

**Tracking Progress Toward Sustainable  
Elimination of Iodine Deficiency Disorders  
in Tamil Nadu**

**Technical Report  
Submitted to the Micronutrient Initiative**

**Indian Coalition for Control of Iodine Deficiency  
Disorders (ICCIDD)**

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## **1. Introduction**

The Department of Public Health and Preventive Medicine, Government of Tamil Nadu, in collaboration with the Indian Coalition for Control of Iodine Deficiency Disorders, and with technical and financial support of the Micronutrient Initiative, conducted a statewide study in Tamil Nadu titled "Tracking progress towards sustainable elimination of iodine deficiency disorders in Tamil Nadu".

As determined by the National Family Health Survey - 2, Tamil Nadu, in spite of being a salt producing state, ranks last among all the states surveyed for the coverage of adequately iodised salt, as tested by salt testing kits.

## **2. Rationale For The Present Study:**

The Tamil Nadu IDD control cell was established with Central government assistance and is functioning since 1<sup>st</sup> July 1994. Goitre surveys and resurveys of all the districts are being carried out periodically since 1991. According to the data available with the Department of Public Health and Preventive Medicine, 27 of the 28 districts in Tamil Nadu are endemic for iodine deficiency disorders.

There has been no state level study to assess the status of IDD in Tamil Nadu. In this special situation, it is important to study the current status of IDD and the knowledge, attitudes, practices and behaviour of the people using both quantitative and qualitative methods. This will help us understand the current status of IDD and people's perception about IDD and iodised salt. The study will also attempt to assess the functioning of NIDDCP in the state and suggest means to improve its efficiency, working toward the goal of sustainable elimination.

### **3. Goals, Objectives, Methodology and Activities under the Present Study:**

#### **3.1) Goal**

To track progress towards sustainable elimination of iodine deficiency disorder in Tamil Nadu

##### *3.1.1) Objectives:*

1. To estimate the prevalence of IDD in Tamil Nadu
2. To assess the availability and cost of adequately iodised salt at the retail shops in Tamil Nadu
3. To assess the community's and trader's perception about IDD and iodised salt in Tamil Nadu

#### **3.2) Methodology:**

**3.2.1) For Objective 1:** To estimate the prevalence of IDD in Tamil Nadu

##### *3.2.1.1) Study Design:*

This was a cross sectional community based study – a field survey. Probability proportionate to size (PPS) cluster method was used for sample selection. All inhabited villages in the state with their population were listed. Using the standard “30 cluster PPS” methodology, a total 30 clusters was selected in the state. The target population was selected by house-to-house visit.

A total of 1230 children in the age group of 6-12 years were to be examined. This sample size, divided among 30 clusters,

meant that 41 children from each of the clusters were to be examined.

The clusters were assigned to the Regional Training Centres, which would be assisted by a Government Medical College. The Food Analysis Laboratories at Guindy, Coimbatore and Palayamkottai were assigned fifteen, ten and five clusters each, respectively and the teams conducting the survey in the clusters were instructed to send the salt samples for analysis only to the allotted Food Analysis Laboratory and all the urine samples to the Kings Institute, Guindy.

#### *3.2.1.2) Household*

Salt samples (50 grams) were collected from all the households visited for estimation of iodine content. These were tested by iodometric titration at the Government Food Analysis Laboratories in Guindy, Coimbatore and Palayamkottai.

#### *3.2.1.3) Collection of urinary sample*

From each household subject, 10 ml of urine was collected in a wide mouthed sample collection bottle. A 2 ml aliquot was transferred to the serum vial for storage and transport to the Kings Institute, Guindy, from which place it was transported to the ICCIDD Reference Laboratory at the All India Institute of Medical Sciences, New Delhi.

#### *3.2.1.4) Collection of salt sample at the retail level*

Salt samples were collected, each from a government fair price shop and a private retail shop, from each cluster. If there were

no government shops in that cluster, two private retail shops were randomly selected. The salt samples were tested by iodometric titration at the Government Food Analysis Laboratories in Guindy, Coimbatore and Palayamkottai.

#### *3.2.1.5) Interviews by Questionnaire method*

Information related to the availability, affordability, accessibility of iodised salt, programme implementation, programme management, IEC, etc was inquired into using structured questionnaire by personal interviews with the respondent in the selected household.

At retail shops, the information on procurement, storage, re-packing and pricing of salt was collected from the retail shops using an interview schedule. In addition, storage and packing was also observed.

#### *3.2.1.6) Parameters Studied*

*Clinical parameters:* Trained and experienced physicians examined clinically all the 41 children in each cluster for thyroid enlargement. Goitre was graded as per the recommendation of the Joint WHO/UNICEF/ICCIDD Technical Consultation Group (May, 1999).

*Biochemical parameter:* Urinary iodine concentration was estimated from urinary samples collected from the 41 children per cluster.

*3.2.2) For Objective 2 and 3:*

**Objective 2:** To assess the availability and cost of adequately iodised salt at the retail shops in Tamil Nadu

**Objective 3:** To assess the community's and trader's perception about IDD and iodised salt in Tamil Nadu

*3.2.2.1) During the Field Survey:*

*3.2.2.1.1) Household Level*

In each household, information on the type of salt used, quantity purchased at a time, method of storage, etc was collected using an interview schedule.

*3.2.2.1.2) Retail Level*

At retail shops, the information on procurement, storage, re-packing and pricing of salt was collected from the retail shops using an interview schedule. In addition, storage and packing was also observed.

*3.2.2.2) Interviews by Questionnaire method and Focus Group Discussions*

The qualitative component of the study involved carrying out semi-structured interviews with various categories of health care providers, namely doctors from both the private and government health care settings, practitioners of alternate medicine, voluntary health nurses (VHNs), health inspectors (HIs) and the ICDS/primary school teacher or community leader. Finally, a retail or PDS shop keeper and a salt manufacturer were also interviewed. From the

point of view of the users, focus group discussions were carried out with both literate and non-literate women using a focus group guide. **Table 1** shows the number of interviews carried out with different stakeholders in the project.

**Table 1: Stakeholder interviews**

<b>Category</b>	<b>Number of Semi Structured Interviews</b>
Doctors	11
VHN & HI	10 ( 5 each )
Retail shop keeper, PDS, Salt distributor	9
Community worker, School teacher, ICDS worker	13
Total	43
Focus Group Discussion	12 (6 with literate group & 6 with non-literate group)

The main focus of the interviews with the health care providers was to understand their awareness of salts used by people in their homes for cooking, the quantity generally bought and methods of storage commonly practiced. The interview also sought to elicit information on what providers believed were the reasons for people preferring one salt over another, people's knowledge and awareness about iodized salt and the health hazards associated with their non-use. Information on the socio-cultural beliefs in the community that influence usage of certain salts and their perceptions on how best the use of iodized salt could be promoted in the community were also elicited.

Interviews with the retail shop keeper primarily aimed at understanding their sources for purchase of salt, the quantity generally bought, the methods of storage practiced, their take on people's salt preferences and their ideas, if any, on the benefits of iodized salt

From the point of view of the users, similar issues were probed through focus group discussions conducted with women living in the community. In addition focus groups also aimed at understanding people's knowledge, awareness and preferences for using a certain salt, their awareness of potential health hazards associated with the non-use of iodized salt, any socio-cultural beliefs associated with the usage of different types of salts and their understanding of the role of the community in promoting use of iodized salt. This process of triangulation of data, whereby, similar information was gathered from more than one source, helped to enhance the validity of the findings.

These interviews and focus group discussions were conducted by the social scientist attached to the Regional Training Centres, with the help and supervision of Dr Shuba Kumar and Dr Sarasha Suresh of IndiaCLEN. The data analysis of the household and retail shopkeeper questionnaires was conducted by the National Institute of Epidemiology while the data analysis of the semi-structured interviews and focus group discussions was conducted by IndiaCLEN.

### **3.3) Activities under the Present Study**

#### *3.3.1) Planning Workshop:*

A half day planning workshop was conducted at UNICEF Chennai, to decide upon the schedule for the study - "Tracking Progress Towards Sustainable Elimination of Iodine Deficiency Disorders in Tamil Nadu".

The participants were from the Government of Tamil Nadu, the National Institute of Epidemiology, the Government Medical Colleges, the ICCIDD, and the MI. The issues in the draft protocol were cleared and the dates for the training programme were fixed.

#### *3.3.2) Training and Orientation Workshop:*

A three-day training and orientation workshop was conducted for team members from the six Regional Health and Family Welfare Training Centers (Regional Training Centres) and also the Government Medical College. The team comprised a doctor, a social scientist and a health educationist.

State Training Orientation Workshop was held at the Institute of Public Health in Ponnammallee for the team leaders to impart practical training in goitre examination and other details of survey methodology. A total of thirty-eight participants from the Department of Public Health and Preventive Medicine, the Regional Training Centres and Government Medical Colleges participated in the workshop. The degree of agreement amongst the investigators on goitre grading was done to minimize the inter-observer variability.

The schedules for the field survey and the qualitative interviews and focus group discussions were finalized; and the survey kits distributed, during the course of the training workshop. The clusters were assigned to the Regional Training Centres, which would be assisted by a Government Medical College. The Food Analysis Laboratories at Guindy, Coimbatore and Palayamkottai were assigned fifteen, ten and five clusters each, respectively and the teams conducting the survey in the clusters were instructed to send the salt samples for analysis only to the allotted Food Analysis Laboratory and all the urine samples to the Kings Institute, Guindy

### *3.3.3) Laboratory Workshop*

A laboratory workshop was conducted at the King's Institute, Guindy, to inform the participants about the method of estimation of iodine in salt, and the quality control mechanisms therein.

### *3.3.4) Field Survey:*

After the training and orientation workshop, the clusters were allotted to the respective regional training institutes and medical colleges and the field survey commenced immediately. Each regional training institute and medical college survey team visited a total of five clusters. In the household of each selected subject, the physician in the survey team administered the household questionnaire. He conducted the thyroid palpation and assigned the goitre grade.

The urine sample from the subject and salt sample from the household was collected by the assistant. The salt samples were transported to the allotted state food analysis laboratory. The urine samples were analyzed in the ICCIDD reference lab in New Delhi.

In each cluster the investigators also visited two retail level shops, one government and one private, and administered a retail shopkeeper questionnaire and collected salt samples of the various varieties for analysis.

The filled in schedules was sent to the National Institute of Epidemiology and the filled-in data schedules were scrutinized and coded. Controls were prepared to ensure completeness of data set. Creation of data files in the computer systems, data management and data analyses were carried out through the software developed at the National Institute of Epidemiology and software packages such as SYSTAT, EXCEL, WORD and Power Point.

## **4) Results**

### **4.1) Coverage**

In this cross-sectional survey 1230 households were covered in 30 randomly selected clusters. There were a total of 6207 family members. Family size with  $\leq 5$  members were 876, 6 to 10 members were 41, and 11 to 15 members were 13 households in the selected sample, 64 retail shops were covered for oral questionnaire interview. Salt samples collected from households and retail shops were 1228 and 167 respectively. Urine samples were collected from 1221 children for analyses of iodine content.

### **4.2) Goitre prevalence**

The total goitre rate was 13.5% (95% CI: 11.6% to 15.4%), prevalence of Grade I goitre being 12.9% and Grade II goitre cases being 0.6% among 1230 children.

### 4.3) Urinary iodine excretion

A total of 1221 urine samples were collected from 1230 children. The remaining 1206 urine samples were analyzed for iodine content. The median urinary iodine excretion level is 89.5 µg/L. The proportion of the population with a urinary iodine excretion below 100 µg/L was 56% and the proportion of the population with a urinary iodine excretion below 50 µg/L was 22%.

### 4.4) Iodine content of salt

A total of 1228 salt samples collected at household level were analyzed by titration. The proportion of households consuming adequately iodized salt i.e. iodine content of  $\geq 15$  ppm (15 mg of Iodine / kg of salt) was 18.2% (95% CI: 16% to 20.4%). The range of Iodine level in salt in the samples from the households was 0 to 80.4 ppm. The total number of salt samples with some iodine was 807 (65.6%).

The quantitative indicators are summarized below:

<b>Indicator</b>	<b>Tamil Nadu</b>
<b>Thyroid size</b> (in age group 6-12 years) Proportion with an enlarged thyroid gland	13.5% (95% CI: 11.6% to 15.4%)
<b>Urinary Iodine</b>	
Median Urinary Iodine (µg/L)	89.5
Proportion below 100 µg/L	56%
Proportion below 50 µg/L	22%
<b>Salt iodisation</b> Proportion of households consuming adequately iodised salt	18.2% (95% CI: 16% to 20.4%)

## **4.5) Household Questionnaire**

### *4.5.1) Type of salt used*

It was found that 16% of households reported the use of iodised salt and 12% of households reported use of both types of salts. However, 45% of respondents said that they do not know, whether their salt contained iodine.

### *4.5.2) Variety of salt used currently*

It was reported by 75% of respondents that they purchased the crystal type of salt. Only 13% of them said they are using powdered salt.

### *4.5.3) Salt storage*

In 96% of the households, the salt is stored in the kitchen itself and 79% in closed containers.

### *4.5.4) Source of information on iodised salt*

The main source of information about iodised salt was T.V. (48%), followed by Radio (20%).

## **4.6) Retail Shopkeeper Questionnaire**

### *4.6.1) Type of salt on sale*

It was reported that 31% of sales were iodised salt.

### *4.6.2) Purchase practices by retail shops*

About 49% of retail shops purchase iodised salt once a month. Mode of payment was mainly by cash (70%).

#### *4.6.3) Cost per kg of salt*

It was reported the cost of either common salt – crystal or powder was Rs. 2.50 / kg. The cost of Iodised crystal salt was Rs. 3.00 per kg and Iodised salt powder Rs. 6.00 per kg.

#### *4.6.4) Awareness of Iodised salt*

The proportion of retail shop owners' acknowledging the benefits of iodised salt was 72%.

### **4.7) Results of Qualitative Analysis**

This section presents the salient issues that emerged following analysis of the qualitative data from the semi-structured interviews and focus group discussions. In presenting our findings we have attempted to link the themes and issues emerging from our different data sources, with a view to providing a more holistic picture on community perceptions on usage of salt and iodine deficiency disorders.

#### *4.7.1) Perceptions on Knowledge and Awareness in the Usage of Iodized Salt*

Information that emerged from the semi-structured interviews with the health care providers indicates that the type of salt most commonly used by people at home was crystal salt (i.e, raw salt that is not iodized). According to

them, while powdered salt was also used in good measure, many were unsure whether this was iodized or not. A few of the community health workers reported that people used the "Arasu salt" (iodized salt supplied by the Public Distribution System) provided by the government, which they knew for a fact was iodized. The focus group discussions with the women in the community also brought out that crystal salt was commonly used in most households. However, with respect to whether or not people were aware of iodized salt, a very mixed picture emerges. On one end of the spectrum were women who were very clear about using only iodized salt on account of its health benefits and on the other end were those who had no understanding of either the health benefits of using iodized salt or, whether or not the salt they used was iodized.

*"Iodized salt is good for brain development and growth of children. It is also said that consuming iodized salt will prevent thyroid deficiency"* (focus group discussion with women in Chengalpet)

*" I do not know about this iodine, nor do I know about iodized salt"* (focus group discussion with women in Dindigul)

The report from the health care providers also gives the same mixed picture. Many believed that television had helped considerably in spreading the message of iodized salt as a result of which people were now aware of iodine deficiency disorders (IDD) and were consciously using iodized salt. However, there were others who reported that "only 10% of the people in the community" were actually aware about IDD

and that majority of the people continued to use non-iodized salt.

#### *4.7.2) Factors Influencing Usage of Iodized Salt*

With respect to factors that influenced the usage of different types of salt, the women in the community reported cost, ease of use and availability, appearance and storage as important factors. Iodized salt was regarded as being more expensive. It was priced at Rs. 3.00 in the PDS and at Rs. 7.50 in the open markets in contrast to non-iodized salt, which was only Rs. 2.00 in the PDS.

*"The two rupees salt (referring to the crystal salt) while the three rupees salt is expensive (salt sold in the PDS)"*(focus group with women in Villupuram)

*"Iodized salt is good for brain and physical development. It prevents swelling in the neck. It is clean, it is expensive also but we still prefer to buy it"* ( Focus group discussion with women in Chennai)

The recurring theme that emerged from all the FGDs was that iodized salt was more expensive. While many were aware of its usefulness and were prepared to pay more, others despite being aware, were not using it.

*"Yes I know about iodized salt but everybody in my village uses crystal salt so I also use the same besides the grocery shop selling iodized salt is far away from my home"* (Focus group discussion with women in Salem)

#### *4.7.3) Decision Making on Usage of Salt*

Decisions on the type of salt to be used as well as the place from where it is to be purchased are largely made by women. To a large extent, habit plays a major role in influencing this decision. People generally prefer to use the salt they have been habituated to and purchase it from the same place.

#### *4.7.4) Knowledge and Awareness About Iodized Salt and IDD*

Our observations on people's understanding of the problem of iodine deficiency, as emerged from the semi-structured interviews and FGDs, reveal a considerable lack of understanding and awareness of IDD. What little knowledge they have has been derived largely from television advertisements. It appears that people view it as something that will add to brain development or growth. There are many others who have no understanding of the role of iodine in preventing such diseases. It is also interesting to note the range of misconceptions people have on the role of iodine in health. The FGDs with women reveal that to many, iodine is understood as a "vitamin" that will enhance or improve an individual's growth and brain development. In addition, some have even attributed to it powers of improving fertility and preventing anaemia. The health care providers for their part believed that there was more awareness among people on IDD following the advertisements on television. However, they estimated that only a small proportion of the population knew about IDD and its link with use of iodized salt

*"Iodized salt helps in physical and brain development. It also helps in fertilization and is good for breast feeding mothers "* (FGD with women in Chennai)

*"Iodized salt is good for children's health. It prevents abortion and anaemia in pregnant women. All this information is advertised in television"* (FGD with women in Dindugal)

#### *4.7.5) Role of Television*

The analysis of the semi-structured interviews with the providers as well as the focus groups discussions with the women in the community have clearly brought out the important role television has played in educating and informing people about IDD and of the benefits of using iodized salt. People seem not to have grasped the significance of iodization of these salts as being the main difference.

*"Yes people are aware of different types of salt like Tata salt, Annapurna salt, Dandi salt etc., through the advertisements on television but they do not know much about the differences between these salts"* (VHN from Ponnammalli RTI)

#### *4.7.6) Perceived Role of the Community and Health Care Providers in Promoting Use of Iodized Salt.*

Based on our analysis of the data, the common methods cited by providers to promote use of iodized salt was through information, education and communication activities. Television was seen as a major player in this regard. In addition they also talked about messages through the radio, handbills and interpersonal communication by the health care

providers with the community members. A few health care providers also reported targeting school children for health education on IDD and use of iodized salt as an important method of promoting its use in the community.

*4.7.7) Key issues that have emerged from the qualitative study:*

- Only a small percentage of the population appear to be aware of iodized salt and its link with IDD
- The role of health care providers in spreading the message of IDD and use of iodized salt in its prevention appears to be minimal. It is imperative that the health care providers are actively involved in educating and informing people consistently about IDD and its link with iodized salts. In addition the community workers and school-teachers should specifically provide health education on IDD and iodized salt among school children to further promote its use.
- Commercial advertisements on television have emerged as the major source in promoting use of iodized salt. However, it has failed to impart adequate information on the role of iodized salt in preventing IDD. The sketchy and sometime inaccurate information provided on these commercials has given rise to several misconceptions.
- Women are the main decision makers on types of salt used within the home. In decision on usage of a particular type of salt women are largely guided by

habit and past use. Any change demands a conscious decision on their part as this will impact on their cooking practices. Hence they need to be fully convinced both about the need for change to iodized salt as well as the benefits that will accrue to the family from this change.

- While cost has been quoted as a deterrent in purchase of iodized salt, it can be overcome providing convincing arguments for its use are provided on a sustained basis
- The iodized salt under various brand names are generally sold in large grocery shops, which are used by the economically better off and literate people. Street vendors and petty shops who generally supply crystal salt seem to be the major source of supply for most people. These sources need to be targeted to sell iodized salt.

## 5. Conclusions and Recommendations

### 5.1) Conclusions

**Table 2** gives the criteria for tracking progress of IDD as a public health problem and the results from the Tamil Nadu study in comparison.

<b>Indicator</b>	<b>Goal</b>	<b>Tamil Nadu</b>
<b>Thyroid size</b> (in age group 6-12 years) Proportion with an enlarged thyroid gland	<b>&lt;5%</b>	<b>13.5%</b>
<b>Urinary Iodine</b>		
Median Urinary Iodine ( $\mu\text{g/L}$ )	<b>&gt; 100</b>	<b>89.5</b>
Proportion below 100 $\mu\text{g/L}$	<b>&lt;50%</b>	<b>56%</b>
Proportion below 50 $\mu\text{g/L}$	<b>&lt;20%</b>	<b>22%</b>
<b>Salt iodisation</b> Proportion of households consuming adequately iodised salt	<b>&gt;90%</b>	<b>18.2%</b>

**Based on WHO/UNICEF/ICCIDD Criteria (Goitre Prevalence, Urinary iodine excretion & iodine content of salt) for assessing the status of Iodine Deficiency Disorders:**

- ❖ Iodine Deficiency Disorders is a public health problem in Tamil Nadu
- ❖ Majority of the people are not aware of iodine deficiency disorders & the benefits of the use of iodised salt
- ❖ The best means of propagating public health messages is the television & the radio

**Dr P Krishnamurthy**, Director of Public Health and Preventive Medicine presented the study results at the 30<sup>th</sup> Annual Session of the

United Nations Standing Committee on Nutrition (UN SCN), at Chennai, on 3<sup>rd</sup> March 2003.

Based on the following conclusions, the following recommendations were suggested, which was accepted by the Government of Tamil Nadu. The Department of Public Health and Preventive Medicine also requested the convening of a dissemination workshop in Tamil Nadu to make public the results of the survey and to involve the main stakeholders to initiate joint efforts to eliminate iodine deficiency disorders.

## **5.2) Recommendations**

- 1) **Production level monitoring** – A representative of the Tamil Nadu government (**IDD Liaison Cell**) may be seated in the Salt Department's office at Tuticorin to liaise between Government of Tamil Nadu, the salt producers and the Salt Department, the three key stakeholders in the salt production industry. This creates a platform to solve the issues faced by the salt producers as well as involve them more closely in the monitoring process
- 2) The "Arasu" brand of salt being produced by the Tamil Nadu Salt Corporation is being sold through the Public Distribution System. There is a felt need to improve the quality, the packaging and the adequate iodine content and make it affordable for Below Poverty Line (BPL) families, who are the families who primarily need iodised salt.
- 3) **Retail level Monitoring** – This can be through the process of cyclic monitoring of iodine content of salt once every three months, through salt sample collection from various pre-selected clusters in the state. The role of medical colleges in designing the sample collection procedures is important.

- 4) **Cyclic monitoring of urinary iodine & iodine content of salt**  
– Biological monitoring at the household level every year for two years, covering 1/2 of total districts per year by rotation.
- 5) **Regular meetings of the IDD Liaison Cell** with the salt producers in Tuticorin – sensitization and re-orientation of the salt producers, with an attempt to understand their limitations and efforts to overcome these limitations.
- 6) **Using the network of government & private health care practitioners** to disseminate information related to iodine, iodised salt, and *health* benefits of eliminating iodine deficiency
- 7) The best means of awareness generation is through the television and radio
- 8) **Grassroot level dissemination** – The introduction of messages on iodine deficiency and iodised salt through the already existing system of Anganwadi workers, ANMs and trained dais could be attempted. This involved the development of graphic and easy to understand IEC material for these workers
- 9) **Department of Field Publicity** – This agency of the Government of India may be involved to produce Tamil Nadu-specific visual and audio programs
- 10) **Establishment of an IDD Review Committee** at the Department of Public Health and Preventive Medicine
  - a. To be chaired by the Secretary Health, Government of Tamil Nadu
  - b. To be a multi-disciplinary team composed of members from the Government, NIDDCP Program manager for the state, salt industry, scientists, VOs, Health & Nutrition experts
  - c. The Committee should meet every three months