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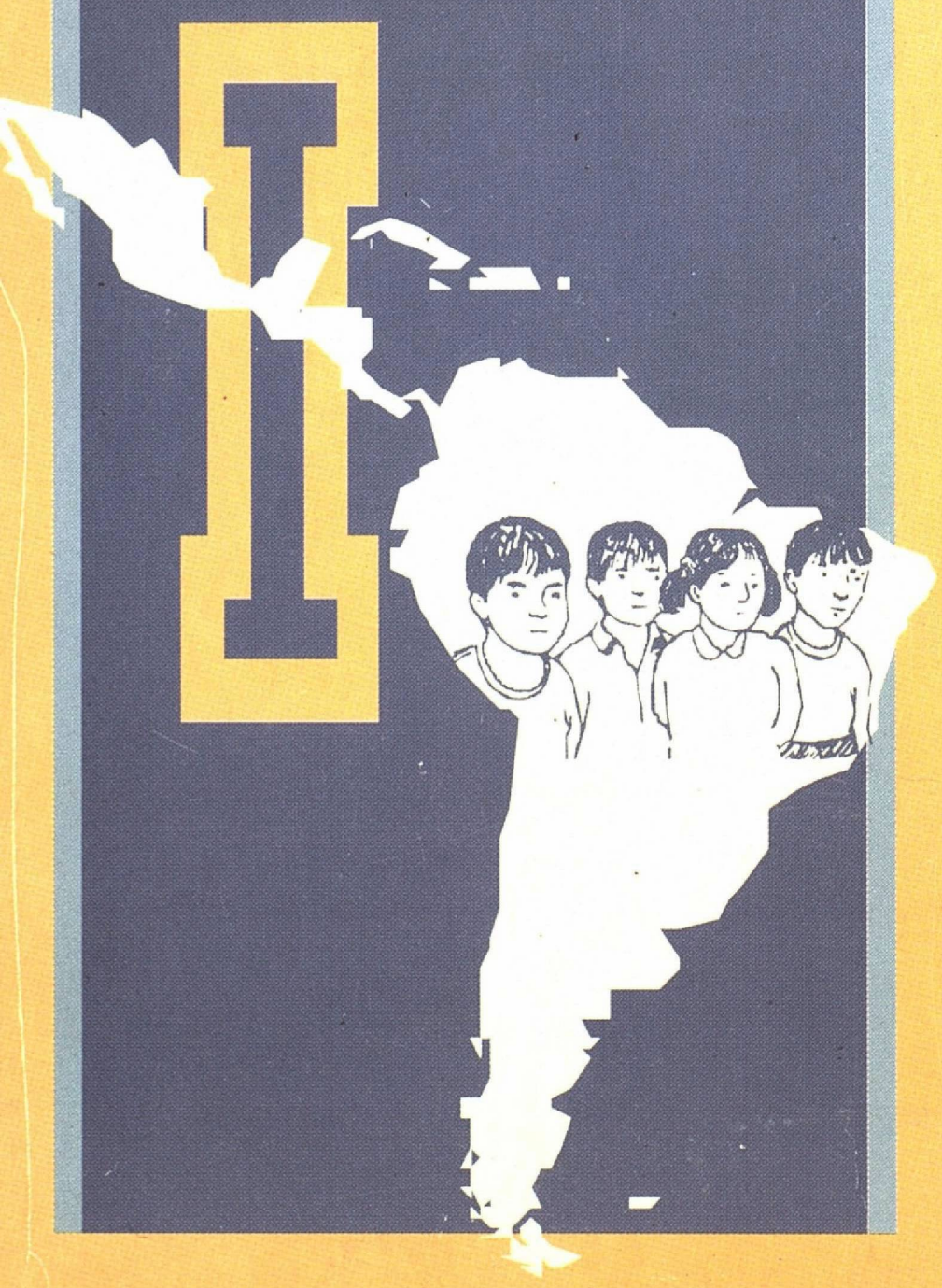

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ANALYSIS OF THE IODINE DEFICIENCY SITUATION IN LATIN AMERICA

TRENDS AND ACTION STRATEGIES

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Contents

I. BACKGROUND

In recent years, international meetings of worldwide importance have been held, all of them focusing on food and nutrition as a primary topic of discussion: the World Summit for Children (New York, September 1990) (1); the Conference Ending Hidden Hunger: A policy conference on micronutrient malnutrition (Montreal, October 1991) (2); the International Conference on Nutrition (Rome, December 1992) (3); and the 45th World Health Assembly, provisional agenda item 21, National Strategies for Overcoming Micronutrient Malnutrition (April 1992) (4). In all these meetings the decision of governments, international organizations, academic associations, technical groups, and private industry, was continuously reinforced to join efforts to achieve the goals for the effective eradication of iodine and vitamin A deficiencies by the end of 1999 and 30% reduction in the prevalence of anemia in women as compared to the 1990 levels.

Since the early 1980s, PAHO/WHO, in close collaboration with UNICEF and the International Council for the Control of Iodine Deficiency Disorders (ICCIDD), has been convening a series of world, regional, and national meetings to focus attention and action for the fulfillment of the commitments to eradicate iodine deficiency disorders (IDD).

In 1983, the Pan American Health Organization updated the information on the iodine deficiency situation and programs for the control of IDD in Latin America and organized an international meeting in September 1983 in Lima, Peru. During this meeting, the iodine deficiency situation in different regions of the world was analyzed, and scientific knowledge on the lack of this micronutrient was updated. This meeting encouraged the participants to double their efforts to prevent and control the diseases caused by iodine deficiency.

The negative effects of iodine deficiency on health and on the socioeconomic development of societies have been widely documented. Endemic goiter and cretinism are the most commonly known conditions of iodine deficiency; however, the magnitude of these disorders range from the early stages of fetal and neonatal development to childhood, adolescence, and adulthood.

These disorders include certain birth defects, deafness, and variable degrees of neurological defects, being endemic cretinism the one that causes the most severe effects on brain function. Iodine deficiency is also associated with an increase in perinatal and infant mortality rates, neonatal and infant hypothyroidism, and retarded physical growth.

Iodine deficiency is not the only causal factor in endemic goiter and cretinism, but the most important factor. There are environmental, goitrogenic, and antithyroid compounds that play a role in the transport of iodine, such as the thiocyanates and isocyanates; in oxidation, organification, and coupling, as resorcinol, phenol, aliphatic disulfides, goitrin, and iodide and lithium, which interfere with the proteolysis, liberation, and dehalogenation of the thyroid hormones. The inhibiting action of an excess of iodide on thyroid hormonogenesis is known as the Wolff-Chaikoff effect (5). Some studies have shown that bacterial antibodies (*Escherichia coli*) can stimulate thyroid growth in humans. On the other hand, some bacteria, such as *Klebsiella pneumoniae*, can degrade goitrogenic substances (6).

There are certain foods that contain goitrogenic substances: traditional foods of the third world, such as cassava, maize, bamboo shoots, sweet potato, lime seeds, and millet, which contain cyanogenic glucosides that can liberate large quantities of cyanide by hydrolysis. Not only is cyanide toxic in itself, but the main metabolite that is formed in the organism is a thiocyanate that is goitrogenic. In a study carried out in the nonmountainous areas of Zaire, Delange et al. (7) demonstrated the role that cassava plays, along with iodine deficiency, in the etiology of goiter and endemic cretinism.

The thioglucosides present in cabbage and turnips varieties have a goitrogenic action when altering iodine absorption, resulting from the goitrin effect.

In populations with iodine deficiency, the achievement of their genetic potential and real possibilities to attain self-sustained socioeconomic development are being limited. This suggests the need to assume the commitment to prevent and control iodine deficiency as a permanent health goal and reasonable socioeconomic development to be fulfilled before the end of the century, which would be an investment in the human capital of future generations.

In the past decade, Latin America has made significant advances in the prevention and control of iodine deficiency, through effective salt iodization programs, education of the population, and in some countries, administration of iodized oil to high at risk groups. These measures have allowed to reduce and maintain prevalence of endemic goiter at levels lower than those considered as a public health problem.

However, it should be stressed that countries that had succeeded significantly to reduce the problem have experienced a reapperance of iodine deficiency and its consequences. In some cases the socioeconomic crisis and the warlike conflicts in certain countries were the main cause of this deterioration. In others, the lack of political commitment in assigning priority to prevent and control iodine deficiency, the ignorance of the population concerning the negative impact of this deficiency on health and community development, and the lack of information on the importance of consuming foods rich in iodine (including iodized salt) have affected the effectiveness of the programs.

In addition, factors of an operational nature have also been common, such as noncompliance of the legal provisions and technical standards for salt iodization and the existence of several sources, localities, and forms of salt production. It has also become evident that the absence or deficiency of an ongoing process of epidemiological surveillance and quality control of salt iodization have been critical in the sustainability of the programs.

In order that a salt iodization program be efficient and effective, it should fulfill the following requirements: 1) maintain a universal coverage of iodized salt supplies for the whole population; 2) permanently and systematically provide quality control of iodized salt, emphasizing on at risk space-populations; 3) establish a surveillance and evaluation process of biological impacts on the population; 4) develop sustained activities to inform, educate, and communicate to the population the importance of consuming iodized salt; 5) maintain the necessary coordination between the governments and the salt industry to assess the fulfillment of the shared responsibility to eradicate IDD, and 6) establish mechanisms for information flow

among the different international cooperation agencies and institutions so that they can coordinate their actions and share resources to support the national programs.

II. JUSTIFICATION

With the purpose of collaborating with the countries in achieving the goal of virtually eradicating iodine deficiency diseases by the year 2000, the Pan American Health Organization, in close coordination with UNICEF and the ICCIDD, has updated information on the status of iodine deficiency disorders, their trends, control programs, and their effectiveness.

The analysis of this information will enable to know the magnitude and severity of this endemic disease, the bottlenecks that impede its eradication, and the lessons learned from successful programs. All these elements will allow to focus regional and national strategies, and within each country to focus actions in priority-populations. Additionally, it is expected that this document will facilitate the analysis and discussion of relevant aspects of the IDD situation, programs for its control, and action strategies.

III. PURPOSE

To collaborate with the Latin American countries to reach the goal of preventing and controlling iodine deficiency disorders during the present decade and to attain universal salt iodization by the end of 1995.

IV. OBJECTIVES

A. To know the current situation of diseases caused by iodine deficiency and their control programs, as well as action strategies in Latin America.

B. To count with relevant information that will enable the countries and the multilateral, bilateral, and international organizations to carry out a critical analysis to orient the development and evaluation of programs to eradicate iodine deficiency disorders.

C. To analyze the strategies and actions that the countries jointly complied with the commitments made during the World Summit for Children, the Policies Conference on Micronutrient Malnutrition, and the International Conference on Nutrition.

D. To promote the establishment of an updated IDD information system and the control programs, using standardized forms.

E. To seek ways and mechanisms to carry out joint action among the United Nations agencies, particularly UNDP, PAHO/WHO, UNICEF, and FAO; as well as bilateral, multilateral, and nongovernmental organizations, international funding agencies, and the International Council for the Control of Iodine Deficiency Disorders.

V. MATERIALS AND METHODS

A review of the literature and of the most recent available reports on iodine deficiency and its control programs in Latin America was made, including goiter prevalence, iodine urinary excretion, salt iodization, supplementation of iodized compounds, current legal provisions, and action plans for the prevention and control of iodine deficiency disorders. Likewise, different actions of interagency coordination carried out during 1983-1994 to control iodine deficiency disorders in Latin America were reviewed and analyzed.

Results are described in Chapter VII, and summaries of the information from the countries in Chapter VIII. The conclusions and suggestions for future actions are presented in Chapters IX and X, and the data sources and references in Chapter XI.

Annex I presents the tables, and Annex II, a form prepared by the WHO Nutrition Unit in Geneva, with the aim that all the countries keep updated standardized data, thus facilitating information exchange and compatibility at international level.

Annex III presents the Declaration of the Representatives of the Central American Governments and the salt industry for the Eradication of Iodine Deficiency Disorders, and Annex IV the Declaration of Quito on Universal Salt Iodization.

VI. EPIDEMIOLOGICAL CRITERIA TO ESTIMATE THE SEVERITY OF IODINE DEFICIENCY DISORDERS IN THE POPULATION

To determine the severity of IDD in the community, WHO proposes the use of biological and biochemical indicators (8) (table 1). Among the first of these is the prevalence of visible or palpable thyroid in schoolage children (preferably in the age group 8 to 10-years, although the range may be extended to 6 to 12 years if the first group does not provide sufficient statistical precision).

Among the biochemical indicators used are the median urinary iodine concentration and the prevalence of high levels of thyroid-stimulating hormone (TSH) in newborns and infants under one year of age.

Since most part of the iodine is excreted in urine, the iodine level in the urine is a good indicator of iodine intake. However, since the concentration of iodine in urine varies daily in the individual, the data can only be used for estimates in the population. Results are expressed

as urine μg/dl concentration, and the sample requires a minimum of 40 individuals, calculating the median obtained from the individual determinations within the group.

A more expensive method than the above and that requires a far more sophisticated infrastructure, as well as a wide health services coverage of newborns, is the determination of TSH levels in whole blood or serum. This directly reflects the availability and adequacy of the thyroid hormone and is the best diagnostic test of hypothyroidism. High levels of TSH in the blood of newborns or infants under one year (expressed in mU/l of whole blood) are particularly alarming since they indicate an inadequate level of thyroid hormone during this critical period of brain development.

It is considered that a serious public health problem exists when the prevalence of goiter in schoolchildren examined is 30% or more, when the median urine iodine concentration is below 2 μg/dl, or when the prevalence of thyroid-stimulating hormone values are higher than 5 mU/l in the newborns blood is greater than or equal to 40% of the children examined. Table 1 also presents the criteria used to determine when IDD represents a moderate or mild public health problem.

VII. RESULTS

Goiter Prevalence

Tables 2 and 3 present the goiter prevalence in 19 Latin American countries. Data are based on the most recent available information.

For a better analysis of the information, it is important to know some aspects on the quality and representativity of the surveys: Bolivia, the Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, Panama, and Paraguay, are the countries that conducted studies at national level with different regional disaggregation levels, based on at random samples.

Brazil, Costa Rica, Ecuador, Peru, and Venezuela carried out their surveys prioritizing on goiter endemic areas in representative samples of those space-populations. Argentina used the data provided by an epidemiological surveillance system initiated in 1962 in 11 sites of the province of Córdoba and from specific studies carried out in Santa Cruz (Patagonia).

Chile developed its study in three communities considered as sentinel sites for IDD surveillance. Colombia's data were derived from the result of a research study that assessed different parameters related to IDD in an endemic area. Venezuela focused its study on a state that had an endemicity history (Mérida).

Mexico carried out its study in the state of Hidalgo; Haiti in its central plateau region, and Uruguay carried out a small-scale study in five areas of the country.

Even though in Cuba TSH levels are determined in all newborns, there is no available information on goiter nor on iodine urinary excretion.

Of the eight countries that carried out representative studies at national level (Bolivia, the Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, Panama, and Paraguay) only one (Paraguay), showed a goiter prevalence higher than 30%, indicating that iodine deficiency disorders constitute a severe public health problem in that country.

Guatemala and the Azuero area of Panama have prevalences that range from 20.0 to 29.9% (moderate problem), while Panama, at the national level, Honduras, and the Dominican Republic have a mild problem (prevalences between 5.0 and 19.9%). Nicaragua, with a goiter prevalence below 5%, does not represent an iodine deficiency public health problem at the national level.

Of the four countries that conducted prevalence surveys in endemic goiter areas (Brazil, Costa Rica, Ecuador, and Peru), in Goias, Tocantis, and Minas Gerais in Brazil, Ecuador, and in the Peruvian Sierra the problem was severe. In Pará (Brazil) and in the Peruvian rain forest, the problem was moderate, while in Guanacaste (Costa Rica) IDD was mild.

In the three sentinel centers in Chile, Yopal in Colombia, the central plateau of Haiti, the state of Hidalgo in Mexico, and in Santa Cruz, Argentina, the problem was mild, while in Chameza (Colombia) and in the state of Mérida (Venezuela) it was severe.

According to the visible or palpable goiter indicator, IDD in Puntarenas, Costa Rica and in the five communities studied in Uruguay iodine deficiency disorders did not represent a public health problem.

Iodine Urinary Excretion

Fourteen countries in the Region have provided information on iodine urinary excretion (tables 4 and 5). Data from Mexico were expressed as micrograms of iodine per gram of creatinine, while the others were expressed in micrograms of iodine per deciliter of urine. Bolivia (1989) refers to the population proportion (percentage) in relation to the iodine median. Guatemala (1987) reported the national median, while Chile (1991, Calama, Santiago, and Temuco), Haiti (1992, central plateau), Uruguay (1992, Durazno, Rivera, and Tacuarembó), and Venezuela (1993, five health districts in the state of Mérida), reported the median of the populations studied. The rest of the countries presented their data as proportion of the population within the established ranges (< 5 μg/dl urine, and from 5 to 9.9 μg/dl: moderate or severe risk and mild IDD, respectively). These countries are: Costa Rica (1990), Ecuador (1992, Callejón Andino), Nicaragua (1990), Panama (1991), Paraguay (1988), Peru (1987, sierra and rain forest), and the Dominican Republic (1993).

Based on the aforementioned, Bolivia presented 5% of the IDD moderate and severe at risk communities studied, while in terms of population, the figures were 6.3% in Costa Rica; 32.8% in the state of Hidalgo Mexico; 17% in Nicaragua; 5.1% in Panama (except for the Azuero area, where IDD was 21.4%); 31.3% in Paraguay; 38 and 35%, respectively, in the

sierra and rain forest of Peru; and 64.8% in the Dominican Republic. Venezuela presented medians ranging from 6 to 9.2 μg/dl, which is an indicator of mild risk, in three of the five health districts studied in the state of Mérida. The national median in Guatemala was 3.5 μg/dl, indicative of a moderate IDD risk.

Of the population sampled in Costa Rica, 7.7% was at mild IDD risk; in Ecuador, 19.2%; in Haiti, 9.2%; in Nicaragua, 50%; in the Dominican Republic, 21%; in Panama, 6.7%; in Paraguay, 43.5%; and in the sierra and rain forest of Peru 61.5 and 58.5%, respectively.

Chile and Uruguay had a median urinary iodine concentration higher than 10 μg/dl; that is, there does not exist an IDD problem in the communities studied.

It is important to mention that there are no standard criteria in all the countries concerning management of this indicator.

Salt Iodization

Table 6 presents information on the salt iodization situation in 16 of the Latin American countries.

El Salvador and the Dominican Republic have the highest proportion of noniodized salt: 95 and 99%, respectively. However, it should be stressed that in the case of El Salvador, on February 18, 1994, the Salt Iodization Program was officially resumed in the country and in May, actions on iodized salt quality control initiated at production and distribution centers, as well as in households.

In March 1994, the Dominican Republic established the salt iodization standard for all the salt for human consumption, and the process to establish the necessary infrastructure in the short term is underway.

According to iodized salt availability, Uruguay has a deficit of 70% of iodized salt. One of the factors that affects this situation is that the legal provisions in effect only demands iodization of the salt used for human consumption in IDD endemic areas. However, for logistical reasons, a proportion of the available iodized salt is being sold in non endemic IDD areas, while endemic areas are not being adequately supplied.

Forty-one percent of the Peruvian population and 43% of the population of Tola, Nicaragua (classified as endemic), is in a similar situation. However, in Nicaragua the results of a national survey on household food consumption and iodized salt household availability, carried out in 1993, showed that only 21% of the households lacked iodized salt.

It has not been possible to obtain recent information on the control of salt iodization in Colombia, where in 1989 availability of iodized salt for the population was estimated in 89% of their needs.

In Ecuador, the analysis of 466 samples collected at the production and sale localities from April to July 1993, showed that 78% of the population had access to adequately iodized salt. During that same year an at random sampling of 630 communities of the sierra with 45,742 children showed that 96.5% consumed iodized salt. Determination of iodine in 1,064 salt samples from small retailers in 1993 revealed that, during all the months of the year, the average values were higher than 20 ppm. It was impossible to obtain monthly information on the proportion of salt samples with values below this figure.

In Bolivia, 96.3% of the salt samples analyzed between January and April 1993 contained iodine: 7.5% between 10 and 30 ppm, and 88.8%, above 30 ppm.

In Brazil, in 1991 the analysis of iodine in salt from production centers showed that 98% of the samples contained iodine; however, in some areas of Brazil up to 42% of the available salt was not iodized.

During 1993 Guatemala reported 97.7% iodized salt availability; Honduras and Panama, 91.6 and 94.8%, respectively. Panama reported that in the first quarter of 1994, 97.6% of its salt was iodized. For two years Costa Rica has been reporting that all the salt for human consumption in the country is iodized and adequately fluoridated. A National Survey on Micronutrients is planned for 1994 that will include the analysis of the availability of iodized, fluoridated salt in households, and the determination of urinary iodine and fluorine excretion in an at random sample of schoolchildren. The procedure to determine the chemical composition of salt for household use during 1987-1992 followed by the Bromatology Laboratory of INCIENSA, has been reporting the corresponding results in an average of five repetitions carried out in a salt subsample, obtained by mixing twenty 500-g bags of each of the different salt brands existing in the market.

National Legislation on Fortification of Salt with Iodine

Table 7 shows that 18 out of 20 Latin American countries have legislation on salt iodization. At present, only Cuba and Haiti lack regulations in this regard. Chile had derogated its legislation in 1982 which was reestablished in 1990. Of the 18 countries with salt iodization laws, 11 demand salt iodization for human and animal consumption.

Colombia, El Salvador, Guatemala, and Paraguay have amended their laws and regulations. In January 1993 El Salvador ruled a new decree-law on salt iodization, since the previous law was incompatible with the country's Constitution and with the secondary in force laws. This law assigns the Ministry of Health the responsibility of establishing regulations and technical standards, and creating a National Commission for Salt Iodization. The new legislation demands salt iodization for human and animal intake. In December 1992 Guatemala, issued a General Law on Fortification, Enrichment, or Standardization of Foods, appointing the Ministry

of Public Health and Social Welfare the design and implmementation of regulations and technical standards, and also the integration of a National Commission for the Fortification, Enrichment, or Standardization of Foods. The updated laws and regulations include salt iodization, vitamin A sugar fortification, and enrichment of wheat flour with iron, folates, and vitamins of the B complex.

In 1979, 1984, and 1988, Colombia enacted laws and regulations to establish preventive safety measures and impose sanctions for the violation of iodization standards (50-100 ppm) and fluoridation (180-220 ppm) of salt for human consumption, and regulate repackaging of salt, specifying the minimum requirements that the establishments involved should fulfill, as well as the characterization of the labeling of salt packages and containers for human consumption.

With the purpose of updating the legislation that had been in force since 1958, Paraguay in 1992 modified its law. This included the creation of technical and administrative standards to control salt iodization, unifying the standard and control parameters specified in Resolution S.G. No. 23/92.

In March 1994, the Bureu of Standards and Quality Systems of the Ministry of Industry and Commerce of the Dominican Republic, in coordination with the Ministry of Health, CENISMI, the salt industry, and INDOTEC, modified the Dominican regulation known as NORDOM 14 (1st. rev. 1990), demanding salt iodization for human consumption in any of its presentations at 30-50 ppm iodine levels.

Action Strategies to Eradicate Iodine Deficiency Disorders

Table 8 summarizes the main action strategies that the countries have defined to combat iodine deficiency disorders.

Total or partial information on the action strategies proposed or under development in 17 countries was available; therefore, the following strategies were identified:

1. Strengthening of Institutional Capacity

   This action strategy is targeted towards reviewing and updating the legal institutional framework and the use of a multisectoral, interinstitutional, and multidisciplinary approach. For example the integration and implementation of national, regional, or local commissions and the creation of specialized technical groups for the management of intervention programs with interagency support of bilateral, multilateral, and international agencies, NGOs, private enterprise, and community and religious organizations, among others.

   In some countries, the development of an integrated strategy has been proposed to control micronutrient deficiency disorders, especially iodine, iron, vitamin A, and fluorine.

Institutional strengthening also involves the integration of a critical group of skilled human resources in the areas of program management, chemistry and biochemistry, epidemiology and public health, education and communication, statistics, and food technology. Likewise, administrative decentralization of the programs at operational levels are focused on priorities, as well as on strengthening their infrastructure.

2. Fortification of Salt with Iodine

All the countries identified salt iodization as the best coverage measure, of low cost, and proven effectiveness to control iodine deficiency.

3. Supplementation

Six countries have included supplementation of iodized compounds as an alternate short-term strategy to be applied immediately in high-risk areas that are not being benefitted with iodized salt consumption.

Salt fortification includes: the full and conscious involvement of the salt industry. (When analyzing the information, it was evident that the salt industry has demonstrated sensitivity and social responsibility regarding the problem). Salt fortification also implies counting with the appropriate technology for each particular context; machinery and inputs to make more efficient the salt iodization process; knowledge of the production, marketing, and iodized salt consumption, as well as an appropriate quality control system for salt iodization.

4. Personnel Training

The 17 countries consider personnel training, as an essential measure. Training includes the different personnel category levels in institutions, business, and the community, adopting different modalities in each country. Experience in the last decade in Latin America suggests that in order to achieve the goals and targets proposed, it is necessary to strengthen national and subregional centers, that had played an important role in personnel training in programs against micronutrient deficiencies, particularly iodine deficiency.

5. Monitoring and Surveillance

This strategy, is designed to provide follow-up and assessment to the programs processes and impacts. Monitoring and surveillance have been defined as the programs backbone. Precisely the failure of this action strategy has contributed to deterioration or virtual disappearance of some programs.

The concept under which this strategy is managed is based on the need to know the magnitude, distribution, and severity of the problem (diagnosis) as a main

element in the design of policies, strategies, priorities, and intervention measures. Situational diagnosis is the key point for a dynamic and permanent process (monitoring and surveillance) that enables the generation and use of reliable and timely information at the different levels, from the community up the highest decision-making policy level, in order to assess the efficiency of the program's operation and its effectiveness to measure the biological impacts on the population and, if necessary, to make adjustments to the program.

Joint efforts are being made by the countries and the specialized technical agencies, particularly WHO/PAHO/INCAP, UNICEF, ICCIDD, and CDC, to establish epidemiological criteria facilitating the standardized use of certain parameters in monitoring and surveillance processes or systems.

6. Education and Mass Communication

Seventeen of the countries, considered this area a key element of the programs.

Even though in three of the cases, educational activities and mass communication were not identified as a strategy per se, these activities were included in the other programs' components.

7. Development of Operational Research

This action strategy was identified in 12 countries.

The research areas mentioned are: to know the influence of goitrogenic factors in thyroid function; to evaluate the conditions for the efficiency of the health services in activities to protect and promote health, epidemiological surveillance, and the control of salt iodization; to know the effect of the natural content of iodine and other minerals in drinking water on thyroid function; iodized salt, production, marketing, and quality control, to assess the reliability, representativity, sensitivity, and acceptability of the different programs' monitoring and surveillance indicators, and development of appropriate technology to improve the quality of salt and its fortification.

This study is aimed at identifying the causal factors of the problems detected in the operation of the programs, and at the same time, determining possible solution alternatives.

8. Diet Diversification

Only two countries identified diet diversification as a strategy to improve iodine nutrition. It should be emphasized that these two countries (Honduras and Nicaragua) are orienting their work towards a micronutrient integral approach, especially hypovitaminosis A and iron-deficiency anemia, where this strategy has

a greater meaning; without discarding the inclusion of foods naturally rich in iodine in the diets consumed by the population, that significantly can contribute to a better adequacy of iodine intake. Hence, taking into consideration the current food habits and patterns of the Latin American population, salt iodization and its promotion for universal consumption is considered the best option.

As can be observed, most of the countries are making efforts to institutionalize programs, both organically and functionally. Many of these initiatives count with technical and external financial support, thus, facilitating their operation. Although most of the countries have assumed a significant share of these financial responsibilities, some express their concern on the fact that suspension of external aid in these crucial moments, consolidation of the programs could result in their serious deterioration.

The governments, with the support of the United Nations Specialized Agencies and in joint technical and financial collaboration with other institutions and governments, have made advances in the design of action plans for the control and eradication of micronutrient deficiencies, taking as a basis, in many cases, the main elements contained in the Nutritional Strategies in the Prevention of Specific Micronutrient Deficiencies, that resulted from the International Conference on Nutrition, held in Rome, December 1992, and the goals agreed upon at the World Summit for Children (New York, 1990).

Interagency Coordination

In October 1983, with the technical and financial support of the Pan American Health Organization (PAHO), the United Nations Children's Fund (UNICEF), and the Government of Italy through the Nutrition Support Joint Program (PROCAN), the V Meeting of the PAHO/WHO Technical Group on Endemic Goiter, Cretinism, and Iodine Deficiency was held in Lima, Peru. This meeting initiated PROCAN/Control of Endemic Goiter in Bolivia, Peru, and Ecuador.

From that date on, different agencies and governments have been collaborating with the Latin American countries in their efforts to control iodine deficiency disorders. The actions of this cooperation have basically been: updating the epidemiological profile of iodine deficiency; reactivating or strengthening iodine salt fortification programs; providing iodized compounds to at risk population groups; establishing iodized salt epidemiological surveillance and quality control systems; training of human resources; participating in research, education, and mass communication activities; strengthening the institutional capacity of the executing units in charge of the control programs; promoting cooperation among countries and mobilizing national and international resources to efficiently implement these actions.

In addition to the meeting of the Technical Group aforementioned (which was a landmark in the struggle against IDD in the Americas), it is worthwhile outlining other experiences in that period.

In October 1986 within the coordination activities of PAHO/UNICEF/PROCAN a Regional Workshop on National Strategies for the Eradication of Goiter and Endemic Cretinism was held in Sucre, Bolivia, to review the programs' progress in this field with technicians and national managers, and to obtain consentment on a regional strategy to support other countries with similar problems.

In mid-1987 at PAHO's initiative, and in collaboration with UNICEF, the Expanded Program for the Control of Iodine Deficiency Disorders in Latin America was launched as a PROCAN's extension.

By the end of that same year, through a joint PAHO/INCAP-UNICEF-PROCAN action, a rapid epidemiological and institutional assessment of the situation of the programs to control iodine deficiency disorders in Central America and Panama was initiated. Its purpose was to design projects to strengthen national programs, and to consolidate the control of iodine deficiency at the medium term.

In view of the advances reached by these actions, it was considered necessary to hold at INCAP's headquarters in Guatemala City on 20 March 1989 a meeting of a Technical Group, including, besides PAHO/INCAP-UNICEF-PROCAN, the International Council for the Control of Iodine Deficiency Disorders (ICCIDD), and coordinate cooperation in the countries.

An outcome of the meeting was that, technical, methodological, and strategic criteria were agreed upon to control IDD in Latin America, the development of guidelines to carry out rapid assessment on the iodine deficiency situation, and the design of general guidelines on education, training, communication, and dissemination of IDD control programs (9).

In addition to the support provided by the Government of Italy to PROCAN, which promoted programs to control IDD in the Andean Region, the Belgian Government also collaborated, first in Ecuador, and subsequently, in 1991, the program was established in Quito, with Belgian Cooperation funds administered by UNICEF and with the technical cooperation from PAHO and the Andean Subregional Program to Control IDD (PSADDI).

The Central American initiative for the prevention and control of IDD and fluorine deficiency has been jointly implemented by PAHO/INCAP-UNICEF, with the support of ROCAP/USAID and, in Nicaragua, the Swedish Government.

From 14 to 16 December 1992, the II Meeting of the Andean Subregional Program to Control IDD (PSADDI) was held in Lima, Peru. During this meeting the advances of the national programs and of the subregional program were analyzed, and their possible expansion to include other micronutrient control activities was also discussed. In this event the following representatives participated: The programs to control IDD in the Andean countries and Paraguay, UNICEF, PAHO/INCAP, the Hipólito Unánue Agreement, USAID, the Program Against Micronutrient Malnutrition (PAMM), and the International Bank for Reconstruction and Development (IBRD).

In recent years Central America has been receiving support to implement an integrated strategy to control and eradicate micronutrient deficiencies from PAHO/INCAP,UNICEF,ISTI-VITAL (International Science and Technology Institute - Vitamin A Field Support Project), the Canadian International Development Agency (CIDA), the Initiative for Micronutrients, the Program of Appropriate Technology in Health (PATH), International Bank for Reconstruction and Development (IBRD), the Centers for Disease Control and Prevention (CDC), and local missions of the United States Agency for International Development (AID) in some countries, and recently, in the Dominican Republic, from the United Nations Development Program (UNDP), and the World Bank. In Honduras, Guatemala, and El Salvador, collaborative work in the field of micronutrients has been carried out with the International Eye Foundation and Project Hope.

The work carried out has been developed within coordination and support efforts aimed at integrating the struggle against micronutrient malnutrition, not only iodine, but vitamin A, iron and fluorine.

The requirements established during the most recent world forums, such as: the World Summit for Children (1990), the Conference on Micronutrient Malnutrition Policies (1991), the World Health Assembly (1992), and the International Conference on Nutrition (1992), have suggested the need for concerted actions from the United Nations organizations, bilateral and multilateral agencies, the academic sector, private enterprise, and nongovernmental institutions, in order to accelerate fulfillment of the goals proposed in these forums during the next decade.

An evident demonstration of an effective coordination in the field was the Interagency Meeting for the Control of Micronutrient Deficiencies, convened by PAHO and held in its headquarters in Washington, DC, on 10 April 1993, with the participantion of delegates from UNICEF, the International Eye Foundation, FAO, WHO, USAID, ICCIDD, ILSI, IBRD, ISTI, Project Hope, CDC, INCAP, and VITAL. During this meeting an analysis was made of the current situation of iodine deficiency, hypovitaminosis A, and anemia in Latin America and the Caribbean. Likewise, the main activities carried out by the participating institutions in support to the countries in this field were reported, and cooperation areas among agencies were identified, emphasizing the importance of intregrating a Regional Action Plan for the Control of Micronutrient Deficiencies, and the establishment of a Regional Technical Group for the Control of Micronutrient Deficiencies. Furthermore, the importance of establishing this coordination in the operational levels of each country was analyzed, taking into account the national context, strenghthening the countries' institutional capacity for advocacy at the decision making levels, and also strengthening the programs infrastructure, both at the management and support services level. It was considered necessary to continue working in the definition of indicators and epidemiological criteria to assess the magnitude and severity of the deficiencies, as well as an evaluation of the impact of the measures taken.

From 26 to 28 October 1993, UNICEF, with the collaboration of INCAP/PAHO and the cosponsorship of CIDA and ICCIDD, organized the High-Level Seminar- Workshop for the Control of IDD in Central America. During this meeting mechanisms and specific actions were established among the political, governmental (ministries), and private sectors supported by international cooperation agencies to ensure universal salt iodization. Annex 3 presents the Declaration of the Representatives of the Governments and the Central American salt industry for IDD eradication.

From 9 to 11 April 1994, the Regional Meeting on Universal Salt Iodization for the Eradication of Iodine Deficiency Disorders in the Americas was held in Quito, Ecuador, organized and cosponsored by the Ministry of Public Health of Ecuador, PAHO, UNICEF, ICCIDD, CIDA, the Micronutrient Institute, and the Belgian Cooperation Agency. In this meeting participated governmental representatives, the salt industry, and cooperation agencies from the Americas, Europe, Africa, and Australia, who issued the Declaration of Quito for the Universal Salt Iodization (Annex 4).

All of this demonstrates that interagency coordination is based on a strategy to support the countries in their efforts to overcome micronutrient malnutrition. However, a more at-depth analysis of the lessons learned during this decade is needed, in order to strengthen successful experiences and criticize failures.

VIII. SUMMARY OF THE COUNTRIES' INFORMATION

ARGENTINA

In 1989 an assessment was made of goiter prevalence in the province of Córdoba, where endemic goiter epidemiological surveillance has been maintained since 1962, when it was initiated. The prevalence observed in 1989 in 11 localities in the province ranged between 0 and 8.3%, in contrast to that observed in these same localities in 1962 when the prevalence was from 15 to 73%, according to the information provided by the Secretariat of Health (10).

Specific studies in other provinces have shown different results; for example, in Santa Cruz (Patagonia) in 1990, the prevalence was 10.3%, and in Chubut, between 20.0 to 26.0% during 1978 and 1984, respectively (11).

Availability of Iodized Salt and Iodine Compounds

Legislation enacted in 1967 requires salt iodization with potassium iodate (30 ppm). However, there are producers whose products have concentrations lower than the standard, and there are other unauthorized producers whose salt contains little or no iodine at all. Current

programs emphasize the control of established producers through short courses to create awareness on the importance of salt iodization (12).

Action Strategies

The Secretariat of Public Health of the Ministry of Health and Social Action of Argentina designed in 1990 a National Program Against Iodine Deficiency Disorders (PRONACODY), aimed at controlling these disorders through an efficient salt iodization program for human and animal consumption, and the establishment of a surveillance and control system. Its purpose is to develop centers for clinical, epidemiological, and laboratory training, disseminate information and raise the population's awareness level on the importance of consuming iodized salt, as well as to carry out operational research that will allow enhancing the program's effectiveness.

The strategies of this program envisages two stages. In the first, epidemiological studies in priority areas on goiter prevalence and urinary iodine will be carried out. These studies will serve as a basis to promote a surveillance and control system for iodized salt in 23 bromatological laboratories, update information on salt production and marketing, and review legal definitions and current technical standards.

During the second stage information and education activities at all levels will be promoted; iodized oil will be supplied to at risk populations, and research on goitrogenic factors and production of oral iodized oil will be carried out (10).

BOLIVIA

In 1989 a national survey on endemic goiter and urinary iodine in 25,830 schoolchildren was carried out. This evaluation was conducted after five years of significant efforts to increase iodized salt consumption, and the administration of 1.7 million doses of oral and parenteral iodized oil. The study showed a 20.6% national goiter prevalence average. Results from the analysis of the data on urinary iodine showed that 5% of the communities studied presented iodine urinary excretion medians of < 5 μg/dl; 11%, between 5 to < 10 μg/dl; and 84%, above 10 μg/dl (13).

Availability of Iodized Salt and Iodine Compounds

For 1992 iodized salt availability was 21,500 metric tons, amount equivalent to 92.8% of the national requirement for human intake. Available information on iodized salt consumption by populations with more than 2,000 inhabitants reveals that at least 50% consume iodized salt. It is estimated that 20% of the nation's population do not consume adequate iodized salt,

corresponding to 213 districts with approximately 513,000 inhabitants. Since 1985, iodized oil has been administered parenterally to 1,720,000 individuals in different parts of the country (13).

Results of the analyses of 617 salt samples from processors and small shops in the first quarter of 1993 revealed that 2.3% did not contain iodine; 1.5% contained between 1 and 15 ppm; 7.4% between 15 and 30 ppm; 42.1% between 30 and 67 ppm; 33.1% between 67 and 100 ppm (the Bolivian standard), and 13.6% more than 100 ppm (14).

Action Strategies

The National Program to Combat Iodine Deficiency Disorders (PRONALCOBO), operating since 1984, has strengthened its capacity in human and material resources and counts with a new laboratory. Likewise, an epidemiological surveillance system has been established which includes systematic iodized salt quality control at the production and supply levels. TSH will be used as a biological indicator, and "salt intake" as an indirect indicator.

One of the program's goals was that by the end of 1993, half of the salt blocks for animal consumption be iodized, and that no community at IDD moderate risk should have an iodized salt intake not below 50%.

Also, by the end of 1994 the whole country should have sufficient iodized salt for human and animal consumption. Additionally, the epidemiological surveillance system should be consolidated through monitoring of salt iodine levels and eradication of iodine deficiency disorders (13). The National Health Secretariat established since August, 1993, on 1 November of that same year, integrated the National Program Against Micronutrient Malnutrition (iodine, vitamin A, and iron). This Program was under the direction of the Food and Nutrition Security Policy Unit where a National Program Against Micronutrient Malnutrition was designed for the 1994-1998 period. The program takes advantage of PRONALCOBO's experience, integrating three components: iodine deficiency disorders, hypovitaminosis A, and anemia caused by iron deficinecy (15).

BRAZIL

During 1990 endemic goiter prevalence was assessed in 12,426 schoolchildren from 13 municipios of five Brazilean states (Maranhão, Pará, Tocantis, Minas Gerais, and Goiás). These municipios have been considered as endemic goiter areas. The prevalences found were: Maranhão 18.2%, Pará 22%, Goiás 35.8%, Tocantis 38.8%, and Minas Gerais 47.5% (16).

Availability of Iodized Salt and Iodine Compounds

In 1990 analysis of salt samples in the municipios of Peixe (Maranhão) and Jequitinhona (Bahia) revealed that 42% of the samples had iodine concentrations below 10 ppm (16).

A study of 82,278 salt samples collected during 1991 showed that 98% of the salt for household consumption contained more than 10 ppm iodine.

Action Strategies

The Ministry of Health of Brazil decided to reorient the Program to Combat Endemic Goiter. This program is called the National Program to Control Iodine Deficiency Disorders. The responsible agency is the National Institute of Food and Nutrition (INAN)/Ministry of Health. Other organizations involved in the program's actions are: the National Health Foundation (FNS)/MH and the Secretariat of Sanitary Surveillance (SVS)/MH, the State Health Secretariats, and Municipal Health Secretariats. The main activities to be carried out are:

1. Review of Law G.150/74 to increase salt iodine content for human and animal consumption.

2. National Goiter Survey, using ultrasonography and iodine urinary excretion (expected to be completed by late 1994).

3. Administration of iodized oil to at risk groups in areas where the IDD problem is severe.

4. Reorganization and expansion of activities to control salt iodization for human consumption.

5. Production of teaching materials to train health professionals.

6. Production of educational materials to be used to redesign the endemic goiter approach in the curricula of schools that trains health professionals, introducing the concept of iodine deficiency disorders.

7. Production of educational materials for the population.

8. Development of mass media campaigns (17).

CHILE

In 1991 a study of 3,389 schoolchildren in the communities of Calama, Santiago, and Temuco showed a goiter prevalence of 9.1% in Temuco, 10.9% in Calama, and 13.5% in Santiago. The proportion of schoolchildren with urinary iodines less than 50 μg/g creatinine was 1.2% in Temuco, 0.8% in Calama, and 1.5% in Santiago (18).

The median urinary iodine values were 85.8 μg/dl in Calama, 60.1 μg/dl in Santiago, and 30.2 μg/dl in Temuco (11).

Availability of Iodized Salt and Iodine Compounds

The endemic survey goiter carried out in 1991 included the collection and analysis of salt samples. Results showed that of a total of 68 salt samples collected in the communities of Calama, Santiago, and Temuco, 15% did not contain iodine and 85% had ranges between 10 and >100 ppm (18).

During 1993, INTA analyzed 1,341 salt samples from the Punta Lobos Salt Company, which provides 90% of the salt produced in the country. The samples were collected in four different areas of the country (Iquique, Valparaiso, Santiago, and Talcahuano). Results revealed that 3.7% of the samples contained iodine levels ranging from 10 to 19 ppm; 58.5%, from 20 to 100 ppm; and 37.7%, >100 ppm. Current regulations establish salt iodization for human consumption at 100 ppm; in practice, a range of 60 to 140 ppm is accepted (11).

Action Strategies

Chile does not have an official program against IDD since this deficiency is not considered a public health problem.

COLOMBIA

In 1986, an investigation carried out in Chameza and Yopal, studied 3,777 subjects older than 5 years of age. The estimated goiter prevalence in Yopal was 13.5% and in Chameza, 52% (19, 20).

Availability of Iodized Salt and Iodine Compounds

In 1989, the Colombian Institute for Family Welfare analyzed 640 salt samples collected in the whole country. Results showed that 55% fell within the Colombian standard for salt iodization (50-100 ppm) and 45% did not comply. There is no available segregated data to determine what salt proportion was not iodized; however, in 1984, 1986, and 1987 in

INGEOMINAS the iodine content frecuency distribution was analyzed in 272 salt samples for human consumption from 15 different parts of Colombia. It was found that 11% of the samples fell within the range of 0-10 ppm. In the 1990-1991 period 1,447 salt samples collected at the wholesale distributors and consumers level were analyzed. Results showed that 23.7% had less than 25 ppm, 32.3% between 26 and 49 ppm, and 44.1% more than 50 ppm (19,20).

Action Strategies

An Interinstitutional IDD Surveillance Committee was integrated. This Committee designed a protocol to assess the IDD situation. In accordance with its recommendations, the Ministry of Health, the Colombian Institute for Family Welfare, with PAHO's collaboration, submitted a proposal for the development of four strategies considered essential for IDD prevention and control:

1. Socioeconomic characterization of small-scale salt producers
2. Information and education to the community
3. Salt iodization control and surveillance
4. Research to determine the country's IDD magnitude and severity

COSTA RICA

In 1990, 5,048 schoolchildren were examined in the provinces of Puntarenas and Guanacaste, considered as endemic goiter areas according to information obtained in the 1979 national goiter survey. Results showed a prevalence of 3.3% for Puntarenas and 11.3% for Guanacaste.

At the national level, 919 urine samples were collected; 6.3% had iodine concentrations under 5 μg/dl; 7.7% between 5 to 9.9 μg/dl; and 86% concentrations $\geq$ 10 μg/dl.

In Puntarenas, 7.8% of the samples were under 5 μg/dl; 7.2%, between 5 to 9.9 μg/dl; and 85% had values higher than 10 μg/dl.

Guanacaste presented 6.8% with levels under 5 μg/dl; 13.5% betweem 5 to 9.9 μg/dl; and 79.9% $\geq$ 10 μg/dl(21).

Control of iodine urinary excretion was initiated in 1993, in a representative sample of schoolchildren 6 to 12 years old who attend public or private schools, and in pregnant women

that assist to prenatal control at the health centers of at high risk areas. Sampling was carried out twice a year (22).

Between 1991 and 1992, 63,786 blood samples were processed to detect hypothyroidism, having found seven cases, hence, establishing an incidence of 1.1 hypothyroid per 10,000 neonates (23).

Availability of Iodized Salt and Iodine Compounds

During 1992, results of the analysis of salt iodine content at the industrial and INCIENSA's central laboratory levels showed that during the whole year iodine content in salt fell within 36 and 45 ppm --that is, within the ranges of the national standard (33-50 ppm).

At present, there are two types of iodized salt control: internal and external. Internal control is carried out daily and is the responsibility of the salt producers and packers, who report monthly to INCIENSA, where cross-analyses are carried out. External control is carried out montly by INCIENSA in 20 salt samples from each industry. INCIENSA reported that in 1993, 100% of the samples analyzed fell within the levels established by the law (23, 24).

Action Strategies

Since 1992 the Ministry of Health of Costa Rica initiated a iodine urinary excretion monitoring and assessment process in the schoolchildren population, and in pregnant women of the province of Guanacaste, whose population is considered to be at moderate risk, according to an evaluation made in 1990-1991.

In the period 1991-1992, the National Program for the Screening of Metabolic Diseases and Innate Errors of Metabolism, with the collaboration of INCIENSA, determined TSH in 63,786 blood samples collected, which were analyzed by nuclear techniques for the early detection of neonatal hypothyroidism in Costa Rica. The estimated hypothyroidism incidence was 1.1 in 10,000.

Costa Rica has a national program to control iodine deficiency disorders with three components (22, 23):

1. Surveillance of endemic goiter, iodine urinary excretion, and TSH screening

2. Control of salt iodization

3. Training of health personnel and education to the population.

The country is currently developing an IDD Eradication Action Plan for 1994-1995, and expects to carry out a micronutrient survey, including determinations of urinary iodine levels in schoolchildren, and household iodized and fluoridated salt availability.

CUBA

In the period October 1986 to November 1993, the program for early detection of congenital hypothyroidism carried out 976,676 TSH determinations in newborns umbilical cord blood; 298 of these were positive, representing a rate of 1 in 3,277.

When analyzing the overall results it was found that between 8 and 12% had TSH levels higher than 10 mU/l, which is currently considered an indirect indicator of iodine deficiency (25).

Availability of Iodized Salt and Iodine Compounds

There is no information on this subject.

Action Strategies

In December 1993, the Ministry of Public Health, the Institute of Nutrition and Food Hygiene, and the Institute of Endocrinology and Metabolic Diseases, jointly with PAHO/INCAP, UNICEF, and FAO's collaboration, designed a Biennial Action Plan for 1994-1995 to Eradicate Iodine Deficiency Disorders in the Republic of Cuba. The Plan has the following strategies:

1. Evaluation of urinary iodine excretion at the national level
2. Strengthening screening of congenital hypothyroidism
3. Characterization of the salt industry
4. An IDD information development, training, and communication component
5. Design and development of a micronutrient integrated program

Salt iodization is considered as the most feasible measure to controll IDD (25).

ECUADOR

In 1983 a national survey on endemic goiter in schoolchildren, carried out in 10 provinces of the Andean region considered as an endemic area, reported a prevalence of 36%.

The results of each province ranged between 29 and 48%, whereas the prevalence of cretinism ranged between 1 and 8% in communities traditionally known for their endemicity.

During 1992, 1,200 urine samples from 41 communities, were collected and analyzed. Results showed that non of the communities had a median below 6 μg/dl. (26,27).

In 1992 available information on urinary iodine excretion according to levels of risk by geographical region revealed that in the sierra 80.8% was not at risk (levels higher than 10 μg/dl) and 19.2% at mild risk (values between 5 and 10 μg/dl). In the coast, 98.5% was not at risk, and only 1.5% at mild risk. In the Amazon region, 1.1% was at mild risk and 98.9% had no risk at all (28).

Availability of Iodized Salt and Iodine Compounds

The Operational Program to Combat Endemic Goiter established the first categorization of the population regarding IDD risk levels in the communities by type of salt used, taking into account the high correlation (60%) between high consumption of noniodized salt in a population group and the proportion of schoolchildren at high IDD risk; in other words, urinary iodine levels lower than 3 μg/dl. The indicator has 92% sensitivity and 95% negative predictive value. The risk categories are: Level 1, latent risk, there is no consumption of noniodized granular salt; Level 2, mild risk, consumption of granular salt lower than 50%; Level 3, moderate risk, 50% granular salt consumption, and urinary iodine median higher than 3 μg/dl; and Level 4, high risk, granular salt consumption higher than 50% and urinary iodine median lower than 3 μg/dl.

By the end of 1992, the situation in the communities was: 10 had granular salt consumption higher than 50%; 34 at the national level, had consumption values ≥ 30%; and 60 reported a consumption between 10 and 29% (26).

In 1992, in the sierra, 96.3% had no risk, 3.2% moderate risk, and 0.5% severe risk. In the coast, 98.5% had no risk and 1.5% mild risk. The amazonian region reported 98.9% without risk and 1.1% mild risk (27). Results of iodine content of 466 salt samples collected from April to July 1993 revealed that 22% of the samples had less than 20 ppm, 26% between 20 and 49 ppm, 50% between 50 and 100 ppm (national standard), and 2% more than 100 ppm (28). The average iodine content of all samples analyzed during this period was 48.06 ppm with a standard deviation of 26.7. The analyses of salt iodine content in 1,064 salt samples from retail shops during 1993 showed that the average salt iodine content throughout the year ranged between 30 an 60 ppm. During this same year, an at random sampling in 630 communities of the sierra (n = 45,742 children), showed that 96.5% of the children consumed iodized salt (29).

Action Strategies

Since 1984 the Operational Program to Combat Endemic Goiter, established by the Ministry of Health with the support of the Belgian Government, has been functioning. This Program counted with the integration of a multidisciplinary team both at the central level as well as in each of the affected provinces. Furthermore, it has laboratory and data-processing facilities. The Program has been denominated a WHO collaborating center to train personnel in IDD control.

With the support of the Andean Subregional Program to Control IDD, the National Program has trained personnel from other countries in the areas of information systems, statistics, epidemiology, education, mass communication, and marketing, among others (27).

This Program has been developed in three stages. The first, a pilot project at the three central provinces level with the purpose of developing and testing an operational methodology, which had a three-year duration. During the second stage the experience was expanded to all affected areas, and finally in the third phase, an IDD surveillance system was implemented as of 1992 to the year 2000. The components of the Program are:

1. Control of iodized salt

2. Epidemiological analyses

3. Education and mass communication

4. Administration of iodized oil to special groups

5. Technical assistance

In Quito from 22 to 25 June 1993, an evaluation of the National Operational Program to Combat Endemic Goiter was carried out with the participation of national staff members and international experts. From this evaluation resulted a series of recommendations so that production plants comply with the legal requirements (iodine concentration between 50 and 100 ppm and a minimum of 20 ppm at the retail shops), and for the design of regulations aimed at salt iodization for animal consumption.

It was also recommended that the cut off points of urinary iodine levels be modified to make them compatible with WHO's recommendations; improve the Program's monitoring and evaluation systems; and expand the cost, cost-effectiveness, and cost-benefit analyses (28).

EL SALVADOR

In 1990 a national survey on endemic goiter was carried out in 5,935 schoolchildren, showing a 25% national average prevalence. Distribution by regions was as follows: Western region 39.1%; central 21.1%; pericentral 22.3%; metropolitan 11.8%, and eastern 29.3% (30).

Availability of Iodized Salt and Iodine Compounds

During this survey 178 salt samples were collected from retail stores and schools, of which only one sample contained iodine in a proportion of 57 ppm iodine/salt, representing only 0.6% of the total of the samples analyzed (30).

The Government of El Salvador, with the support of the National Association of Salt Producers and with the technical and financial cooperation from PAHO/INCAP, UNICEF, and the IBRD, has comprised itself to reactivate the Salt Iodization Program. Therefore, on 18 February 1994, salt iodization was reactivated and concerted periods for quality control in iodization plants were established between the Government and the salt industry. An educational campaign will be launched in May to promote iodized salt consumption (31).

Action Strategies

In January 1993, El Salvador updated the law and regulations concerning salt iodization and carried out a series of seminars and workshops with the participation of the public sector, private enterprices, NGOs, and bilateral, multilateral, and international cooperation agencies to reactivate the Program for the Control of Iodine Deficiency Disorders. A plan was design for the period 1993-1995 whose general objective is "to control iodine deficiency disorders in vulnerable population groups by adding this nutrient to salt for human consumption." The plan has the following objectives:

1. To obtain at the short term 100% salt iodization for human and animal consumption.

2. To gradually reduce prevalence of endemic goiter in the country to less than 10% at the medium term.

3. To train personnel involved in the inspection and analytical control of iodized salt.

4. To obtain materials and reagents to control salt iodization in the country (32, 33).

GUATEMALA

In 1987, at the national level 2,560 schoolchildren were examined. The average goiter prevalence was 20.4%, and its distribution by regions was: Metropolitan 22%; central 22.5%; northeastern 17%; northwestern 27%; southwestern 19%; southeastern 18.5; Verapaces 25%, and Petén 12%.

Iodine urinary excretion showed a national median of 3.2 mcg/dl, with a minimum of 0.2 and a maximum of 6.7, and an average of 3.3 $\pm$ 1.3 mcg/dl (34).

Availability of Iodized Salt and Iodine Compounds

In 1993, 179 salt samples were collected in production centers and retail shops. The analyses of the iodine content revealed that 2.3% did not contain iodine; 27.5% less than 30 ppm; 61.1%, between 30-100 ppm; and 9.1%, more than 100 ppm (35).

Action Strategies

In December 1992, Guatemala enacted the General Law on Food Fortification, Enrichment, and Standardization, which opens the possibility of using different vehicles and nutrients according to the population needs. The law determines the creation of a national commission to ensure enforcement of the law and collaboration with the Ministry of Health for its regulation and standardization.

In 1993, the Ministry of Health and Social Welfare, with the support of other ministries, private enterprise, and cooperation agencies, jointly worked in the desing of an integrated plan for the prevention and control of micronutrient deficiencies, particularly iodine, vitamin A, iron, and fluorine.

This plan was analyzed and discussed in a seminar-workshop held in March 1994 with intersectoral participation and the support from PAHO/INCAP, UNICEF, and LAC/HNS-VITAL (36). The program has the following components:

1. Epidemiological surveillance of micronutrient deficiencies
2. Food fortification and enrichment
3. Micronutrients' supplementation
4. Production and marketing of foods, sources of micronutrients
5. Education and communication on micronutrients

HAITI

In 1992 a survey on goiter, urinary iodine, and TSH determination was carried out in a sample of 1,622 subjects of all ages in the country's central plateau. The average goiter prevalence found was 10%; the median urine iodine level, 9.2 μg/dl, and 1.7 mU/l TSH level (37).

Availability of Iodized Salt and Iodine Compounds

No information was available on this subject.

HONDURAS

In 1987 a national survey on endemic goiter was carried out in 4,414 schoolchildren, finding an average prevalence of 8.8%; its distribution by regions was: Metropolitan 9.1%, Regions, One 9.8%, Two 12.6%; Three 8.4%; Four 12.2%; Five 8.5%; Six 5.1%; and Seven 4.9% (38).

Availability of Iodized Salt and Iodine Compounds

During 1993, 552 salt samples were collected in the country's seven health regions. The analyses of iodine content showed that 8.4% did not contain iodine, 6.5% less than 50 ppm, 76.4% between 50-100 ppm (national standard), and 8.7% more than 100 ppm (39).

Action Strategies

In 1992 the Ministry of Health of Honduras, with the support of other ministries, private enterprise, NGOs, and bilateral, multilateral, and international cooperation agencies, designed and implemented a Project to Support Strategies for the Prevention and Control of Micronutrient Deficiencies in Honduras with emphasis on vitamin A, iron, and iodine.

Actions to control salt iodization are being carried out on a priority basis in the salt production and processing areas.

The general objectives of the action plan for the control of micronutrient deficiencies are:

1. To develop an intra- and interinstitutional national strategy for the prevention and control of micronutrient deficiencies as a food safety component.

2. To strengthen the technical-operational capacity of the public, private, and community sectors to jointly provide an appropriate and timely response to micronutrient deficiencies. The working areas include: Supplementation; food

fortification; communication and education; production and preservation of foods rich in iron and vitamin A; training of human resources, and epidemiological surveillance, monitoring, and evaluation (32).

A biennial Action Plan is currently being developed (40).

MEXICO

During 1991 in the state of Hidalgo, a survey on the prevalence of endemic goiter and urinary iodine was carried out in 3,032 schoolchildren. In addition, determinations of iodine in salt for human consumption and natural content of iodine in water of the populations studied were made.

Results showed that the state of Hidalgo has an average goiter prevalence of 6.0%. Of the 24 municipios studied, in 13, goiter was not detected, whereas in the remaining 11 (sierra and huasteca) the goiter prevalence was 11%; four localities had prevalences ranging between 20-27%; and three between 33-41%.

Urinary iodine determinations showed that in eight municipios (33.3%), the average excretion was higher than 100 μg/g creatinine; in 12 (50%), the figures ranged between 50-100; in four (12.5%) between 25-49; and only in one municipio (4.2%) the value was below 25 μg/g creatinine. The average iodine concentration in water was 0.9 μg/l (41).

Availability of Iodized Salt and Iodine Compounds

In 1991 in 24 municipios of the state of Hidalgo, 59 salt samples were analyzed. In these municipios, the average salt iodine content was 18.1 ppm iodine/salt ranging between 15-20.5 ppm (41).

During the period January to March 1993, analysis of 172 salt samples showed that 68% had satisfactory levels (20 ppm iodate or iodide national standard) and 6% did not contain iodine (42).

Action Strategies

The Ministry of Health of Mexico, through the Office of Preventive Medicine and with the collaboration of PAHO/WHO and UNICEF, has designed and implemented a Plan for the Eradication of Iodine Deficiency Disorders in the Mexican Republic (43). Its basic strategies are:

1. Update regulations for salt iodization for human consumption
2. Monitor compliance of established salt iodization standards
3. Improve iodized salt distribution, availability, and consumption
4. Attention to vulnerable groups through iodine supplements
5. Conduct IDD studies, targeted to problem states

NICARAGUA

In 1990 an assessment of endemic goiter and urinary iodine was carried out in 7,938 schoolchildren of all the country, finding 3.9% average goiter prevalence of 3.9% with the following distribution by geographical areas: Pacific region 7.6%; central 3.1%, and atlantic 1.8%.

Determination of iodine urinary excretion in the population sampled in the pacific region revealed that 9.7% presented levels below 5 μg/dl; 8.6%, between 5-10 μg/dl; and 85.7%, above 10 μg/dl. The results from the atlantic region were, 9.3, 9.4, and 81.4%, respectively (44).

In May 1993, a survey on goiter and urinary iodine was carried out in schoolchildren from the municipio of Tola (where in 1990 high prevalences of goiter were found), revealed an overall prevalence of 33.7%: 32% in men and 34.5% in women. A 6.4% presented urinary iodine levels lower than 2 μg/dl, 14% 2 and 5 μg/dl, and 29.6% between 5 to less than 10 μg/dl (44, 45).

Availability of Iodized Salt and Iodine Compounds

During 1993, the Micronutrient National Survey was carried out; 391 salt samples were collected in the households studied. Results showed that 21% of the samples had less than 10 ppm; 48%, between 10 and $<$ 30 ppm; 29%, between 30 and 50 ppm (national standard), and 2%, $>$ 50 ppm (46).

That same year, a study was conducted in 65 households of the municipio of Tola where it was found that 43% of the salt samples contained less than 10 ppm; 44.6%, from 10 to 29.9 ppm; and 12.4%, more than 30 ppm (45).

Action Strategies

In 1992, the Ministry of Health assessed the technical and operational aspects of the salt iodization program. This prompted a call to the different national and international institutions to prepare an Action Plan for the Control of Iodine Deficiency Disorders.

In early 1993, with the technical support of INCAP/PAHO, the Department of Nutrition of the Ministry of Health prepared a three-year plan (1993-1995) for the prevention and control of micronutrient deficiencies. The purpose of the plan is to motivate decision-makers and the population in general on the importance of micronutrient deficiencies, and the need to comfront them multisectorally, count with an epidemiological profile of such deficiencies, and carry out interventions using a comprehensive and multisectoral approach.

The strategic axis at the short and medium terms are focused on food diversification, food fortification and enrichment, supplementation, and public health measures (47).

PANAMA

In Panama during 1991 a national survey on endemic goiter and urinary iodine was carried out in schoolchildren, finding 13.2% national average goiter prevalence. The study design placed emphasis on the Azuero region, since it was considered an endemic area. A 23.2% prevalence was found in this region.

The prevalence for the rest of the country, excluding the Azuero region, was 12.4%, The estimated prevalences by provinces were expressed in percentages): Bocas del Toro 0.0, Coclé 2.8, Colón 4.2, Chiriquí 4.7, Darién 30, Herrera 33.6, Los Santos 15.1, Panama 21.0, and Veraguas 19.5.

Urinary iodine excretion values at the national level showed that 5.1% of the population had urinary iodine concentrations below 5 μg/dl. In the Azuero region, the proportion of schoolchildren with values lower than 5 μg/dl was 21.4% (48).

Availability of Iodized Salt and Iodine Compounds

In 1993, 580 salt samples from retail shops collected in the whole country were analyzed. Of these, 95% were iodized to a level of 30 ppm or higher, 66.4% fell within the standard range (50-100 ppm), and 3.2% did not contain iodine. During the first quarter of 1994, 125 samples were analyzed: 98% had iodine levels higher than 30 ppm, 89% fell within the standard, and 2.6% did not contain iodine (49).

Action Strategies

In 1992 the Ministry of Health of Panama held a national workshop to analyze the information provided by a study on iodine and fluorine deficiencies carried out in 1991, and to propose alternatives to reactivate the salt iodization program. The main recommendations were: Information dissemination and community education; training and development of human resources; epidemiological research and interventions, including supplying Lugol to at high-risk

populations; surveillance, monitoring, and evaluation of salt iodization; and institutionalization of interinstitutional commissions.

Likewise, by the end of 1992 a new multisectoral and interinstitutional seminar-workshop was held, with the participation of cooperation agencies on "Measures to Prevent and Control Micronutrient Deficiencies" (49).

The Department of Food Control and Veterinary Surveillance in coordination with other ministries and salt industries of the private sector, carries out activities on training and advisory services, inspection of salt refineries and retailers, and supervision of the program.

Moreover, Panama, has initiated a program for iodine supplementation, providing Lugol in priority areas, until reaching 100% of iodized salt coverage.

An Action Plan to control IDD for the period 1994-1995 has been designed and implemented.

PARAGUAY

During 1988 a national survey on endemic goiter was carried out in 14,233 schoolchildren ranging from 6 to 16 years of age estimating 49% average goiter prevalence.

In the 12 departments studied, prevalence ranged from 31 to 58%; however, it should be emphasized that in 15% of the districts, prevalences higher than 60% were found, reaching up to 77% in one of them.

Prevalences found by departments (expressed in percentages) were: Misiones 57.8, Ñeembucú 55.3, Encarnación 54.9, Presidente Hayes 54, Cordillera 54, Paraguarí 47.6, Caazapa 54.6, Guairá 50.4, Canindeyú 48.4, Asunción 50.5, Central 41.4, San Pedro del Ycuamandiyú 45.6, Concepción 41.9, Alto Paraná 39.2, and Amambay 30.8.

In this survey iodine urinary concentration in 638 samples was determined. Results showed that 9.4% contained levels lower than 2.5 μg/dl; 31.3%, below 5 μg/dl; 55.5%, less than 7.5 μg/dl; and 25.2% showed values higher than 10 μg/dl (50-52).

An evaluation of goiter prevalence in schoolchildren, conducted in 1993 in the Misiones region, showed 32.4% goiter prevalence, while in 1988 this prevalence had been 57.8%. A focalized research carried out in 1993 in four localities of El Chaco revealed 42% prevalence versus 70.8% found in 1988. This effect could be attributable to the salt iodization control program (11).

Availability of Iodized Salt and Iodine Compounds

Available information shows that Paraguay is a genuine salt importer, and that since approximately 1976, salt for human consumption has not been iodized. However, since 1988 the country has been making efforts to resume salt iodization. In the mean time, as an emergency measure, iodized oil was administered to 607,000 schoolchildren in the eastern sanitary regions of Paraguay, prioritized due to the magnitude and severity of iodine deficiency (51, 52).

There are 34 salt brands in the market. Quality control of 148 samples collected during 1993 in Misiones and Asunción revealed that 82% corresponded to fine and medium-fine salt, and 18% to coarse salt. Iodine content of 77% of the fine and medium-fine salt samples was adequate (20 ppm and higher), while 13% had lower levels or was not iodized. Seventy-three percent of the coarse salt was not iodized (11).

Action Strategies

Paraguay has a National Program for the Prevention and Control of Iodine Deficiency Disorders that is directly under the Ministry of Public Health and Social Welfare. Its general objective is the prevention and control of IDD in five years, through salt iodization for human and animal consumption.

The program's strategies are targeted towards informing and educating the population on IDD control; administration of iodized oil to the population at risk; instalation of seven iodization plants by the private sector; establishment of a salt iodization surveillance system; review the legal provisions and establishment of technical standards; identification of areas and populations at IDD risk; training personnel in charge of the program; and maintain an information, analysis and evaluation system of the program's activities (51).

PERU

In 1987, an evaluation on goiter prevalence was carried out only in the sierra and the rain forest regions with a total of 754 localities and 62,160 schoolchildren. Ninety-one percent of the localities in the sierra, and 78% in the rain forest were classified as endemic. The average goiter prevalences were 38 and 25%, respectively, with an estimation of 5 million subjects at risk.

It was verified that 38.1% of the population examined in the sierra and 20.5% in the rain forest presented urinary iodine concentrations below 10 μg/dl (53, 54).

Availability of Iodized Salt and Iodine Compounds

Between July 1986 and April 1987 an assessment to determine the IDD magnitude and distribution was made in the sierra and rain forest regions. A survey among housewives demonstrated that approximately 40% of the population continues to consume noniodized salt, due among other factors, to the high cost and irregular distribution of iodized salt in endemic areas and to the existence of a large number of noniodized salt natural sources whose consumption is favored by established sociocultural patterns.

The prevailing standards for salt iodization range between 30 and 40 ppm. During 1992, iodized oil was administered to 350,000 persons in 27 provinces of 9 departments (53,54).

Current iodized salt production is 79,128 metric tons, while the internal demand is 138,000, estimating that in 1993 there was an iodized salt deficit of 58,872 metric tons. This suggests that 42.7% of the Peruvian population did not have access to iodized salt, a situation that was confirmed by the results of the analysis of 1,370 salt samples collected during 1993; 59% had iodine levels $\geq$20 ppm and 41% $<$ 20 ppm (34).

Action Strategies

In Peru the National Program for the Control of Endemic Goiter and Cretinism (PRONABCE) is currently consolidating the regional teams established in endemic areas, which have been identified based on the epidemiological diagnosis made by the program. The population at risk has been protected by iodized oil supplementation.

At present, a marketing study on iodized salt in the northern area of the country is being conducted to find mechanisms that guarantee salt availability in the affected areas.

For the period 1992-1996, a project has been designed prioritizing the northern and southern areas of the country. The general objective of the project is to protect 80% of the population at IDD risk over a period of five years, using as the basic strategy effective iodized salt production, distribution, and consumption. In the implementation of the project the following strategies are emphasized: Updating and applying legal provisions; establishing mechanisms to reach consensus among the salt producers and distributors, the public sector, NGOs, churches, and others; creating a demand for iodized salt; and generating social responsibility, for which five target groups have been identified: Iodized salt producers, distributors, and consumers, authorities and PRONABCE staff.

Systematization of communication and education activities will continue and logistic support will be provided to the regional teams. Furthermore, there is a structure for the establishment of a permanent iodized salt quality control system. Likewise, 10 regional laboratories with trained technicians have been established.

The short-term action plan, October 1993 to December 1994, of the National Program for the Control of Endemic Goiter and Cretinism (54-55) is currently underway, and the initiation of actions to control other micronutrients such as iron and vitamin A is being planned.

DOMINICAN REPUBLIC

In 1993, the National Maternal and Child Health Research Center (CENISMI)) conducted a National Survey on Micronutrient Deficiencies. The national average goiter prevalence in schoolchildren was 5.3%; however, in the Azúa and La Vega regions it was 12.3 and 7.2%, respectively. For 43.8% of the children, urinary iodine excretions were lower than 3 μg/dl; 21.1% between 3 and 5 μg/dl; 21%, between 5 and 10 μg/dl; and 14%, more than 10 μg/dl (56).

Availability of Iodized Salt and Iodine Compounds

The results of the analyses of salt samples collected at the households of schoolchildren studied in the 1993 micronutrient survey revealed that 95% of the households do not consume iodized salt (56).

URUGUAY

In 1990, surveys on goiter prevalence were conducted in 724 schoolchildren of the provinces of Durazno, Rivera, and Tacuarembó, estimating a prevalence lower than 1%, according to the Pérez and Scrimshaw classification.

The median urinary iodine concentrations were 32.8 μg/dl in urban Durazno, 30.5 μg/dl and 35.0 μg/dl in two urban areas of Tacuarembó, 19.3 μg/dl in rural Tacuarembó, and 29.2 μg/dl in rural Rivera.

During a consultation meeting held in November 1993, 6.1% goiter prevalence (WHO classification) was detected in a nonrepresentative sample of 116 schoolchildren in a Montevideo school (11).

Availability of Iodized Salt and Iodine Compounds

During 1993, the total salt sales volume for direct human consumption was 8,832 metric tons; of these, only 2,570 metric tons had been iodized (30%). If we consider the current trend at world wide level concerning universal salt iodization, the potential demand in Uruguay would be 11,260 metric tons; however, the current iodized salt production only represents 23% (11).

Action Strategies

There is an Honorary Commission for the Study of the Prophylaxis of Endemic Goiter (CONAPROBO), as an official commission of the Ministry of Health, integrated mainly by physicians who have particular interest in iodine deficiency. CONAPROBO's past working successes have been published in the *IDD Newsletter*. Currently, there is no mechanism to monitor salt quality in retail shops (12). Screening for congenital hypothyroidism through determination of TSH levels in the newborns' blood has recently been established.

VENEZUELA

In 1993, a survey on goiter prevalence and urinary iodine was carried out in five health districts of the state of Mérida: Mérida, El Vigía, Tovar, Lagunillas, and Macuchíes, estimating 64.8% average goiter prevalence in 6,632 schoolchildren.

The median urinary iodine excretions were: 10.0 μg/dl in Mérida; 8.5 μg/dl in El Vigía; 10.5 μg/dl in Tovar; 5.9 μg/dl in Lagunillas; and 9.2 μg/dl in Macuchíes (57).

Availability of Iodized Salt and Iodine Compounds

According to estimates of the National Institute of Nutrition salt availability at national level for 1991 was 473,000 metric tons, of which 296,000 metric tons were iodized (62.6%). Of the total iodized salt, 177,000 metric tons (59.8%) is destined for direct human consumption and 36,000 (12.2%) for indirect human consumption, leading to the conclusion that approximately 72% of the iodized salt is consumed by the population. Twenty-eight percent of available iodized salt is destined for animal consumption. The established levels for salt iodization are 20-30 ppm (58).

In 1993, 44 salt samples collected in health districts of the state of Mérida were analyzed: 31.8% was iodized according to the standard; 13.6% above the standard and in 54.5% below the standard (57).

Action Strategies

The National Institute of Nutrition has integrated a technical team that may become the center to promote and orient IDD control activities. At present, the Institute is carrying out a study on IDD rapid diagnosis. In August 1992, an executive decree established the Foundation to Eradicate Iodine Deficiency Diseases.

It is still necessary to determine the number of companies that process iodized salt, their production volumes, their marketing areas, and the iodization systems used. Modifications to increase the efficiency of the salt iodization quality control system are being introduced.

The Technical Department of the National Institute of Nutrition has prepared a protocol for the prevention of iodine deficiency disorders in the Andean region whose general objectives are to eradicate diseases caused by iodina deficiency in this region and educate Andean communities on IDD. The project's components are:

1. An IDD pilot study in the state of Mérida

2. An IDD educational program in the Andean region (58)

IX. CONCLUSIONS

1. The most commonly used indicators to evaluate IDD are the prevalence of goiter and iodine urinary excretion.

   In some countries, congenital hypothyroidism, screening through blood determination of the thyroid-stimulating hormone (TSH) in newborns, has been established as the biological indicator of IDD risk.

   The information analyzed shows that there is no standard criteria to use these indicators, particularly regarding cut off points, even though WHO has proposed standards in this regard.

2. Some countries have started to use as an indirect indicator availability of adequate iodized salt (production and retail stores), and consumption (households).

   No commonly accepted methodology exists to collect salt samples, nor to interpret results based on at risk criteria. However, Ecuador an Bolivia have made considerable advances in this area.

3. In 11 of 19 Latin American countries, endemic goiter remains a public health problem, in some cases, generalized at national level and in others focused on endemic areas.

4. In most cases, the information on the salt iodization status is more recent than that related to the data on goiter prevalence and urinary iodine.

5. No information was obtained on quality control of the raw material (fortifier): iodate, iodide, iodine-lime premix (potassium iodate plus calcium carbonate in a 1:19 proportion). INCAP has found that in Central America some countries have commercialized the iodine-lime premix that does not meet the required parameters.

6. Of 20 Latin American countries, 18 have legal provisions that require salt iodization; nine of them include salt iodization for human and animal consumption.

7. In Latin America, five classifications are used to set the salt iodization levels, ranging from 10 and 100 ppm iodine/salt.

8. In Central America, the proportion of iodized salt samples with iodine levels equal to or greater than 20 ppm ranged between 79 and 100%.

9. El Salvador and the Dominican Republic present the lowest proportions of iodized salt availability, for the population: 6 and 5%, respectively. In El Salvador, the program was reactivated in February 1994. The Dominican Republic has issued a salt iodization standard for human consumption and is organizing a National Program for Salt Iodization during 1994.

10. Cuba and Haiti lack regulations on salt iodization. Cuba has designed a National Plan for the Control of IDD for the period 1994-1995.

11. In Bolivia, Ecuador, Peru, Colombia, Venezuela, and Mexico, the proportion of iodized salt samples with iodine levels $\geq$ 20 ppm ranged between 45 and 96%, while the proportion of salt samples with an iodine content $\leq$ 20 ppm ranged between 4 and 55%.

12. In Chile, Brazil and Paraguay, the proportion of iodized salt samples with iodine levels equal to or greater than 10 ppm ranged between 77 and 100%, and in some municipios of Marhanão and Bahia in Brazil, the iodized proportion was 58%.

13. In Uruguay, in 1993 availability of iodized salt was 30% as related to the whole population. At present salt iodization is mandatory only for IDD endemic areas.

14. In some countries, the in force laws proclaimed many years ago limit the possibility of making adjustments to the iodization levels and their control mechanisms, since some aspects related to technical standards susceptible of modifications by the scientific and technological progress are within the law, and, therefore, these adjustments need to be approved in the legislative bodies where,

in many occasions it takes years to review and approve the modifications required.

15. Most of the Latin American countries have envisaged the need for developing comprehensive strategies for the prevention and control of micronutrient deficiencies, particularly, iodine, vitamin A, iron, and fluorine.

16. The United Nations organizations, multilateral and bilateral agencies, nongovernmental organizations, private enterprise, academic sector, and popular organizations have adopted an active and consistent participation to jointly work to eradicate IDD and to prevent and control other micronutrient deficiencies, particularly vitamin A, iron, and fluorine.

17. The unsustainability of the IDD epidemiological surveillance systems and iodized salt quality control has been identified as the leading cause of the failure or deterioration of the IDD control programs .

18. The action strategies identified by 17 countries were: Strengthening of institutional capacity, salt iodization, education and mass communication, and monitoring and surveillance. Ten countries, considered implementation of operational research; nine, supplementation of iodized compounds; and two, food diversification.

19. Both the Declaration of the Representatives of the Central American Governments and the Salt Industry for the Eradication of Iodine Deficiency Disorders, as well as the Declaration of Quito for Universal Salt Iodization reflect the commitment of governments, the salt industry, and the international cooperation agencies to achieve the goal of universal salt iodization by the end of 1995, and the effective eradication of iodine deficiency disorders in the American Hemisphere.

X. FUTURE PROSPECTS

Five years from the estimated date to achieve an effective eradication of iodine deficiency disorders, much work still needs to be done.

It is necessary to prevent the deterioration of those programs that have gained progress, it is necessary therefore, that the countries strengthen or establish mechanisms to monitor the IDD situation, conducting epidemiological studies when there is need to reevaluate progress or update information.

Considering that salt fortification with iodine is the chosen strategy, it is necessary to continue and increase concerted actions among the governments of the countries, the salt industry, and the society, so that, with the support of international cooperation, quality control of iodized salt at the production, sale, and consumption centers, be permanently established and systematized.

Besides, the aforementioned consideration, meetings should be held of technical groups and representatives of the salt industry and governments to establish criteria to standardize salt iodization levels in the region. At the national level, legal provisions should be designed to iodize salt, for both human and animal consumption.

Regarding the drafting of new laws on salt iodization these should contain a provision to delegate to the executive organisms (ministries of health), the preparation of technical standards and to watch over their fullfillment and if necessary, allowing their modification. In this regard, participation of the salt industry should be considered among the sectors involved.

It should be considered that available salt to the consumer should contain an iodization level not lower than 20 ppm iodine when the average salt consumption per person, per day is 10 g. When consumption is lower, the iodization level should be adjusted so that iodine intake be in the order of 200 μg per person, per day. In order to ensure this intake, certification of quality of the iodized compounds used by the suppliers in the fortification of salt, should be mandatory, and their periodical analysis should be included in the process to control salt iodization in the iodizing plants.

The governments, the salt industry, and the international cooperation agencies should establish mechanisms enabling evaluation of the progress of national programs, and certify permanent IDD eradication. For this purpose, it is necessary to strengthen the establishment of permanent IDD epidemiological surveillance and salt quality control systems, by training the personnel responsible of its implementation, promoting community education activities and supporting the strengthening of the responsible institutions, providing them the necessary infrastructure that will allow the continuity of the programs.

For many years IDD control programs in the countries have been working vertically. This entails a risk of their weakening, once the most striking visible aspects of the problem (goiter), along with public, scientific, and political interest, decrease. It is urgent to coordinate and integrate programs to eradicate micronutrient deficiencies, such as, iron, vitamin A, and, in many countries, fluorine, so that these programs benefit from experience gained, and maximize available resources. Surveillance systems, education, training, and social marketing programs, as well as strategies such as multiple fortification and supplementation would benefit from a comprehensive approach.

Finally, recommendations and guidelines to evaluate IDD and their control programs must be published and widely disseminated, with the aim of standardizing technical criteria and methodologies in epidemiological IDD surveillance, and monitoring and evaluation of interventions, in view of the knowledge and experiences gained on this subject.

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ANNEXES

ANNEX I

TABLES

TABLE 1

EPIDEMIOLOGICAL CRITERIA TO ESTIMATE THE SEVERITY OF IODINE DEFICIENCY DISORDERS IN THE POPULATION

	Severity of the public health problem		
	Mild IDD	**Moderate IDD**	**Severe IDD**
Goiter prevalence (Schoolchildren) (%)	5.0 -19.9%	20.0 -29.9%	≥30.0%
Urine iodine level (Median, μg/dl)	5.0 -9.9	2.0 -4.9	<2.0
TSH >5mU/l blood (newborns) (%)	3.0 -19.9%	20.0 -39.9%	≥40.0%

TABLE 2

GOITER PREVALENCE IN SCHOOLCHILDREN SOUTH AMERICA

	Year	Percentage
ARGENTINA		
Córdoba	1989	0-8.3
Santa Cruz	1990	10.3
BOLIVIA	1989	20.9
BRAZIL	1990	
Marhanão		18.2
Pará		22.0
Goiás		35.9
Tocantis		38.8
Minas Gerais		47.5
CHILE	1991	
Temuco		9.1
Calama		10.9
Santiago		13.5
COLOMBIA	1986	
Yopal		13.5
Chameza		52.0
ECUADOR	1983	36.0
PARAGUAY	1988	49.0
PERU	1987	
Selva		25.0
Sierra		38.0
URUGUAY	1990	<1.0
VENEZUELA	1993	
Mérida		64.6

TABLE 3

GOITER PREVALENCE IN SCHOOLCHILDREN CENTRAL AMERICA, PANAMA, MEXICO, AND THE CARIBBEAN

Country	Year	Percentage
COSTA RICA	1990	
Puntarenas		3.3
Guanacaste		11.3
EL SALVADOR	1990	25.0
GUATEMALA	1987	20.4
HAITI	1992	
Meseta central		10.0
HONDURAS	1987	8.8
MEXICO	1991	
Hidalgo		6.0
NICARAGUA	1990	3.9
PANAMA	1991	13.2
Azuero		23.2
DOMINICAN REPUBLIC	1993	5.3
Arzúa		12.3
La Vega		7.3

TABLE 4

URINARY IODINE CONCENTRATION MEDIANS

μg/dl Country (year)	< 5	5 < 10	≥ 10	Area covered
Guatemala (1987)	3	-	-	National
Chile (1991)			60.1 85.8 30.2	Santiago Calama Temuco
Haiti (1992)			10	Central plateau
Uruguay (1990)[1]			32.8 30.5-35.05 19.3 29.2	Durazno[2] Tacuarembó[2] Tacuarembó[3] Rivera[2]
Venezuela (1993)		8.5 5.9 9.2	10.0 10.5	Mérida El Vigía Tovar Lagunillas Macuchies

[1] Median.
[2] Urban.
[3] Rural.

TABLE 5

POPULATION PROPORTION ACCORDING TO IODINE URINARY EXCRETION LEVELS (IN PERCENTAGE)

μg/dl Country (year)	< 5	5 < 10	≥ 10	Area covered
Costa Rica (1990)	6.3	7.7	86	National
Ecuador (1992)	-	1-19	81-97	Sierra, coast, and Amazon
Nicaragua (1990)	17.0	21.7	61.3	National
Panama (1991)	5.1	6.7	88.2	National
Paraguay (1988)	25.2	43.5	25.2	National
Peru (1987)	38.1 - 20.5		61.9 - 79.5	Sierra and selva
Dominican Republic (1993)	64.8	21	14	National
Bolivia (1989)[1]	5	11	84	National
Mexico (1991)[2]	14.7	50	33.3	Hidalgo

[1] Bolivia reports the population proportion according to medians.

[2] Mexico reports urinary iodine excretion in micrograms of iodine per gram of creatinine, with ranges as follows:

25-50 μg
50-100 μg
≥ 100 μg

TABLE 6

SITUATION OF SALT IODIZATION
PROPORTION (%) EXPRESSED IN PPM (IODINE/SALT)

Country	Year	Sample size	< 10	10-30	30-50	50 ≥ 100
Bolivia	1993 (January-April)	617	3.7	7.5	88.8	
Brazil	1991	85,278	2.02	87.08	10.9	-
Chile	1993	1,341	-	3.7	96.3	
Colombia	1989	640	11	34	-	55
Costa Rica	1993	20 monthly samples by industry	-	-	100	-
Ecuador	1993 (April-July)	466	< 20 (22)	20-49 (26)		52
El Salvador	1990	178	99.4	-	-	0.6
Guatemala	1993	179	2.3	27.5	70.2	
Honduras	1993	552	8.4	-	6.5	85.1
Nicaragua Municipio of Tola	1993 1993	391 (households) 65 (households)	21 43	48 44.6	29 6.2	2 6.2
Panama	1993 1994	580 125	3.2 2.6	- -	94.8 97.6	
Paraguay	1993	146 (refined salt)	13	77	-	-
Peru	1992	1,370	41	59	-	-
Uruguay	1993	Based on production	70	30	-	-
Venezuela (Mérida)	1993	40	54.5	13.6	31.8	-
Dominican Republic	1993	Households	95	-	-	-

TABLE 7

NATIONAL LEGISLATION ON MANDATORY IODINE SALT FORTIFICATION

Country	Date of law enactment	Date iodization began	Includes animal consumption
Argentina	1967	1970	Yes
Bolivia	1968	1977	Yes
Brazil	1953	1957	No
Colombia	1947 Amended in 1979, 1984, and 1988	1959	Yes
Costa Rica	1941	1972	No
Cuba	No legislation	--	--
Chile	1959 Repealed in 1982, reinstated in 1990	1991	No
Ecuador	1968	1973	No
El Salvador	1961 Amended in 1993	1972	Yes
Guatemala	1954 Amended in 1992	1959	Yes
Haiti	No legislation	--	--
Honduras	1960	1971	Yes
Mexico	1963	1963	No
Nicaragua	1969	1978	Yes
Panama	1965	1970	No
Paraguay	1958 Amended in 1992	1966	Yes
Peru	1969	1972	Yes
Dominican Republic	March 1994	In process	No
Uruguay	1961	1963	Yes
Venezuela	1966	1968	Yes

TABLE 8

ACTION STRATEGIES IDENTIFIED BY THE COUNTRIES TO CONTROL IODINE DEFICIENCY DISORDERS

Country	Strengthening of institutional capacity	Fortification	Supplementation	Training	Monitoring and surveillance	Education and mass communication	Operational research	Food diversification
Argentina	X	X	X	X	X	X	X	--
Bolivia	X	X	--	X	X	X	X	--
Brazil	X	X	--	X	X	X	X	--
Colombia	X	X	--	X	X	X	X	--
Costa Rica	X	X	--	X	X	X	--	--
Cuba	X	X	--	X	X	X	X	--
Ecuador	X	X	X	X	X	X	--	--
El Salvador	X	X	--	X	X	X	--	--
Guatemala	X	X	--	X	X	X	--	--
Honduras	X	X	--	X	X	X	X	X
Mexico	X	X	X	--	X	X	--	--
Nicaragua	X	X	--	X	X	X	X	X
Panama	X	X	X	X	X	X	--	--
Paraguay	X	X	X	X	X	X	--	--
Peru	X	X	--	X	X	X	X	--
Dominican Republic	X	X	--	X	X	X	X	--
Venezuela	X	X	--	X	X	X	X	--

ANNEX II

FORM TO DETERMINE THE IODINE DEFICIENCY DISORDERS SITUATION IN THE COUNTRIES

ANNEX II

Form to determine IDD in the countries

This form annuls previous versions. Please note the review date on the title page. In completing this questionnaire, the following criteria for quality of the information supplied should be used:

1 = Based on a good randomized community epidemiological study.

2 = Based on focal or incomplete information of other epidemiological studies.

3 = Based on information from small-scale or institutional surveys.

4 = Based on indirect estimates or other epidemiological parameters.

5 = Based on ad hoc information instead of empirical evidence.

Note: This form was prepared by the WHO Nutrition Unit, Geneva, Switzerland (version dated 17 February 1993).

I. ACTIVITIES ON IDD SURVEYS

Key indicators of the IDD situation recommended for global monitoring

Total goiter rate in schoolchildren (8-10 years)
Urinary iodine TSH in newborns

Indicator	Geographical area National, regional (Specify)	Responsible group (Government, NGOs, etc.)	Age group	Sample size (n)	Rate	Quality*
Goiter (total goiter rate)						
Cretinism (Y/N)						
TSH (% > 5 mU/l)						
Urinary iodine (median)						
Others (specify)						

* The following criteria were used to rate the quality of the surveys:
1 = good quality, highly reliable; 5 = low quality, not reliable; 9 = incomplete, does not apply.

II. IDD LEGISLATION

Does current legislation exist for salt iodization? (Y/N)_____

If yes, does the law apply to salt used for animal consumption? (Y/N)_____

If yes, please specify:

Required salt iodization level (ppm of iodine)*	Compound	Year of enactment	Last review

* Assumed at production level, not at the retail sales level or imported.

III. IDD National Responsibility

Which are the primary groups responsible for the IDD control programs? (For example, Ministry of Health, IDD Commission, Agriculture, Industry.)

_____

IV. IDD Training

Please complete the following table, indicating the adequacy of the personnel trained in IDD:

Personnel	Adequacy*	Personnel	Adequacy*
IDD Technicians/scientists		**IDD Managerial personnel**	
IDD Biochemists		Salt monitoring	
IDD Endocrinologists		Supervision of oil administration	
IDD Epidemiologists		IEC responsible	

* Adequacy in terms of quantity and duration on IDD personnel training (1 = highly adequate, 5 = inadequate, 9 = does not apply)

V. Information, Education, and Communication (IEC)

Please complete the following table with the information that describes the IEC efforts related to IDD in the country (please mark those that are appropriate, as well as quality of the efforts):

(1 = good operational system, 5 = lacks system or poor system, 9 = does not apply

IEC efforts regarding:	
IDD advocacy for policy-makers	
IDD health education	
Iodized salt social marketing	
Iodized oil social marketing	

When appropriate, indicate the degree of importance (1 = most important, 5 = least important, 9 = does not apply)

Group responsible for the IEC efforts:	
Health education sector	
Nutrition sector	
Industry	
Ministry of Information	
Other:_____	

SALT

Key IDD indicators recommended for overall monitoring
Total percentage of available iodized salt

VI. IODIZED SALT AVAILABILITY

Is iodized salt available for human consumption? (Y/N)_____

If yes, total percentage of available iodized salt? (%)_____

If yes, percentage of iodized salt that is imported? (%)_____

If iodized salt is imported, what is the primary source (if known)?

_____

VII. INFORMATION ON SALT PRODUCTION

Please provide information on the country's salt production, including: number of producers, location, control (private/public), kind of salt produced (rock, refined, etc.) and iodization percentage.

_____

_____

_____

VIII. SALT IODIZATION PROCESS

What is the most common procedure for salt iodization in terms of:

Iodine content (ppm)	**Compound used**	**Iodization method** (simple, highly mechanized)	**Type of packaging material** (plastic, jute, polypropylene, etc .)

IX. SALT CONSUMPTION

Daily estimated per capita salt consumption (iodized and noniodized): (est. g/day)_____

Estimated percentage of daily **iodized** salt consumption: (%)_____

X. COST OF IODIZED SALT

Iodized salt sale price to the consumer in the main urban area: (US$/kg)_____

Noniodized salt Sale price to the consumer in the main urban area: (US$/kg)_____
Year this information applies to:_____

Is there a significant difference in cost between the capital city and remote rural areas? (Y/N)_____

If yes, what is the urban/rural (%) cost difference? _____

Estimated time between production (or importation) and consumption of iodized salt in remote rural areas (weeks)_____

XI. SALT TRANSPORTATION

Indicate the level of importance of salt transportation in the country (1 = most important, 5 = least important):

Transportation mean	**Generally used for salt transportation**
Land	[ ]
Railway	[ ]
Animal	[ ]
Other	[ ]
Specify:_____	

SUPPLEMENTATION

XII. IODIZED OIL

Please complete the following table with information on the country's supplementation activities, including number of doses, administration method, and target groups.

No. of supplemented persons during the last three years	Administration method	Target groups (age/gender)	Target groups (geographical)
	Oral (%) _____ Parenteral (%) _____		

Average dosage administered orally: adult _____ child _____
Average dosage administered parenterally: adult _____ child _____

XIII. OTHER SUPPLEMENTATION ACTIVITIES

Describe other supplementation activities that are being carried out to control IDD in the country; i.e., water, bread, milk, etc.

_____

_____

_____

MONITORING

XIV. MONITORING INDICATORS USED

Which of the following indicators are used to monitor the IDD control program?

Indicator	Monitoring (Y/N)	Quality 1 = high 5 = low
Goiter		
Iodine in urine		
Other (specify)		
Salt		

OBSERVATIONS

XV. EXTERNAL SUPPORT

What external groups are involved in activities to control IDD (UNICEF, WHO, bilateral agencies, NGOs, etc.)?

_____

Estimation of funding needs to control IDD
during the next three years. _____

Has a detailed document of a plan/project been designed, with information on future needs
to finance IDD control? (Y/N)_____

If yes, give title and source of the IDD project plan.

_____

If yes, provide the amount needed, as presented in the plan. _____

XVI. OTHER OBSERVATIONS

Please include other observations on the situation of the IDD national control program.

ANNEX III

DECLARATION OF THE REPRESENTATIVES OF THE CENTRAL AMERICAN GOVERNMENTS AND THE SALT INDUSTRY FOR THE ERADICATION OF IODINE DEFICIENCY DISORDERS

DECLARATION OF THE REPRESENTATIVES OF THE CENTRAL AMERICAN GOVERNMENTS AND THE SALT INDUSTRY FOR THE ERADICATION OF IODINE DEFICIENCY DISORDERS

The representatives of the Central American Governments and the salt industry, based on the conclusions and recommendations issued by the High-level Seminar/Workshop for the Control of Iodine Deficiency Disorders (IDD) in Central America, held in Guatemala City from 26 to 28 October 1993,

CONSIDERING THAT:

- Iodine deficiency continues to be a public health problem in most of the Central American countries,
- Iodine deficiency disorders limit the human development of their populations,
- Eradication of iodine deficiency disorders constitutes an investment in human capital,
- It is the responsibility of the society to coordinate efforts to guarantee fulfillment of the goal "The effective eradication of iodine deficiency disorders in the present decade,"
- It is necessary to create a subregional entity to monitor implementation of the national programs, and to certify sustained eradication of IDD,

DO HEREBY AGREE:

First: To commit themselves to give the highest priority to the eradication of iodine deficiency disorders, strengthening national initiatives, and promoting international cooperation,

Second: To strengthen the national programs to fulfill the commitments made for the effective eradication of iodine deficiency disorders, through the allocation of the necessary human, institutional, and financial resources,

Third: To request technical and financial cooperation from friendly countries, the international organizations and agencies, especially UNICEF, PAHO/WHO/INCAP, ICCIDD, and nongovernmental organizations to support the programs for IDD eradication, facilitating the integration and sustainability of the programs,

Fourth: To establish coordination, exchange, and cooperation mechanisms among the different institutions and sectors involved in the programs for the eradication of IDD in the countries, and to promote technical cooperation among them,

Fifth: To assess the programs' progress and to certify sustained IDD eradication, confirming universal iodized salt intake for human and animal consumption, verifying that the population does not have urinary iodine concentrations less than 10 micrograms, and ascertaining that the school population has goiter prevalences below 5%, and

Sixth To create a subregional entity with the participation of the Central American Governments, the Central American Parliament, the salt industry, UNICEF, PAHO/INCAP, ICCIDD, and nongovernmental organizations, with the purpose of coordinating subregional activities, evaluating the programs' progress, and certifying sustained IDD eradication, being INCAP the Technical Secretariat of this entity.

Representatives of the Central American Governments

Representative of the Central American Salt Industry

Witnesses of Honor: UNICEF, PAHO/INCAP, and ICCIDD

ANNEX IV

DECLARATION OF QUITO FOR UNIVERSAL SALT IODIZATION

DECLARATION OF QUITO
FOR UNIVERSAL SALT IODIZATION

We, the representatives of the participating countries in the Regional Meeting on Universal Salt Iodization for the Eradication of Iodine Deficiency Disorders in the Americas, held in Quito, Ecuador from 9-11 April 1994,

RECOGNIZING THAT:

- A great proportion of populations living in the Region of the Americas are at risk of suffering iodine deficiency disorders (IDD) due to the inadequate availability of iodine in soil, water, and foods,

- Iodine deficiency significantly affects the development of children and constitutes the most significant cause of mental retardation,

- Many countries in the Region have coped successfully the problems of iodine deficiency, through the fortification of all types of salt with iodine, and that this practice has shown to be the most effective and inexpensive method to eradicate iodine deficiency disorders,

- In the countries of the Region where salt iodization has not been sustained, an increase in iodine deficiency disorders has been reported,

DO HEREBY DECLARE:

1. That the whole population of the Region has the right to receive adequate amounts of iodine and that our Governments have the responsibility of guaranteeing the fulfillment of this right,

2. That the most efficient method of ensuring adequate intake levels to iodize all the salt for human and animal consumption, including the salt used in foods manufacture,

3. That through continuous joint efforts with all the salt producers, distributors, exporters, importers, and consumers, our Governments shall establish the legal, technical, and administrative provisions and other measures necessary to ensure that all the salt for consumption be adequately iodized, and likewise, shall implement adequate information strategies with the purpose of comprehending, and participating in the use of iodized salt through the pertinent Ministries (Health, Education, Economy), and other public and private institutions related with this problem, such as municipios, research centers, community, and nongovernmental organizations, social welfare institutions, and international cooperation agencies,

4. That iodization of all the salt for human and animal consumption should be continued on a permanent basis, and that we the countries of the Region shall develop mechanisms to ensure its sustainability and the fulfillment of the goal of universal salt iodization by the end of 1995 to assure that new cases of iodine deficiency disorders do not appear and these deficiencies be effectively, eradicated in the American Hemisphere,

5. That all the salt for consumption, marketed among the countries of the Region, be properly iodized.

ANNEX V

ABBREVIATIONS

ABBREVIATIONS

PAHO/WHO	Pan American Health Organization/World Health Organization
UNICEF	United Nations Children's Fund
FAO	Food and Agriculture Organization of the United Nations
ICCIDD	International Council for the Control of Iodine Deficiency Disorders
PAMM	Program Against Micronutrient Malnutrition
OMNI	Opportunities for Micronutrient Intervention
USAID	United States Agency for International Development
UNDP	United Nations Development Program
CIDA	Canadian International Development Agency
ILSI	International Life Sciences Institute
ISTI	International Science and Technology Institute
VITAL	Vitamin A Field Support Project
IBRD	International Bank for Reconstruction and Development (World Bank)

CDC	Centers for Disease Control and Prevention
PATH	Program for Appropriate Technology in Health
PROCAN	Joint Nutrition Support Program
PSADDI	Andean Subregional Program for the Control of Iodine Deficiency Disorders
INCIENSA	Costa Rican Institute of Research and Teaching in Health and Nutrition
INCAP	Institute of Nutrition of Central America and Panama
CIDD	Control of Iodine Deficiency Disorders
NGOs	Nongovernmental organizations
ppm	Parts per million