

Section VII

The National Program for the Elimination of IDD *CS Pandav and BS Hetzel*

With special contributions by
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1. Introduction

This section describes the National Program, which is the basic operational unit for the global program. As already indicated there are 130 IDD affected countries. In this Section we review the status of these programs. In addition detailed reports are provided for three different Country Programs.

Since 1990 through the World Summit for Children there has been unprecedented political support at Heads of State level for National Programs for the elimination of brain damage caused by iodine deficiency.

This political support has been a major factor in the progress that has been made since 1990 as described in the Joint ICCIDD/WHO/UNICEF Report (1999).

Political support depends on community awareness and understanding of the problem. Without this awareness politicians are unlikely either to be aware or willing to act. Political support is essential for the passage of laws or regulations on salt iodization through the legislature and also for timely economic incentives.

The process of communication in building community awareness has been fully described in Section VI.

In this Section VII we are concerned with the whole social process required for a successful national program. This can be understood through a social process model as recommended in the Joint ICCIDD/WHO/UNICEF 2001 Report and outlined in Section II.

2. The Social Process Model

The social process model can be usefully presented in the form of a 'wheel' as described in the Joint Report.

The model shows the diversity of functions that have to be linked together to achieve an integrated successful national IDD elimination program. This model is being followed in a number of countries. The wheel must keep turning to maintain the vitality of the program! The wheel is driven by the availability of data on urine iodine and salt iodine levels.

The 'wheel' model involves six components clockwise in the hub of the wheel (**fig. 1**).

The multidisciplinary orientation required for a successful program, poses special difficulties in implementation. Experience indicates that

Wheel model for IDD Elimination Program

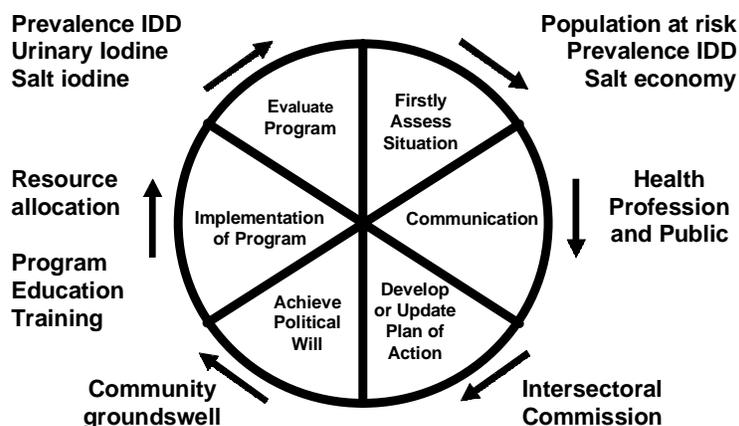


Fig. 1 *Wheel Model for IDD Elimination Program*

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** 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 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.

communication problems often arise between health professionals and the salt industry-with their different professional orientations. There is need for mutual education about the health and development problems of IDD and about the problems encountered by the salt industry in the continued production of high quality iodized salt. Such teamwork is required for sustainability to be achieved.

The additional cost of iodine fortification in the process of salt production (less than 5US cents per person per year in 1999) should eventually be borne by an educated community. This will greatly assist sustainability.

The 'wheel' model is driven by the 'marker' of salt iodine consumption and urine iodine excretion of the community or population. It is fortunate that the urine iodine excretion provides an excellent indication of dietary iodine intake as described in Section IV.

These markers provide the essential elements for monitoring the program to assess whether iodine deficiency is being eliminated. Determinations must be carried out regularly using procedures described in Section IV and Section IX. If there is evidence of inadequacy of iodine intake through iodized salt then appropriate remedial measures can be taken at factory, retail or household level.

Measurements of urinary iodine are usually carried out in school children aged 8-12 years taking advantage of their availability in the school setting. However, if school attendance is reduced due to inadequate access (foreseeable through distance or poverty) then this must be followed up by sampling at household level.

Another community group of great importance to the elimination program, are women of reproductive age including particularly pregnant and lactating women. These groups should receive special attention, as for example, in China where comprehensive data are now being collected (see China Report Section VIII).

These groups are very important to foetal and child health. An adequate amount of iodine must be provided for the mother during pregnancy so that she can produce the necessary extra thyroid hormone required, particularly in the first half of pregnancy before the foetal thyroid secretes thyroid hormone. Even at the end of pregnancy there is a significant proportion of foetal thyroid hormone derived from the mother.

This means that effective and reliable laboratories need to be available at country and regional level for salt iodine (by titration) and urine iodine (by chemical determination). Regional Reference Laboratories are important for external quality control at country level by exchange of

samples as in the recently established International Resource Laboratories for Iodine (IRLI) Network (Section III).

The availability of the salt iodine and urine iodine determinations suitable for large-scale use is a great strength for the National IDD Elimination Program. The effectiveness of the social process can be reliably and readily assessed through these determinations for which adequate resources must be provided by funding trained manpower, equipment and materials.

3. Report on Progress in National Programs

In 1999 WHO in collaboration with UNICEF and ICCIDD reviewed the IDD global situation with reference to National Programs .

Three key elements in the Social Process Model are a national intersectoral coordinating body or commission, a plan of action for the elimination of IDD and legislation on salt iodization. The findings are shown in **Table 1** regarding the status of the global program for 130 IDD affected countries.

Of the 130 countries with IDD, 98 (75%) had legislation on salt iodization in place and a further 12 have it in draft form.

Table 1. Current status of key elements of IDD control programs

WHO Region	Number of countries			
	Affected by IDD	National Intersectoral Coordinating Body	Plan of Action for IDD Control	Legislation in place
Africa	44	35	36	34 (6*)
Americas	19	18	18	17
SE Asia	9	9	8	7 (1*)
Eastern Mediterranean	17	15	14	14
Europe	32	20	18	20 (3*)
Western Pacific	9	8	8	6 (2*)
Total	130	105	102	98 (*12)
Percent	100%	81%	78%	75% (9*)

*The figure in brackets refers to the number of additional countries, which have legislation in draft form. (From WHO/UNICEF/ICCIDD 1999).

Table 2. *Current Status of household consumption of iodized salt*

WHO Region	Number of Countries with IDD	Percentage of household consumption of iodized salt					Overall*
		No data	<10%	10-50%	51-90%	>90%	
Africa	44	8	6	8	19	3	63%
Americas	19	0	0	3	6	10	90%
SE Asia	9	0	1	2	5	1	70%
Eastern Mediterranean	17	5	1	2	6	3	66%
Europe	32	10	4	12	4	2	27%
Western Pacific	9	0	1	4	3	1	76%
Total	130	23	13	31	43	20	68%

*Total population of each country multiplied by the % of households consuming iodized salt. Numbers then totalled for each Region and divided by the total Regional population. (From WHO/UNICEF/ICCIDD (1999))

Table 3: Current status of monitoring activities and laboratory facilities in IDD affected country (1999)

WHO Regions	Number of IDD affected Countries	Number of IDD affected Countries		
		Monitoring salt quality	Monitoring iodine status	With laboratory facilities*
Africa	44	29	24	28
Americas	19	19	19	19
South-East Asia	9	8	7	6
Europe	32	17	13	13
Eastern Mediterranean	17	14	10	11
Western Pacific	9	8	6	7
Total	130	95	79	84
Percent	100%	73%	61%	65%

*These figures reflect countries with the capacity for both, urinary iodine and/or salt iodine level analyses. Standard of laboratories and expertise for each of these, however, is very different. (from WHO/UNICEF/ICCIDD (1999)).

Following the promulgation of legislation on salt and the sensitization of the salt industry, there has been a big increase in the consumption of iodized salt. The latest data for each of WHO's Regions are summarised in **Table 2**.

Table 2 shows the uneven progress by Region. Europe has achieved only 27% coverage whereas the other Regions have achieved 60% or more.

This report emphasises the importance of monitoring for ensuring the sustainability of IDD control programs. The latest data from the same report, concerning the status of monitoring programs in the various WHO Regions are summarised in **Table 3**.

The poor achievement of Europe shown in **Table 2** with only 27% coverage is reflected in the inadequate facilities for the monitoring of salt iodine and urine iodine (**Table 3**) with only 13 out of 32 countries with functioning iodine laboratories. This situation in Europe is attributable largely to political and government failure as discussed further in the Regional Report (Section VIII).

4. Specific Country Programs in Different Political Situations

A series of three examples of successful country programs are now presented with reference to the Social Process Model. Each illustrates the development of national programs in three different situations. They are:

4.1 The Russian Federation-a large Federation of States
(population 145 million)

4.2 Bhutan-a small Himalayan Kingdom (population 2.1million)

4.3 Madagascar-an Island Nation (population 16 million)

4.1

IDD In The Russian Federation

Gregory Gerasimov

4.1.1 Introduction

4.1.2 Assessment

4.1.3 Planning

4.1.4 Implementation

4.1.5 Monitoring

4.1.6 Challenges ahead

4.1.1 Introduction

There is ample evidence to show that from 1955-1970 IDD in the Russian Federation, as well as in other republics of the former USSR, were put under relatively strict control. As a result, there was a significant reduction of endemic goitre (EG) incidence and prevalence. Data from the 1969 national survey revealed the prevalence of total goitre to be less than 5%, i.e. almost at sporadic level. This was accomplished by a mix of technologies including a significant increase in iodized salt production and use (up to 1 million tons annually, or 4.5-5kg per capita of population); the distribution of iodine tablets to specific target populations, principally women and children in severe deficient areas; and careful monitoring. To a certain extent therefore it can be concluded that during the period of 1950-1970, IDD/EG in the USSR were put under strict control (Dedov et al 1992, Gerasimov et al 1993, Gerasimov 2003). However, two decades later, with the availability of urinary iodine estimation and ultrasonography methods for measuring thyroid volumes for IDD assessment, it has become clear that IDD can and do occur in many areas, where they have been considered to have been eliminated. In all probability this consideration applies to progress reached in the Soviet Union: IDD were not fully eliminated, but significantly ameliorated, while the most severe manifestations of iodine deficiency (cretinism, large goitres) were eradicated.

The main shortcoming of IDD/EG control in the USSR was its limitation to “endemic goitre” areas only. There was no legislation for universal salt iodization (USI) in Russia, and IDD prevention was regulated by the administrative mechanisms of a fully centralized economy. Iodized salt was supplied to endemic goitre areas as identified on the list provided by the Ministry of Health. However, iodization of *all* edible salt was not mandated for the salt industry. In the 1970s and 1980s iodine deficiency gradually returned as supervision waned and regular effective monitoring was reduced. Because of broader economic and political problems, the system of IDD/EG control started deteriorating and finally collapsed with the break up of the USSR in 1991.

In the meantime, an International Symposium on the Elimination of IDD with special reference to the USSR, was held at Tashkent in November 1991. It was sponsored by UNICEF, ICCIDD and WHO, became an important milestone in the development of the IDD control program in Russia. Many Soviet colleagues presented data from their own republics and areas, information that had not been previously available to the

international world. G.Gerasimov and R.Gutekunst, both of the ICCIDD Board, arranged and collated the presentations, and edited them for publication. The proceedings of the meeting were published in Russian and in English, and the main presentations were summarised in the IDD Newsletter (IDD Newsletter 1992). A number of international speakers discussed various general aspects of IDD, including B.Hetzel, J.Stanbury, J.Dunn, R. Gutekunst, C. Thilly, R. DeLong, H.Burgi, D. Haxton and others from the ICCIDD.

In the resolution, which concluded the meeting, the participants called for emergency measures to fight IDD in the USSR. They also recommended conducting more surveys and using advanced techniques such as urinary iodine determination to assess the current status of IDD in different regions of the country. Unfortunately, the break down of the USSR and the subsequent turmoil significantly delayed the implementation of these recommendations. At the same time, the significance of this meeting can not be overestimated.

4.1.2 Assessment

Reinstitution of an IDD program in Russia required high level advocacy based on scientific evidence of a significant iodine deficiency nationwide. In 2001, the National IDD Centre under the Russian Ministry of Health published data from epidemiological studies performed to date in different areas of Russia from 1991 to 2000 (Table 1). These surveys covered at least 28 of the 89 administrative districts of Russia, but in terms of population and size of territory these studies covered more than



Fig. 1 Map of the Russian Federation

half of the territory of the Russian Federation (**fig. 1**) (Russian Ministry of Health 2001).

Results of these surveys provided clear information that all populations in the currently surveyed territory of Russia is exposed to some degree of iodine deficiency. In some remote regions extremely severe manifestations of iodine deficiency (cretinism) were found (Osokina and Manchuk 1998). Iodine deficiency is present in big cities (Moscow, St. Petersburg and others) and in coastal areas, and is generally more prevalent in rural than in urban regions. It is also prevalent in districts that have not been earlier considered as “endemic for goitre”. Iodine deficiency is more prevalent in the Eastern (Asian) districts of the country than in the Western (European) part. The results of these surveys have provided a solid background for high level advocacy, on the part of international as well as bilateral organisations and donors.

When iodine deficiency is eliminated goitre prevalence among schoolchildren decreases to less than 5%. Optimal median UI levels are between 100 to 200µg/L.

4.1.3 Planning

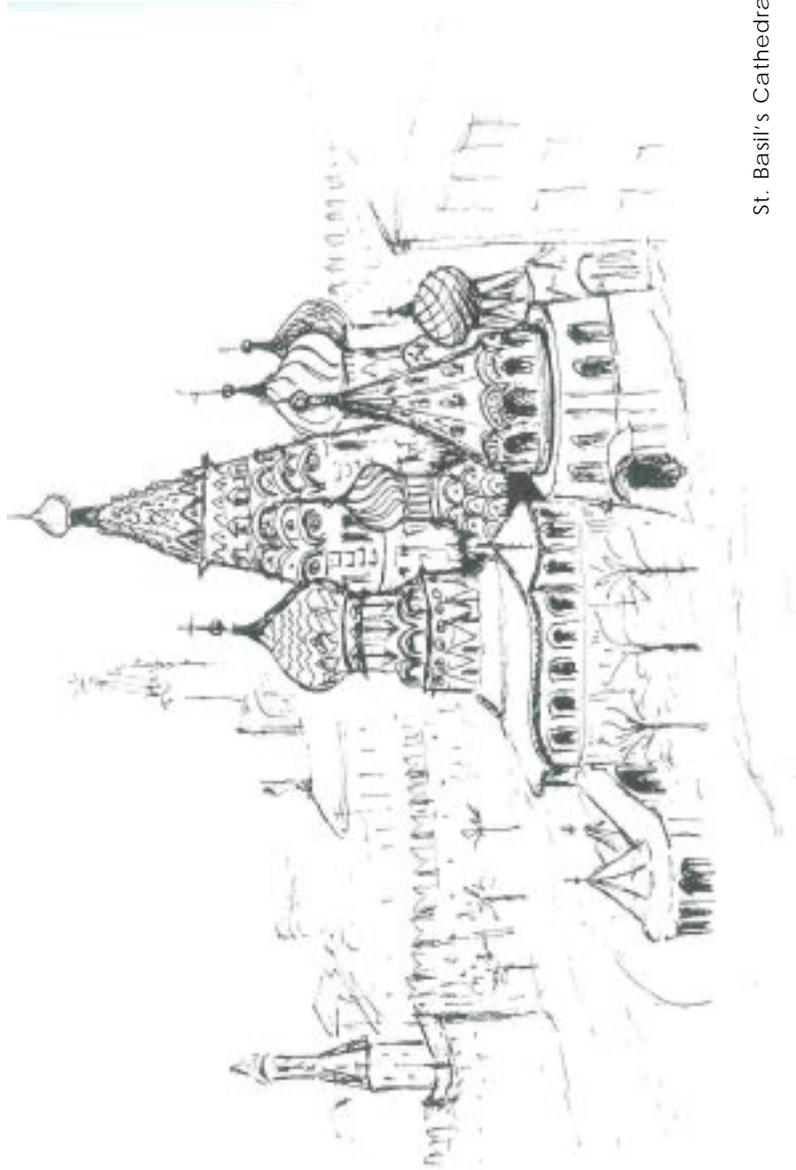
As mentioned above, the whole concept of IDD prevention in the Soviet Union was designed for a centralized state management system for iodized salt production and distribution. The country’s disintegration and subsequent economic reform in Russia put an end to the centralized and distributive system in the economy. At the beginning of the 1990s, many enterprises of the salt industry and almost the entire wholesale and retail trade system were privatised. After the collapse of the Soviet Union, there was no legislative framework in the Russian Federation for conducting an IDD prevention program under the conditions of a market economy. As a result, this program was practically curtailed, production of iodized salt ceased between 1993 and 1996, and less than 20,000 tons of iodized salt were produced in Russia in 1997.

Moreover, the former National Industrial Standard for “Common table salt”, adopted in 1991, actually hindered the mass manufacture of iodized salt: only relatively unstable potassium iodide (KI) was permitted as an iodizing fortifier, it was forbidden (!) to iodize fine grade evaporated salt, and shelf-life of iodized salt was limited to three months. There were significant difficulties in providing the salt industry with iodizing fortifiers, production of which had essentially ceased in Russia and other CIS countries. The price of these fortifiers was also often unjustifiably high.

Table 1. Iodine deficiency in various regions of Russia: cumulative results of regional surveys performed in 1991-2000 (Russian Ministry of Health 2001)

Regions Of the Russian Federation	Goitre prevalence in school- children	Range of UI median values (µg/L)	IDD severity *mild **moderate *** severe
European part of the Russian Federation			
Moscow (city)	10-12	44-87	*
Moscow region	12-29	25-83	* to **
Tambov region	19-30	52-59	**
Voronezh region	16-40	30-58	**
Tula region	15-30	51-64	**
Orel region	20-45	40-84	* to **
Bryansk region	12-30	69-84	*
Kaluga region	10-30	54-89	* to **
Tver region	12-23	57	* to **
Belgorod region	16-28	48-80	* to **
Orenburgsk region	15-30	42-58	* to **
St.Petersburg (city)	9-21	69-75	*
Arkhangelsk region	11-98	30-74	* to ***
Kirov region	14-28	56-78	* to **
Komi Republic	10-15	52-102	*
North Ossetia Republic	-	68-74	*
Yaroslavl region	13-34	30-68	* to **
Lipetsk region	14-28	82	*
Udmurtia republic	16-48	64-86	* to **
Krasnodar region	10-23	48-57	*
Kalmykia republic	14-50	51-100	* to **
Bashkiria republic	27-31	16-42	**
Asian part of the Russian Federation			
Khanty-Mansiysk region	37-39	28-67	**
Tuva republic (1997)	68-88	16-18	***
Tuva republic (2000)	5-50	91-186	Generally *
Sakha-Yakutia republic	16-39	16-53	** to ***
Tyumen region	12-37	28-67	**
Sakhalin region	3-12	51-117	*
Krasnoyarsk region	14-32	44-69	* to **
Novosibirsk region	16-34	68-85	* to **

Iodine deficiency is considered to be eliminated when goitre prevalence among schoolchildren decreases to less than 5%. Optimal median UI levels are 100-200 µg/L.



St. Basil's Cathedral

Consumer demand for iodized salt was extremely low, since clients and customers were poorly informed about the benefits of iodized salt. Another reason for this low demand included the very short storage time (3 months), which restricted sales, and the relatively low quality of iodization.

4.1.4. Implementation

The situation began to improve gradually after 1997 when owing to the joint efforts of national salt manufacturers, the Russian government and the Ministry of Health, with the active participation and financial support from international organisations, primarily UNICEF, the problem of eliminating iodine deficiency began to receive priority attention again. On the first meeting of salt producers of Russia, Ukraine and Belarus held in Moscow in November 1997 an agreement was reached on raising the weight proportion of iodine in salt to 40 ± 15 mg/kg (from previous 23 ± 11 mg/kg) and gradually transferring to the use of potassium iodate. In contrast to the former standard, the stipulated shelf life for iodized salt has been noticeably extended and constitutes the following: using potassium iodide – 6 months, using potassium iodate – 9 months, for vacuum salt – 12 months. Later the shelf life of iodized salt has been further extended.

By 2002 Russian salt producers had built up sufficient production capacities, refurbished their production facilities, drawn up and introduced new advanced quality standards based on international experience, led to improved iodization, quality assurance and the packaging of iodized salt. It is now safe to state that there are no longer any real obstacles preventing the Russian salt industry from fully meeting the country's demand for iodized salt (Apanasenko et al 2002).

The six main Russian salt enterprises now have the technological potential to produce 671,000 tons of iodized salt annually. Estimated demand for iodized salt in Russia is approximately 500,000 tons (based on 3.5 kg of salt per capita a year, and a population size of 145 million). Iodized salt production in Russia in 2000-2001 reached 82-90,000 tons, and an additional 35-40,000 tons were imported from Ukraine and Belarus and processed in small repackaging enterprises belonging to major salt dealers. Thus, the annual supply of iodized salt to Russia has increased dramatically from 20,000 tons in 1997 to almost 140,000 tons in 2002 (**fig. 2**). However, this amount covers no more than 25-30% of potential demand for iodized salt in Russia (Apanasenko et al 2002).

Problems concerning the supply of iodizing fortifiers (potassium iodate) to salt production enterprises have also been completely resolved over the past three years. The existing capacities of two Russian chemical enterprises are sufficient to supply the salt industry with the necessary amounts of potassium iodate at reasonable prices.

The price of nationally produced iodized salt is only slightly higher (5-15%) than the price of ordinary salt, mainly due to the cost of the iodizing fortifier. Iodized salt is the cheapest way of meeting the population's requirement for this essential micronutrient and is affordable to all social groups. However, the production of iodized salt is still hindered by insufficient consumer demand for this product (Apanasenko et al 2002).

4.1.5 Monitoring

In response to several resolutions of the Head of State Sanitary Physician of the Russian Federation, the system of IDD monitoring has been restored after thirty years of non-existence at the national level. It now includes production monitoring (data on production, sale and quality of iodized salt) as well as impact monitoring. Iodized salt is tested in more than 1,500 food control laboratories and the results are reported to the Ministry of Health. In the first nine months of 2002 almost 50,000 samples of iodized salt were checked nationwide. The data show that the quality of iodized salt is further improving and that the number of samples with inadequate iodine content decreased from 16% in 2000 to 11% in 2001. However, there is still room for further improvement of iodized salt quality (Gerasimov 2003).

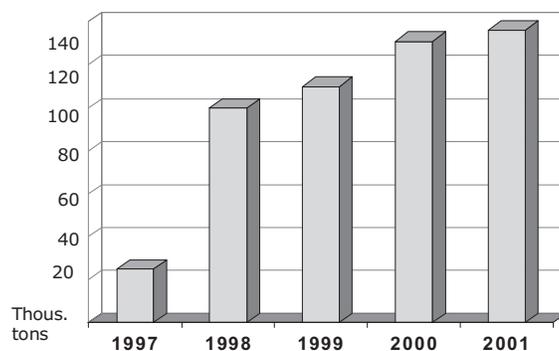


Fig. 2 *Supply (production and import) of iodized salt to the Russian Federation (1997-2001)*

The biological monitoring system of IDD is gradually becoming stronger. From 1994 to 2000, seven laboratories for UI measurement were organised in different regions of Russia with the central resource laboratory based in Moscow. This laboratory is participating in the CDC-led EQUIP network, and provides technical support to sister laboratories in Russia and in Central Asia.

Policies of IDD prevention are currently stipulated by a Resolution of the Russian Government (1999), setting a **voluntary** model of IDD prophylaxis. In the absence of mandatory legislation, the supply of iodized salt to both households and the food industry depends on demand from the retail trade, and hence, large and small consumers. Efforts to increase “public demand” are unlikely to achieve the aim of 90% of households consuming iodized salt within the next few years. A comprehensive legislative framework, with a strong enforcement system, that requires mandatory iodization of all food-grade salt (table salt and salt for food processing) is therefore necessary. This requires high level advocacy, including concerted efforts from international (FAO, UNICEF, WHO) and bilateral organisations and donors.

4.1.6 Challenges ahead

In spite of significant progress achieved in Russia over the past 5 years, there are still more challenges ahead. On several occasions the Russian Ministry of Health supported the position that a mandatory model of IDD prevention though USI in Russia could be implemented through federal legislation. This it would require the adoption of a special act (law) on IDD prevention, or the amendment of existing laws (for example, the Food Safety Law) by the Federal Legislative Assembly of the Russian Federation. In 2003 such draft legislation has been developed and submitted to this national legislative body. However, this draft legislation needs further advocacy and active lobbying in the parliament. With the adoption and full enforcement of national legislation of IDD prevention by mandatory and universal salt iodization, Russia acquires a great chance to reach the goal of IDD elimination by 2005.

4.2

Bhutan *CS Pandav*

4.2.1 Introduction

4.2.2 Assessment

4.2.3 Planning

4.2.4 Political Decision

4.2.5 Monitoring

4.2.6 Evaluation

4.2.1 Introduction

Bhutan is located in the eastern Himalayas bordered by India in the south, east and west and by the Tibetan Autonomous Region of China in the north. A population of 2.1 million lives in an area of 47,000 square kilometers. The Royal Government of Bhutan has worked with the International Agencies to achieve good progress with Community Development and public health program programs (**Table 1**).

Infant mortality rate (IMR) has declined from the 1983 figure of 102.8 to 70.7/1000 live births in 1994. With the more recent strides made in salt iodization, the IMR is bound to have declined further. Similarly, the under-five mortality rate has decreased from 162.4 to 96.9 per 1000 live births (Bhutan Health Statistics). These rates can also be correlated with a decrease in the total goitre rates and the cretinism rates.

Iodine deficiency disorders (IDD) have long been a major public health problem in Bhutan. Over the past three decades several studies have been conducted on the prevalence of IDD in Bhutan. The first published report was by two English doctors who spent five weeks in Bhutan in 1964. While these doctors did not conduct an empirical study to specifically investigate goitre, they reported that goitre among the population was “so prevalent as to be taken for granted”.

A nationwide study in 1983 (UNICEF/WHO, 1983) reported a total goitre prevalence of 60 per cent, a high prevalence of cretinism and low urinary iodine concentration in the majority of the population. Based on the results of the study, UNICEF commissioned a study to assess the salt distribution in the country and form a broad outline of a feasible salt iodization program in the country (UNICEF/ROSCA, 1983). The study demonstrated the technical, organizational and economic feasibility of iodization of all salt consumed in Bhutan (**Table 2**).

Table 1. Key Events in Community Development in Bhutan

1. Colombo Plan	1962
2. Joining of United Nations	1971
3. Joining of South Asia Association for Regional Cooperation	1985
4. Signing of Convention of the Rights of the Child	1991
5. Achievement of Universal Coverage of Immunization	1991
6. Preparation of National Plan of Action for Children	1992

Table 2. *Key Events in Bhutan's IDD Control Program*

1. Iodine Deficiency Disorders in Bhutan: Extent and Severity: First nationwide IDD study	1983
2. Production and Distribution of iodized salt to Control Iodine Deficiency Disorders in Bhutan	1983
3. National Policy, Strategy and Plan of Action to Control Iodine Deficiency Disorders in Bhutan: The National IDD Control Program in Bhutan	1985
4. Situational analysis of the salt iodization Program in Bhutan	1986
5. A nationwide internal program evaluation of IDDCP	1992
6. Iodine Deficiency Disorders in Bhutan: Extent and severity - External evaluation	1996
7. Statement signed by His Holiness the Je Khenpo	1997
8. Introduction of annual cyclic monitoring	1998
9. Sustainable elimination of IDD	2002

The Royal Government of Bhutan formulated and introduced a coordinated multi-sectoral Iodine Deficiency Disorders Control Program (IDDCP) in 1985 (RGB/UNICEF, 1985). The main components of IDDCP were salt iodization and distribution (introduced in April 1985 by the establishment of a salt iodization plant in Phuentsholing); iodized oil injections in high risk areas; monitoring iodine content of salt; evaluation of the Program and community level education.

4.2.2 Assessment

A situational analysis of the salt iodization Program in Bhutan was carried out in 1983. The study identified issues in implementation and made suggestions to improve its efficiency. A nationwide Program evaluation of IDDCP was carried out in 1991-1992 (DHS, 1992). The results showed that as compared to 1983, there was a considerable reduction in the prevalence of goitre and cretinism and improvement in the urinary iodine status of the population. This was attributed to the successful salt iodization Program as reflected in over 95 per cent salt samples at household level having an adequate amount of iodine.

In mid-1996, a national assessment was undertaken to track progress towards the sustainable elimination of iodine deficiency disorders in Bhutan. The assessment was conducted jointly by Nutrition Section, Division of Health, Royal Government of Bhutan, the International Council for Control of Iodine Deficiency Disorders (ICCIDD), New Delhi (India), UNICEF, WHO, and The Micronutrient Initiative, Ottawa (Canada) (RGB/ICCIDD/AIIMS/UNICEF/WHO/MI, 1996). The study found that 82 per cent of salt samples at household level had adequate iodine as compared to 95 per cent to 96.5 per cent of salt samples in the 1991-92 study. The low levels of iodine in salt at household level in the study could also explain the observation that 24 per cent of school children had urinary iodine excretion less than 100 µg/L as compared to only 13 per cent to 16 per cent in 1991-92 study.

The report indicated that since 1994 there was a breakdown in monitoring of the iodine content of salt at the production level at the Salt Iodization Plant (SIP), Phuentsholing. In addition, the salt crusher was also not functioning properly. Moreover, since 1994, there had also been consistent problems in the regular procurement of common salt by Bhutan Salt Enterprise (BSE), Phuentsholing. These resulted in retailers buying salt from across the Indo-Bhutan border directly, with consequent loss of control over the iodine content of salt.

Together these factors probably resulted in salt having inadequate and non-uniform iodine content as observed in the community. There was also a breakdown in the monitoring of iodized salt at the community level. The total number of salt samples analyzed per district was less than the recommended targets. The quarterly salt monitoring reports sent from the district to the Public Health Laboratory (PHL), Thimphu were incomplete and irregular. There was no system of providing feedback on salt monitoring to the District Administration, Health Department, Bhutan Salt Enterprise (BSE), Phuentsholing and other stakeholders for any corrective action.

The Royal Government of Bhutan reviewed the report of this study in September 1996. The recommendations emerging out of the findings of the assessment provided a framework for future action to maintain progress towards the sustainable elimination of IDD in Bhutan by and beyond the year 2000.

4.2.3 Planning

Based on the findings and the recommendations, the Royal Government of Bhutan reviewed its plan of action to reach the year 2000 goal of elimination of iodine deficiency disorders. The monitoring system has been strengthened. The district hospitals are being provided with laboratory equipment in order to do the salt analysis for iodine content by the titration method at the district level. School children have been included in the regular monitoring, to ensure a multi-sectoral approach. A revised strategy for training health staff was adopted.

4.2.4 Political Decision

On 30 August 1997, a policy statement was signed by His Holiness the Je Khenpo (spiritual head in Bhutan) at a ceremony attended by most of the senior officials of ministerial rank and by heads of UN agencies (Kuensel, 1997). The key component of the statement was "Children in Bhutan are at high risk of being affected by iodine deficiency since Bhutan falls in the iodine deficient belt of the Himalayas. Every one of us has the responsibility to ensure that our children get iodized salt to be able to grow into healthy adults." The statement signing was followed by a function at one of the larger High Schools in the capital where school children and teachers from many schools gathered to receive blessings from His Holiness the Je Khenpo and to get information on IDD.

4.2.5 Monitoring

Bhutan may be one of the first countries in the region to have begun annual cyclic monitoring in addition to the regular monitoring system. The recommendation of the 1996 study was to divide the country into five zones of four districts each and one zone per year to be covered. In each zone, 30 clusters or Community/Primary schools are to be randomly selected and 40 school children between 6-11 years of age will be examined for goitre grading. Urine and salt samples will be randomly collected from 25 per cent of the examined children per zone. Per year 1200 children will be examined for goitre grading and laboratory analysis of 300 urine and salt samples respectively will be done for iodine content. The whole country would thus be covered in a phased manner in five years. The cycle can be repeated after five years so that each zone is surveyed once in five years.

In late April 1998, the first cyclic monitoring exercise was conducted. The study team comprised local health workers, staff of the central Nutrition Section and one member of the administration staff.

4.2.6 Evaluation

In 1998, total goitre rate was 17%, the percentage of people with urinary iodine greater than 100 µg/L was 88%, median urinary iodine was 277 µg/L and iodized salt coverage was 96%. Since then regular monitoring has ensured that coverage of iodized salt remains above 90%, (total goitre rate was 12%, the percentage of people with urinary iodine greater than 100 µg/L was 77%, median urinary iodine 170 µg/L and iodized salt coverage was 71%). In spite of the set back Bhutan now has a total goitre rate less than 5%, median urinary iodine 298 µg/L and iodized salt coverage was 95%. More recently, an external evaluation was carried out in 2002 which confirmed elimination of IDD in Bhutan.

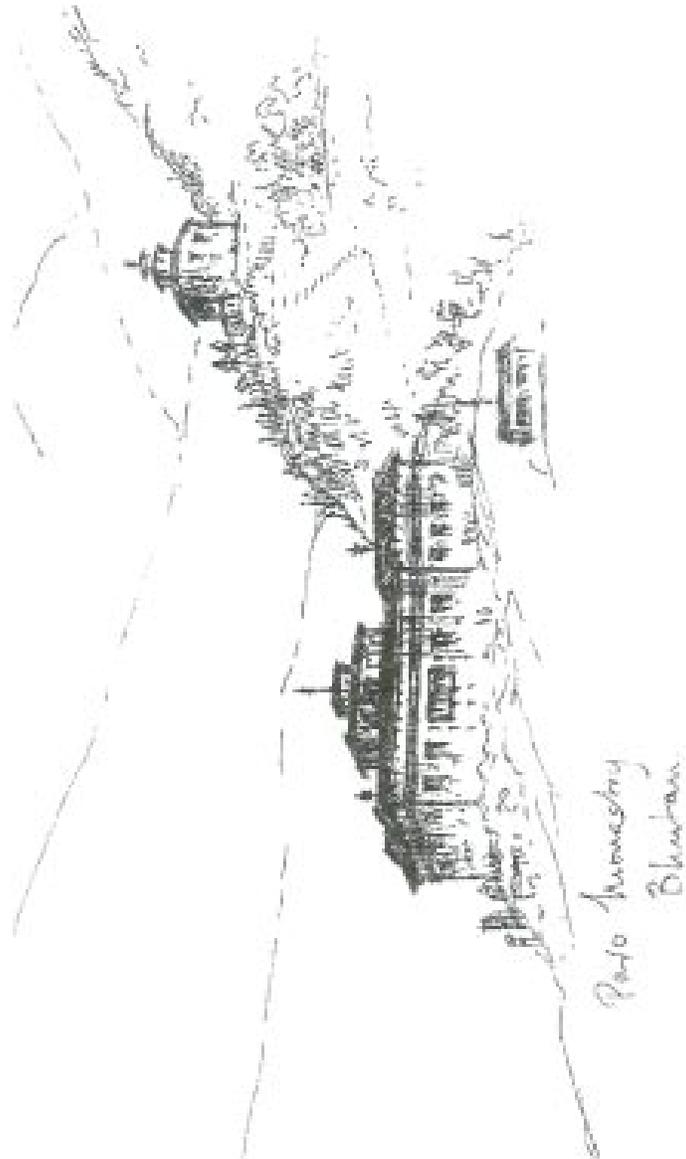
The WHO/UNICEF/ICCIDD guidelines (2001) have specified ten program indicators of which eight criteria have to be fulfilled for a country to be declared as having completely eliminated IDD as a public health problem.

1. An effective, functional national body (council or committee) responsible to the government for the national program for the elimination of IDD. This council should be multidisciplinary, including the relevant fields of nutrition, medicine, salt industry, education, the media and consumers, with a chairman appointed by the Minister of Health

2. Evidence of political commitment to universal salt iodization and the elimination of IDD
3. Appointment of a responsible executive officer for the IDD elimination program
4. Legislation or regulations on universal salt iodization. (While ideally regulations should cover both human and agricultural salt, if the latter is not covered this does not necessarily preclude a country from being certified as IDD-free.)
5. Commitment to assessment and re-assessment of progress in the elimination of IDD, with access to laboratories able to provide accurate data on salt and urine iodine
6. A program of public education and social mobilisation on the importance of IDD and the consumption of iodized salt
7. Regular data on salt iodine at factory, retail and household levels
8. Regular laboratory data on urine iodine in school aged children with appropriate sampling for higher risk areas
9. Co-operation from the Salt Industry in maintenance of quality control
10. Database with recording of results or regular monitoring procedures, particularly for salt iodine, urine iodine and, if available, neonatal TSH, with mandatory public reporting

In point of fact, the Royal Government of Bhutan has fulfilled all the ten criteria.

Through the exemplary efforts of the Royal Government of Bhutan, the program has achieved elimination of Iodine Deficiency Disorders in Bhutan. The processes are in place so as to ensure that the elimination of iodine deficiency will be a sustainable achievement. The introduction of cyclic monitoring as part of the monitoring process for the first time in the world has worked to the country's advantage. Bhutan has shown that, with the political commitment and leadership in place, with adequate infrastructure, scientific leadership, and the notable contribution from Bhutan Salt Enterprises the program to eliminate IDD has achieved its objective. The challenge is now is to ensure sustainability!



4.3

Prevention and Control of Iodine Deficiency in Madagascar 1990-2003

Daniel N Lantum

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4.3.8 Summary of IDD Program Impact

4.3.9 Sustainability Strategy for 1998-2005 and beyond

4.3.10 Conclusion

4.3.1 Introduction

The review of the fight against iodine deficiency and its consequences commonly referred to as “Iodine Deficiency Disorders” (IDD), for Madagascar is of special interest because it paints a vivid picture of the importance of IDD as a great contributory factor to abject poverty as well as the effectiveness of the work of a determined coalition of partners to radically change the situation within less than a decade (1992-2002). The population of Madagascar was estimated at 16 million in 2000 with an annual growth rate of 3%.

This evidently poor developing country had been known to have vast regions with visible goitres for several decades, but assessment was yet to be carried out.

4.3.2 Assessment

i) Preliminary studies of goitre

Although several researchers had done some limited goitre surveys in some regions, the national reference study was that of R Lala conducted between 1988 and 1992, involving a large sample of 20,832 school children of 10-14 years.

The results of goitre prevalence are presented by province and by altitude in (**Table 1**).

Table 1. Average Goitre Prevalence Rate by Province and Altitude for Madagascar, 1991 .

Province	Altitude					
	0-100m	>100-500m	>500-1000m	>1000-1500m	>1500-2000m	
Antananarivo	5042	-	-	26.0%	26.4%	34.0%
Fianarantsoa	3708	21.0%	21.1%	33.7%	41.4%	43.2%
Toamasina	3198	21.2%	22.7%	21.3%	24.2%	
Antsiranana	2600	5.3%	13.8%	32.8%		
Mahajanga	3203	5.0%	9.2%	16.2%		
Toliary	3007	3.0%	1.4%	16.8%		

The above table shows that the severity of goitre endemicity correlated well with altitude in all the provinces of Madagascar, besides indicating that goitre prevalence was of moderate to severe endemicity.

These findings were presented at a National Seminar Workshop in Antananarivo, Madagascar, on 14-16 October 1992 to which, an ICCIDD/UNICEF consultant was invited. At this meeting a convincing community diagnosis was established and this led to the organization of a national IDD program.

Apart from the effectiveness of the Information, Education and Communication (IEC) political will and government commitment was attained for the program. The following policy recommendations were made:

“The participants in the National Seminar-workshop on IDD held at Antananarivo, 14-16 October 1992; thank and congratulate the Ministry of Scientific Research, the Ministry of Public Health, UNICEF and WHO for organising this workshop which led to:

- the exchange of information on the problems of iodine deficiency,
- the derivation of principal strategies with the aim of virtual elimination of IDD from Madagascar by the year 2000.”

4.3.3 Recommendations

- the elaboration of a program for the fight against IDD, adapted to the realities of the country, and integrated into the activities of the government of Madagascar;
- the creation of a multidisciplinary and multisectoral National Committee which will coordinate all the nutritional activities, directed to IDD elimination
- the nomination of a National Coordinator for the control of IDD within the Ministry of Health, charged with the application, management, follow-up and evaluation of the program, and with the convening of meetings of the national committee;
- the obligatory iodization of food grade salt in Madagascar;
- the putting in place of the necessary regulations for the production and quality control of iodized salt in Madagascar;
- as needs arise, utilize other methods of delivering iodine to the population such as iodized oil;
- the mobilisation of resources for the prevention and control, and for research on IDD in Madagascar;
- the introduction of some modules on IDD into the curricula of primary, secondary and professional schools (Faculty of Medicine, Nurses, Health Technicians);

- the introduction of some indicators of IDD among the indicators for the sectoral policies of government in the domains of health, nutrition, education, population, from WHO (HFA 2000) and UNICEF (National Program for the Survival, Protection and Development of the Child);

4.3.4 Dissemination

- the creation within the National Committee of an IEC component charged with the conception, planning, elaboration and dissemination of the necessary material for implementation; and to evaluate the impact of the messages on awareness-building and education;
- the promotion of the best methods of circulation of the messages on IDD among the different ministries, researchers, scientists and physicians;
- the creation of a Scientific bulletin for networking supported by researchers, physicians, nutritionists and sociologists concerning nutrition and nutritional deficiencies (This bulletin will equally favour the exchange of information between Madagascar and other countries interested in the progress of research on IDD);
- the strengthening of training in epidemiology and in management of IDD;
- the fixing of a National Day for the fight against all deficiency disorders in a manner as to raise the awareness each year of the public and decision-makers on the progress achieved in the implementation of the different programs;
- the association more closely of the national mass media (the press, radio, television) with the program for the fight against IDD with the special favour of the free diffusion of messages;
- the research and collaboration of the multilateral bodies (UNICEF, WHO, FAO, WBK (SECALINE) and NGOs with the government for the technical and financial support to the IDD program.

4.3.5 Planning

Within four weeks of these recommendations, a lot of activities took place, indicating the high level of political will and commitment gained:

- The ICCIDD consultant developed an IDD training program, which was adopted and used for the training of 36 medical doctors and scientists on IDD and the conduct of IDD surveys and interpretation of the findings.

- These 36 trainees were divided into 7 groups and proceeded to carry out IDD surveys in the 6 provinces and to create Sentinel Zones for eventual IDD program monitoring and evaluation.
- The Ministry of Health was restructured, creating a service for IDD control followed by the nomination of a National Coordinator.
- The drafting of the project for legislation was completed.
- A nucleus of the national committee of salt producers was created and it began to discuss prospects of iodizing all food grade salt in Madagascar.
- While strengthening the Micronutrient Laboratory of the Faculty of Medicine, a new iodine laboratory was proposed under the direct control in the Ministry of Health.
- The urine, blood and salt samples collected from the sentinel sites were shipped to Yaounde (Cameroon) for analysis.
- The creation of an IDD data bank was initiated for the Nutrition service.

During the same period a **National Seven-Year Action Plan 1992-1999** was elaborated to guide all actions as adopted in the resolutions while awaiting the results of the urine, blood and salt analyses.

From the above actions there was good evidence that the Plan was now well understood to be a major contribution to the alternative of the great poverty and slow socio-economic and cultural development that characterised the nation. Hence, IDD control became the long-awaited opportunity and entry point for the international partners who took part in the workshop. A national coalition was soon established consisting of:

- Ministry of Public Health
 - Ministry of Scientific Research
 - The Faculty of Medicine University of Antananarivo
 - The Ministry of National Education
 - The Ministry Of Justice
 - Salt Producers
 - UNICEF
 - World Bank–SECALINE Project I And II
 - WHO
 - USAID (OMNI)
 - Kiwanis International, and
 - ICCIDD
- Other partners joined later.

4.3.6 Implementation

i) Plan of Action 1992-1999

The multidisciplinary and intersectoral committee set up for the plan adopted all the resolutions of the historic National IDD seminar of October 1992 and worked out details to cover seven years in three major but overlapping phases, namely, Resources Mobilisation, Implementation, Monitoring and Evaluation.

Considering the resources, they were seen as consisting of Financial, Manpower, Material, Administrative and management capacity, space and structures, woven into over-lapping and supportive programs integrated into other on-going activities. Implementation and monitoring had already begun from the baseline surveys and the creation of sentinel zones, and a major evaluation was planned to take place after 5 years of progress, that is, by 1998. The plan was carefully costed and a budget prepared. It is convenient for this presentation to separate the elements and present each in order to highlight the IDD program process, progress and success, as each phase rolled by.

ii) Financial Resources

The budgetary estimate of US\$ 1.2 million for the period 1992-1997 was prepared. By the year 1999, the estimated requirement was expected to be US\$ 1.6 million. That time, the cost of potassium iodate was US\$ 30 per kg.

The World Bank project (SECALINE) saw the National IDD program as an antipoverty opportunity and proposed US\$ 1 million immediately while UNICEF committed US\$ 400,000 out of the total of US\$ 1.6 million. The Kiwanis International joined in later for 1996/97 budgetary year with US\$ 148,000 and with US\$ 150,000 for 1998/99. UNICEF was to be the administrator of these funds.

iii) Administration of Lipiodol (Ultra-fluide Guerbet Capsules 1993-1995)

The administration of iodized oil in the form of capsules was an emergency measure based on the severity of IDD in parts of the country. Therefore the capsules were targeted to high-risk groups to prevent brain damage. The groups consisted of pregnant women and children of 1-14 years in hyper-endemic regions. As this strategy is relatively more expensive, universal salt iodization and consumption was accelerated to take over as soon as possible by December 1995.

Reports from all sources confirm that 1 million capsules of Lipiodol (ultra-fluide Guerbet) capsules were purchased and administered in high-risk endemic zones. According to the UNICEF Progress Report, April 1997, "Iodized oil capsules distribution was monitored through monthly utilisation reports sent in by Health Centres. 98% of 206 health centres submitted their reports accounting for 100% of first supplies and 93% of second supplies of iodized oil capsules. The beneficiaries totalled 8,86000, of whom more than 80% were pregnant women, children 0-14 years, and women 15-45 years, in accordance with the Ministry of Health protocol for iodized oil supplementation.

It was also reported that there was a stampede for iodized oil capsules once goitres were observed to be regressing after 6 months and some parents of school children whose goitres rapidly shrunk came up to thank the medical officer in charge of the School Health Service. Formal evaluation of iodized oil impact took place in 1995 in the sentinel zone only, as operationally directed from the central coordinating office; and the results were quite positive and encouraging - a concrete proof of the efficacy and effectiveness of iodized oil.

iv) Salt Iodization Activities (1994-1996)

These consisted specifically of:

- Formulation of legislation
- Contact and training of all salt producers
- The arrival of a salt Engineer as ICCIDD/UNICEF consultant- (Mr Meftah Lamine)
- Organisation of salt producers into cooperatives in Tuleary
- Purchase and supply of iodization equipment by SECALINE;
- Technical training of salt producers and installation of equipment, and training of mechanics for maintenance; in collaboration with UNIDO.
- Purchase and supply of Potassium Iodate by UNICEF.

v) Legislation

- The principal regulatory texts guiding the National IDD program included:
- Inter-ministerial Order #° 413/94/MPCA/MINSAN/MRAD of 2nd June 1994 defining and stipulating the accepted norms for food grade salt and iodized salt.

- Decree N°95-587 of September 1995 lays down the National policy for the control of IDD, states the regulatory measures and creates the National IDD committee (multisectoral body)
- Inter-ministerial order #° 0409/96/MINSAN/MINA/MINEC/MINCT of 6 February 1996 defines the modalities of application of Decree N° 95-587 of 5 September 1995.
- Decree N° 97-212 of 25 March 1997 reorganises the Ministry of Health to facilitate the functioning of the IDD program in an integrated Micronutrient Malnutrition control system which is described in detail in the “program de cooperation Madagascar UNICEF 1996-2000.”

In general the regulatory texts were well-applied and necessary revisions made to include sanctions for failure to comply. A complex chain of control and certification of salt products has been invented and updated to minimise fraud.

vi) Information, Education and Communication (IEC)

A sustained Information, Education and Communication component kept up the dynamics of the national IDD control program. This consisted of:

- Periodic National seminar/workshops,
- Documents: IDD booklets and pamphlets;
- Posters, stickers, slogans, iodized salt LOGO;
- Mass media: press, television, radio;
- House to house education during iodized salt surveys;
- Health talks on the prevention of IDD given in maternal and child health clinics;
- Celebration of IDD days and of Health weeks—big event for social mobilisation
- Special visits of the Minister of Health to IDD endemic zones;
- Teaching of IDD modules in school curricula at all levels;
- Wide distribution of rapid test kits to the elite of the population to involve them in quality control.

All these were confirmed in the UNICEF Progress Report of April 1997.

Apart from the IEC activities, an extensive program for training included 1500 workers on IDD control, 30 laboratory technicians and mechanics for 23 small salt-works and 15 more laboratory technicians for the Ministry of Health regional laboratories.

4.3.7 Monitoring and Epidemiological Surveillance

The creation of seven sentinel zones and the establishment of several baseline indicators constituted a very strong base for the Madagascar IDD prevention and control program.

i) **Progressive Impact Assessment**

Thanks to existing baseline information from the pre-Universal Salt Iodization (USI) period 1989-1992 and the confirmatory baseline survey of 1992. It was, therefore, possible to assess the progressive impact of the intervention with iodized oil (1993-1995) and USI (1995-1998). This was so because the same techniques of measurement and parameters were strictly followed in the evaluations of 1995, 1996, 1997 and 1998. The study population remained that of children aged 6-12 years.

Table 2. *Comparison of Goitre Prevalence for 1992 and 1997*

Sentinel Zone	1992	1997
Ambohidratrimo	38%	4.9%
Belazao/Antsirabe II	32.8%	14.6%
Betroka	16.8%	12.4%
Bealanana	18.0%	17.0%
Maroambitry	38.6%	23.0%
Ranomafana – East	28.8%	16.5%
Total Average	28.7%	14.8%

a) **Goitre Prevalence**

The dramatic reduction was well recorded for sentinel zones (**Table 2**).

b) **Urinary Iodine Excretion 1992-1997**

By 1995, it was reported that for children 6-12 years in the seven sentinel zones, the relative proportion of 16% with levels below 20µg/L had dropped to 5%; by 1996, it was 0.9%; and by 1997 it was 2.4%. Similarly the proportions of children excreting iodine at 100µg/L and above had risen from 0% in 1992 to 25.3% by 1995; to 78.7% by 1996 and was 45.7% by November 1997. The drop from 78.8% for 1996 to 45.7% was attributed to transfer from iodized oil to the consumption of

iodized salt which was not yet universal in all the sentinel zones such as Bealanana in Mahajanga rural Province.

In 1992 the median value for urinary iodine excretion was only 39µg/L. The median values for urine samples randomly taken from school children in May 1997 to January 1998 had a range from 90µg/L to 180µg/L with the average or mean of medians being 124.9µg/L. This showed definite improvement in the correction of iodine deficiency.

ii) Household Coverage with Iodized Salt

Although iodized salt had reached every health district by November 1997 thus achieving 100% territorial coverage, not all the salt samples tested positive for iodine. Hence for Balazoa 88.3% tested positive while for Diego in Antsiranana it was 100%. Thus, progress had occurred but there were still problems in some places. In Betroka 93% and in Ranomafana East 96.1% tested positive for iodine. The UNICEF indicator of 90% was already achieved in Madagascar by 1998.

Table 3 Performance in Exams at Government School, Belazao-Antstrabe 1994 and 1997.

Class	Pass Rate in 1994	Pass Rate in 1997
11 – 10	40%	64%
10 – 9	66%	65%
9 – 8	56%	68%
8 – 7	38%	69%

Table 4 Proportion of Pupils Repeating by 1994 and 1997

Class	Repeat Rate 1994	Repeat Rate 1997
11 th grade	40%	36%
10 th grade	30%	17%
9 th grade	29%	26%
8 th grade	31%	13%
7 th grade	43%	21%

iii) New Endemic Cretins

In the severe IDD endemic areas where cretins were quite frequent in 1992, no new cretins were reported. Unfortunately, as this indicator had not been provided for in the national epidemiologic surveillance form, none could be recorded. However in the Pediatric Ward of the Regional Hospital for Fianarantsoa, Dr R Nielle and his Chief Nursing Officer who had been running the unit for 27 years volunteered the information that new endemic cretins were no longer seen in their unit since the introduction of iodized oil followed by iodized salt in the community. At the Centre for Mentally Handicapped children "Orchide Blanche" in Antananarivo, it was reported that new cases had not been reported.

iv) Impact on Intellectual Function

From as early as 1994 the University and research sector had already launched ongoing operations research projects. The results were presented at the seminar held in August 1998. They demonstrated that the pass-rate in First School Leaving Certificate had greatly improved between 1994 and 1997. In addition the proportion of repeaters considerably reduced in Belazao-Antsirabe.

It is pertinent to mention that the iodized salt consumed in Belazao comes from Morondava, Tuléara and Antananarivo (reconditioned). Thus better results could be expected in Antsiranana enjoying higher quality salt.

Another parallel study in another school in Antsirabe showed the following results: (**Table 5**)

Table 5. *Progress in Antsirabe School Performance from 1994 to 1997.*

Year	Enrolled	Pass	Pass – Rate
1994	63	16	25%
1995	55	26	65%
1996	73	39	53%
1997	71	50	70%

We observed a positive correlation between continued iodine consumption in time and the success in intellectual performance during the period 1994-1997.

v) Iodine Induced Hyperthyroidism (IIH)

As was expected, the transient epidemic of iodine-induced hyperthyroidism (IIH) was already setting in by the year 1998, that is, two years after the introduction of iodized salt into this severely iodine deficient community. Six cases of IIH were reported at the Central Reference Hospital, Befelatana. During the IDD National seminar of August 1998, the subject of IIH was extensively discussed and medical specialists (Cardiologists, Endocrinologists and Psychiatrists) were advised to be more vigilant and to diagnose and treat new cases of IIH promptly or refer suspicious cases for early diagnosis and therapy.

vi) Integration of IDD into other Micronutrient Malnutrition Control Programs

Textually and structurally, there are provisions for integrating IDD control into the general program for control of other micronutrients, such as vitamin A, iron and calcium deficiency. The Prime Minister's decree N° 97-212 of 25 March 1997 fixing the attributions of the Ministry of Health provides for it, and "The Cooperation program Madagascar / UNICEF 1996-2000, Part II, NUTRITION" had already worked out the details for such integration.

vii) IDD Program Investment

We have already stated the World Bank (Secaline) and UNICEF commitments. The April 1997 Report on the IDD Elimination Project prepared by UNICEF detailed the budget and actual expenses. The Kiwanis International had donated US\$148,000, for the 1996/97 Budgetary year, and US\$ 150,000 were received as supplementary funds by 1998, totalling US\$ 298,000 of Kiwanis support by January 1998. The government of Madagascar provided enthusiastic and maximum cooperation in space, manpower and coordination. Other support (unspecified) was provided by USAID/OMNI.

4.3.8 Summary IDD Program Impact

The impact of iodized oil and salt on the Madagascar population is summarised in the **Table 6**.

4.3.9 Sustainability Strategy for 1998-2005 and Beyond

- i). The political will and commitment remains high and has been translated into policy and programs, which are perennial.

- a) The present organic structure of the Ministry of Health stipulated in Decree N° 97-212 of 25/3/97 permitted easy coordination of relevant service units.
- b) Appropriate legislation and regulatory texts on salt iodization have been enacted and are being applied and updated to meet program challenges.
- c) The integration of IDD in the Community Health Care delivery system at District level with community participation has been implemented.
- d) The creation of a central IDD committee, which carries out regular monitoring and periodic evaluation in addition to the National Epidemiology Surveillance system, which produces yearly reports in health activities and diseases including the IDD spectrum.
- ii) The fact that all food grade salt is produced and iodized in Madagascar is a strong and favourable sustainability factor
- iii) The formation and commitment of the National Association of Iodized Salt producers of Madagascar is indicative of continued civic engagement.
- iv) The highly organised system of social mobilization and IEC through social structures using printed messages promises to be sustainable.
- v) The integration of IDD modules in school curricula for permanent teaching promises to sustain the control program.
- vi) As iodized salt is a principal and lucrative business industry in Madagascar, it will sustain IDD control.
- vii) The involvement of the Ministry and University in operations research to improve the program and its outcomes is important.
- viii) The formation of partnerships with agencies of the United Nations such as UNICEF, WHO, FAO, the World Bank, UNIDO will foster sustainability of the fight against brain damage and poverty in favour of child survival and development for decades to come.
- ix) ICCIDD is available to advise and facilitate.

4.3.10 Conclusion

The National Madagascar IDD program has been an exemplary and successful program in that the logical social model for eliminating an endemic disease was well followed, namely: problem estimation, securing of political will and commitment, elaboration of a Plan of Action, formation

Table 6. Summary of Health Impact Indicators of National IDD Program

INDICATOR	SITUATION 1992	SITUATION 1997
Goitre Prevalence	Range 28%-68% Mean 45%	15% March 1997 15% December 1997
Urinary Iodine	Median = 39µg/L Mean = 42 µg/L Proportion less 20 µg/L 16% Proportion > 100 µg/L	125µg/L 150µg/L December 1997 2% 46% March 1997 87% December 1997
Coverage by universal salt iodization	0%	80% by November 1997 90% by March 1998
Endemic Cretins	Ambohidratrimo++ Belazao- Antsirabe++ Fandriana+++ Tananarive+ Pediatric ward Fianarantsoa+++	No New cases - - - NIL
Juvenile Hypothyroidism	Raised TSH: 30% Low T4: 54.1%	Not assessed
Intellectual Performance	High school failure rate High drop-out rate High repeat rate	Improved pass rate Reduced dropout rate Reduced repeaters
Jod-Basedow	Unknown	6 cases reported, Emergence of minor epidemic
Incidence of Operated Goitre cases	Very high+++	Relatively few cases+
Population growth	3.0% (estimates)	3.3% (estimates)
Knowledge of IDD spectrum control measures	Goitre-was known. NIL for control measures	Increased++++ Good knowledge of iodized oil and salt
Salt production	Individual Dirty, non iodized	Cooperative groups with improved production Clean iodized salt
Pediatric morbidity & mortality	Generally High rates	To be assessed by Demographic surveys

of partnership for resources mobilisation and development, implementation, monitoring and periodic evaluation, continuing IEC component, Operations Research and feedback for re-planning. Hence it has been possible to assess the health impact along several indicators. In the domain of partnership formation, the promotion and catalysing role of ICCIDD in collaboration with UNICEF and WHO has been central.

Thanks to the major financiers namely, the World Bank (SECALINE) and Kiwanis International, the program never faltered. The timely arrival of USAID/OMNI to support a post-five year evaluation through an ICCIDD consultant highlighted the spectacular success of the IDD program of this big island nation whose development energy and know-how had long been sapped by severe iodine deficiency and its consequences of general low intellectual and economic performance. All along, we have also discovered a motivated developing nation geared up to fight underdevelopment, poverty and to improve their quality of life. Certainly, the promising elimination of iodine deficiency and the assurance of sustained optimal iodine nutrition by 2002, was a worthy goal and great mission for the ICCIDD—the principal leader.

5. Summary and Conclusions

5.1 Russian Federation

As pointed out by Dr Gerasimov an international meeting held in Tashkent in January 1991 with the joint sponsorship of UNICEF/ICCIDD/WHO was very important in initiating new momentum into the IDD control program in Russia (IDD Newsletter 1992). The subsequent breakdown of the USSR delayed the implementation of the recommendations from this meeting.

Surveys carried out over the period 1991-2000 demonstrated a significant problem with IDD as indicated by elevated goitre rate and reduced urine iodine excretion throughout the population (145 million) of the Russian Federation.

Implementation of an iodized salt program did not occur until after 1997 with significant progress achieved by 2002 so that there is now confidence that the demand can be met. Monitoring of iodized salt indicates better quality but there is still room for improvement. Laboratories for the measurement of urine iodine have been established

with the recent assistance of the International Resource Laboratories for Iodine (IRLI) Network.

However, there is a lack of demand for iodized salt. Legislation has not been passed. Universal Salt Iodization is necessary but requires 'high level advocacy' including international organizations from the UN System (FAO, UNICEF, WHO).

5.1.1 Comment

It is clear that a major communication and education campaign is required to promote the use of iodized salt immediately without USI legislation. But an effective education program should assist the future passage of legislation, eventually for USI.

5.2 Bhutan

This small Himalayan Kingdom (population 2.1 million) had severe IDD. A Plan of Action was drawn up in 1985 with implementation of the IDD Control Plan (IDDCP) by the establishment of a salt iodization plant on the border with India at Phuentsholing, iodized oil injections in high risk areas, salt monitoring, evaluation and community level education.

However, a Joint Report in 1996 to the government by the ICCIDD indicated inadequate monitoring of iodized salt. This was corrected with acceptance by the government of the objective of sustainable elimination of IDD in Bhutan by 2000. Urine iodine laboratories were established.

Political support was provided by His Holiness the Je Khenho at a special ceremony on 30th August 1997, attended by Ministers and Heads of UN Agencies. This ceremony was followed by the signing of a Statement of Commitment to 'ensure that the children of Bhutan get iodized salt to be able to grow into healthy adults'.

In 1998 the TGR was 17%, median urine iodine was 277µg/L and iodized salt coverage was 96%. By 2002 the TGR was less than 5% with median urinary iodine of 298µg/L. An external evaluation carried out in 2002 confirmed the elimination of IDD.

The WHO/UNICEF/ICCIDD (2001) Guidelines for sustainability have now been met by the Royal Government of Bhutan. A normal cyclic regular monitoring system has been established with the division of the country into five zones of four districts each. Each year 1200 children are checked for goitre grading and analysis of 300 urine samples and salt samples for iodine levels.

5.2.1 Comment

External assistance (ICCIDD/UNICEF/WHO/MI) with the initial assessment led to the IDD Control Program. This Bhutan experience indicates the need for sustainability measures, particularly by the monitoring of salt iodine and urine iodine and the role of the ICCIDD in ensuring this.

5.3 Madagascar

This national program in an island nation of 16 million has been most successful.

As reported by Dr D Lantum the social process for a national program was adopted. The sequence of Assessment, Dissemination, Planning, Political Decision, Implementation and Evaluation was followed. Necessary funding support was provided by US\$1 million from the World Bank (anti-poverty program) with additional support by UNICEF and Kiwanis International.

Legislation has been passed for norms for iodized salt and the creation of a National IDD Multisectoral Committee.

A sustained Information, Education and Communication (IEC) Program has been established with the use of mass media, IDD booklets and pamphlets. An extensive staff training program included 1500 workers on IDD control, 30 laboratory technicians and mechanics for 23 small salt works and 15 more laboratory technicians from the Ministry of Health Regional Laboratories.

Progressive Impact Assessment was carried out showing fall in TGR. Improved household coverage with iodized salt, rise in urine iodine and improved school performances. Full details are given in Table 6 in Dr Lantum's Report.

5.3.1 Comment

The Madagascar program presents an excellent example of the fully developed social process for a national program. The island situation has the advantages of a clearly defined population, conscious of its identity in accepting the challenge of the elimination of IDD as a factor in the reduction of the widespread poverty.

The success of the program has been greatly assisted by the leadership provided by the ICCIDD through Dr Dan Lantum.

Conclusion

Each of these three programs demonstrates a significant role for external assistance through the UN System-UNICEF, WHO and the ICCIDD. This is also illustrated in the experience with a number of national programs reported in Section VIII.

It would seem essential that some external assistance through the UN System will need to continue to sustain national programs from time to time.

The technical role of the ICCIDD is unique. It needs to be continued to promote sustainability.

The good progress made with national programs reflects the strength of the informal global partnership of WHO, UNICEF, and the ICCIDD with the governments of IDD affected countries.

This global partnership is further strengthened by the support of the salt industry through the recently established Global Network for Sustainable Elimination of Iodine Deficiency (see Section III).

Sustainability is now the challenge (see Section IX).

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