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Conference on Sustainable Elimination of Iodine Deficiency Disorders in Africa by the Year 2000

Harare 22 – 24 April 1996

Hosted by the Government of Zimbabwe

Organised with the collaboration of WHO, UNICEF, ICCIDD, MI

World Health Organization

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Micronutrient Initiative

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Contents

Executive summary

The Conference on the Sustainable Elimination of Iodine Deficiency Disorders in Africa by the Year 2000 was held in Harare, Zimbabwe, from 22-24 April 1996, and was hosted by the Government of Zimbabwe, and sponsored by the WHO, UNICEF, the ICCIDD[1] and the MI[2]. The Conference drew 175 participants from 45 African countries, as well as Agencies for International and Bilateral Cooperation working in the area of micronutrient deficiencies. Participation from African countries included five Ministers, the Representative of the Organization of African Unity (OAU), those responsible for IDD[3] National Programmes, and representative bodies from Ministry departments and universities.

The programme was created in order to enable all the participants involved in the control of micronutrient deficiency disorders to express their views. The main topics covered were the following:

- IDD elimination in Africa: contribution to the economic development;
- Challenges and opportunities;
- Regional and country reports on the status of IDD control programmes in Africa;
- Opportunities for action:
- Monitoring, evaluation, supervision and training;
- Integration of micronutrient control programmes;
- Food fortification and control of micronutrient deficiencies.

Following the presentations of the speakers on these topics in plenary, the participants joined in group discussions which allowed for a detailed review and discussion of all these topics. From then on participants mostly worked in groups. The aims of the working groups were specifically to:

- Develop a vision of the requirements for the elimination of iodine deficiencies, and more generally micronutrient deficiencies, taking into account the current situation and context;
- Identify the constraints linked to the sustainable elimination of IDD and the opportunities for action in the light of past experiences;
- Make recommendations on the ways of overcoming constraints, and on the measures that need to be taken to benefit from opportunities for action.

Through group work, participants were given the chance to briefly present the status of iodine deficiency control, as well as of vitamin and iron deficiency in their own country. As a result of group work and plenary session discussions, for the consolidation of group deliberations, a set of recommendations were drawn up. They were aimed at Governments, Agencies for International

[1] ICCIDD: International Council for Iodine Deficiency Disorders
[2] MI: Micronutrient Initiative
[3] IDD: Iodine Deficiency Disorders

and Bilateral Cooperation and communities. They are valuable in the sense that they represent a very important advocacy document for the elimination of iodine deficiency and also vitamin A and iron deficiencies.

It is estimated that 181 million people are at risk of iodine deficiency, and that the impact of iodine deficiency on the socioeconomic development in Africa is considerable. If we consider the known effects of iodine deficiency on foetal brain development and on the general health of children and adults, the elimination of iodine deficiency disorders is a major priority for health, taking into account not only the quality of life of individuals, but the development of countries as well.

Based on the presentations made during the Conference, it is clear that many African countries have made great progress as far as the elimination of IDD is concerned. However, more needs to be done if the Continent intends to eradicate IDD by the year 2000. This goal is noble but should have a real impact on the socioeconomic development of countries once they reach it. The elimination of the IDD by the year 2000 is a realistic challenge, even though Africa is faced with problems that seem to be insurmountable, and result from poverty and underdevelopment.

The main constraints identified as a hindrance to the elimination of iodine deficiency were lack of information, insufficient political will, lack of resources and infrastructure for the implementation and monitoring of iodine deficiency control and, in some countries, the inability to control many small-scale salt producers. Nevertheless, the achievements seen in a number of countries are very encouraging. It is clear that the iodine deficiency problem lies in a multisectoral approach, involving interactions between health workers, salt traders, legislators, politicians and educators.

Salt iodization has proved to be, in Africa as well as in other Regions of the world, an effective and sustainable method for the elimination of IDD. The Conference participants recommended that universal salt iodization (USI) be legislated for, funded, implemented and monitored by African Governments. They also recognized that vitamin A and iron deficiencies were major health problems in Africa, and that it was desirable for IDD control programmes to integrate the control of vitamin A and iron deficiencies.

The Conference also recommended that Governments give priority to IDD as a public health problem, and underlined the need for countries to be able to iodize salt locally. It also recommended the establishment of mechanisms at a regional level to harmonize and implement universal salt iodization standards, make an inventory of regional resources, set up regional reference laboratories, and encourage the production of iodization equipment. On more general terms, it was recommended that Governments develop food-based prevention strategies in order to maximize the potential of local food. It further recommended, that they support fortification programmes of miconutrient food, as well as research on the possibilities of food fortification through combined micronutrient supplementation.

Opening session

The Conference was officially opened by the Minister of Health and Child Welfare of Zimbabwe, Dr T.J. Stamps. He welcomed the delegates and expressed the hope that countries attending the Conference would share experiences and lessons learned in the control of iodine deficiency, in order to reinforce the continuity of the programmes carried out. He also encouraged participants to examine the possibilities of applying their experiences gained in iodine deficiency to other micronutrient deficiencies, especially iron and vitamin A deficiencies.

In his main address, Professor F. Delange, Executive Director of the International Council for the Control of Iodine Deficiency Disorders (ICCIDD) highlighted that 181 million people in Africa, that is one third of the continent's total population, are at risk of suffering from iodine deficiency, and that 86 million people are affected by goitre. Professor Delange reviewed the progress made by African countries in the last fifteen years in the reduction of iodine deficiency disorders. He insisted on the remarkable progress made in eradicating goitre, hypothyroidism, cretinism and mental retardation in several countries of the Region. This success was attributed to the implementation of recommendations on iodine deficiency by countries in the Region during various international forums, which were adopted by the Governments in the Region, with the support of Agencies for Bilateral and International Cooperation as well as nongovernmental organizations.

Professor B. Hetzel, Chairman of ICCIDD, reported that according to WHO estimates, 25% of the world's total population - that is over 1.5 billion people - is at risk of iodine deficiency disorders. He emphazised the importance of the elimination of iodine deficiency disorders for country development, and the importance of iodized salt as an achievable and sustainable means to eradicate iodine deficiency disorders. Professor Hetzel pointed out the measures to be taken at country level to succeed in eradicating iodine deficiency.

Mr D. Alnwick, Chief of Nutrition in UNICEF, reminded delegates that in 1995, 34 out of the 83 developing countries, were iodizing over 75% of their salt and that by February 1996, over 57% of all salt consumed in these 83 countries was found to be adequately iodized. Consequently, 12 million children per year were saved from suffering some degree of mental retardation. He evaluated the efforts made in the last five years to determine the trends aimed at improving nutrition in Africa. He noted that the nutritional problems of women and young children in the Continent were not going to be solved by an increase in food production alone. Governments needed to be reminded that the quality of food supply was as important as the quantity of food available.

Dr R. Tshabalala, Director of the Division for Health Protection and Promotion, WHO/AFRO, reminded delegates that to reach the goal set for the elimination of IDD by the year 2000, several basic principles had to be put into practice. One of those principles was universal salt iodization, which should be paid special attention. Its implementation has to be, however, accompanied by a surveillance and monitoring system of the level of iodine in salt, to ensure that the iodine content of salt consumed is within the recommended level requirements.

Dr L. O. Masimba, Chief of Nutrition at the OUA[1], informed delegates to the Conference that a Special African Group had been created to control micronutrient deficiencies. Moreover, he indicated that the control of micronutrient deficiencies was an important item to be included on the agenda of meetings of the OAU Council of Ministers, the Conference of Ministers of Health and, most of all, the OAU Summit of Heads of State and Government.

The opening session was closed by a vote of thanks from Dr R. Chatora, Permanent Secretary for Health and Child Welfare in Zimbabwe.

[1] OUA: Organisation for African Unity

Country reports

Angola

According to estimates, Angola has a population of 10 million people. The first national survey on goitre conducted in 1971 indicated a prevalence of 25%. Another survey done in 1994 indicated a prevalence rate of 67%. Six out of the eighteen Provinces in the country were shown to be endemic-goitre areas.

Angola produces 90 000 tons of salt per year, enough to meet both human and animal consumption. The first iodization plant was installed in 1995, and universal salt iodization was targeted for 1996.

The major constraints were:

- Lack of adequate financial resources;
- Inadequate infrastructure for trade and transport;
- Lack of IDD awareness;
- Inadequate technical capacity.

Algeria

Five to six million people are at risk of iodine deficiency disorders in Algeria. Studies in the 1970s classified the endemic goitre zones as severe, as the total goitre rate exceeded 60%, urinary iodine was below 25 µg/l, 50 % of subjects had T4 seric levels below normal and high T3 and TSH levels. In addition, cretinism was present. In the early 1980s, efforts were centred on different areas: studies on endemic cretinism and neonatal hypothyroidism, the effects of iodized oil administration on thyroid function, puberty development in the affected zones, and on the development of industrial plants for the production of iodized salt.

The creation of Ministerial and Inter-Ministerial Committees in the 1990s allowed for the revival and re-evaluation of the IDD control strategy, and renewed the efforts to control all micronutrient deficiencies and protein-caloric malnutrition.

The Ministry of Health was able to:

- Carry out a goitre prevalence survey among school children in 1992, which showed a national total goitre level of 8,5%;
- Implement salt iodization programmes covering the whole country with an increase in the level of iodization of 30-50 ppm;
- Set up a national surveillance system.

A study done in 1995/1996 showed that 92% of households used iodized salt. Nevertheless, urinary iodine in sentinel sites was 347± 182 mg/l with a total goitre rate of 48%, and with disorders in the neonatal thyroid function.

Training on iodine deficiency disorders is included in the university curriculum. Nutrition seminars have been organized in five health regions in the country. During those seminars on quality control, materials for measurement of salt iodine by titration and field kits were distributed. Concerning salt iodation programmes, the Ministry is planning to modify salt regulations, set up a quality control laboratory and increase private sector production and do a study on neonatal hypothyroidism.

Benin

Endemic goitre was first identified in Benin in the northern areas in 1936. Two goitre studies were carried out in several districts in 1983 and 1994. They both found a total goitre rate of 19%. These studies were completed by another survey conducted by the Ministry of Health, in all the districts of the Central and Northern Provinces. It revealed a total goitre rate ranging from 4 to 43% in the north-east (Borgou) with a median urinary iodine of 40 µg/l.

A geographically limited distribution of iodized oil took place in 1994. Nevertheless, the main strategy for controlling iodine deficiency disorders is through universal salt iodization. For its implementation, an interministerial order regulating the import and marketing of iodized salt was passed in 1994, and a population awareness programme was launched in 1995.

Benin imports 80% of its salt consumed, while 20% is produced locally in more than 150 villages along the coast. Customs data show that in the first semester of 1995, more than 60% of salt imported was iodized. Efforts have been deployed to iodize locally-produced salt, and two iodization sites have been identified. A system for salt quality control has been established at import points and at markets.

The main difficulties encountered are:

- The difficulty in grouping small-scale salt producers into a cooperative or association;
- The ease with which non-iodized salt can be imported, especially from Togo;
- Poor storage conditions for iodized salt from traders and consumers;
- The lack of knowledge of iodized salt on the part of traders and consumers.

Cameroon

In 1990, the national mean goitre prevalence was 29%, with the Eastern Provinces being the most seriously affected. Median urinary iodine at two sentinel sites was 70 µg/l. It was the first year that iodized salt was produced locally. In 1991 the National Control Programme was established, and a ministerial order stipulating that salt should be iodized at 100 ppm was issued. Since then a thorough evaluation of iodization procedures at the Selcam plant, in Douala, has been undertaken on three occasions and its results have been satisfactory. Since 1995, 13 million people have had access to iodized salt. According to a survey carried out in 1992, 63% of salt samples tested in the household were of good quality. Efforts are being made to improve storage conditions, particularly at consumer level, with preference given to the use of suitable and cheap plastic containers.

A monitoring system for iodized salt was set up with the completion of the baseline survey in 1990-1991, and the identification of sentinel surveillance sites. This system lies on a triple strategy of clinical monitoring (goitre study), biological monitoring (urinary iodine), and salt quality control. The system for salt quality control is now established in each health district, as well as in factories

and ports of entry. Following trade liberalization in 1994, new operators joined the salt market. It turned out that a part of the salt marketed was not iodized and if it was, it contained potassium iodide but not potassium iodate. As a result, the 1991 legislation was modified in 1995 stipulating that all salt sold in Cameroon had to be iodized with potassium iodate only.

The data from the 1995 study demonstrate the success of universal salt iodization, with the national mean goitre prevalence falling to 10%, and urinary iodine levels (median) ranging from 110-120 µg/l. Thus, the elimination of iodine deficiency disorders in Cameroon is now within sight.

Comoros

As a national goitre survey carried out in 1994 showed, the total rate for goitre was 15.6%, and 0.8% for cretinism. One of the villages surveyed had a goitre rate of 43%, which confirms that iodine deficiency disorders is a serious public health problem in Comoros. The results of this survey were spread at a national seminar held in 1995, where the objective for the elimination of iodine deficiency disorders by the year 2000 was adopted. The strategies for the prevention and control of iodine deficiency disorders in Comoros are the administration of iodized oil to vulnerable groups on a short-term basis, and salt iodization on a long-term basis. To this end, an interministerial directive was issued at the end of 1995 requiring that "all salt imported or produced in Comoros for human or animal consumption be iodized". Other strategies were food iodization, IEC[1] and social mobilisation. Iodized oil capsules are being distributed in areas where goitre prevalence is high.

Other important strategies that are worth mentioning are:

- Traders awareness;
- Establishment of a rapid control system of salt iodization levels at points of entry and of qualitative tests at household, school and community levels;
- Distribution and marketing.

Djibouti

Iodine deficiency disorders can be seen among refugees from neighbouring countries. It was recently decided that iodized salt should be made available on the market.

Egypt

A survey conducted in 1959 in the New Valley Governorate indicated that iodine deficiency was a public health problem in that area. In 1992, a national survey revealed that 9 out of 22 Governorates had a total goitre rate exceeding 5%. The total goitre rates in the Governorates of New Valley, Aswan and Kafr el Sheika are 82%, 22% and 17% respectively.

Following this survey, iodized oil capsules were distributed to all children in the Governorate of New Valley, where iodine deficiency disorders were the most severe. An intersectoral IDD Committee chaired by the Ministry of Health was formed with the mandate to coordinate IDD control activities. The Government allocated around US$ 800,000 for the local production of iodized salt. The goal for universal salt iodization was set for 1996, and legislation was passed to ban the production and distribution of non-iodized salt. The recommended salt level was set at 50 - 80 ppm potassium iodate.

Specialists in the field of food hygiene were trained to control the quality of iodized salt. Oral iodized oil (oriodol) is now distributed in areas where iodine deficiency is highly endemic. An analysis of the salt industry situation was undertaken, emphasising salt sources, production techniques and

[1] IEC: Information, Education, Communication

potentials for iodization. Surveys were also done to detect magnitude of iodine deficiency at a national level, and to compile baseline data so that the issue on iodine deficiency is on the agenda.

Eritrea

Eritrea became officially independent in 1993 after a 30-year liberation war. It has a population of 3.5 million people, with 80% living in rural areas. Even though iodine deficiency disorders, especially in the form of goitre, have been known in Eritrea for many decades, the importance and severity of the problem as well as its consequences, were only given recognition after its independence.

A national survey by the Ministry of Health on micronutrient status, found that 22% of 9-11-year-old children had goitre. Girls (26%) had a higher prevalence than boys (19%). The urinary iodine rate was below the recommended range in 82% of the children surveyed, with 36% suffering from severe deficiency, 25% from moderate deficiency, and 21% from mild deficiency. According to estimates, most of the population in Eritrea, with the exception of a minority that regularly consumes fish, are at risk of iodine deficiency.

The measures taken for the elimination of iodine deficiency disorders include:

- The creation of a "Task Force" to control iodine deficiency disorders, with four sub-Committees responsible for (i) legislation, (ii) IEC, (iii) surveillance and quality control, and (iv) trade and industry. These sub-Committees are multisectoral, follow up important issues in their areas of concern, and report regularly to the Task Force;

- Universal salt iodization which started in December 1995. The Government invested a total of US$ 6.7 million to be able to produce iodized salt on a sustainable basis. By the end of 1995, salt iodization equipment was installed, and iodized salt is currently produced in sufficient amount to meet the requirements for both Eritrea and Ethiopia;

- Drafting of legislation, the setting up of quality control including as well, the training of key officers and the IEC for promoting the demand for iodized salt.

This was the opportunity to:

- Set up a coordinationg unit for private salt producers;

- Conduct salt market survey;

- Facilitate salt import and distribution;

- Train workers from the health sector and from other sectors on quality control procedures.

Ethiopia

Ethiopia is mainly a mountainous country. Its soil has been washed away by the rain and glaciers on several occasions, which increases its exposure to iodine deficiency. A survey conducted by the Institute of Nutrition in 1980, showed that the rate for goitre prevalence was 26%. It is estimated that 78% of the population, that is 35 million people, is at risk of iodine deficiency. Furthermore, the prevalence of cretinism is 0.5%.

After recognizing that iodine deficiency disorders are a national public health problem, the Government put all its efforts and gave all the support needed to eliminate iodine deficiency disorders by the year 2000. Currently, the "Task Force" for the control of micronutrient deficiencies, set up by the Ministry of Health, and the sub-group on iodine deficiency disorders, have been given the mandate to provide the technical and managerial support. As a public awareness measure, the celebration of IDD Day[3] has been established. One of the key strategies chosen by the Government and hence, by the Ministry of Health to control micronutrient deficiencies, and most particularly iodine deficiency, has been to decentralize the IEC. A major breakthrough in the control of iodine deficiency disorders in the country was made in 1995 with a press release, where the Prime Minister expressed his support for the strategy of universal salt iodization.

Ghana

A national survey on iodine deficiency conducted in 1992-1993 indicated that 27 Regions in the country were affected by moderate to severe iodine deficiency disorders. It also showed that iron deficiency was highly prevalent amongst children and pregnant women: a study in 1987revealed that 69% of pregnant women examined in an antenatal clinic had anaemia. Vitamin A deficiency is considered to be endemic in the north. A number of studies including the measure of serum retinol revealed the predominance of low serum retinol levels among 65% of the children sampled.

The production of micronutrient-rich foods is seen as a sustainable control strategy, which was promoted by the Ministry of Agriculture and Food. All the front-line workers - whether they belong to the health, agriculture or community development sector - undergo training to promote the consumption of micronutrient-rich foods. Moreover, the administration of iodine supplements, vitamin A and iron, has been integrated into the Ministry of Health programmes.

Iodized salt is now available and the possibility of fortifying other foods with iron and vitamin A is under study. Studies on double and triple fortification are in progress at the University of Ghana. Special importance is placed on advocacy, ongoing surveillance, development of human resources and IEC. A significant phase was the creation of a National Plan of Action for Nutrition (NPAN) with the help of a multisectoral planning group involving Ministry representatives, Universities, NGOs, FAO, WHO and UNICEF.

Kenya

Kenya is one of the countries which has made great progress in the control of iodine deficiency disorders. A programme based on a collaboration between the Government and private sector has been set up. Data collected in four country Regions between 1962 to 1994 showed a decrease in goitre prevalence (see Table 1). This decrease is probably linked to salt iodization policies.

Table 1: Evolution of goitre prevalence in four regions of Kenya between 1962 and 1994

Region	Goitre prevalence expressed in percentage			
	1962	1974	1984	1994
Kericho	72	72	55	14
Kiambu	44	-	21	15
Nairobi	16	-	21	15
Mombasa	18	-	-	10

Salt iodization began in 1970 with a level of iodine in salt of 20 ppm. This level reached 30 ppm in 1973. In 1978 the Government accepted that non-iodized salt be sold, as long as the label indicated that salt did not "supply the necessary nutrient". This clause was, however, revoked in 1988. In 1990 the salt iodization level had increased to 100 ppm.

A national survey among school children was conducted in 1994 , and results indicated that:

- 98% of salt was iodized;
- The total rate of goitre prevalence was 16,0%;
- Median urinary iodine was 113 µg/l and 65% of the sampled population was above 100 µg/l.

The major constraint faced by the iodine deficiency programme is funding, especially the funding needed for advocacy, training of district personnel, operational research, and production of IEC material.

Libya

Libya has been iodizing salt for human consumption for many years. The present level of iodization is 26 ppm iodine, and salt is iodized with potassium iodide. It was recently decided to switch to potassium iodate. All salt is produced in factories. A national study is planned for the end of 1996 to evaluate the salt iodization programme.

Madagascar

Iodine deficiency disorders are a serious public health problem in Madagascar. A survey done in 1989 showed that 9 million people are at risk, with 3 million of them living in highly-endemic areas on the high plateaux. In 1992, the mean total goitre rate, calculated from 7 sentinel sites in endemic areas, was 48%. As a result of this study, Madagascar adopted a national IDD control policy, which goal is to reduce the prevalence rate of IDD below 5% by the year 2000. In order to meet this goal, the short-term strategy is based on the distribution of iodized oil capsules to populations at risk, together with an intensive IEC campaign and the training of health personnel at all levels.

The longer-term strategy is based on universal salt iodization. Madagascar produces 80 000 tons of salt per year, 60% of which is produced by the Salt Company of Madagascar and the remaining 40% is produced by small-scale producers mostly located in the south of the country. In order to allow small-scale producers to iodize their salt, they were put into eight groups of producers, and were supplied with iodization and potassium iodate material, and machinery maintenance material over two years. The production of iodized salt has been compulsory since January 1996.

Other components of the strategy for control of iodine deficiency disorders include:

- Information and education of the public on iodine deficiency and promotion of iodized salt consumption through an education campaign;
- Creation of a leading interministerial Committee for salt isolation, including Representatives from the Ministry of Health, Commerce, Industry, Planning and Finances. Committees for salt iodization were also set up at provincial and district level. To guarantee salt isolation, a law is being passed to make the sale of salt in the form of iodized salt compulsory.

An evaluation of the IDD programme done in 1995 shows a regression in the total goitre rate, from 75.4% in 1992 to 71.3% in 1995. The visible goitre rate decreased from 13% in 1992, to 0.9% in 1995. At the same time, the levels of urinary iodine increased: in 1992, 49% of the Niassa population had urinary iodine levels below 20µg/l, and in 1995 these levels dropped to 16%. The prevalence of moderate deficiency decreased by 10%, from 41% in 1992 to 31% in 1995.

It is necessary to keep on distributing iodized oil capsules, while we await for salt iodization to be made available to the entire population.

Mali

Several goitre surveys have been carried out in Mali.. These have shown that 80% of the population is at risk of iodine deficiency disorders, i.e. about 7 million people. The area located in the south of the 14th parallel is mostly affected. The initial IDD control strategy included the distribution of iodized oil in the Segou region in 1989. However, this approach proved to be too costly. The direct costs alone for the general distribution of iodized oil to the entire population at risk, were estimated US$1.2 million per year.

Mali is the first country to have experimented the iodization of well water as a prevention method for iodine deficiency. This method consists of the placement of a silicon polymer containing sodium iodate, at the bottom of a well or borehole. The iodine is slowly released in the water over a year. In order to test the feasibility of water iodization, a pilot project was carried out in the Djidian district, a region known for the severity of endemic goitre. The evaluation showed that this method is costly (US$ 0.40 per person per year) and only viable in certain parts of the country where there are adequate water supplies.

Mali has adopted salt iodization as a preventive method for iodine deficiency. Legislation on salt iodization was passed in 1995, and that same year a programme of local iodization was started in Bamako. This confirmed that setting up of a local salt iodization unit, is more costly than importing iodized salt, with a 20 to 30 % increase on the price of salt. Nevertheless, local salt iodization is less costly than water iodization or the administration of iodized salt.

Namibia

A national IDD survey of 8-12-year-old school children was carried out in 1992 and revealed a severe goitre prevalence of 55% in the north-eastern region (Caprivi), a moderate prevalence of 15-20% in the north-western region, and a mild to marginal prevalence of 0-7% in the southern region.

An IDD control programme was started in 1991. Iodine capsules were used as a short-term intervention strategy, while salt iodization was chosen as a long-term sustainable intervention method. Legislation was established to ensure that all salt intended for human consumption be iodized at 50 to 80 ppm iodine. The monitoring of iodine level is done at different levels: household, schools and ports of entry. National training workshops have been organized for health inspectors, customs officers and for the business community. IEC materials include posters, leaflets and videos.

A follow-up study was planned for 1996 while an evaluation of the programme is to be done by the year 2000. The major constraints highlighted are the absence of salt legislation for animal consumption; the need to strengthen monitoring and surveillance programmes; training programmes and collaboration between countries at regional level.

Nigeria

During a national survey on goitre carried out in 1993, school children from 30 states were examined by palpation. The mean total prevalence for Nigeria was 20%, the more severely affected states being in the south-east, especially in Benue and Cross- River. However, evidence showed that several other regions had a more severe iodine deficiency, which was probably related to cassava consumption. Overall, it is estimated that 20% of the population - that is 20 million people - were found to be at risk of iodine deficiency.

An initiative launched concurrently with this survey, brought together the Standards Organisation of Nigeria, salt importers, and the private sector involved in salt import and iodization. A public awareness campaign through the media was initiated through workshops, conferences and seminars.

Since 1994, salt iodization for human consumption has become mandatory. By the end of 1994, at least 15% of households used iodized salt to a level of 50 ppm, and 97% consumed iodized salt. One of the major salt importers is DICON, which imports iodized salt from Australia, and the other two importers use local iodization plants.

In future, it is crucial to:

- Comply with the provision on salt iodization within a framework adopted by ECOWAS Member States;
- Place greater emphasis on awareness;
- Establish a reliable quality monitoring system.

Uganda

Surveys carried out in 1990 and 1991 in four regions in the country showed a total goitre level between 66.2 and 85.3% with a mean of 74.6%, a visible goitre rate ranging between 24.5 and 58.5% with a mean of 40.3%. An integrated survey on iodine, vitamin A and iron was conducted in 1993 and covered 37 out of 39 districts in the country. Preliminary results indicated that more than 50% of the districts studied had a total goitre rate of more than 5% and that the mean total goitre level was 15.7%.

In 1993, the goal to eliminate micronutrient deficiencies was integrated into the long-term national development plan of Uganda, which is working towards the alleviation of poverty and the development of human resources. An emphasis was placed on the establishment of this programme of iodine deficiency control along with other programmes, such as the extended national programme on vaccinations. This programme also emphazises the participation of the community through district chiefs and communities, as well as nongovernmental organizations, which is a key role.

In other respects, the survey on vitamin A showed that a vitamin A deficiency is a major public health problem. The prevalence of corneal xerosis and kerotomalacia was 20 times higher than what WHO recommends, to make it a public health problem. In addition, it turned out that more than 50% of the children under 6 years of age were exposed to an inadequate nutrition in vitamin A.

Republic of South Africa

Endemic goitre was first reported in 1920. In 1955, a partial survey identified an iodine deficient belt in rural areas, where iodine deficiency was rampant. In response to this, the production of iodized salt was decided. In 1995, however, less than 50% of consumed salt was iodized. Iodine deficient areas still persist and several small-scale surveys have shown goitre prevalence in children ranging from 14 to 74%, with median urine iodine concentration between 15 to 85 µg/l. No national data is available and there is no national programme for IDD control.

Concerning anaemia, a national anaemia survey was conducted in 1994. The measured parameters were the seric concentration of haemoglobin, and blood count (fbc). A representative sample of 11 430 children was taken, and included 6 469 children from rural households and 4 961 from urban households. The analysis of the results showed that the overall prevalence of anaemia was 21%, with mean concentration of haemoglobin of 12 g/dl. Moderate anaemia was prevalent in 7% of the samples, while severe anaemia was prevalent in 0.2%. The mean serum ferritin concentration was 35 g/l, and proved to be significantly lower in urban children than in rural children. Furthermore, this survey shows that the prevalence of anaemia and iron depletion significantly decrease with age, and that 12-13 month-old children are the most severely affected.

In relation to vitamin A deficiency, we are dealing with an important public health problem. A national survey concurrently carried out with a survey on anaemia and with the same sample of

children, showed that 12% of the children examined suffered from night blindness, 0.4 to 0.8% had Bitot's spots, 0.2 to 0.7% corneal xerosis, and 0.1% kerotomalacia. No significant differences were found between children from rural and urban areas. The measures of seric retinol showed that the prevalence of subclinic deficiency (where serum vitamin A is greater than 20 g/dl) was 33%.

Democratic Republic of Congo

The National Council for IDD Control was created in 1988. Prevalence studies done between 1991 and 1993 indicated a total goitre rate of 43% and a cretinism rate inferior to 1%. The IDD endemicity affects the whole country, Haut Zaïre being the most affected region.

Feasibility studies on salt iodization were carried out in 1990 and 1991, followed by a ministerial order published in 1993, which made salt iodization compulsory. An awareness of importers took place in 1994. In 1995 laboratory equipment and rapid test kits for the control of iodine levels in salt were acquired. The import of non-iodized salt was forbidden by the Ministry of External Commerce, a monitoring system was set up at points of salt entry, and the General Surveillance Society (GSS) was instructed to allow the off-loading of iodized salt only.

Household surveys in 1995 and 1996 in 6 out of the 11 provinces, showed that household availability of iodized salt varied greatly. There was a marked availability increase between March 1995 and March 1996. In March 1996, 100% of imported salt at various points of entry was iodized and the monitoring of urinary iodine in three out of four sites did not find any samples with urinary iodine levels below 100 µg/l.

Future plans include:

- The establishment of a national surveillance system with a monthly monitoring of iodized salt levels and an annual monitoring of the total goitre and urinary iodine levels;
- The identification of indicators for the monitoring and surveillance system;
- Activities to promote the consumption of iodized salt;
- The integration of monitoring and surveillance activities of the different micronutrient deficiencies.

The main constraint identified in setting up the programme was the mobilization of the needed resources.

Rwanda

A prevalence survey carried out in six prefectures in 1990 revealed a total goitre rate of 49% (n = 6 398), indicating that Rwanda is affected by severe IDD endemicity. On the other hand, urinary iodine studies indicated moderate endemicity with 78% of samples being below 50 µg/l. A salt consumption survey showed that 99% of households consumed salt. A 3-phase National Control Programme was adopted in 1991. The main strategy for the prevention of iodine deficiency was salt iodization. Control measures for salt iodization are applied at the borders, internal markets and households, to ensure that all salt consumed contains 30 ppm iodine. By 1996, more than 95% of salt imports were iodized, and a consumption survey on iodized salt carried out in all the health regions in the country, showed that 82% of households consumed salt with at least 30 ppm iodine.

Important considerations for the future are:

- Suitable packaging;

- The need for an ongoing awareness of salt importers and the public in general;
- The necessity for a survey follow-up to assess the success of the strategies adopted.

Senegal

Eighty per cent of the objectives set in the 1995 action plan for the control of iodine deficiency disorders were met. Concerning the districts of Kaolack and Fatick where many small-scale salt producers are found, the producers - that is 4200 people - were organized into Groupings of Economic Interest (GEI). At present there are 9 GEI and a similar programme has just been initiated in Lake Rose, another district where small-scale producers operate. A regulation on iodized salt production and distribution for human consumption was passed in 1995. A private local company, has recently purchased iodization equipment as well as potassium iodate, with the Government's and Cooperation Agencies' support, and has installed 10 iodization units (20 tons/hour) which will be used by the newly created GEI. A GEI programme aimed at the Ministry of Health staff and the Ministry of Commerce was launched to promote the surveillance and monitoring of iodized salt, using field kits. An IDD Day was organised in 1995. Four companies are currently distributing iodized salt, primarily in endemic areas.

Somalia

Though data for Somalia is scarce, the provision of iodized salt for refugees and for internally displaced people has been recommended on several occasions.

Sudan

For many years Sudan has distributed iodized oil in endemic areas. Recently, the Government has decided to iodize all salt. Hence, the formation of a national IDD Committee and the adoption of a ministerial decree making salt iodization mandatory.

Swaziland

A prevalence study on iodine deficiency was carried out in June 1993 by the Swaziland National Nutrition Council. It was done on school children and covered the four administrative regions in the country.

In 1994, an IDD programme was created and its objectives were to eliminate iodine deficiency disorders by the year 2000, and to ensure universal salt iodization at the levels recommended by the Government in 1995. Short and long-term strategies were put in place. The long-term strategy included universal salt iodization, social marketing, advocacy, laboratory and programme management. The short-term strategy included supplementation in areas of endemic goitre. The first actions taken within the framework of this programme included legislation banning the import of non-iodized salt, a mobilization campaign targeted at political leaders and traders, and the establishment of a Micronutrient Multisectoral Committee.

Tanzania

The IDD control programme is coordinated by a multisectoral council. An important feature of the IDD strategy is the production of iodized salt by small-scale producers: their salt production represents 40% of the total salt production of Tanzania. Tanzania is endowed with many natural salt deposits of economic importance which can broadly be classified into four main categories:

- Sea salt along the coast belt;
- Underground brine at Uvcinza;

- Rock salt in the soils of lower hills, lakes and swamps located in the geological rift across east Africa from north to south.

The Tanzania Salt Producers Association has planned the setting up of 42 iodization units of which 25 are being installed. Potassium iodate and field test kits are regularly supplied to salt producers, who also benefit from technical assistance to help them improve the quality of salt produced and, therefore, the quality of iodized salt. Over 9 600 salt producers have access to this service. According to recent studies (1995) done by the Tanzania Bureau of Statistics, the mean consumption of iodized salt is 75.3% per household, of which 95% are in the endemic areas. These studies also show that about 71% of the total population is aware of the IDD problem and its prevention by the use of iodized salt.

Compulsory legislation on iodized salt goes back to 1978. This legislation was consolidated in 1995 to meet the following requirements:

- Level of iodization should be 75-100 ppm at factory level and not less than 30 ppm at retail level;
- Purity rate should be at least 97%;
- Rate of insoluble matter in water should be less than or equal to 0.2%;
- Moisture rate should be less than 4%;
- $MgCl_2$ rate should be less than 0.5%.

Unfortunately, salt produced by small-scale producers still fails to meet these criteria.

Togo

The use of iodized oil for the elimination of iodine deficiency disorders began in the area where the prevalence of goitre was evaluated at 39% in 1982. A study on the impact of iodized oil supplementation on the iodized status of children was carried out: more than 4000 children (n = 4 182) between 0 and 6 years of age in five villages, benefited from this programme. Iodized oil supplements were administered to children suffering from iodine deficiency disorders and to a control group. Results showed that before the treatment with iodized oil supplementation, the mean TSH levels differed between the two groups but became significant after iodized supplementation. Thyroid hormones (TA) were not measured. The iodized oil treatment decreased the prevalence of iodine deficiency disorders in the following order: goitre, convulsions, infertility, deaf-mutism and cretinism.

Zambia

A goitre survey conducted in 1972, indicated a total goitre rate of 51%. In 1978, legislation was adopted making mandatory salt iodization at 50 ppm. Nevertheless, this was not fully enforced due to constraints faced by agencies responsible for its enforcement. However, the National Milling Company, which supplied most of the salt, opted for the import of iodized salt.

An IDD "Task Force" was created in 1991. A second survey was then conducted in 1993. Results showed that the total goitre rate was 32%, and the median urine iodine rate 60 µg/l. Regulations on salt iodization were amended in 1994 and were enforced with the help of a private organization responsible for assuring the monitoring of iodized salt in collaboration with government officials. A survey carried out in 1995 showed that 90% of Zambian households used iodized salt. A study in three Zambian districts indicated a marked decrease in the total goitre rate (see Table 2).

Table 2: Total goitre rate in three districts of Zambia between 1993 and 1996

Districts	Year	Total Goitre Rate
Livingstone	1993	82%
	1996	4%
Choma	1993	59%
	1996	16%
Katete	1993	31%
	1996	4%

Zimbabwe

A national goitre survey done in 1988 showed that the national mean total goitre rate was 44% (weighted mean: 38%). Of the 53 districts surveyed, 20 (38%) presented severe endemia and 21 (40%) moderate endemia. Most of these were in the north-eastern region, which is mountainous and has the highest rainfall. All the districts had a total goitre rate of at least 10%. Median urinary iodine rates in the more severely affected districts ranged from 20 to 50 µg/l.

A National Intersectoral Committee was created in 1989, to develop and implement a control programme aimed at eliminating iodine deficiency by the year 2000. The Ministries represented in this Committee included the Ministries of Health, Trade and Commerce, Finance, Industry and Technology, Education, Community Development, Local Government, Agriculture and Justice. The University of Zimbabwe and the Agencies for International Cooperation were also represented in this Committee. In addition to this, a Secretariat, based in the Ministry of Health, Subcommittees for monitoring and research, salt iodization and social mobilisation were also formed.

Legislation enacted in early 1995 required that all salt for human consumption have an iodization level (potassium iodate) between 30 and 90 ppm iodine. Salt traders have shown a great deal of cooperation and increasing amounts of iodized salt have been imported since 1993. A national salt monitoring system was set up in 1994-1995, and used salt test kits for the monitoring of salt iodine levels. These showed that 88% of the tested salt samples were adequately iodized. A formal survey on salt iodine level by titration revealed a mean rate of salt iodization of 29 ppm, with 41% of samples meeting the legal requirement (n = 225).

Moreover, the analysis of urinary iodines indicated a significant change in median urinary iodine levels in districts that were previously the most severely affected. Median urinary iodine rose from 230 g/l in 1993 to 430 g/l in 1995: such results demonstrate that iodine deficiency has been eliminated.

By the end of 1994, an increase in the number of cases was reported. The investigations undertaken since 1991, have shown that incidence of hyperthyroidism - regardless of the age - had dramatically tripled. Most cases were in older subjects with nodular goitre.

Although the IDD control programme has been very successful, there is a risk of iodine-induced hyperthyroidism, and of iodine supplementation being too high.

Group deliberations: constraints and opportunities

Constraints

The following constraints were identified during group deliberations, with some countries facing more constraints than others.

1. Inadequate or non-existent funding for activities such as:
   - Social advocacy;
   - Training;
   - Operational research;
   - Production of educational material for the IEC.
2. Inadequate or poor legislation on fortification concerning the following items:
   - Quality of the fortificant;
   - Quality of the foods to be fortified;
   - Shelf life of fortified products;
   - Packaging and labelling;
   - Micronutrients other than iodine.
3. Shortage of technical capacity concerning:
   - Food fortification technologies;
   - Monitoring and evaluation programmes.
4. Inadequate infrastructure especially for:
   - Transport and storage;
   - Trade;
   - Monitoring and evaluation.
5. Inadequate laboratory structures due to:
   - Shortage of equipment;
   - Shortage of trained manpower.

6. Lack of funding affecting:

   - Purchasing power for food production and fortification;
   - Quality of goods produced.

7. Pricing policy as in some countries iodized salt is more expensive than non-iodized salt.

8. Inefficient technology for salt production resulting in low productivity and poor quality of salt.

9. Small-scale salt production units operating in remote areas, difficult to reach.

10. Individualistic mentality of the small-scale salt producers preventing groupings or associations.

11. Collaboration between the different parties concerned with salt iodization hampered by the absence of a continuous system of information exchange and communication at regional level.

12. Integration of micronutrient deficiency control programmes constrained by:

   - Verticalization of micronutrient, iodine, iron and vitamin deficiencies control programmes;
   - Priorities too often dictated by donors;
   - Lack of adequate baseline information on the nature and extent of three micronutrient deficiencies;
   - Lack of adequate manpower to plan, implement and manage integrated micronutrient deficiencies control programmes;
   - Reluctance of health personnel to change and to work as a team;
   - Control programmes at different development levels;
   - Lack of human resources to conduct applied research programmes on micronutrient deficiencies.

13. Inadequate mobilization:

   - Low public awareness related to iodine deficiency;
   - Inadequate funding to continue social advocacy;
   - Inadequate appreciation regarding the severity of micronutrient deficiencies;
   - High levels of illiteracy in most of the groups at risk.

14. Difficulty in setting up food fortification programmes due to:

   - A great number of small-scale producers;
   - Inadequate development of technologies for home-grown foods.

15. Difficulty in setting up monitoring and evaluation systems due to:

- Lack of resources;
- Lack of trained personnel;
- Inadequate infrastructure;
- Lack of cooperation between the countries of the Region to promote the setting up of regional laboratories.

Opportunities

1. For the integration of micronutrient control programmes:

- Availability of micronutrient rich foods;
- Similarity of target populations to benefit from the programmes;
- Existence of adequate capabilities to generate baseline information;
- Emergence of technologies that look at the possibility of food fortification, with two or three micronutrients;
- Existence of training programmes for planning and managing integrated micronutrient control programmes;
- Promotion of integrated micronutrient control programmes by all stakeholders;
- Possibilities to measure micronutrients on a single biological specimen;
- Administration of micronutrient supplements in existing programmes on mother and child health.

2. For fortification of food:

- Availability of food fortification technologies with different fortificants;
- Availability of multiple food fortification technologies, that is with several fortificants;
- Possibility of fortifying most weaning foods with vitamins and minerals;
- Availability of technologies allowing for small-scale production.

3. For social awareness:

- Awareness of political leaders:
- Use of the media (advertising) to educate the public on the advantages of consuming fortified foods;

- The use of the media as partners through an involvement in workshops, conferences, and seminars;
- Participation of Ministers and Senior Government Officials in workshops on IDD and other micronutrients deficiencies.

4. For funding:
   - Allocation of funds by some governments for the control of micronutrient deficiencies;
   - Funding for the control of iodine deficiency disorders and other micronutrient deficiencies from Agencies for Bilateral and International Cooperation, nongovernmental organisations and private sectors.
5. For monitoring and evaluation:
   - Creation of sentinel sites;
   - Integration of surveillance and monitoring systems of programmes for the control of the three main micronutrient deficiencies: iodine, iron and vitamin A;
   - International collaboration;
   - Community participation in salt monitoring.
6. For training:
   - Support from international cooperation for the training of health personnel on quality control;
   - Intersectoral training.
7. For marketing:
   - Studies to determine the acceptability of the iodized salt;
   - Availability of social marketing strategies.
8. For legislation:
   - Awareness by Governments on the need for legislation on fortification, especially for salt iodization;
   - Development of standards for salt iodization at international level.
9. For collaboration:
   - Governments and UNICEF should be responsible for providing building capacity for sustainable production of iodized salt.

Recommendations

Recognizing that:

- Micronutrient deficiencies are a major public health problem in Africa;
- African Governments have committed themselves towards this goal by endorsing all resolutions at a global, regional and sub-regional level;
- Universal Salt Iodization (USI) is chosen for the elimination of iodine deficiency disorders;
- Major progress has been made during the last decade, resulting in the reduction of goitre prevalence, the incidence of cretinism and mental retardation, which will have an impact on national development;
- Additional efforts are required to fill the gap in order to ensure the sustainable elimination of iodine deficiency disorders.

Concerning the control of IDD, participants from 45 countries to the Conference recommend the following:

A) **To Governments**

1. To define a policy on micronutrient deficiencies which prioritizes iodine deficiency disorders as a public health problem that can be eliminated by the year 2000;
2. To legislate, regulate and enforce universal salt iodization;
3. To set up the necessary means for the iodization of locally produced salt, by encouraging the creation of iodization units and by training the personnel required for universal salt iodization;
4. To allocate budget and promote the contribution of nongovernmental organisations and the private sector to sustain universal salt iodization;
5. To establish a surveillance system for IDD control and universal salt iodization, including biological surveillance at community level and salt quality control at all levels;
6. To encourage salt producers and retail traders through incentive schemes, to produce and market iodized salt by e.g. facilitating imports, administrative procedures and tax reduction;
7. To strengthen inter-country cooperation by harmonizing the programmes, facilitating a network of experiences exchange by involving the production and trade sectors;
8. To support the World Health Organization Executive Board resolution EB 97.R9., regarding prevention and control of iodine deficiency disorders;

9. To harmonize and reinforce standards on universal salt iodization and regulation on the import and export of iodized salt in the African Region;

10. To make an inventory of the Region's resources;

11. To draw a list of reference laboratories which have or could have a regional influence;

12. To encourage the local production of equipment for salt iodization;

B) **To communities**

13. To develop a business culture and the idea of programme ownership at community level;

14. To encourage community participation in the development, implementation, follow-up and evaluation of programmes;

C) **To Agencies for International Cooperation**

15. To pursue and reinforce advocacy for universal salt iodization;

16. To support the development and implementation of the National Plan of Action on Nutrition (NPAN) recommended by the International Conference for Nutrition (ICN) by including the development of priority capacity and harmonization;

17. To strengthen the collaboration between donors and Governments to provide the initial capital for salt iodization investments;

Concerning the control of micronutrient deficiencies and disorders, participants from 45 countries to the Conference recommend the following:

A) **To Governments**

18. To review nutrition curricula at all levels to ensure an integrated approach to micronutrient deficiencies;

19. To promote food-based strategies by exploring the potential of locally-produced foods in the prevention of micronutrient deficiencies;

20. To develop research and feasibility studies on food fortification so as to identify potential vehicles for combined micronutrient supplementation;

21. To promote food fortification by the private sector through incentives and awareness;

22. To promote food diversification through Information Education Communication (IEC) strategies and social mobilization for the prevention of micronutrient malnutrition;

23. To promote and strengthen inter-country cooperation especially in the field of research, exchange of information and experiences through existing regional institutions;

24. To develop regulations on the marketing and distribution of fortified foods;

B) To Governments and Cooperation Agencies

25. To encourage donors to support the promotion of an integrated micronutrient malnutrition;

26. To encourage Agencies of International and Bilateral Cooperation, as well as Nongovernmental Organizations to pursue and reinforce their support to micronutrient deficiencies management training programmes.

Annex 1

Working groups

Five groups were formed as follows :

Group 1: Gambia, Ghana, Nigeria, Sierra Leone

Group 2: Algeria, Burkina Faso, Cape Verde and Côte d'Ivoire

Group 3: Angola, Burundi, Cameroon, Comoros, Gabon, Equatorial Guinea, Madagascar, Democratic Republic of Congo, Sao Tome and Principe, Chad

Group 4: Botswana, Mozambique, Namibia, Republic of South Africa, Swaziland, Zimbabwe

Group 5: Eritrea, Ethiopia, Kenya, Uganda, Tanzania

The working groups worked on three topics:

- Form a vision of what is required in the context of the present situation;
- Identify the constraints and opportunities in the light of experience gained so far;
- Recommend actions to overcome the constraints and take advantage of opportunities in the next 2 to 3 years.

Annex 2

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Iodine has considerable implications for economic and social development on the African continent where an estimated 181 million people are at risk of iodine deficiency. Given iodine's importance for ensuring and preserving health, particularly for foetal and child growth and brain development, the elimination of iodine deficiency disorders remains a major regional public health priority.

The Conference on the Sustainable Elimination of Iodine Deficiency Disorders in Africa by the Year 2000 (Harare, Zimbabwe, 22-24 April 1996) provided participants from 45 countries the opportunity to exchange their experiences in the control of iodine deficiency disorders; to update their knowledge in this area; to assess regional progress during the past ten years in the prevention and control of these disorders; and to formulate recommendations so that through concerted action by health workers, salt traders, legislators, politicians and educators, the elimination of iodine deficiency as a public health problem becomes a reality by the year 2000.

The report of the Conference summarizes the progress status of invited countries with regard to the control of iodine deficiency disorders and the results of group deliberations, especially on constraints that programmes for elimination of iodine deficiency must face. The Conference's recommendations are addressed to governments, communities and international cooperation agencies.