<td>Identify and strengthen communication channels</td>
<td></td>
</tr>
<tr>
<td>(cont’d)</td>
<td>Individual advocacy</td>
<td>Turnover of policy-makers</td>
<td>Public recognition of issue: IDD</td>
<td>Only public-private sector partnerships can address such issues effectively</td>
</tr>
<tr>
<td>Engage the salt industry</td>
<td>“PR” media coverage</td>
<td>Public-private sector communication barriers</td>
<td>Donor inputs</td>
<td></td>
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<tr>
<td></td>
<td>Seminars/ workshops/ exhibitions/</td>
<td></td>
<td>Legislation</td>
<td></td>
</tr>
<tr>
<td></td>
<td>events</td>
<td></td>
<td>IDD and national health communities to include representation of industry</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Advocacy support</td>
<td>Funds</td>
<td>Attract donations (External and internal)</td>
<td>Better quality and better marketing means better profits</td>
</tr>
<tr>
<td>Engage the consumer</td>
<td>Encourage technical and quality</td>
<td>Skills</td>
<td>Facilitate move from selling to marketing approach</td>
<td></td>
</tr>
<tr>
<td></td>
<td>improvements</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Import marketing skills and support</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Engage the consumer</td>
<td>Acquire improved knowledge of</td>
<td>Funds</td>
<td>At least medium term funding and support until behaviours</td>
<td>Prevent brain damage and improve</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Skills</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Objective</td>
<td>Strategy</td>
<td>Constraint</td>
<td>Solution</td>
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</tr>
<tr>
<td>consumer</td>
<td>Knowledge, attitudes and practices (KAP) survey</td>
<td>Sustainability of improved behaviour patterns</td>
<td>internalized Legislative action, response the options of ordinary salt</td>
<td>school achievement of your children</td>
</tr>
<tr>
<td></td>
<td>Databank</td>
<td></td>
<td></td>
<td>Use iodized not ordinary salt</td>
</tr>
</tbody>
</table>

**GROUP B: Social and economic aspects of salt iodization including the economics of potassium iodate, its production, availability and cost**

The group was instructed to consider ways to promote universal salt iodization (USI), taking into account the participation of small scale salt producers in salt iodization activities and the constraints which had prevented USI from being achieved everywhere. The following issues were identified.

**Iodizing technology**

The salt industry should always look at new and, where necessary, alternative ways of producing iodized salt.

**Coarse salt upgrading technology**

Salt quality depends on the technology used and industry should look at the most appropriate technology, which is also cost-effective and assures quality.

**Research and development**

Research and development (R&D) is an important area to be developed in all industries. It is the area that looks at sustainable methods for improving the technology, production and economic aspects of a company.

**Training of factory personnel**

Personnel must at all times be well educated in the “why” and “how” of their responsibility. Employees are reservoirs of valuable experience and are often knowledgeable about ways of improving production. It is therefore important that they are given opportunities to share their working experience.

**Supply of potassium iodate**

The best source of iodate is the original source of production. Producers should contact the bulk producers of iodate. Contact addresses are available with the technical experts.

**Licensing**

Governments should consider issuing licenses to the producers of iodized salt on the basis of whether they have appropriate iodizing equipment and laboratory facilities for quality control. The license should be linked with a logo that the producers can use on the packages.

**National Manufacturers Association and RISPA**

Producers should form national salt manufacturing associations. These associations can assist producers in bulk buying of potassium iodate, chemical reagents and laboratory equipment for quality control and in updating news and information on USI/IDD. The associations can also act as lobbying forums for producers.

**Taxation on iodized salt and import duties on iodate**

Iodized salt is the accepted solution to IDD elimination and should be a public health requirement. To motivate producers to produce and market quality iodized salt, taxation on the finished product should be reduced to a minimum, and the importation of iodate should be duty-free.
Small-scale salt producers

There is need to explore, together with governmental departments, the availability of incentives for small producers to form cooperatives or small business companies.

At the government level, a meeting should be held for the small producers in order to:

- inform them of the current status of IDD in the country;
- update them on world progress in USI;
- where possible, take producers on a field trip so they can see what IDD is all about.

GROUP C: Strengthening partnerships between salt producers and suppliers and programme managers of national IDD control programmes

The group was instructed to consider ways to improve the partnerships and cooperation between different stakeholders involved in the iodization of salt, in light of the existing constraints. The following approaches were identified and recommended.

**General**

- Each country should establish an IDD committee. The national IDD committee should act as a model point of interaction between the public and the private sector.
- Every country in the Region should adopt the universal iodization of salt.
- Specifications should be adopted for the manufacturing sector.
- All packaging of iodized salt should contain expiry dates.
- Taxes should be reduced for iodized salt, and potassium iodate should be exempt from customs duties.
- Quality control should be monitored at every step of production and distribution.

**Manufacturing level**

- Every factory should provide the national IDD committee the industrial specifications.
- Routine (hourly) analysis of iodine in salt should be reported to the IDD committee every month.
- Random samples should be collected from the factories and retail outlets.
- Technical help should be sought from WHO, UNICEF and MI.
- Iodization levels, storage and expiration dates should be standardized.
- The packaging industry should be closely involved in iodization efforts.
- A standardized yellow colour should be used for salt packaging.
- A small amount of non-iodized salt may be produced and distributed for medical purposes.

**Country level**

- Activities regarding IDD and the status of salt iodization should involve the IDD committee in each country.
- Education for members of the public, government and the salt manufacturing sector is essential.
- Non-iodized salt, either smuggled or inappropriately imported, undercuts the price of iodized salt, thereby reducing its consumption by the population. Strong legislation is required to prevent smuggling.
- To promote public awareness of the importance of iodized salt, each country could establish national IDD day or a national salt iodization day. Since Morocco has already identified a national IDD day, other countries should plan to have the commemorative activities around the same time.

4. Recommendations

The participants called for a renewed effort to accelerate universal salt iodization in the Region, in order to achieve sustainable elimination of IDD. They committed themselves to spearheading this effort, and made the following recommendations for action.

**4.1 To all countries in the Region**

1. Universal salt iodization (i.e. all salt intended for human and animal consumption is adequately iodized) [USI] should be implemented in accordance with WHO/UNICEF/ICCIDD guidelines.
2. In view of its importance for human health and brain development, potassium iodate should be exempted from customs levy and taxation.
3. To provide encouragement to salt producers, taxation on iodized salt should be reduced to a minimum.
4. The legal level of iodine should be standardized at 30 ppm (allowing for a margin of ±10 ppm), as recommended by WHO/UNICEF/ICCIDD (reference document WHO/NUT/96.13). This regional standard will assist in harmonizing trade in the Region.
5. The Executive Board of the Health Ministers’ Council for Gulf Cooperation Council States should take immediate action in enacting legislation for a single salt iodization standard in accordance with WHO/UNICEF/ICCIDD recommendations.
6. To ensure sustainable USI, an effective monitoring system should be established encompassing the different stages of salt production, distribution and consumption at the household level. This needs strong partnership between producers, health authorities and regulatory bodies.
7. To promote universal coverage of salt iodization, an import/export certification system should be established for iodized salt in accordance with the set standards and the Codex Alimentarius guidelines.
8. Ongoing national surveys and national surveys conducted at regular intervals should include suitable questions to obtain information on the IDD situation and salt processing and iodization activities. This information should be shared between countries as part of a regional network coordinated by WHO/UNICEF.
9. Training in different aspects of salt production, proper iodization of salt and appropriate techniques in monitoring and quality control of iodized salt should be organized at the local, national and regional levels. International organizations like WHO, UNICEF, the Micronutrient Initiative (MI), International Council for Control of Iodine Deficiency Disorders (ICCIDD) and regional level bodies like the Regional Iodized Salt Producers Association (RISPA) may provide the necessary technical assistance.
10. Agencies providing emergency food aid should ensure that salt provided as part of the food basket conforms to the required level of iodization.
11. To promote the participation of small-scale salt producers in salt iodization activities, it is necessary to provide incentives to such producers and form cooperatives for easy accessibility to items of iodization, including potassium iodate.
12. Countries are encouraged to document the status of their achievement in USI in order to be declared IDD-free.
13. A universal IDD day should be declared and celebrated by all countries in the Region.

4.2 To WHO/UNICEF

14. In order to move towards USI, the Regional Directors of UNICEF/MENARO and WHO/EMRO should write to all the Ministers of Health of the Region, urging them to:
   - adopt the standard iodization level recommended by WHO;
   - exempt iodate and iodization equipment from import taxation and duties; and
   - minimize taxation on iodized salt.
15. Findings from the recent WHO/UNICEF/MI salt situation analysis conducted in countries of the Region should be provided to the national governments. Where adequate information is lacking, UNICEF/WHO/RISPA should work jointly to fill the gap and update the information base on a regular basis. As the agency responsible for compiling information on IDD and related control and prevention activities, WHO/EMRO will send a questionnaire to countries requesting necessary data on IDD prevalence and salt iodization activities.
16. UNICEF and WHO should, at the regional level, establish a system to declare if a country has achieved the elimination of IDD. The Regional Directors are requested to issue a joint statement of congratulation to countries having achieved IDD-free status. The Islamic Republic of Iran and Tunisia will be the first to be addressed in view of their achievement of satisfactory iodine status, according to WHO/UNICEF/ICCIDD indicators.
17. The success of the Islamic Republic of Iran and Tunisia should be treated as a standard/model for emulation and a mechanism established for other countries of the Region to receive relevant information/input from these and other successful programmes.
Annex 1

Agenda

1. Registration and poster session
2. Opening ceremony
3. Objectives and mechanics of the meeting
4. IDD control in the Region
5. A situation analysis of iodized salt production, trade and usage in countries of the Eastern Mediterranean, Middle East and North Africa Region
6. Salt iodization technology
7. Monitoring and quality assurance in salt iodization and iodized salt transit
8. Importance of legislation and standards for salt iodization
9. Overview of successes and constraints in salt iodization; information from posters and displays
10. Field visit
11. Group work
12. Conclusions and recommendations
Annex 2

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Annex 3

List of countries

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<th>Countries in the Eastern Mediterranean Region of WHO</th>
<th>Countries in the Middle East and North Africa Region of UNICEF</th>
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