Section II

An Overview of the Global Program for the Elimination of Brain Damage due to Iodine Deficiency

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1. Introduction

This overview of the global program for the elimination of brain damage caused by iodine deficiency will consider briefly the various aspects that are discussed in more detail in subsequent sections of the book. It aims to provide a general orientation so that the special aspects can be seen as part of the development of the whole program.

The scientific basis for the global program rests on a combination of clinical and epidemiological studies in various parts of the world, supported by studies in animal models which has established that iodine deficiency is the most common preventable cause of brain damage which can be prevented by correction of the deficiency. This evidence has already been reviewed in Section I.

The global elimination program has developed through successful application of this knowledge at country level, mainly with the use of iodized salt. This has involved the support of the United Nations System, particularly WHO and UNICEF and has been initiated in more than 100 countries with an at risk population in excess of two billion.

The program has involved the development of an informal global partnership including the people and governments of affected countries, the bilateral aid agencies, the technical agencies and special funding support from Kiwanis International, The Gates Foundation (both through UNICEF) and most importantly the salt industry. This Global Partnership is fully described in Section III.

The scientific basis for the elimination of brain damage due to iodine deficiency is presented in Section IV. The use of iodized salt for the sustained elimination of iodine deficiency is described in Section V. The role of education and communication is discussed in Section VI. National country programs are described in Section VII and VIII. Finally, the challenge of sustainability is described in Section IX including the further steps that have been taken to ensure elimination is not only achieved, but sustained by continuous monitoring of the iodine nutrition of the populations of more than 100 countries that have the problem of brain damage due to iodine deficiency.

In 2002 in order to promote sustainability a new Global Network for the Sustainable Elimination of Iodine Deficiency was established to involve the salt industry at national and international levels together with UNICEF, WHO, the ICCIDD and other technical agencies with Kiwanis International.

This network was formally launched at the time of the UN General Assembly Special Session on Children (UNGASS), in New York (May

2002). At this time the new goal of elimination of IDD by the year 2005 was accepted by the UN System.

2. Bridging the gap between Research and its Application

There was an urgent need to bridge a great gap between research on the subject of iodine deficiency and brain damage and its application in public health programs. A beginning was made with a Symposium at the 4th Asian Congress of Nutrition in Bangkok, which indicated the need for public health action (Lancet 1983). After this in response to an invitation from the Subcommittee on Nutrition of the UN System (SCN) a proposal for a global prevention program was prepared early and submitted to the SCN in 1985. The proposal included a review of the scientific evidence, a model for a national program and then a proposal to establish the International Council for Control of Iodine Deficiency Disorders (ICCIDD) as an expert Non-Governmental Organization (NGO) available to agencies and governments to assist in the development of national programs. This proposal was accepted by the SCN in 1985 and later published (Hetzel 1988).

2.1 International Council for Control of Iodine Deficiency Disorders (ICCIDD)

The ICCIDD is an international multidisciplinary network, which aims to bridge the gap between the research and its application in national programs. The ICCIDD now comprises more than 700 professionals from over 100 countries with a majority from developing countries. The disciplines include, endocrinology, nutrition, epidemiology, laboratory technology, salt technology, education, mass media and public health administration.

In 1987 the ICCIDD was recognized as the expert group on all aspects of iodine deficiency disorders (IDD) by the UN System through the UN Subcommittee of Nutrition (SCN). In 1987 the SCN also established an IDD Working Group of multilateral and bilateral agencies involved in nutrition programs and it is to this group that the ICCIDD has reported as well as to WHO. In 1994 the ICCIDD was officially recognized by WHO as an NGO working collaboratively towards the elimination of IDD by the year 2000 (Hetzel 2002) (see further Section III).

From its foundation the ICCIDD chose technical assistance to national programs as the first priority. This led to a working relationship with the governments of IDD affected countries (usually Ministries of Health and those concerned with Iodized Salt) and with the leading international aid agencies WHO and UNICEF and more recently with the salt industry.

2.2 World Health Assembly

The 1986 World Health Assembly (WHA,) with representation from more than 160 governments, passed a Resolution sponsored by Australia, which noted this new aggressive approach to the prevention and control of IDD (WHO 1986).

This was followed by WHA Resolutions in 1990, calling for elimination of IDD by the year 2000 and later Resolutions in 1996, calling for sustainability of the program through systematic monitoring. Both included reference to the role of the ICCIDD and its availability to assist countries (WHO 1990,1996).

This massive problem of iodine deficiency has been met at the technological level with iodized salt. This measure has been shown to be effective in a number of industrialized countries. But this was much less so in developing countries where until 1990 experience had been generally not been up to the expected level. However, this has changed following recognition of the effects of iodine deficiency on brain development and the adoption of a policy of universal Salt Iodization (USI) by WHO, UNICEF and the ICCIDD followed by legislation in the IDD affected countries. This required that all salt for human and animal food grade consumption be iodized (WHO 1994).

2.3 World Summit for Children

By 1990 a Global Action Plan for the elimination of IDD by the year 2000 was proposed by the ICCIDD, which provided for actions at global, regional and national level. This plan was endorsed by the SCN in 1990 and the goal was accepted by the World Health Assembly and the Executive Board of UNICEF (SCN 1990) (WHO 1990).

The endorsement of the Global Action Plan was followed by the adoption of the goal of elimination of IDD by 2000 by the World Summit for Children on September 30th 1990 at a special meeting at the united Nations, New York. This meeting was attended by 71 Heads of State who signed a declaration providing new goals for improved health and education for all children throughout the world (World Summit for Children

Table 1. *IDD and the United Nations System*

1983	IDD: Concept of the Iodine Deficiency Disorders
1986	ICCIDD: International Council for Control of Iodine Deficiency Disorders. Formal Inauguration, Kathmandu, with the support of WHO and UNICEF
1986	39th World Health Assembly, (WHO Geneva) Call for prevention and control of IDD
1990	ICCIDD Global Action Plan for the Elimination of IDD by the year 2000, endorsed by United Nations Subcommittee on Nutrition (SCN), Paris
1990	43rd World Health Assembly, WHO Geneva: Elimination of IDD as a major public health problem in all countries by the year 2000 accepted as a goal
1990	World Summit for Children, United Nations, New York 71 Heads of State, Total of 159 Governments, Declaration, adopted Included Virtual Elimination of IDD by the year 2000
1991	Ending Hidden Hunger, Policy Conference on Micronutrient Malnutrition, Montreal, 55 countries
1992	45th World Health Assembly, Geneva: National Strategies for Overcoming Micronutrient Malnutrition
1992	International Conference on Nutrition, Rome
1996	49th World Health Assembly, Geneva: Resolution on Monitoring and Sustainability of Elimination of IDD
1999	52nd World Health Assembly, Geneva: Resolution on Considering elimination of IDD as a priority program for WHO; Maintain & update the WHO global database on IDD.
1999	WHO/UNICEF/ICCIDD Report on Progress in the Elimination of Iodine Deficiency Disorders (IDD)
2002	UN General Assembly Special Session (UNGASS) on Children, New York. New goal set for 2005.
2002	Global Network for the Sustained Elimination of Iodine Deficiency established

1990). This Declaration was subsequently signed by representatives of 88 other national governments. Such a Resolution was unprecedented and has provided very important political support for national IDD programs throughout the world. These and other developments since 1983 are summarized in **Table 1.**

Table 2. *Global Partnership for Elimination of IDD*

- People of affected countries
- Governments of affected countries
- The salt industry of affected countries and salt exporting countries
- The International Agencies: especially WHO; UNICEF; World Bank
- The Bilateral Aid Agencies: especially Australia; Canada; Netherlands;
- The International Council for Control of Iodine Deficiency Disorders (ICCIDD)
- The Micronutrient Initiative (MI); Program Against Micronutrient Malnutrition (PAMM)
- Kiwanis International
- Global Network for the Sustained Elimination of Iodine Deficiency

Table 3. *Major ICCIDD/UNICEF/WHO Meetings from 1985*

1985	Birth of ICCIDD	New Delhi, India
1986	Inauguration	Kathmandu, Nepal
1987	Africa	Yaounde, Cameroon
1988	Scientific Meeting on Iodine and the Brain	Washington DC, USA
1989	Asia	New Delhi, India
1989	China	Tianjin, China
1990	Africa	Dar-es-Salaam, Tanzania
1991	10th ITC	*The Hague, The Netherlands
1991	Former USSR	Tashkent, Uzbekistan
1992	Europe	Brussels, Belgium
1993	Middle East	Alexandria, Egypt
1994	Latin America	Quito, Ecuador
1995	Asia	Dhaka, Bangladesh
1996	Africa	Harare, Zimbabwe
1997	Europe	Munich, Germany
1998	China	Beijing, China
2000	China	Beijing, China
2003	Asia	Chiang Rai, Thailand
2004	Latin America	Lima, Peru

* Transferred from Islamabad, Pakistan, due to the Gulf War and associated with the 10th International Thyroid Congress (ITC)

2.4 The Global Partnership

An informal global partnership has now developed. The key members are listed in **Table 2.** This partnership includes the people and governments of the IDD affected countries, the salt industry of the affected countries; the international agencies WHO and UNICEF, the World Bank, ellaborate and the technical agencies; the ICCIDD, MI, PAMM (formerly-now Emory University) and Kiwanis International. Kiwanis International is a world service club based in the USA with nearly 600,000 members from 85 countries. Kiwanis International has already contributed US$60 million to country programs in 90 countries, through UNICEF, from a total of US$76 million in cash and pledges. The Global Partnership is described in detail in Section III.

3. Development and Progress of Country Programs

3.1 Development

A significant factor in the development of these national programs, has been a series of Regional meetings held throughout the world by the ICCIDD with the support of WHO and UNICEF. These meetings have been attended by representatives from the Ministries of Health and other important sectors such as the salt industry and media in relation to the National Programs. These meetings are listed in **Table 3**.

It is through these Regional meetings that the limited number of experts from the ICCIDD network have been able to communicate with professionals from many countries. This has been subsequently developed further with consultancies and more contacts designed to identify obstacles to progress and remove them (Hetzel 2002).

Notable progress has occurred in Africa. At the first African Regional meeting (Yaounde, Cameroon in 1987), only 22 countries were represented. In 1996, a total of 45 countries were represented including Angola, Eritrea, Mozambique and Zaire in spite of the occurrence of civil war in these countries (WHO/UNICEF/ICCIDD 1997).

At these Regional meetings a 'wheel' model for a National Program has been presented to show its multisectoral nature and the relation between the different elements **(fig. 1)**.

The expertise required includes epidemiology, the establishment of laboratories (salt iodine, urine iodine) advice regarding planning, education and communication, management, iodized salt and other iodine technologies. This is why the multidisciplinary network is necessary.

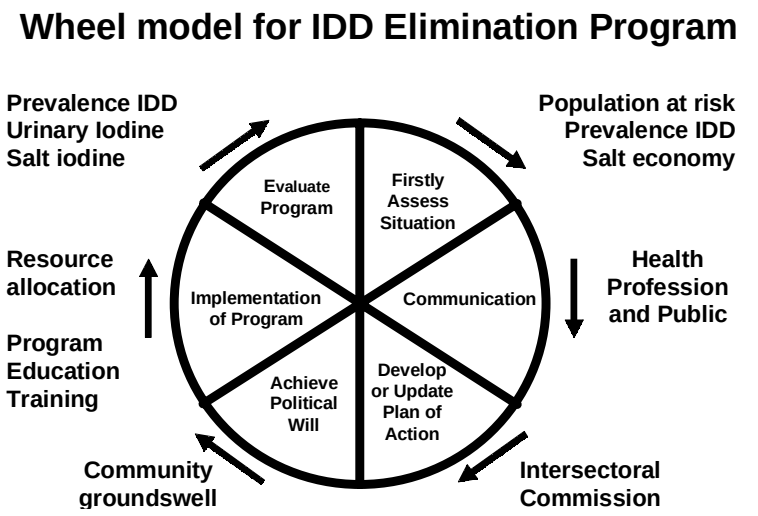

Fig. 1 *Wheel Model for IDD Elimination Program*

The '**wheel**' model shows the social process involved in a national IDD Control Program. The successful achievement of this process requires the establishment of a National IDD Control Commission, with full political and legislative authority to carry it out. (WHO/UNICEF/ICCIDD 2001).

The '**wheel**' must keep turning to maintain an effective program. It consists of the following components.

1. **Assessment of the situation** requires baseline IDD prevalence surveys, including measurement of urinary iodine levels and an analysis of the salt economy.
2. **Communication** implies Dissemination of findings to health professionals and the public, so that there is full understanding of the IDD problem and the potential benefits of elimination of the most common preventable cause of brain damage.
3. **Development of a plan of action** includes the establishment of an intersectoral committee or commission on IDD and the formulation of a strategy document on achieving the elimination of IDD.
4. **Achieving political will** requires intensive education and lobbying of politicians and other opinion leaders. This is achieved by community education through the mass media and other means.
5. **Implementation of Program** needs the full involvement of the salt industry. Special measures, such as negotiations for monitoring and quality control of imported iodized salt, are required. It is also be necessary to ensure that iodized salt delivery systems reach all affected populations, including the neediest. In addition, the establishment of cooperatives for small producers, or restructuring to larger units of production, may be needed. Implementation will require training at all levels in management, salt technology, laboratory methods and communication.
In addition a community education campaign is required to educate all age groups about the effects of iodine deficiency with particular emphasis on the brain.
6. **Monitoring and evaluation** require the establishment of an efficient system for the collection of relevant scientific data on salt iodine content and urinary iodine levels. This requires suitable laboratory facilities.

Table 4. *Progress in the Elimination of IDD. (WHO/UNICEF / ICCIDD Report 1999)*

·	130	IDD affected countries
·	105	(81%) have intersectoral body
·	192	(78%) have plan of action for IDD
·	98	(75%) have legislation in place
		(+9%) have draft legislation
·	95	(73%) monitor salt quality
·	84	(65%) have laboratory facilities for monitoring

From: WHO/UNICEF/ICCIDD (1999)

The preferred public health technology on the grounds of effectiveness and cost is universal salt iodization (USI). This means that all food industry salt for human (and animal) consumption should be iodized. This requires legislation. The recommended level is 20-40 mg iodine per kilogram of salt (WHO/UNICEF/ICCIDD 1996).

Such a measure has been adopted by many countries including the highly populous countries, Bangladesh, China, India, Indonesia and Nigeria.

3.2 Progress

The WHO/UNICEF/ICCIDD Report on Progress in the Elimination of IDD in 1999 indicated remarkable progress in that, of 130 IDD affected countries, 105 (81%) had an intersectoral national body (Committee or Commission) with responsibility for the program. Other details are shown in **Table 4**. Of the five billion people living in countries with IDD, 68% of them had access to iodized salt.

4. Sustainability

The next challenge in relation to the success of USI is the issue of sustainability. It is well known, that past success has been followed by failure, due to a variety of factors. In Guatemala and Colombia in South America it was due to political changes, and social upheaval, in the former USSR countries to complacency and apathy together with political changes and in China due to the Cultural Revolution when public health programs were suspended.

Table 5. *Summary of criteria for monitoring progress towards sustainable elimination of IDD as a public health problem*

Indicators	Goals
Salt Iodization	
Proportion of households using adequately iodized salt	***>90%***
Urinary iodine	
Proportion below 100µg/L	*<50%*
Proportion below 50µg/L	*<20%*

From: WHO/UNICEF/ICCIDD Assessment of Iodine Deficiency Disorders and Monitoring their Elimination. A guide for program managers, (2nd Edition) (2001) WHO/NHD/01.1

Experience indicates that the continuing social process is essential– the 'wheel' must turn if sustainability is to be ensured. For this regular data collection of salt iodine and urine iodine is essential **(fig. 1)**.

The cooperation of the salt industry in providing good quality iodized salt is very important to sustainability of the elimination of IDD. There are great opportunities for community education through the distribution of iodized salt.

Sustainability is discussed in detail in Section IX.

4.1 Progress of Salt Iodization

An assessment of the progress of USI has been provided by UNICEF (UNICEF/WHO 2000). Over 90% of the populations of 28 developing countries use adequately iodized salt. In an additional 36 countries more than half of the population is protected from IDD by using iodized salt.

These 64 countries include China, India, Indonesia and Nigeria as well as a number of poorer countries such as Bangladesh, Benin, Burundi and Eritrea.

There are still 36 countries where less than half the population uses iodized salt. This includes many countries in Central and Eastern Europe and the Commonwealth of Independent States (CIS) where once adequate salt iodization rates have dropped dramatically in recent years and iodine deficiency disorders, including endemic cretinism, have recurred.

4.2 Criteria for Monitoring Progress towards Sustainable Elimination of IDD as a Public Health Problem

This refers to the monitoring of elimination programs using internationally accepted indicators to determine whether iodine levels are sufficient within a population.

The criteria for monitoring progress towards sustainable elimination of IDD as a public health problem were originally determined by a Joint WHO/UNICEF/ICCIDD Working Group on Assessment and Monitoring of IDD in 1994 and further developed at a subsequent meeting in 2001 (**Table 5)**.

4.3 Global Network for the Sustained Elimination of Iodine Deficiency

This Global Network was established following the Salt 2000 Meeting in The Hague and subsequently at a Summit of Leaders Meeting in Paris (10 January 2001).

Participants at the Summit agreed to form an international network (Subsequently designated The Global Network for the Sustained Elimination of Iodine Deficiency) to tackle tasks beyond the ongoing agendas of each particular organization. The focus of the Network is to be on global strategy, support to national coalitions, analysis of national problems, collaborative responses to national needs, monitoring of global progress, information exchange and networking among members in order to achieve the sustained elimination of iodine deficiency through USI.

Nominations for Board Membership were accepted by UNICEF, WHO, Salt Institute (USA), ESPA (European Salt Producers Association), ICCIDD, CDC, MI and Kiwanis International. The China National Salt Industry and the Program against Micronutrient Malnutrition (at Emory university) and CDC, Atlanta were later accepted as Board members. Support for the Network has been provided by a small permanent Secretariat. The Network has been particularly concerned with the issue of Universal Salt Iodization (USI) as a special challenge to ensure sustainability.

This network was formally launched at the time of the UN General Assembly Special Session for Children, in New York (May 2002). At this time the new objective of elimination of IDD by the year 2005 was accepted by the UN System.

A special fund, (US$15 million) was allocated by the Gates Foundation to UNICEF for the support of the elimination of iodine deficiency through the Global Network. These funds are now being directed to country evaluations and other special projects within the global program. The ICCIDD has been designated the lead agency for country evaluations (Hetzel 2002).

An International Meeting for Sustained Elimination of IDD under the co-sponsorship for the Global Network and the Chinese Government

took place in Beijing, 15-17 October 2003. Some 350 delegates from 30 countries including two Deputy Premiers and 20 Ministers and heads of a dozen international organizations attended the meeting.

The countries invited were mainly from the Asian Region but Ecuador, Egypt, Ethiopia, Guatemala, Iran and Nigeria were invited to share their experiences. All participating governments submitted a brief report of their national programs. The ICCIDD was well represented.

At the inaugural session in the Great Hall of the People, Mme Wu Yi, Deputy Premier and Minister of Health, Ms Carole Bellamy UNICEF Executive Director and Dr Catherine Le Gales-Camus WHO Assistant Director General spoke strongly for accelerated efforts towards the 2005 goal.

After an update on the global IDD status and a report about China's program, the sessions focused on the five issues critical for sustained IDD elimination; policy/political commitment at various levels, the supply and distribution of iodized salt, social mobilization to generate community support for behavioral compliance, monitoring of salt quality and adequate iodine nutrition and national coalition for sustained elimination.

A closing statement on consensus that took into account the proposed action from the national reports and the discussion was then presented. A number of amendments were tabled from the floor and the consensus with specific follow-up action was adopted unanimously.

5. Conclusion

The global elimination program has made significant progress over the period since 1990. It is important to identify the reasons for this progress.

A series of factors can be cited as follows:

i) The definition of the problem of iodine deficiency as a readily transmitted concept, with an easy acronym – the concept of the iodine deficiency disorders (IDD) – referring to all the effects of iodine deficiency with special emphasis on brain damage in a population that can be totally prevented by correction of iodine deficiency.

ii) This was followed by the creation of the International Council for Control of Iodine Deficiency Disorders (ICCIDD) with the support of WHO and UNICEF committed to the assistance of national programs for the elimination of IDD.

iii) The availability of effective technology suited for mass use in large populations – iodized salt has met this requirement and the salt industry has become — an important stakeholder and a cooperative partner.
iv) The availability of simple practical methods for monitoring and surveillance – the measurement of salt iodine and urine iodine has been made effective for use on a large scale with the technical assistance of the ICCIDD.
v) The availability of a national program model, (the 'wheel' model), which can be readily understood and implemented and which is driven by regular data on salt iodine and urine iodine-

Political support has come through the UN System- the World Summit for Children supported by WHO, UNICEF, the World Bank and the bilateral aid agencies (AusAID, CIDA, the Netherlands, Sweden and USAID) with the participation of the governments of IDD affected countries.

Implementation has depended on national organizations-both the public and private sectors have been involved. This applies particularly to the involvement of the salt industry.

The funding support of the governments of IDD affected countries has been quantitatively most important. Funding has been provided by all these agencies but Kiwanis International through UNICEF has been particularly significant. This depends on an educated community, which understands the relation between iodine deficiency and brain damage and the opportunity of prevention. It needs to be understood that adequate dietary iodine intake is just as important as clean water as part of the general knowledge of the community.

The challenge now is sustainability, as well as implementation in the countries that have not yet developed effective programs.

The Director General of the WHO (Dr Gro Brundtland) has pointed out that the achievement of IDD elimination "will be a major and total public health triumph ranking with small-pox and polio". It will be a major global triumph in the elimination of a non-infectious disease (WHA 1999).

This effort has involved a remarkable partnership between countries, international and bilateral aid agencies, technical organizations, the salt industry and Kiwanis International.

The strength of this Partnership and the newly established Global Network encourages confidence that elimination of IDD is a realistic goal,

although inevitably its achievement by a country will depend on continued political and social stability, as well as technical efficiency.

The progress achieved with the elimination of brain damage due to iodine deficiency provides a possible model for the successful solution of other global nutritional, as well as social and environmental problems.

References

Hetzel BS (1988). The Prevention and Control of Iodine Deficiency Disorders, Report to the united Nations System. ACC/SCN Nutrition Policy Discussion Paper #3 FAO Rome.

Hetzel BS. (1990). Global Action Plan for the Elimination of Iodine Deficiency Disorders by the year 2000. uN Subcommittee on Nutrition (SCN) 16th Session, Paris.

Hetzel BS (2002). Eliminating Iodine Deficiency Disorders-The Role of the International Council for Control of Iodine Deficiency Disorders in the Global Partnership. Round Table, Bulletin, WHO 80 (5), 410-417.

Hetzel BS, Pandav CS, (Eds). (1996). SOS for a Billion: The Conquest of Iodine Deficiency Disorders, 2nd Edition Oxford university Press, New Delhi.

Lancet (1983). Control of Iodine Deficiency Disorders in Asia. 2: 1244.

Lancet (1986). Inaugural meeting of International council for Control of Iodine Deficiency Disorders. 1: 1164.

UN General Assembly Special Session on Children (UNGASS), New York (2002).

UNICEF/WHO (2000). Ending Iodine Deficiency Forever. UNICEF New York.

WHO/UNICEF/ICCIDD. (1996). Recommended Iodine Levels in Salt and Guidelines for Monitoring their Adequacy and Effectiveness. WHO/NuT96.13.

WHO/UNICEF/ICCIDD. (1999). Progress Towards the Elimination of Iodine Deficiency Disorders (IDD); WHO/NHD/99.4

WHO/UNICEF/ICCIDD. (2001). Assessment of Iodine Deficiency Disorders and monitoring their elimination WHO/NHD/01.1

WHO/UNICEF/ICCIDD (1997). Report on Regional Conference on The Sustainable Elimination of Iodine Deficiency Disorders (IDD) in Africa by the year 2000. IDD Newsletter 13. (2) May (1997).

World Health Assembly (1999). Statement by the Director General of WHO. Press Release WHA/17, WHO Geneva.

World Health Organization (1986). Prevention and Control of Iodine Deficiency disorders, Report to 39th World Health Assembly, Geneva WHA39.6.

World Health Organization (1990). Prevention and Control of Iodine Deficiency Disorders, Report to 43rd World Health Assembly, Geneva WHA43.2.

World Health Organization (1994). Iodine and Health. A statement by the World Health Organization WHO/NUT/94.4.

World Health Organization (1996). Prevention and Control of Iodine Deficiency Disorders. Report to 49th World Health Assembly, Geneva. WHA49.13.

World Summit for Children (1990). United Nations, New York.