



NAMS - NFI SYMPOSIUM

Food Fortification for Improving Micronutrient Intakes



Universal Salt Iodisation in India: Lessons learned for Food Fortification

29th November, 2017, DELHI

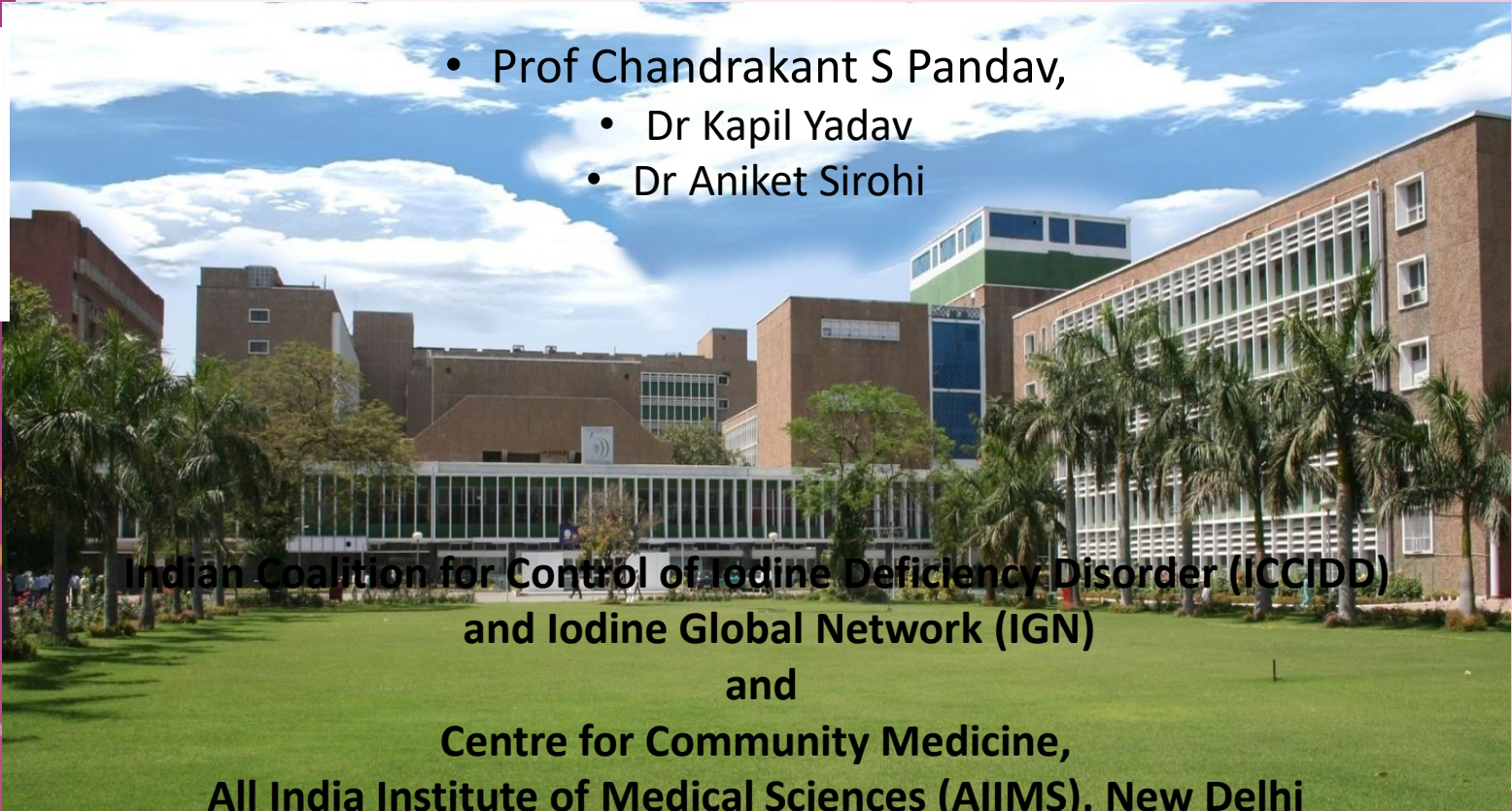




Contributors



- Prof Chandrakant S Pandav,
 - Dr Kapil Yadav
 - Dr Aniket Sirohi



**Indian Coalition for Control of Iodine Deficiency Disorder (ICCIDD)
and Iodine Global Network (IGN)
and
Centre for Community Medicine,
All India Institute of Medical Sciences (AIIMS), New Delhi**





Outline of Presentation



- Evolution of Goitre Research- Tale of two institutions (NIN, Hyderabad and AIIMS, New Delhi)
- Etiology of Himalyan Goitre and Kangra Valley study
- New epidemiological evidence
- From Goitre to IDD
- From District specific to USI
- NISI Survey, 2014-2015
- Policy decisions and withdrawal of the ban
- Wisdom by Hindsight: Revisiting policy and values
- Sustainability of USI: National and Global experience
- The last mile



First Announcement



NIN Centenary Year (1918-2018)

Empowering Nation through Nutrition

**First International Conference on
"Nutrition before, beyond and during
first 1000 days of life - evidence and action"**

November 26 - 28, 2017



National Institute of Nutrition
(Indian Council of Medical Research)
Hyderabad-500 007, Telangana State, INDIA



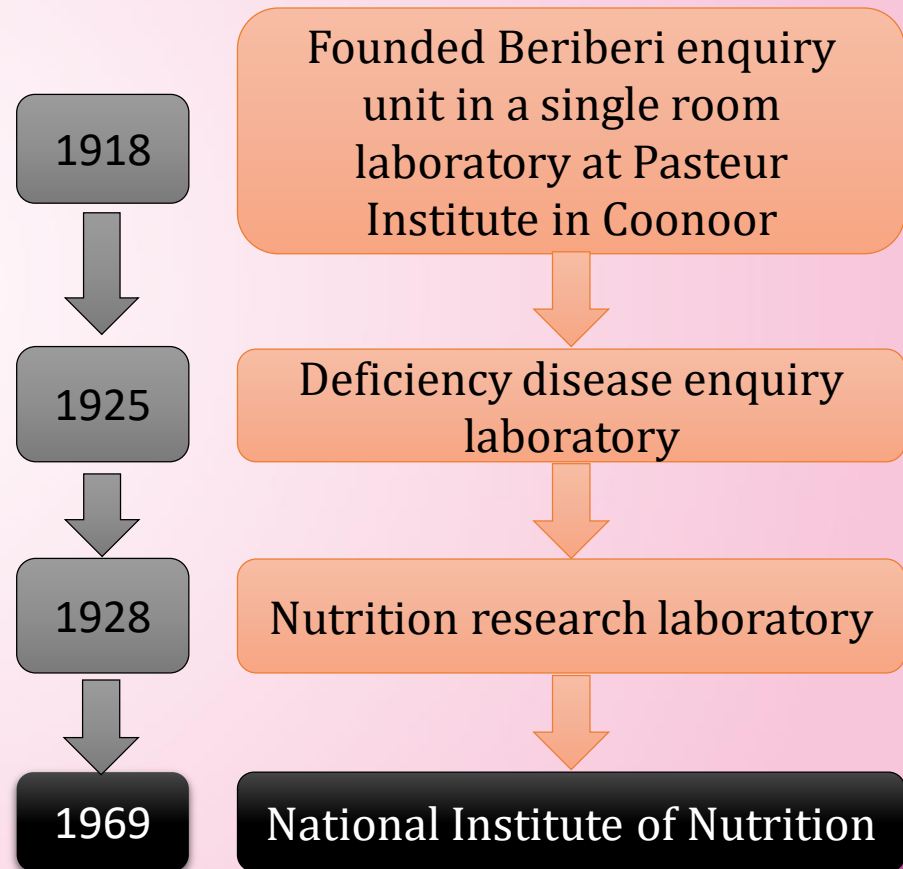


NIN Centenary Year (1918-2018)

Empowering Nation through Nutrition



**Sir Robert McCarrison
(1878-1960)**





NIN Centenary Year (1918-2018)

Empowering Nation through Nutrition



Sir Robert McCarrison
(1878-1960)

17 out of his total 43 publications are related to Goitre research. Two of his earliest publications are “Observation in Endemic Goitre and Cretinism in Chitral and Gilgit valleys”, now part of Pakistan occupied Kashmir (PoK)

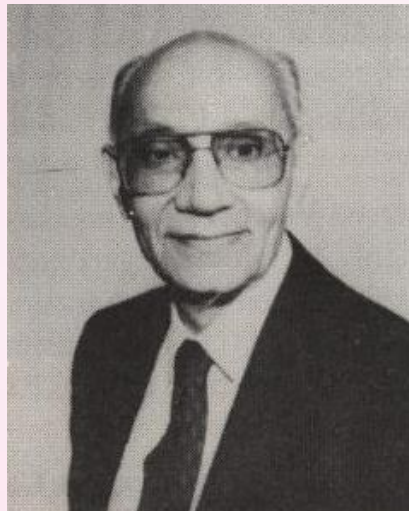
Propounded the theory of Goitrogens (E-Coli infection and Diet) in the genesis of endemic Goitre

**His description of Endemic Cretinism
is true even today**



NIN Centenary Year (1918-2018)

Empowering Nation through Nutrition



Met Sir Robert in 1949-1951 while working in Oxford University's Laboratory of Human Nutrition

**Professor V. Ramalingaswami
(1921-2001)**

thyroid hormone homeostasis. **During my visits to him in Oxford, he used to encourage me to work on Himalayan endemic goitre and resolve the uncertainty then prevailing...I was determined to go back to India...to start working on Himalayan endemic goitre.**

...I went back in 1951 to the Nutrition Research Laboratories... I set out on my study in Kangra Valley. There I had the good fortune of teaming up with the Health Officer of the District of Kangra, Dr Santokh Singh Sooch. Dr M. G. Deo, my first resident in Pathology...joined me in the study along with Dr Madhu Karmarkar.. We crossed the Ganges by country boat at Patna with our



Aetiology of Goitre



THE ÆTIOLOGY OF HIMALAYAN ENDEMIC GOITRE

V. RAMALINGASWAMI,
M.D., D.Phil. Oxon.

T. A. V. SUBRAMANIAN
M.Sc., Ph.D. Madras

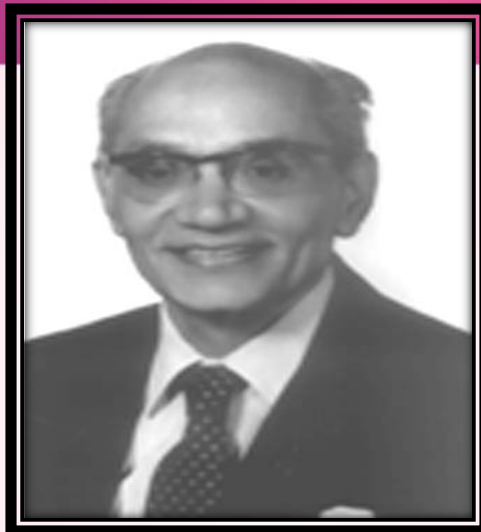
M. G. DEO
M.B. Agra

*From the Department of Pathology, All-India Institute of
Medical Sciences, New Delhi, and the Department of
Biochemistry, The Vallabhbhai Patel Chest Institute, Delhi, India*

The results showed increased avidity of the thyroid for iodine in endemic goitre associated with low serum-P.B.I. levels. **The results are consistent with the view that the Himalayan endemic in the two areas is probably causally related to an environmental iodide deficiency.** They also show that the deficiency is extreme.

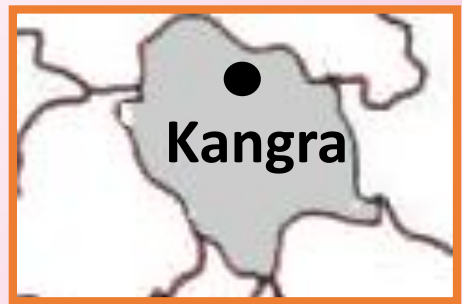
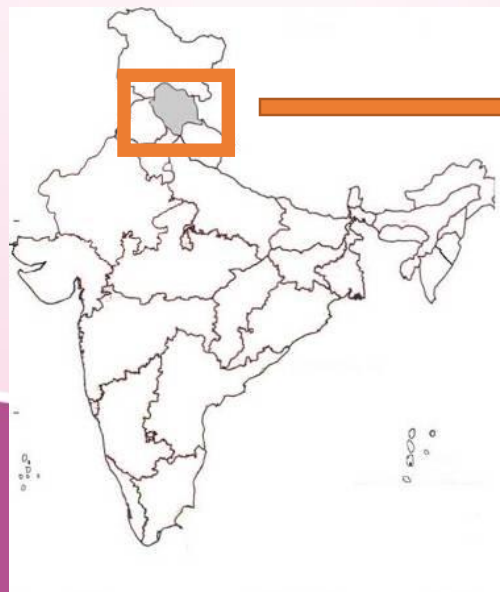


The Kangra Valley Study (1956 – 1972)



**Legacy of The Legend
Science for Society**
Prof. V. Ramalingaswami
8th August 1921 – 28th May 2001

**Pioneer study conducted in Kangra
District of Himachal Pradesh**



Himachal Pradesh

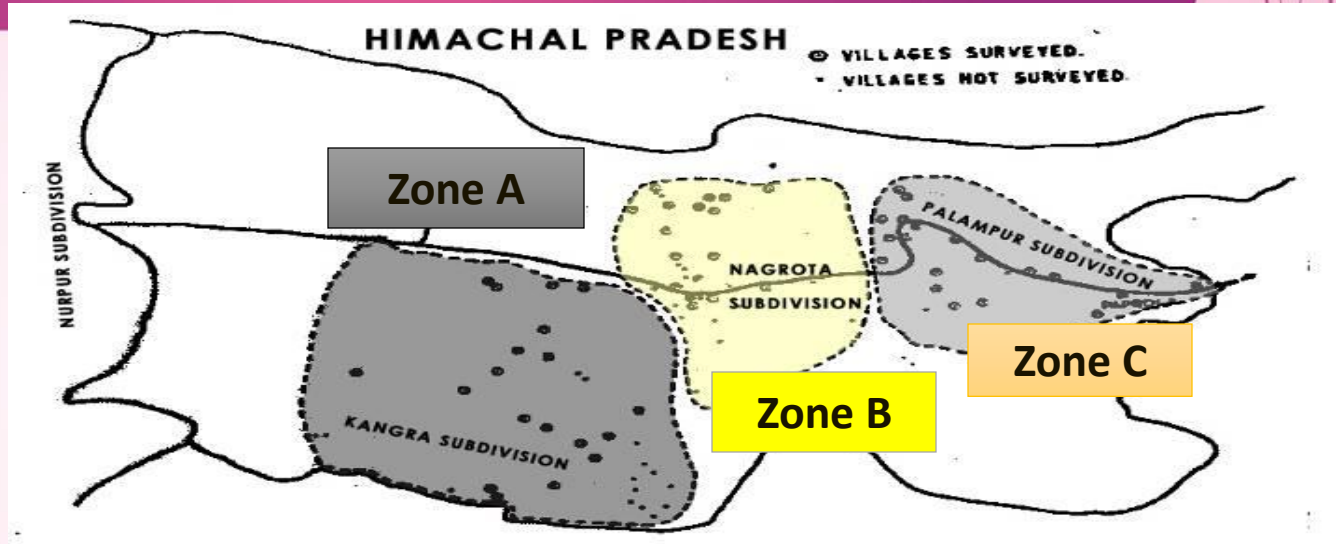


The Kangra Valley Study (1956 – 1972)



Study design	Community based Prospective controlled trial
Study area	Kangra Valley, Himachal Pradesh Divided into 3 zones –A , B , C
Study period	1956 - 1972
Study duration	16 years
Study population	1,00,000 School age children
Outcome variable	Goitre prevalence among school age children

The Kangra Valley Study (1956 – 1972)



Zone A	Salt + Potassium iodide	Intervention
Zone B	Plain salt	Control
Zone C	Salt + Potassium iodate	Intervention

15 gms of salt/person/day to ensure 200 µg of iodine/person/day
 Salt produced by Hindustan Salts Ltd. at Sambhar lake (Rajasthan)
 with UNICEF assistance





The Kangra Valley Study (1956 – 1972)

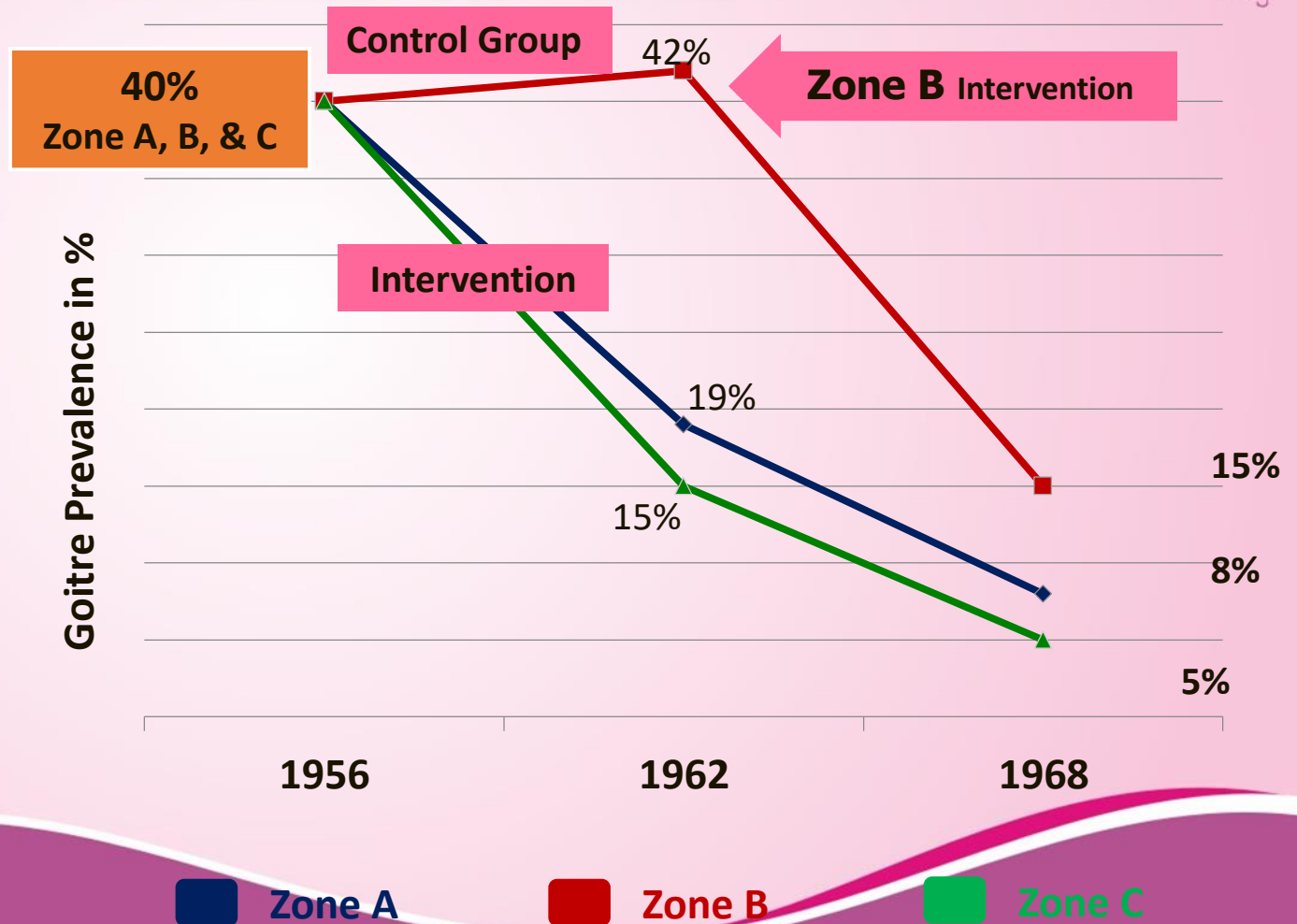


Administrative Interventions

- **Legislation (ban on sale of non - iodized salt in study area)**
- **Iodized salt distributed through government shops**
- **No price difference between iodized and non-iodized salt**



The Kangra Valley Study (1956 – 1972)





The Kangra Valley Study (1956 – 1972)



Conclusions

Iodine supplementation in the form of adequately iodized salt on a regular and continuous basis reduces Goitre prevalence

Recommendations

**Establish a National Goitre Control Programme (NGCP) in 1962
renamed as NIDDCP in 1992**



New epidemiological evidence



- **Delhi study: Endemic Goitre in Delhi, 1980**
- **Extra Himalayan foci of IDD reported**
- **1984–86: ICMR multi-centric study**

**Subsequent surveys
carried all over India**

**Iodine Deficiency Disorders:
A public health problem in
all states/UTs of India**





Endemic Goitre in Delhi, 1979



ਦਰਿਅਮਿਤ ਚਿਕਿਤਸਾ
ਦੀ ਚੋਟੀ 'ਤੇ ਲੋਕੀ: ਲੋਕੀ ਲਈ ਜੀਵਨ

Daily consumption of iodised salt
is a healthy habit



For further details correspondence is invited at:

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ENDEMIC GOITRE IN DELHI

Goitre Unveiled in Walled City - A tale of two generations!



Chandrakant S. Pandav

December, 1979



Centre for Community Medicine
 All India Institute of Medical Sciences,
 New Delhi





Neonatal Hypothyroidism Study



- Documented extremely high rates of neonatal hypothyroidism in India
- Validated filter paper radioimmunoassay for TSH
- Feasible to conduct neonatal hypothyroidism in community setting by untrained births attendants “dais”



Research Recherche

Bulletin of the World Health Organization, 64 (4): 547-551 (1986)

© World Health Organization 1986

Iodine deficiency and neonatal hypothyroidism*

N. KOCHUPILLAI,¹ C. S. PANDAV,² M. M. GODBOLE,³ M. MEHTA,⁴ & M. M. S. AHUJA⁵

The incidence of neonatal hypothyroidism, as reflected in cord-blood thyroxine and thyrotropin levels, varied from 0.6% to 13.3% in iodine-deficient and normal regions of India (selected districts of Uttar Pradesh and Kerala and the city of Delhi), depending on the degree of environmental iodine deficiency. In populations with a high incidence of neonatal hypothyroidism, an increased prevalence of nerve deafness and a shift to the left in the distribution of IQ scores (towards lower scores) have been demonstrated. These indications of mild brain damage suggest that nutritional iodine deficiency can present in other ways than goitre or cretinism. Determination of the incidence of neonatal hypothyroidism using dried cord-blood spot screening appears to be the most useful and reliable method to assess the risk of brain damage in iodine-deficient areas.





Iodine deficiency and learning disabilities - India



1. Mehta M, Pandav CS, Kochupillai N. Intellectual assessment of school children from severely iodine deficient villages. *Indian Pediatr.* 1987 Jun;24(6):467-73.
2. Upadhyay SK, Agarwal KN, Rani A, Cherian S, Tripathi AM, Agarwal DK. Developmental lag in preschool children of goitrous mothers. *Indian Pediatr.* 1983 Apr;20(4):259-63.
3. Pandav CS, Kochupillai N, Karmarkar MG, Ramachandran K, Gopinath P, Nath LM. Endemic Goitre in Delhi. *Indian J Med Res* 1980; 72: 81-88.

All studies point to impaired intellectual and physical development, and reduced psychomotor performance due to iodine deficiency



The Hourglass of IDD

**Iodine Deficiency =
Goitre**

**No Pain, Cosmetic problem
Cretinism: A rare event
(Low Priority)**



**Historic
view**

1962-1983

**Current
view**

1984 onwards

Brain Damage

**Lack of Energy,
Hypothyroidism,
Learning Disability, ↑ Deaths
↓ Child Development & Child
Survival**



↓ HRD (HIGH PRIORITY)



Political commitment to Iodine Deficiency Disorders (IDD) and Universal Salt Iodization (USI)



From District specific iodization
to Universal Salt Iodization
1962-1984





Progress of Iodised Salt Industry over last Three Decades

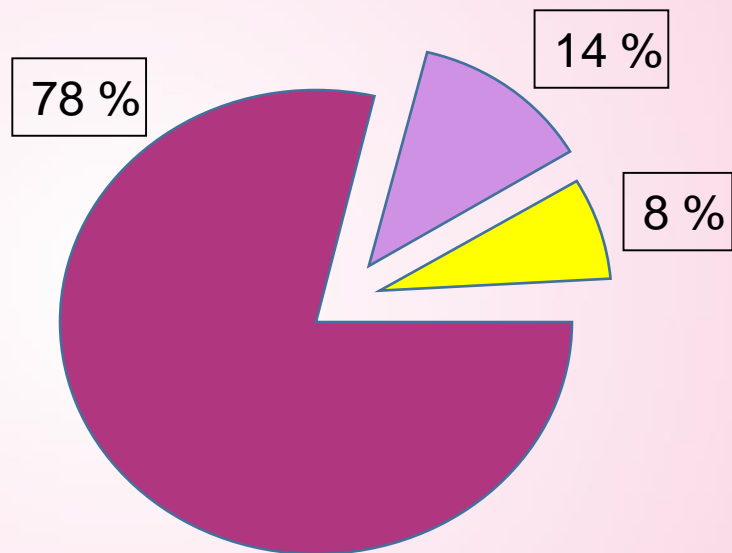
VARIABLES	1962 - 1983	2012 - 2013
No. of salt iodization plants/Refineries	12	820
Production capacity (in lac tons)	0.38	177
Estimated requirement/year (in lac tons)	1	63
Actual production (in lac tons)	0.15	62
Actual Production/ Required production	15%	98%
Production in public sector	100%	2%
Production in Private Sector, including cooperatives	0%	98%

Salt Industry pioneer of CSR in India





Household Coverage of Iodised Salt in India National Iodine and Salt Intake Survey 2014-15

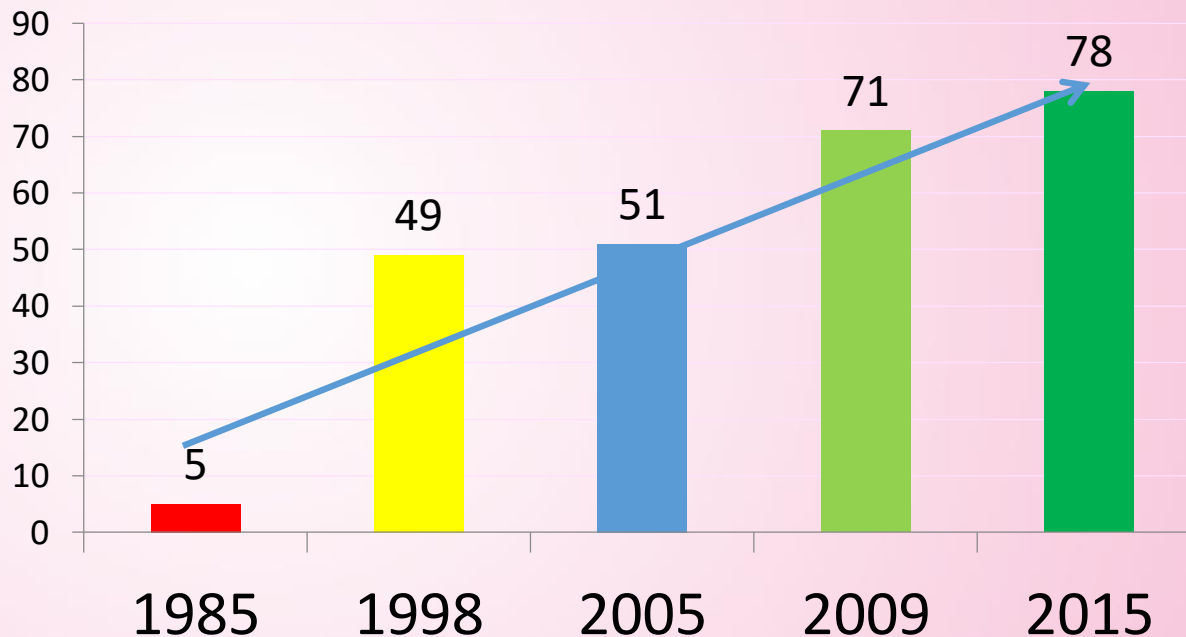


- Adequately iodized salt (≥ 15 ppm)
- Inadequately iodized salt (5-14.9 ppm)
- Non-iodized salt (< 5 ppm)

Overall 92% households consuming iodised salt



Adequately Iodised Salt Coverage trends in India (1985–2015)



Significant increase in adequately iodised salt coverage at national level over three decades



Impact of Success of Salt Iodisation

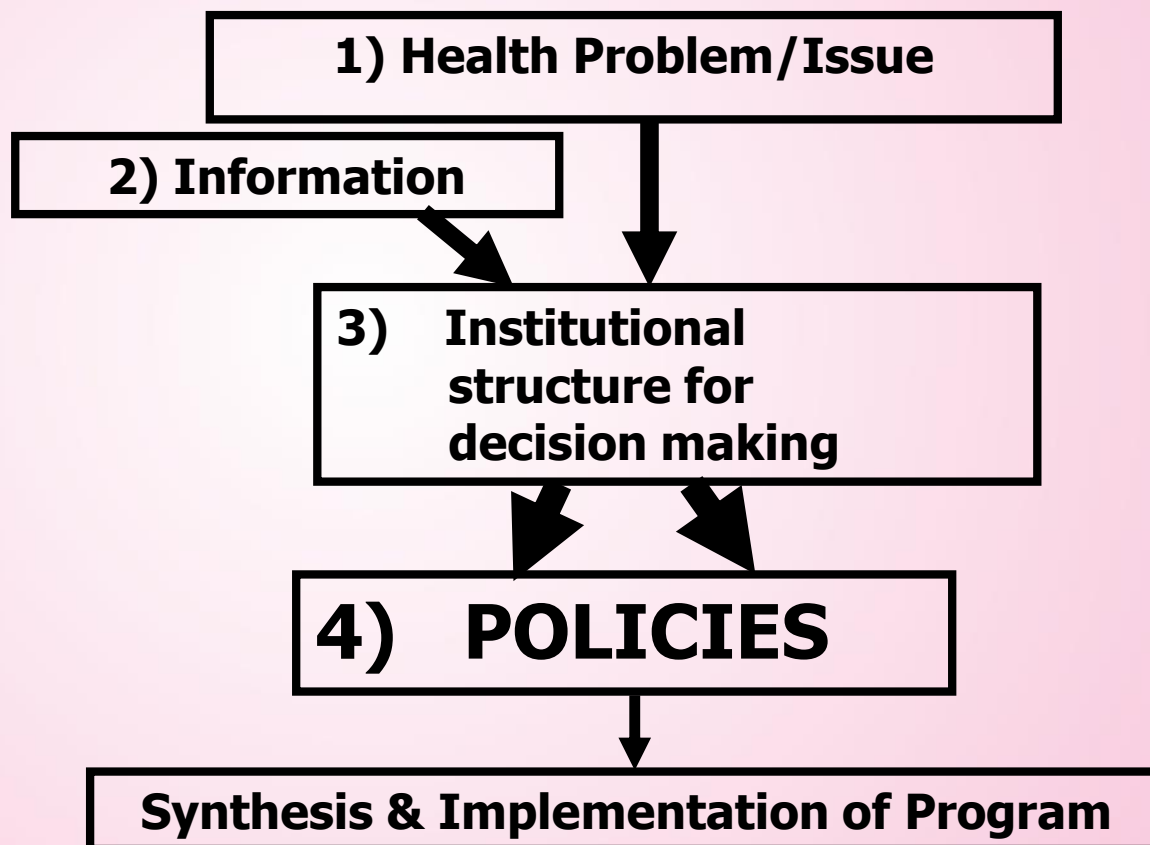


- Salt Iodisation in India alone has saved -
 - 5.4 billion IQ point since 1985
 - 300 million IQ points every year
- Estimated to contribute to 1.4% GDP growth by preventing Brain damage in children
- And all this at cost of only 0.2 Rupees per child per year, with a cost benefit ratio of 1: 80





The World In Which Public Health Policies *Were Being* Made





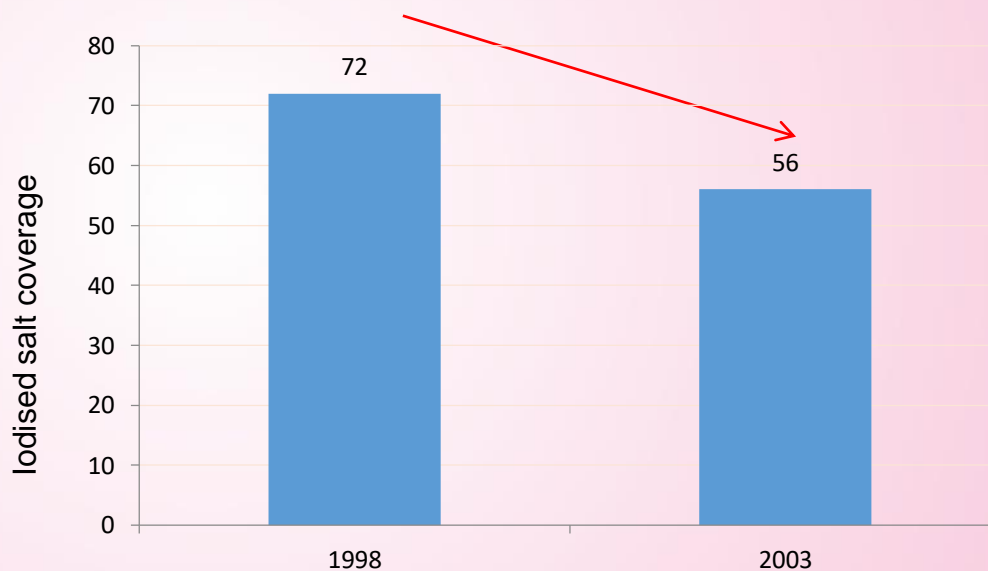
Withdrawal of the Ban



- Government of India withdrew ban on sale of non-iodized salt for human consumption (13th September 2000)
- Reason given by Government of India: *“Matters of public health should be left to the informed choice, and not enforced through compulsion”*
- Ban lifted due to pressure from salt producers



Impact of Removal of Ban at National level in year 2000





World In Which Public Health Policies *Should Be* Made



Values

CORE VALUES
Ideologies, Ethics

BELIEFS
Casual Assumptions

INTERESTS



Revisiting The Policy Process: The Missing Link - *Values*

CORE VALUES (IDEOLOGIES)

Gandhians – Salt as a icon of the freedom struggle

- Is IDD a nationwide public health problem?
- Do we need compulsory iodisation?

SJM – Globalization & Liberalization

- Multinational Vs National
- Import of iodine
- Price of Iodised salt

BELIEFS of People / Casual Assumptions –

Sea salt is impure
Traditionally used to big crystal salt
Iodine not an essential nutrient

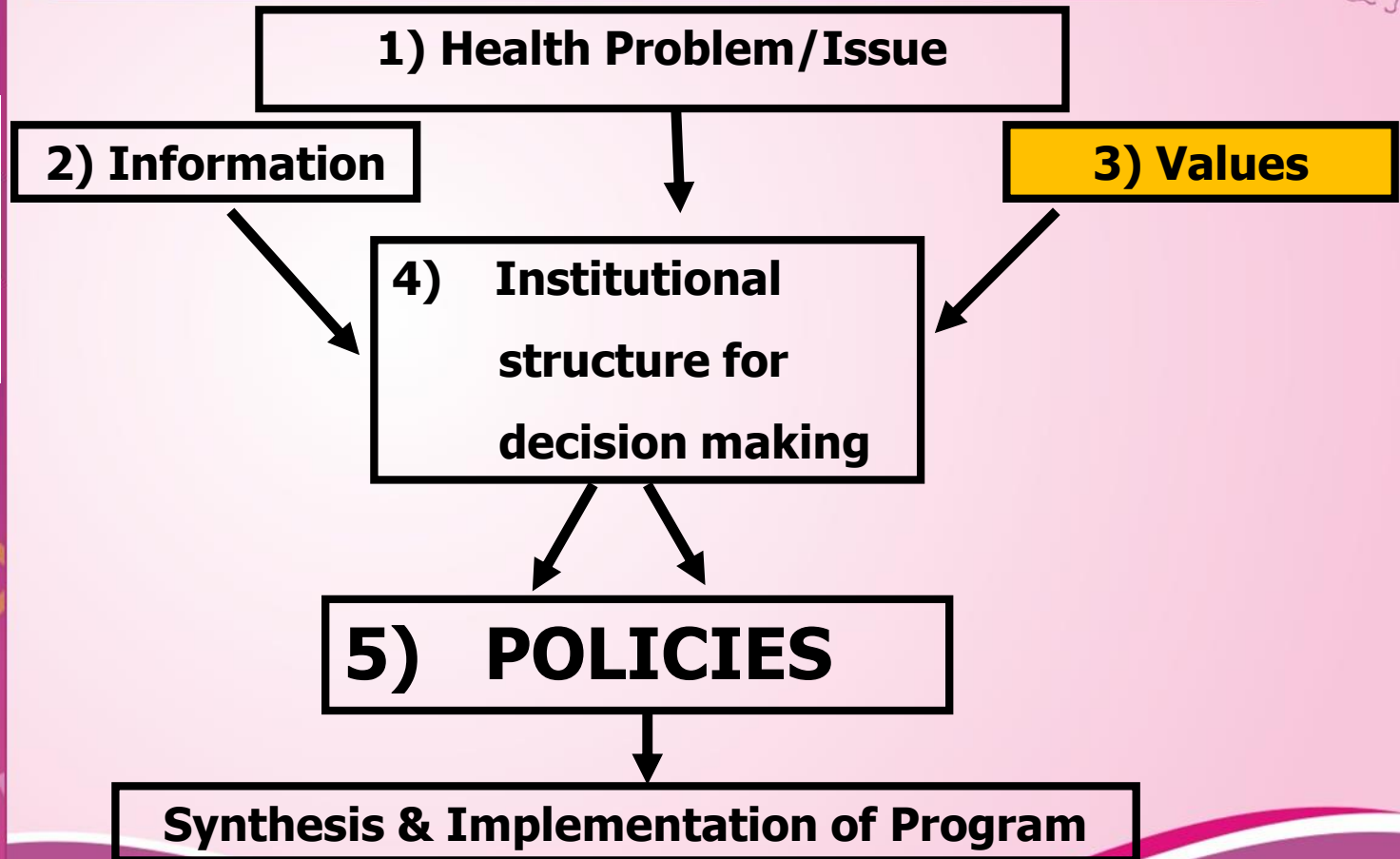
INTERESTS –

Common and Iodised Salt manufacturers

PFA Act and its penalties, Loose Vs Packaged
Small Vs Big producers



Policy Process: World In Which Policies *Should Be* Made





“Panchsheel” of Partnership

International, Bilateral,
National Agencies

Academics /
Universities



Civil Societies

Private Sector

Government Agencies

National/State





National and State level Coalitions

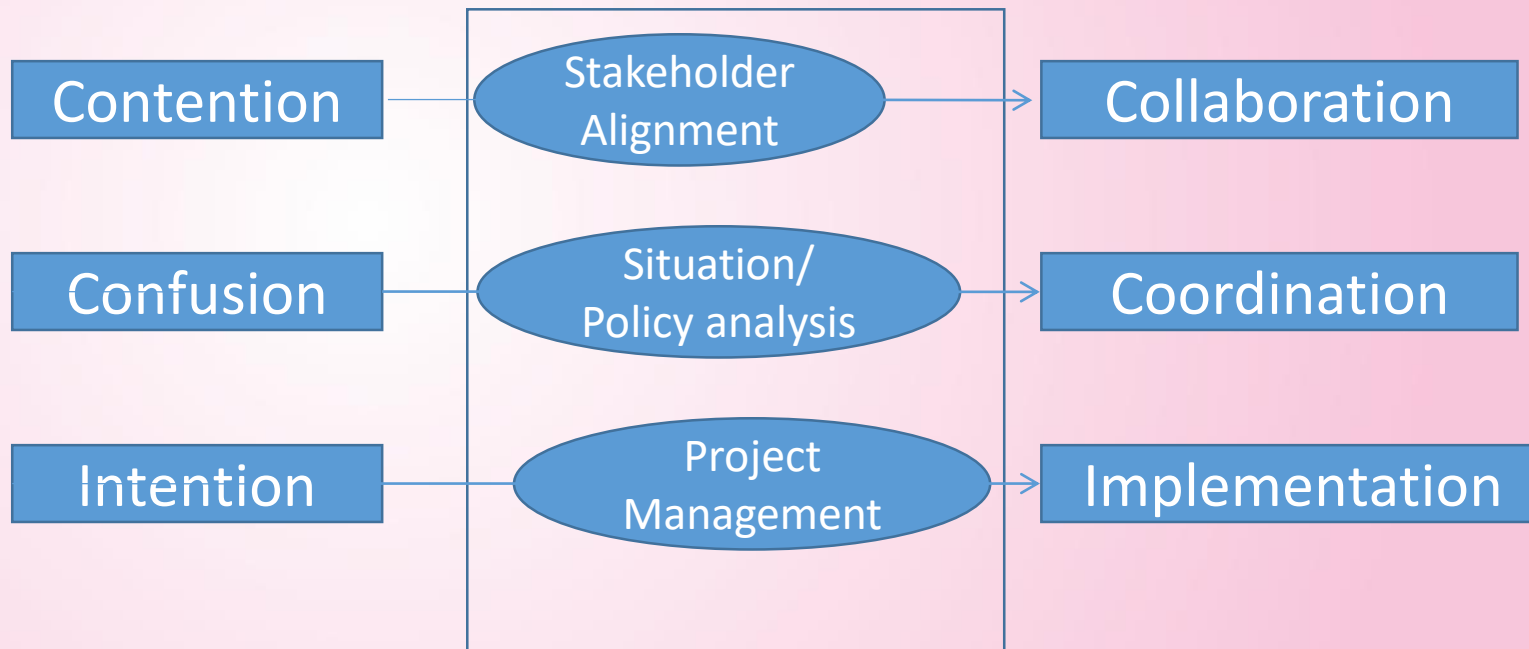


National Coalition for Sustained Optimal Iodine Intake

- State USI Coalitions in Bihar, Gujarat, Orissa, Rajasthan, Tamil Nadu and Uttar Pradesh



Guiding Principle of National Coalition



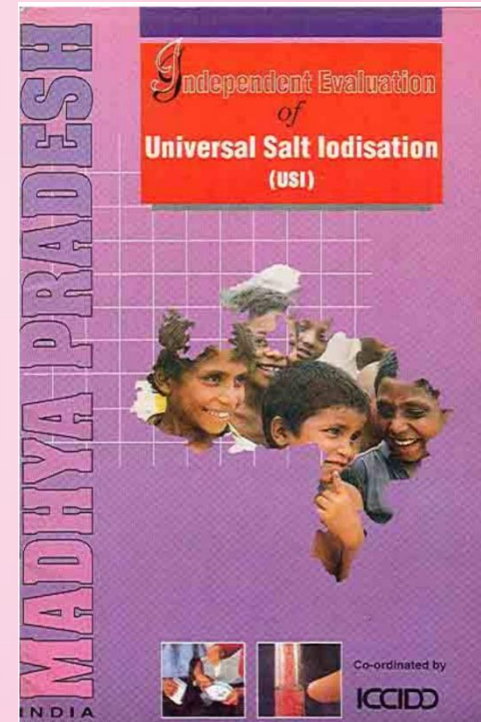
An ecosystem of collaborative action to promote and sustain USI



Rajiv Gandhi Mission for Elimination of Iodine Deficiency



- Launched on 20th August, 1994
- Objectives of the Mission was to ensure availability of adequately iodised salt in all villages and towns of Madhya Pradesh by 1997
 - Strengthen demand side
 - Action on the supply side





Achieving USI in Madhya Pradesh



- By November 1995, iodised salt coverage increased to 98.4 %
 - Adequately iodised salt coverage of 65%
- Key factors for success of “Mission”
 - Political Commitment
 - Science
 - Partnership with industry
 - Learning from global experience

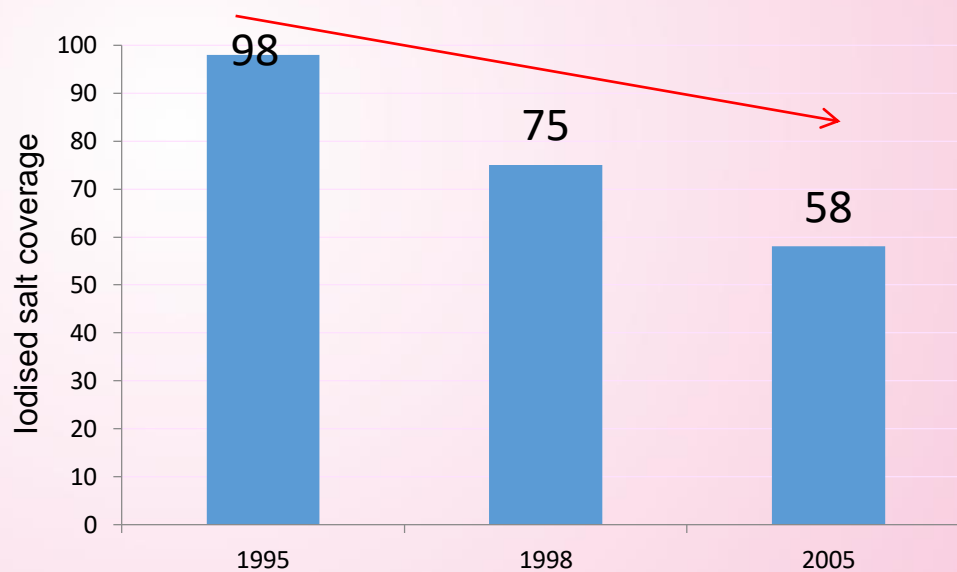




Lesson from Madhya Pradesh



- Decrease in coverage of iodized salt after Rajiv Gandhi Mission





Global Experience on Need to Sustain USI



- Re-emergence of IDD in Russia
 - Mandatory salt iodisation started in 1956
 - Goitre eliminated by 1970
 - Disintegration of USSR in 1991
 - Iodised salt production decreased from 3 lakh MT (1966) to only 20 Thousand MT (1997)
 - TGR of 20-90% reported in different regions of Russia



Global experience on need to sustain USI



- Re-emergence of IDD Guatemala
 - Universal salt iodization started in 1954
 - TGR declined from 38% in 1952 to 5.2% in 1965
 - Salt iodization suffered in 1970s and 1980s due to inadequate monitoring and political instability
 - TGR again increased to 20.4% in 1987
- Re-emergence of IDD in developed countries like New Zealand, Australia, United Kingdom, and United States



Achieving the Last Mile of USI



- Address Equity - Focus on vulnerable groups
- Strengthen regulatory monitoring from production to consumer end
- Consolidate, mechanise & modernise Salt Industry
- Review and Revise NIDDCP guidelines
- Quality assurance of salt iodisation and harmonisation with salt reduction strategy
- Mission Approach – Accelerate, Achieve and Sustain



Key messages



- Evolution of Goitre Research- Tale of two institutions (NIN, Hyderabad and AIIMS, New Delhi)
- Etiology of Himalyan Goitre and Kangra Valley study
- New epidemiological evidence
- From Goitre to IDD
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- Sustainability of USI: National and Global experience
- Achieving the last mile



Thank-you

