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INDIAN COUNCIL OF  
MEDICAL RESEARCH

NATIONAL INSTITUTE  
OF NUTRITION

*Serving the Nation since 1918*





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# Message from The Minister's Desk



**डॉ हर्ष वर्धन**

**Dr Harsh Vardhan**

स्वास्थ्य एवं परिवार कल्याण,  
विज्ञान और प्रौद्योगिकी व  
पृथ्वी विज्ञान मंत्री, भारत सरकार

**Hon'ble Union Minister, Health & Family Welfare,  
Science & Technology and Earth Sciences  
Government of India**

I am very pleased to note that Indian Council of Medical Research–National Institute of Nutrition (ICMR-NIN) is releasing a compilation of its significant contributions and achievements over the last hundred years during the National Nutrition Week in the form of 'Coffee Table Book' in very simple and engaging way.

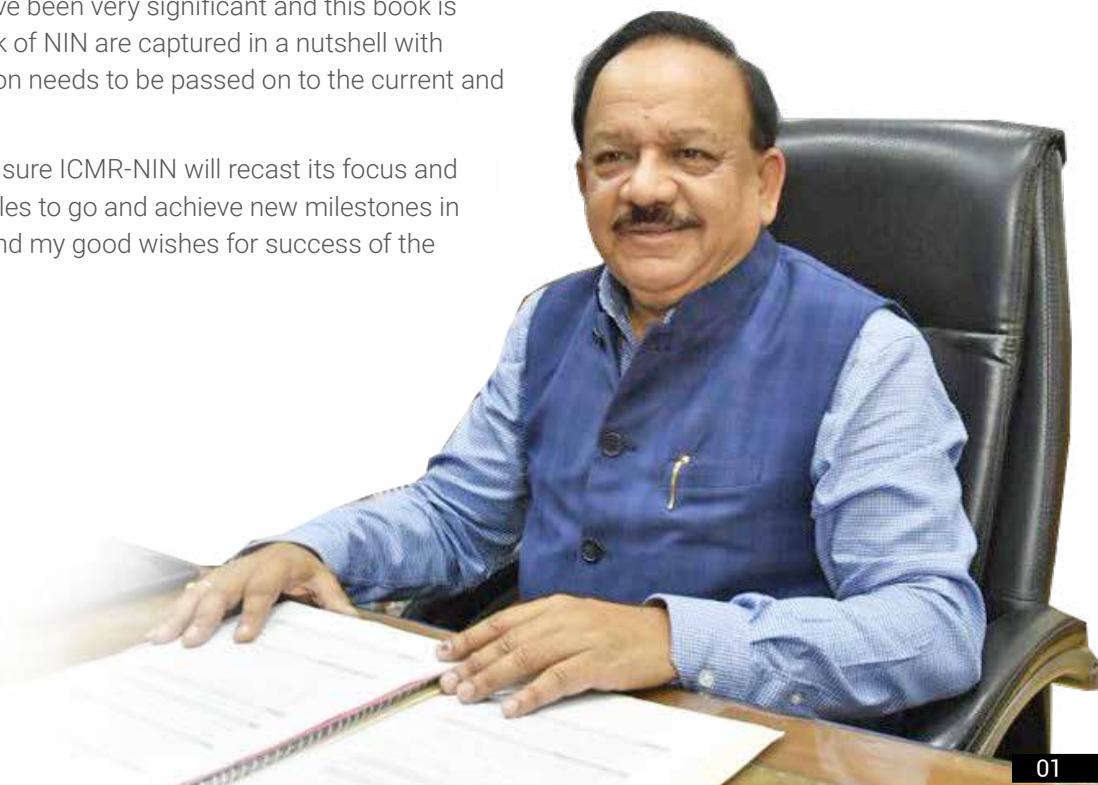
As a country which has a very high proportion of young and productive population, we definitely value our people as the greatest investment for our country's future. Along with personal hygiene and cleanliness, nutrition has been given highest priority as nutrition, food safety and hygiene are all interrelated. This Government under the dynamic leadership of Hon'ble Prime Minister Shri Narendra Modi accords highest priority to nutrition through various plans and programmes including POSHAN *Abhiyaan*. In the light of the changing food scenario and lifestyles, dietary patterns are also continuously undergoing changes.

ICMR-NIN has been a harbinger of nutrition science research and has immensely contributed to the national policies and programmes. ICMR-NIN has been carrying out need-based research looking at the problems of nutrition from a multi-disciplinary perspective, closely integrating laboratory, clinical and community oriented research for outcomes that would have a lasting impact on the health and nutrition status of the nation's population.

The last 100 years of ICMR-NIN's research have been very significant and this book is timely as the key milestones of the stellar work of NIN are captured in a nutshell with adequate depth of information. This information needs to be passed on to the current and new generations to come.

On completing a century of its existence, I am sure ICMR-NIN will recast its focus and work with renewed enthusiasm as we have miles to go and achieve new milestones in nutrition science and health. At the end, I extend my good wishes for success of the celebration of National Nutrition Week.

**(Dr Harsh Vardhan)**



## The Director General

It indeed is heartening to know that the National Institute of Nutrition has thought of bringing out this coffee table book on the successful completion of 100 eventful years. Among the fraternity of ICMR institutes, NIN has in fact secured a distinctive place for itself in medical, public health, social and policy space. ICMR has taken special initiative to document Mahatma Gandhi's views and philosophy on health. This includes his views on increasing diet diversity with locally available foods, promoting nutritious food choices, advocating safety, hygiene habits and encouraging physical activity as cornerstones of a healthy and developed nation. Indeed, ICMR-NIN through its research, publications and recommendations has been propagating the same ideals. In fact, Gandhi had direct interactions with the scientists of NIN and referred to a lot of work published by the Institute in those days to shape his views on nutrition.

ICMR-NIN's contributions have been stellar in understanding the protein energy malnutrition. Further, community studies and nutrition research of NIN became the basis for pan India roll out of the Integrate Child Development Services (ICDS), National Anaemia Control Programme and several other national level nutrition programmes. ICMR-NIN's databases on food and nutrient compositions of Indian foods are widely used by different stakeholders. Similarly, the Institute has been actively engaged in providing science based advice to many regulatory bodies like FSSAI, BIS and so on.

The history and evolution of an Institute that has been continuously raising the bar of nutrition science in the country needs to be documented lucidly with all the important milestones in a reader-friendly and engaging manner. This indeed is such an effort.

I congratulate NIN and wish them success.



**Dr Balram Bhargava**

Director General, ICMR  
Secretary, Dept. of Health Research  
MBBS, MD, DM (Cardiology)  
FAHA, FAMS, FNASc, FACC



## Message from The Director

I consider myself privileged to be at the helm of the prestigious ICMR-National Institute of Nutrition (ICMR-NIN) in this historic moment of dedicating contributions in nutrition science and public health to the nation. During this long journey of 100 years, the Institute has carefully built its much deserving reputation through concerted research efforts with the vision of attaining practical solutions to the country's nutrition problems.

From the days of the colonial rule to freedom and from an era of evolution to today's globally fast changing economic scenario, India has witnessed vast changes in its economic development and also the nutrition and health profiles of the population. Concomitant with such changes, the nutrition and disease profile of the population has also changed. Against this backdrop, NIN's multi-disciplinary scientific team, with dedicated technical team and ever-supportive administrative team, work relentlessly to address the nutrition and health challenges.

Scientific outcomes of ICMR-NIN have been the mainstay for most of the country's nutrition programmes and also for the development of Recommended Dietary Allowances (RDAs), Dietary Guidelines for Indians and specific recommendations for people with special conditions. Thus, the great story of ICMR-NIN continues to meet the challenges hurled by the changing nutrition landscape and is indeed worth documenting. This coffee table book is a modest effort to provide an overview of the legacy of this great Institute.

It is about yesterday, meant for today's reader as we move to a new tomorrow filled with renewed vigour to improve the nation's nutrition profile and public health in the country.



**Dr R. Hemalatha**  
Director, ICMR-NIN  
MBBS, MD, FNAMS, FIUNS, FTAS



# From the Picture Desk





# When Science Meets Food

Curiosity is the essential ingredient of character that propels the human brain towards discoveries. It was this very curiosity that provided the seedbed for nutrition research a century ago when the science behind the food we consumed was little explored.

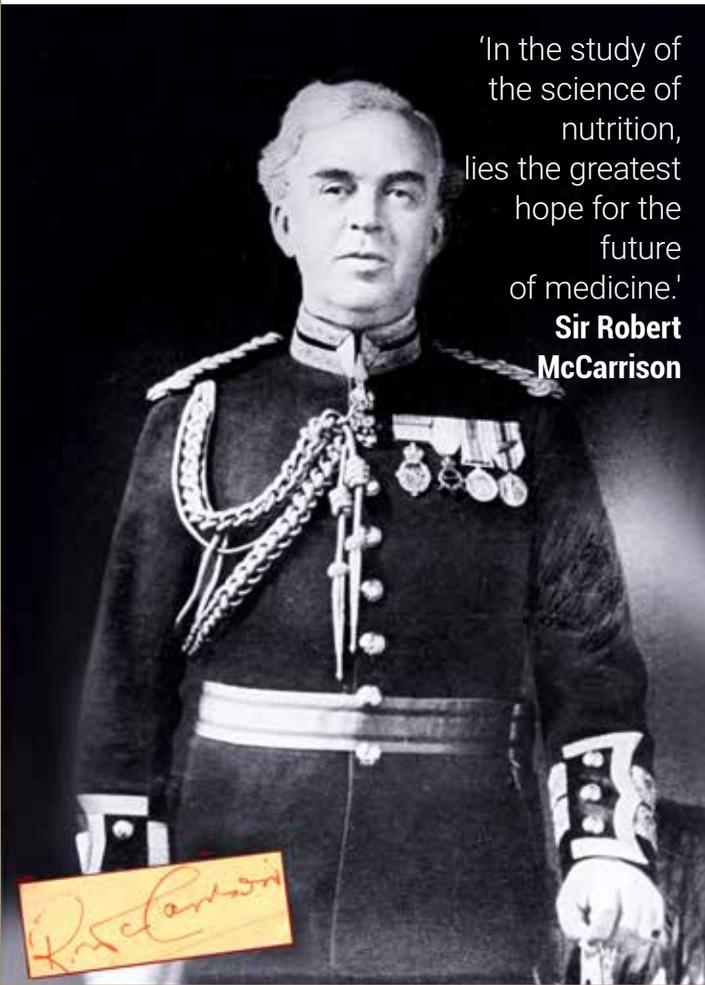
Today, National Institute of Nutrition is one of its kind, premier Indian nutrition research organization of ICMR, recognized as a Centre of Excellence by international bodies such as World Health Organization (WHO) and Food and Agriculture Organization (FAO).

This coffee table book chronicles the signal contributions of ICMR-NIN in moulding the nation's health through dietary approaches and demonstrates how science comes to the rescue of a nation plagued with undernutrition and nutrition related health problems. The magnificence of the research carried out at ICMR-NIN comes alive as visual history on the pages of this book.

# Seedbed of Nutrition Research



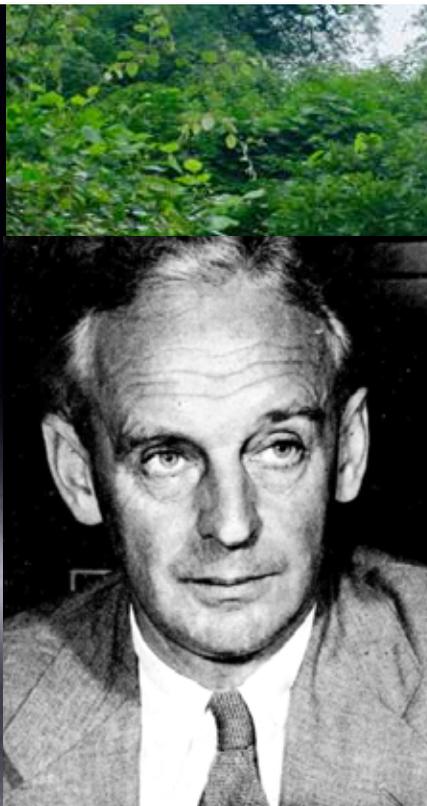
Those were the days of the British rule in India. Young Sir Robert McCarrison was a man of strict intellectual discipline and a fertile mind, bursting with creative energy. As a fresh graduate of the Royal University of Ireland, he sailed for India on his 23<sup>rd</sup> birthday in 1901, to serve the Indian Medical Service in the remote and desolate region of Chitral and Gilgit. He was a dedicated doctor who did not hesitate to subject himself to experiments while investigating the cause of goitre, endemic in the area. When in 1918, he arrived at the Pasteur Institute in Coonoor to set up the Nutrition Research Labs, there was just a one room laboratory with an untrained assistant! He was a man of indomitable spirit and the limited resources were no match to his unlimited resolve.



'In the study of the science of nutrition, lies the greatest hope for the future of medicine.'

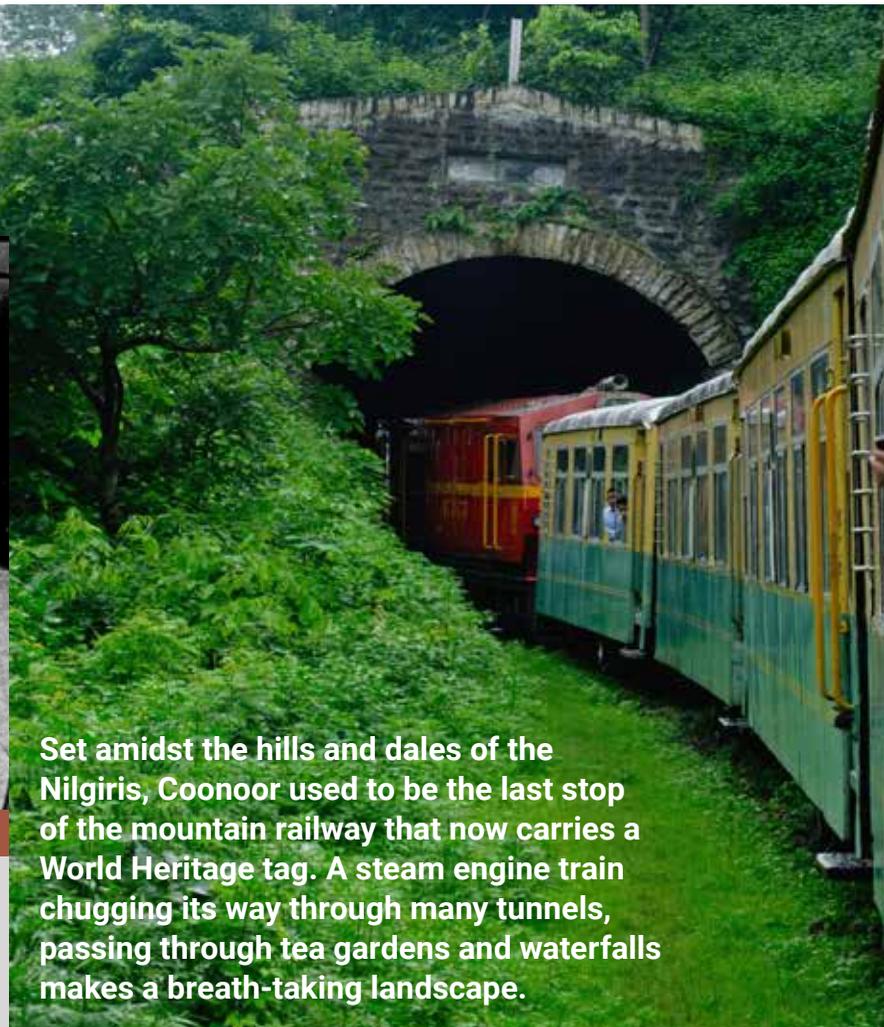
**Sir Robert McCarrison**

Sir Robert McCarrison, Founder-Director of NIN



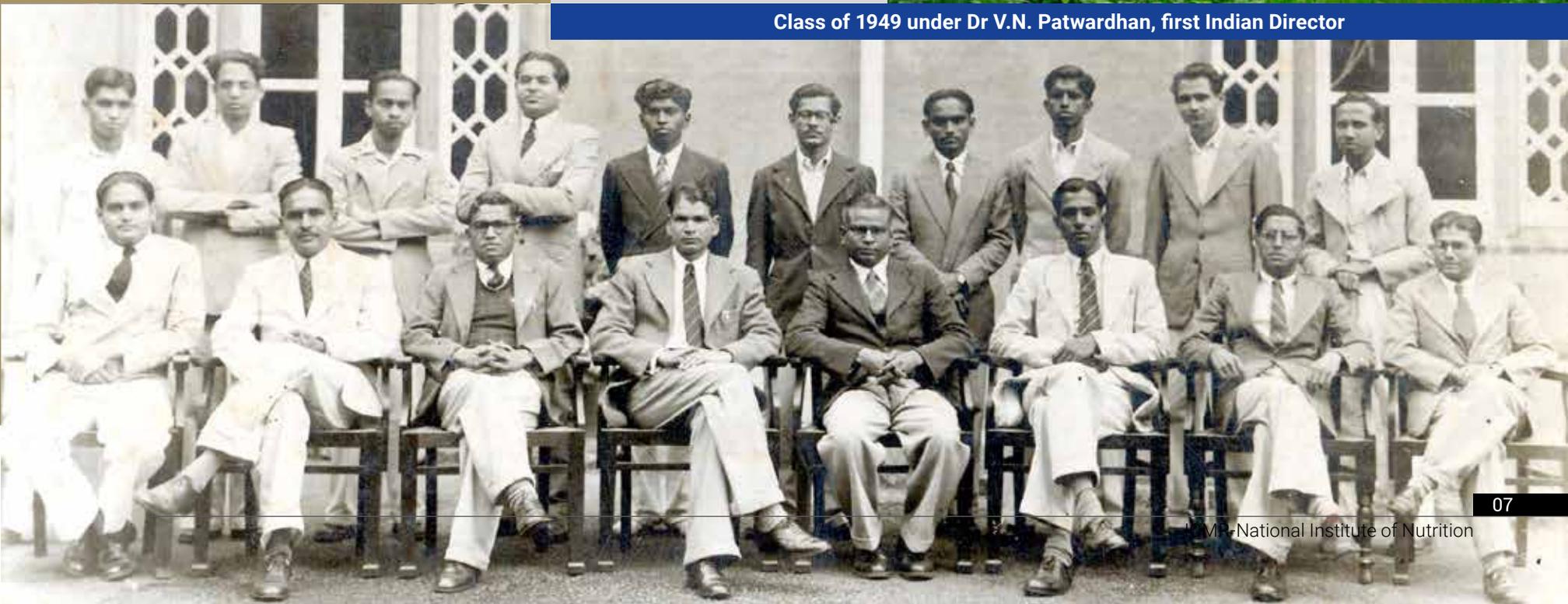
**Dr Wallace Ruddel Aykroyd**

In 1937, the first ever systematic diet survey in India was initiated under Dr Aykroyd.



Set amidst the hills and dales of the Nilgiris, Coonoor used to be the last stop of the mountain railway that now carries a World Heritage tag. A steam engine train chugging its way through many tunnels, passing through tea gardens and waterfalls makes a breath-taking landscape.

Class of 1949 under Dr V.N. Patwardhan, first Indian Director



# Agony and Ecstasy of Discovery

## B Group Vitamins

An intelligent mind craves intellectual stimulation. In the 1920s Vitamin B deficiency diseases were the major focus of the nutrition scientists. The pandemic nature of the nutritional deficiency challenged the scientists and they pushed the boundaries of research.

**Beriberi:** Difficult to diagnose, beriberi was a medical mystery of those days. It was paradoxical to find the disease in a region blessed with abundant grain. Scientists set about unravelling this tropical pathological puzzle and found that deficiency of **vitamin B<sub>1</sub> (thiamine)** led to dreadful diseases of the heart and nervous system. Further research concluded that prevalence of beriberi was high in those people who consumed polished rice as a staple diet. In the regions where people consumed partially polished or hand pound rice, the prevalence was low. Supplying unpolished rice in these regions put a natural end to beriberi.

**Angular Stomatitis:** Angular Stomatitis is a condition wherein the corners of the mouth get inflamed. The discovery of the association of **vitamin B<sub>2</sub> (riboflavin)** deficiency with stomatitis was NIN's major contribution. B<sub>2</sub> deficiency was effectively treated with yeast and skimmed milk.

**Pellagra:** Caused by nutritional deficiency of **vitamin B<sub>3</sub> (niacin)**, pellagra was common in maize and sorghum eaters. High leucine content in sorghum inhibits absorption of niacin and causes dementia, diarrhoea and dermatitis. Increased rice production and supply through public distribution system (PDS), ensured that people switched to eating rice and very soon pellagra was eliminated, without the need of niacin supplementation.

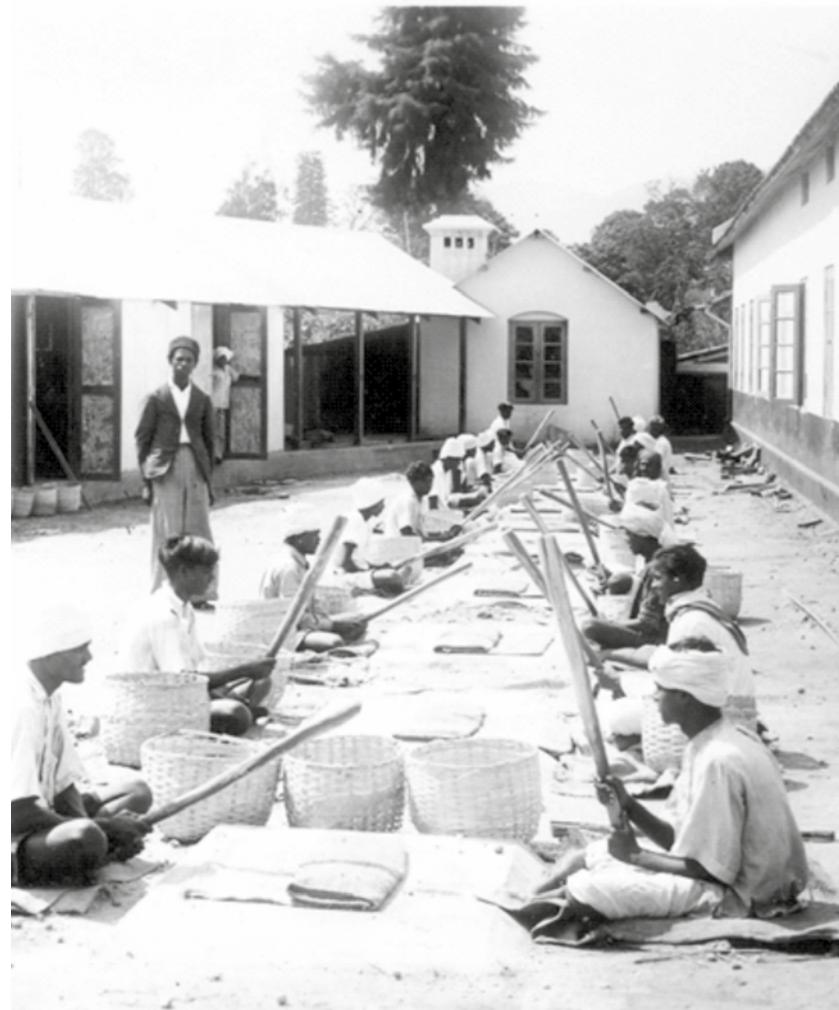
## Moments of NIN



**Burning Feet Syndrome:** Also known as Grierson-Gopalan syndrome, the ailment identified in the very poor segments of society, was found to be a **vitamin B<sub>5</sub> (pantothenic acid)** deficiency disorder. It causes severe burning sensation in the sole of the feet. In India the Institute was first to spotlight it.

**Vitamin B<sub>12</sub> (Cobalamine)** is important for cellular metabolism in the human body including DNA synthesis, mitochondrial and methylation metabolism. Typically B<sub>12</sub> deficiencies manifest as pernicious anaemia and nervous system disorders including motor and sensory disturbances, ataxia and cognitive decline.

Even though the effects of B<sub>12</sub> deficiency are seen across all the age groups, aged individuals, infants, children, pregnant and lactating women are at high risk. B<sub>12</sub> deficiency is caused by inadequate intake of animal foods, milk, milk products or inadequate bioavailability of the vitamin. B<sub>12</sub> deficiency is also related to diabetic retinopathy.



### A Biomarker for CVDs

B<sub>12</sub> deficiency leads to accumulation of homocysteine (Hcy) which is an important biomarker for cardiovascular diseases.

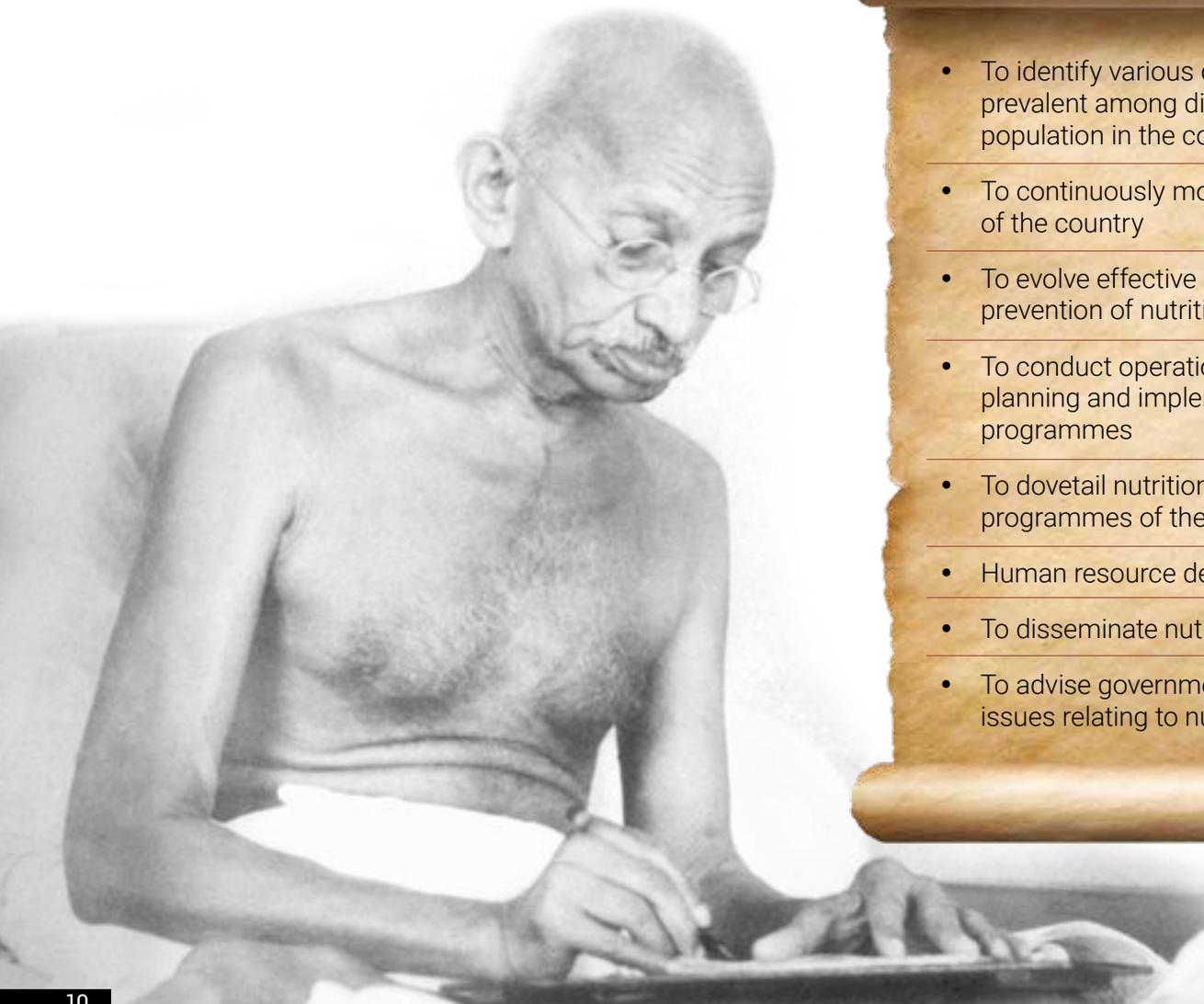


## Thy Medicine

Nutrition science was in its infancy in the 1930s. McCarrison set about researching different dietary habits among populations of various regions. The South Indian diet appeared less nourishing compared to Punjabi and Bengali diets. The infamous expression 'poor South Indian diet' came into use after this. The Nationalist Movement was gaining momentum and Gandhi too made observations on the Indian diet. He wrote about polished rice weakening the vitality of the Indian race in his weekly newspaper Harijan (1936).

Nutrition Research Laboratory (NRL) was shifted from Coonoor to Hyderabad in 1958 and rechristened as National Institute of Nutrition in 1968. Having done extensive groundwork on nutrition research McCarrison drew up the objectives of NRL based on which the NIN vision was developed.

As the premier institute of nutrition of the nation the mandate of NIN was to provide guidelines to well-being through nutrition.



- To identify various dietary and nutrition problems prevalent among different segments of the population in the country
- To continuously monitor diet and nutrition situation of the country
- To evolve effective methods of management and prevention of nutritional problems
- To conduct operational research connected with planning and implementation of national nutrition programmes
- To dovetail nutrition research with other health programmes of the government
- Human resource development in the field of nutrition
- To disseminate nutrition information
- To advise governments and other organizations on issues relating to nutrition

# A Mandate for Well-Being

## Health Bulletin

The first edition of Health Bulletin No. 23(5) in 1935 was a ground breaking publication as it carried 'Nutritive Value of Indian Foods and Planning of Satisfactory Diets'. 250 foods were chemically analysed for carbohydrate, protein, fat, mineral and vitamin content and published in the bulletin. Simple language explained how these foods could be used to provide nutritionally adequate diets. It was translated into many Indian languages and proved to be popular.

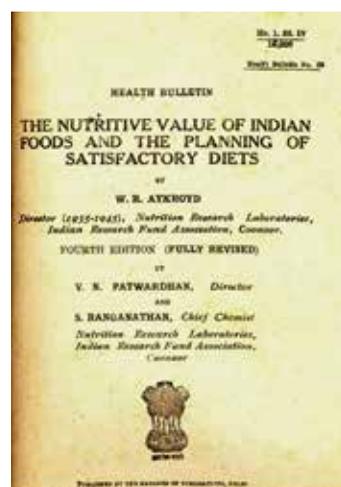
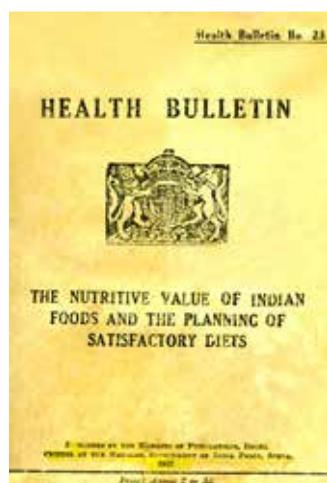
The enhanced nutritional benefits of parboiling rice came to light during this period. Ill effects of rice milling also came to be known. In 1943-44 the Great Bengal Famine and World War II were raging concurrently and taking a heavy toll on the health of the population. NIN scientists were called upon to advise the government on nutrition issues.

Prime Minister Jawaharlal Nehru visited the Institute in 1950. Understanding the significance of the work done, the Prime Minister asked for a plan to provide mid-day meals (MDM) in schools across India.

In the past hundred years, the face of the nation has changed considerably with significant progress on nearly all fronts. Keeping up with new challenges of the times, the Institute added a few key priorities to the existing mandate in 2018.



- Periodic assessment of nutrient intakes, health and nutrition status of the population for optimal health
- Establishment of dietary reference intake values
- Identify various nutrition deficiency disorders prevalent among different segments of the population
- Conduct surveys and study the risk factors of non-communicable diseases (NCDs) through multidisciplinary research
- Conduct innovative basic science research on nutrient metabolism, interactions, requirements and responses
- Identify and study food and environmental safety challenges for providing scientific input for policy and regulation



The Nutritive Value of Indian Foods and Planning of Satisfactory Diets was published in 1935 in Health Bulletin No.23



## NIN the Myth Buster

Historically protein energy malnutrition (PEM) was commonplace due to war, poverty and disease. The widely held view of those days was that kwashiorkor was mainly due to the deficiency of protein and marasmus due to energy deficiency. This myth persisted for a long time and was at its peak in the late sixties. International agencies were advocating protein concentrates (fish protein) in developing countries to fight PEM.

Dr C. Gopalan was the first to challenge the overemphasis on protein. His path breaking research proved beyond doubt that kwashiorkor in India was primarily due to calorie deficiency and not protein deficiency. With this myth busted India could solve the PEM problem through locally grown foods that were inexpensive. It also gave opportunity for course correction in policy decisions.

**The protein content in the Indian diet was found to be adequate and contributed 15% of the energy, but the average energy intake itself was grossly deficient.**

Hyderabad Mix was developed by NIN as a complementary food made from a mixture of wheat (40 gms) roasted Bengal gram (16 gms), groundnut (10 gms) and jaggery (20 gms). About 86 gms of Hyderabad mix provides 330 kcal energy and 11.3 gms protein.

Marasmic kwashiorkor



Kwashiorkor



Growth pattern of the same age group



PEM refers to a gamut of conditions ranging from growth failure to severe emaciation found in marasmus and kwashiorkor which is identified by pitting oedema.



## Nutrition Wing in Hospitals

### Seeds of stunting are sown in foetal life

Apart from malnutrition, stunting is another chronic problem in India. The abnormal height for age that manifests in stunting is related to the mother's overall health. NIN continues to spotlight maternal and child health to improve their nutritional status.

Stunting begins in the womb itself. The health of mothers determines the health of the children which in turn determines the health of the society and future generations. Poorly nourished mothers give birth to small babies with altered body mass composition.

### Nutrition units in hospitals

Nutrition units have been in operation in government hospitals of Telangana state including Niloufer Hospital, Osmania General Hospital and Government Maternity Hospital, Hyderabad since the past five decades. The provision of nutrition support in hospitals is necessary to ensure that patients' nutritional needs are given due care. Nutrition Units work under the supervision of medical doctors to manage nutritional deficiency diseases like marasmus, kwashiorkor, pellagra and phrynoderma among children and adults.



Launch of Balamrutam+ Community based management of severe acute malnutrition(CM-SAM)

## Vitamin A Deficiency

The blight of nutritional blindness or vitamin A deficiency (VAD) among young children occurred in India during the sixties. Vitamins are those elusive biochemical compounds crucial for every organism in small amounts to ensure proper growth and development of the body. Vitamin A deficiency causes night blindness, dry eyes and corneal ulcers. Young children are particularly vulnerable to VAD.

The scientists at NIN played an important role to promote Vitamin A prophylaxis programme on a massive scale to control nutritional blindness and bring back hope into the lives of people.

As a result, prevalence of VAD disorders like Bitot's spots and keratomalacia significantly declined in later years.

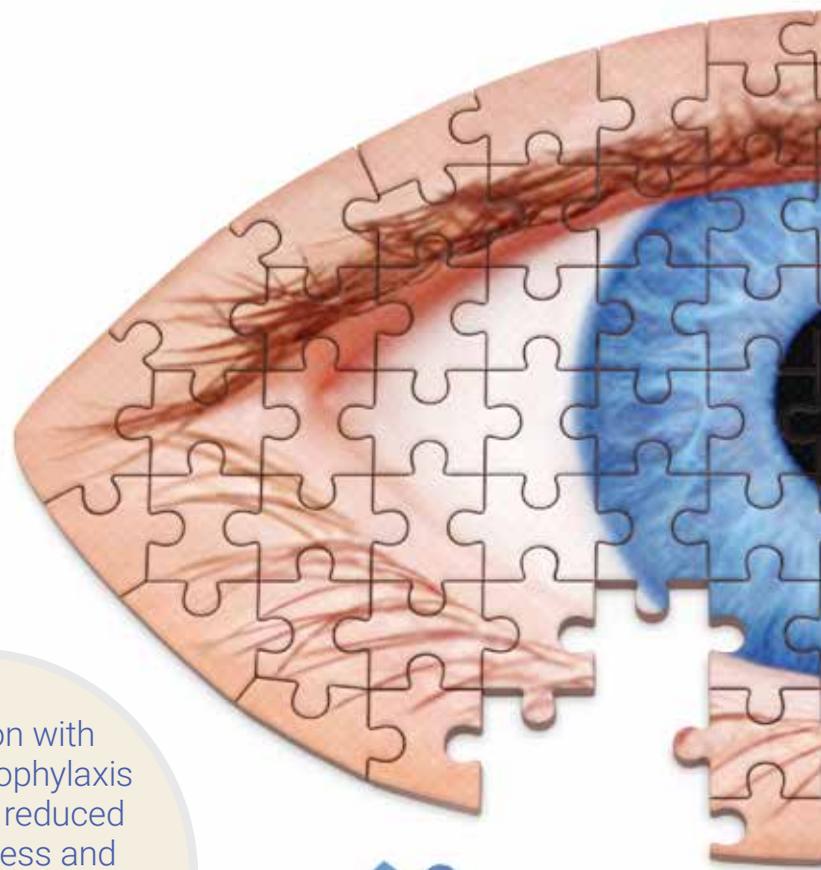


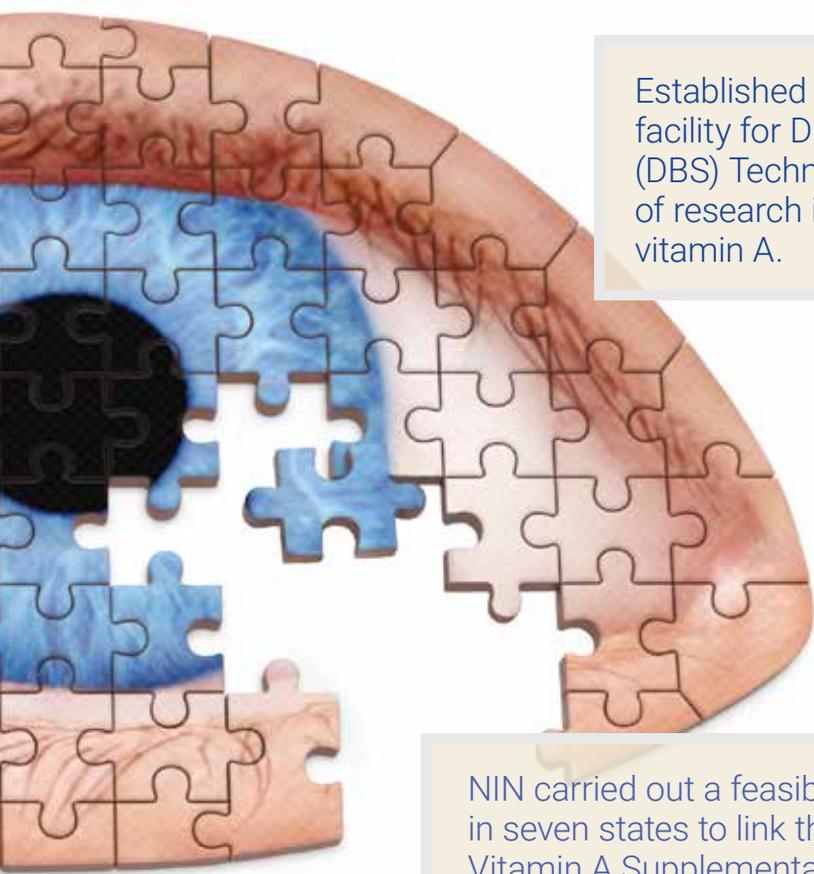
Bitot's Spots



Keratomalacia

Intervention with Vitamin A prophylaxis significantly reduced night blindness and keratomalacia, bringing back the light of happiness in the eyes of children.





Established a national facility for Dried Blood Spot (DBS) Technology for ease of research in estimation of vitamin A.

NIN carried out a feasibility study in seven states to link the National Vitamin A Supplementation Programme with Universal Immunisation Programme (UIP) to increase its coverage.



## Conquering Nutritional Blindness

During the sixties, preliminary clinical trials on the effect of oral administration of vitamin A were done on 2500 children. Based on this study outcome, NIN recommended administration of 200,000 IU vitamin A drops to children at six month intervals to avoid clinical manifestation of Bitot's spots and keratomalacia. This paved the way for a nationwide vitamin A prophylaxis programme with its inclusion in the fourth Five year plan in 1969.



# Ironing out the Scourge of Anaemia

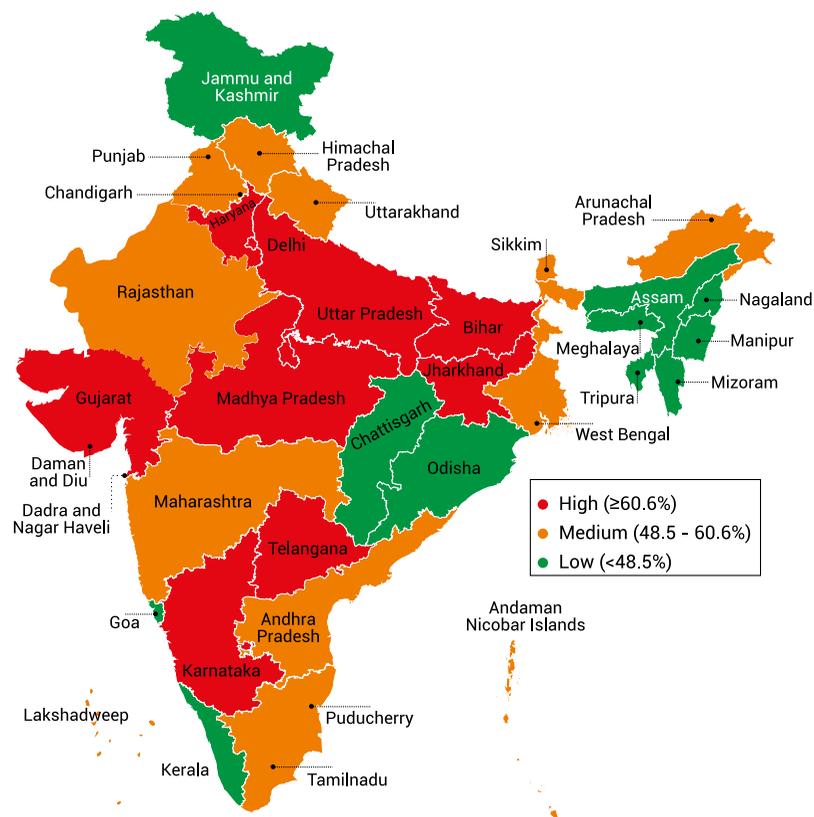


India carries a high burden of iron deficiency anaemia (IDA). Like most nutritional deficiencies, anaemia too is invisible. It remains underdiagnosed and undertreated. NIN dietary surveys found that improper food intake coupled with poor absorption of dietary iron seems to play an important role in the prevalence of IDA. The socio-biological aspects of anaemia in women are evident from the statistics; it hits the vulnerable sections the most, children, adolescent girls and women, including pregnant and lactating mothers.

The economic losses caused by a huge anaemic population are high—in other words, it bleeds the economy and brings down the GDP. Weak adults have lower productivity and lower economic contribution. Anaemic children grow up as weak adults, physically as well as mentally and this vicious circle continues. This impacts future productivity. Dietary diversification and food based strategies are essential to complement the prophylaxis programmes that are in force.

Govt launched the National Nutritional Anaemia Prophylaxis Programme for pregnant women and young children in 1970s based on NIN studies.

**Distribution of Anaemia 2015-16**  
Children aged 6-59 months(<11.0g/dl)



## Micronutrient fortification makes smarter kids

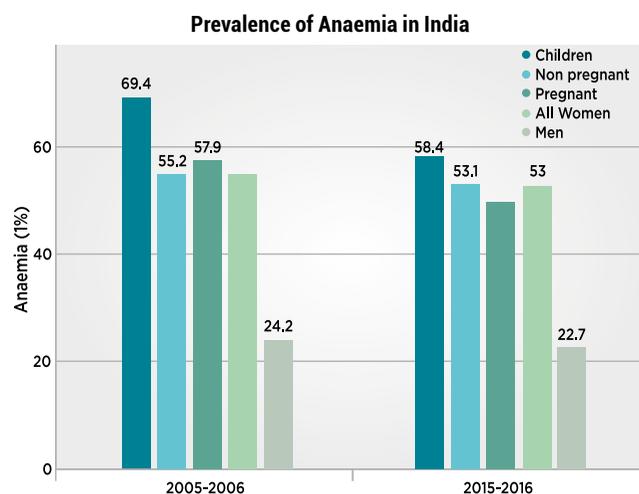
Reduces IDA

Promotes cognitive development

- NIN carried out research to promote early child development among rural infants and preschoolers in India through multiple micronutrient fortification.
- Findings from this study are used to guide policies and programmes designed to promote development, education and potential of young children in rural India.



Spoon Nails



## Arresting Iron Deficiency Anaemia (IDA)

Supplementation of iron and folic acid to vulnerable groups

NIN recommended the supplementation of iron and folic acid through a national programme for pregnant women and preschool children. GoI introduced the National Nutritional Anaemia Prophylaxis Programme for pregnant women and young children in 1970s based on a study on nutritional anaemia under the leadership Dr C. Gopalan in 1968 in association with the Nutrition Society of India (NSI).

## Iron folate pills in pregnancy make bonnier babies

NIN conducted a series of studies in pregnant women to assess the impact of iron folate supplements on birth outcomes. The results showed that dual supplementation with iron and folic acid was more beneficial than single nutrient supplementation. Infants born to women supplemented with both folic acid and iron had higher birth weight. Folates reduce the risk of neural tube defects.

The study also suggested that 60mg iron supplement would be adequate to ensure transfer of required amount of iron from maternal to foetal tissues. These studies provided basis for the anaemia control program in India.

## A Success Story in Public Health

Along with IDA, Iodine Deficiency Disorders (IDD) was also widespread in the country. Seminal research on iodine was initiated by Sir Robert McCarrison in the early years of the Institute. IDD was a huge public health challenge, detected at the community level as early as 1962. GoI took cognizance of the endemic nature of this problem and tackled it with Universal Salt Iodisation Programme.

Iodine is essential for the synthesis of thyroxine hormone that plays a vital role in regulating the metabolism and development of the human body. Iodine deficiency impacts the brain development and leads to mental dullness of varying degrees. This affects academic performance in children, work productivity in adults and thus the overall standard of life in communities.



### Symptoms of thyroid disorders

- Mental retardation
- Fatigue
- Depression
- Constipation
- Muscle weakness
- Thin hair
- Intolerance to cold
- Loss of weight (overproduction)
- Weight gain (underproduction)
- Cretinism
- Still births
- Abortions

### Foods rich in iodine

Fish, Eggs, Nuts, Meats, Dairy products,  
Seaweed, Iodized table salt



### India was the first to start a public health programme to address IDD based on salt iodization

A landmark study in Kangra Valley region of Himachal Pradesh was conducted from 1956 to 1972. This community-based intervention demonstrated the effectiveness of iodized salt in reducing goitre prevalent in the region.

IDD control programme was a success story in public health and continues to be one as NIN scientists have played a crucial role in tackling it at the community level.





Scientific Advisory Committee chaired by Dr M.K. Bhan

Developed a kit to detect iodine content in salt



Look out for the smiling sun logo when buying salt

## Goitrogenic Foods

Goitrogenic foods are rich in goitrogens which are anti-nutrients naturally occurring in edible plants. Goitrogens interfere with the uptake of iodine which disrupts the production of the thyroid hormone. Certain foods have been identified as goitrogens: ragi, bajra, soyabean, tapioca, bamboo shoots, and cruciferous vegetables like cabbage and cauliflower. Consuming high amounts of goitrogenic foods on a regular basis can impact thyroid health. Prolonged consumption of bamboo shoots especially in Northeast states can increase the risk of iodine deficiency in a region already low in iodine.

The disruption in the bioavailability of iodine activates the production of thyroid stimulating hormone (TSH) which causes the thyroid tissue to grow. The overgrown thyroid gland is identified as goitre.

## National Goitre Control Programme (NGCP)

- NGCP launched in 1962 made salt iodisation compulsory. The programme is now called National Iodine Deficiency Disorders Control Programme (NIDDCP).
- Recent surveys showed that 76.3% Indians consume iodised salt. The Iodine Survey 2018-19 for India was conducted by Nutrition International, a global nutrition organisation, in collaboration with AIIMS, New Delhi and Association for Indian Coalition for Control of Iodine Deficiency Disorders.

## Nutritive Value of Indian Foods

Nutritive values of foods play a very important role in determining the food we eat. The knowledge of different food groups and their nutritive values helps people to select the food that are suitable to their culture, customs as well as a balanced diet.

The assessment of nutritive values of commonly consumed Indian foods was first taken up in 1935 and published as the 'Nutritive Value of Indian Foods and Planning of Satisfactory Diets' in Health Bulletin No 23 in 1937 by Dr Aykroyd.

Improved analytical methods of nutrient estimation helped to revise the data and was published as 'Nutritive Value of Indian Foods' (NVIF) in 1971 and 1989.

More recently, the database profiling the nutritive values of Indian foods was readied in 2017 and published as Indian Food Composition Tables (IFCT) 2017. It is a compilation of nutritional composition of 160 food components of 528 key foods.

This book not only provides data of regular nutrients in foods but also a whole range of bioactive substances.

Vitamin D<sub>2</sub> content detected in plant foods for the first time in the world is documented in this book.



**Nutritive Value of Indian Foods is a ready reckoner on Indian food composition useful for all sections of society.**

- Healthcare policy makers
- Agriculturists
- Academicians
- Scientists
- Students
- Doctors
- Public health workers
- Nutritionists
- Food supply and procurement professionals
- Food industry



Key Foods  
Researched



Food Components  
Identified

A balanced diet contains food from all the food groups and satisfies the hidden hunger of the body.

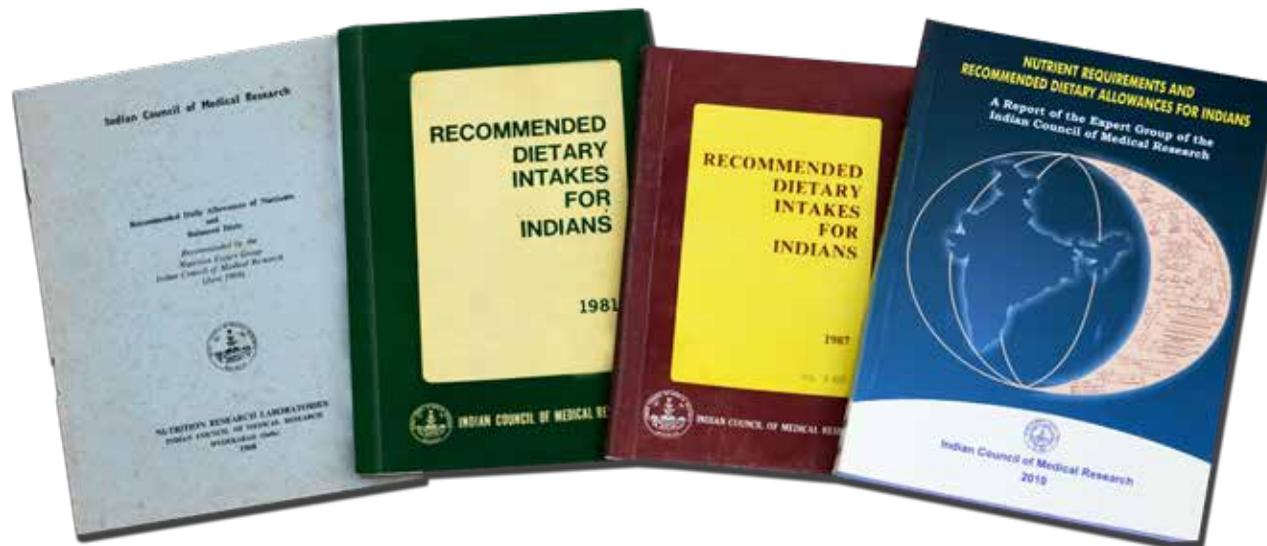
## The Count of Calories

Having calibrated the nutritive value of foods, it was now time for NIN scientists to recommend the dietary allowance that would qualify as adequate nutrition to maintain a healthy body. India became the first developing nation to have its own recommended dietary allowances (RDAs). RDAs work on two levels; preparing healthy menus and formulating food production strategies.

Human beings require wide-ranging nutrients to lead a healthy and active life. The amount of each nutrient needed for an individual depends on gender, age, body weight, physical activity and physiological state.

RDAs refer to the intake of essential nutrients that are considered adequate or sufficient to meet the nutrient requirement of healthy individuals in a particular life stage and gender group.

In 1935, NIN began the arduous task of quantifying the food Indians need; what to eat and how much to eat, because a balanced diet is at the crux of good health. The food department of the Government of India had been set up only in 1942 to deal with the task of food procurement and distribution. By 1944 ration cards were distributed to people below the poverty line based on the RDAs.



RDAs are revised periodically as they form the basis for several national level commitments.

- Fixing minimum wages
- Formulating guidelines for government food programmes
- Planning food production through agriculture
- Planning food import to meet the gaps that exist in demand and supply
- Guidance of regulatory bodies such as FSSAI

## Ensuring Nutritional Adequacy

After establishing the RDAs for various physiological groups of population, NIN developed Dietary Guidelines using various food groups keeping the nutritive values in view. Balanced diet which is represented in My Plate provides all the required nutrients from various food groups in order to promote health at the community level.

### My Plate with Balanced Diet

NIN advocates a lifelong strategy of food-based approach for prevention of nutritional deficiencies. My Plate is a guide to nutrition for a healthy meal and it contains food from all the food groups. No other supplement will provide the nutrients that are met through this plate. Dietary Guidelines was compiled in 1998 and revised in 2011 with a section on physical activity.

It carries information on doable action points and physical activity for Indians to ensure optimal health.

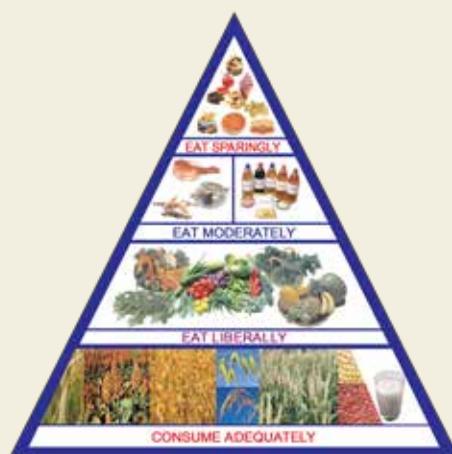
- Details about nutritionally adequate diet through a wide variety of foods
- Additional food requirement during pregnancy and lactation
- Consumption of fruits and vegetables
- Rotation of variety of oils
- Restriction of salt intake
- Right precooking process with appropriate cooking methods

### My Plate for the Day



### Benefits of My Plate

- Prevents hidden hunger
- Gives protection against diseases
- Less likely to develop CVDs
- Better nutrition status
- Better school performance
- Less expenditure on health
- Better earning capacity
- Improved household income and GDP



Food Pyramid

### Food Pyramid Eat this way to keep many diseases at bay

Food pyramid provides dietary guidance for meal planning. It provides a visual representation of variety of foods to consume in appropriate proportions (sparingly, moderately, adequately, liberally).

'Look to the farms, not the pharmacies'

Dr C. Gopalan

## Eat, Workout, Enjoy

Physical activity is as important as eating healthy food. A brisk walk of 45 minutes daily helps to improve the blood circulation while releasing endorphins, the feel-good factors in the body. Brisk walking and jogging improves the heart and lung function necessary to maintain optimal health throughout life.

### Health benefits of physical activity

- Reduces the excess body fat and improves the body composition
- Helps in prevention of NCDs, Type 2 diabetes, high blood pressure, heart disease, osteoporosis, arthritis etc.
- Improves flexibility
- Wards off depression
- Improves mood, sense of well-being and self-esteem

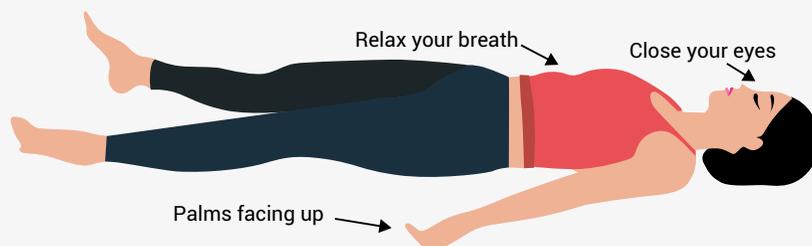
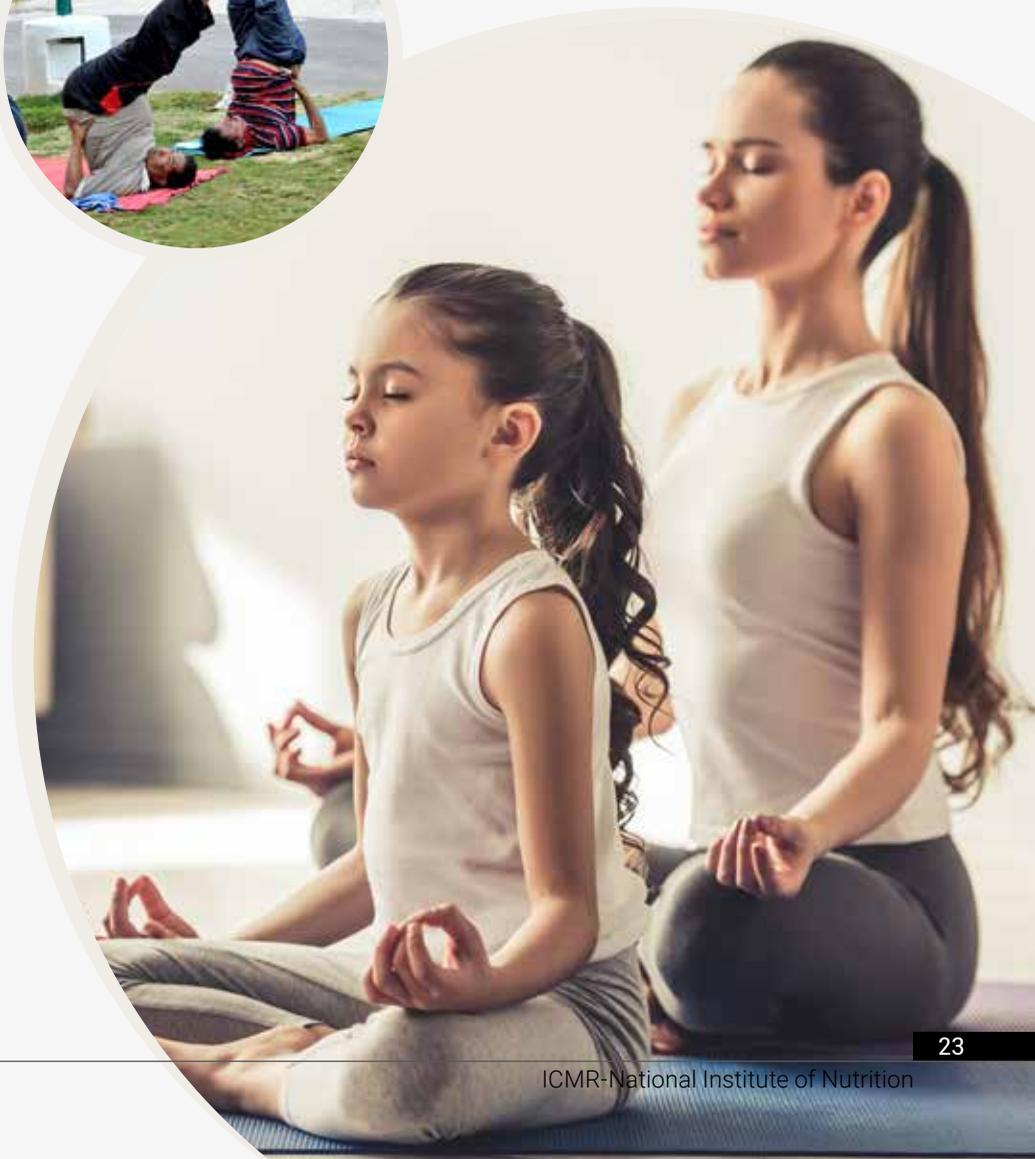
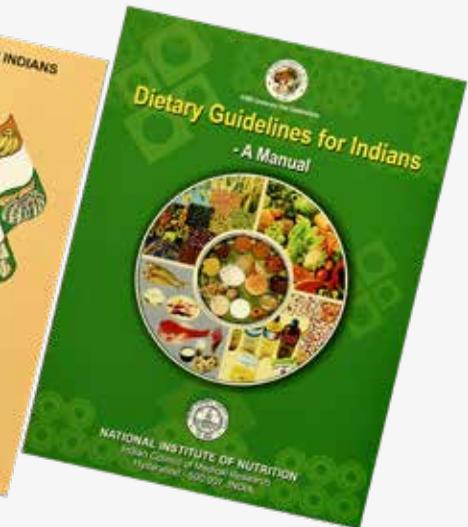
### Yoga improves overall health

- Regular practice of yoga of different *asanas* for 30-40 minutes improves flexibility, tones body muscles, corrects the body posture
- Improves the vital activity of the organs
- Relaxation in '*Shavasana*' (*Yoga Nidra*) reduces high blood pressure, stress, depression and anxiety drastically
- Improves concentration, memory and well-being

1998



2011



Shavasana Pose

# Rotation of Variety of Oils

In a balanced diet, the contribution of energy is 25-30% from dietary fats. The energy balance in relation to carbohydrates and protein depends on the dietary fat intake. Our body derives essential fatty acids from diet alone as it does not synthesize these. Essential fatty acids, linoleic acid (LA/n6) and alpha-linolenic acid (ALA/n3) are provided through vegetable oils and other sources like nuts, fish, green leafy vegetables. Studies at NIN indicated that consumption of green leafy vegetables will increase alpha-linolenic acids (omega 3 or n3) while providing micronutrients and fibre.

India is going through a transitional period; the country is experiencing economic development resulting in an increase in incomes. Fat intake of Indians is income dependent and consequently there is a steep escalation in prevalence of obesity, diabetes and cardiovascular diseases (CVDs). Fat intake of Indians is also impacted by regional and cultural influences.



Saturated	Linoleic acid (n-6 PUFA)			Good source of α-Linolenic acid (n03 PUFA)	MUFA Source
	Low n6 PUFA	Medium n6 PUFA	High n6 PUFA		
Coconut <sup>a</sup>	Palmolein	Peanut/ Groundnut	Safflower	Mustard <sup>c</sup>	Olive Oil
Ghee	Red Palm Oil	Rice Bran	Sunflower	Rapeseed <sup>c</sup>	Peanut
Vanaspathi <sup>b</sup>	Olive		Sesame	Soybean	Groundnut Oil
Palm Kernel			Corn	Canola	
			Cottonseed		
(60-90%)	(10%)	(27-35%)	(40-70%)	(5-10%)	

a. Medium chain (90%) b. Transfatty Acids (10-40%) c. Erucic acid (50%)

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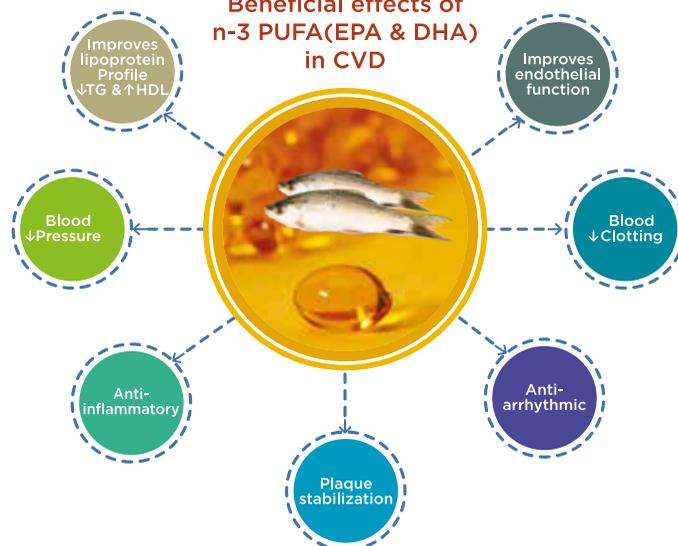
### NIN recommends use of variety of oils

Rotation of cooking oils was seen to enable better availability of a combination of fatty acids and other functional food components from different oils.

The relative role of n-3 and n-6 polyunsaturated fatty acids (PUFAs) in regulating the plasma profile was studied, and the desirable ratio of these fatty acids in Indian diets was worked out. Based on these studies, it was advocated to use a combination of oils to reap the benefits of n-3 and n-6 fatty acid by rotating different oils. NIN recommended the use of more than one oil as diverse sources of oils confer the additional advantage of providing a variety of minor components present in non-glyceride fraction of oils.

6

### Beneficial effects of n-3 PUFA(EPA & DHA) in CVD



### Nuts are good source of essential fats

Nuts are rich in Omega 3 fatty acids, monounsaturated and polyunsaturated fatty acids



- Eat foods rich in alpha-linolenic acid such as legumes, green leafy vegetables, fenugreek and mustard seeds
- Prefer fish over poultry and meat
- Avoid reheating used oils



### Trans fats reduce insulin sensitivity

Back in 1959, NIN research proved the harmful effects of trans fats and the importance of essential fatty acids. More recent research on partially hydrogenated vegetable oils showed that trans fats decrease insulin sensitivity to a greater extent when compared to saturated fats.

In the olden days, edible oils were extracted in bull-driven mills. There is a quiet revival of this age old practice and cold press oils are now widely being used.

## Tackling Micronutrient Deficiency



Food fortification is the process of enriching food by adding micronutrients. It is a short-term strategy to overcome micronutrient malnutrition at the community level. Vitamin A, D, iron, iodine and zinc are some of the nutrients used in food fortification. Salt, rice grain and wheat are some of the vehicles used for food fortification.

### Double-fortified salt tackles the twin problems of IDA and IDD



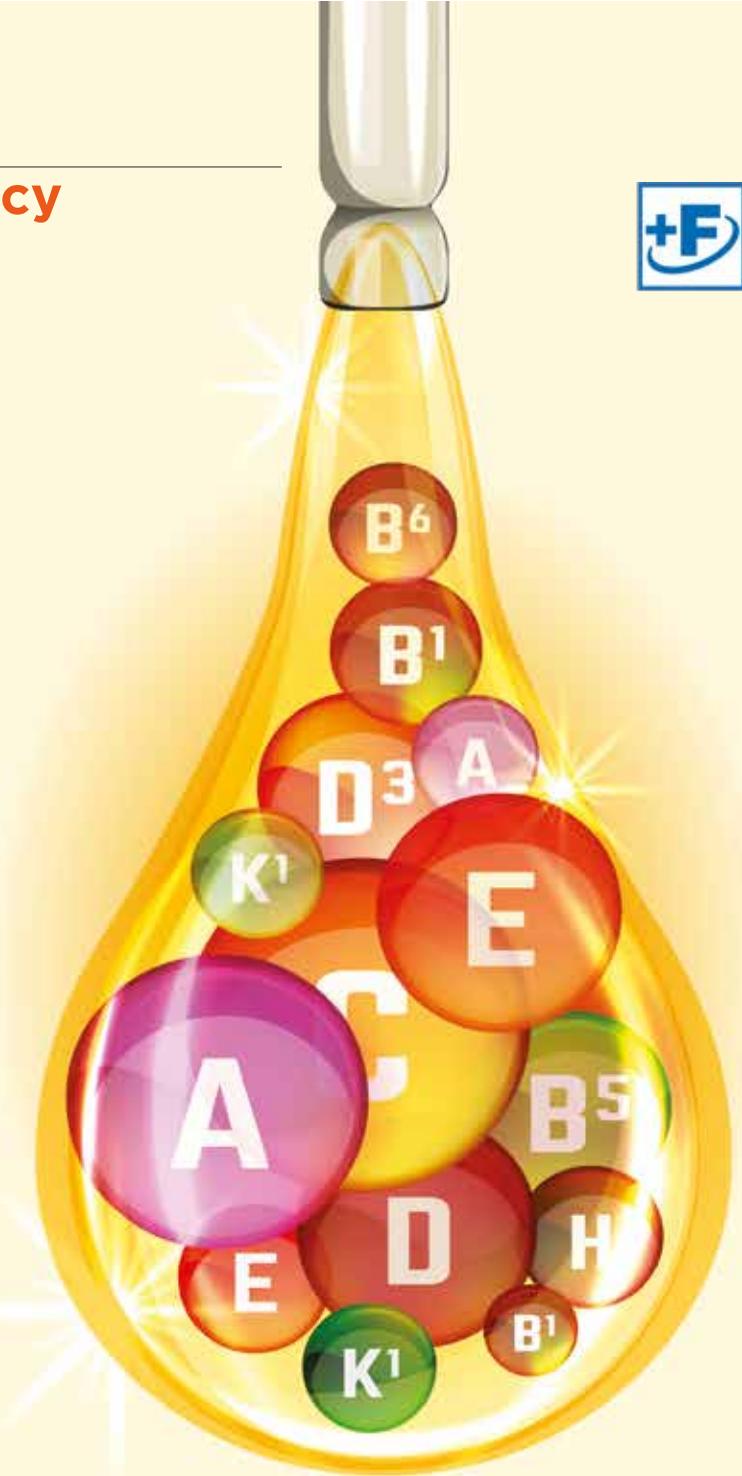
**Double-Fortified Salt (DFS):** NIN research focussed on developing a technology for double fortification of salt with both iodine and iron to combat both IDD and IDA. This led to the development of a successful formula to ensure the stability of iodine on storage and bioavailability of both micronutrients when taken with food. DFS technology was transferred to the industry. NIN also contributed to the preparation of the regulatory specifications for FSSAI on DFS.

### Public Private Partnerships

NIN entered into MoUs with small, medium and large manufacturers and transferred NIN-DFS technology for production of salt. In-vitro bioavailability screening methods of iron, zinc and carotenoids were established to test the efficacy of fortified foods and beverages as part of private-public partnerships.

**Fortification of Wheat Flour:** Wheat is a staple diet in large parts of the population and fortifying the flour is a simple and inexpensive way of improving the nutritional status. Mid-day meals at schools and food served in Integrated Child Development Services (ICDS) canteens are being made with fortified wheat flour and fortified edible oil.

**Rice Fortification:** A study was conducted to determine the impact of ultra-rice (Micronized Ferric Pyrophosphate–MFPP) supplied through extruded rice kernels in a rice-based meal on iron status of children participating in mid-day meal scheme (MDM) for eight months. Controlled trials improved the body iron stores. The iron-fortified rice was similar to natural rice in sensory qualities and was well accepted by the children.



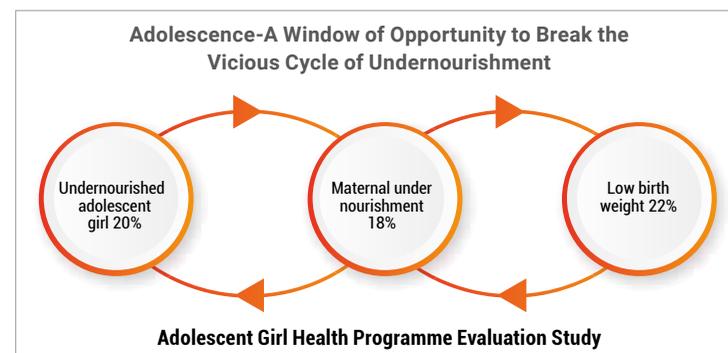
# Adolescent Girl Health

## A Blossoming Life



Adolescence is a transient phase of life between childhood and adulthood. The body matures and undergoes several hormonal and physiological changes. These have an impact on self-image, behaviour and dietary choices. As spending time with friends and snacking is common in this age, peer influence on food choices is seen. Girls in particular are influenced by external societal factors and feel the pressure of looking slim. Skipping meals is a commonly observed behaviour in girls. Adolescent girls are susceptible to undernutrition and this has a bearing on their future as mothers and the health of the children they bring to life.

Anaemia is rampant in adolescent girls. Preconception period includes the adolescent phase. Adequate nutrition in this stage is important for correct birth outcomes. Undernourished girls become undernourished mothers who bring low birth weight babies into the world. Investing in the nutrition and development of adolescent girls is essential to break the vicious intergenerational cycle of low birth weight and undernutrition.



### Good Health is Bridal Wealth

NIN prepared a kit for newly-wed couples and those planning pregnancy. The bride's good health is a prerequisite for a healthy baby.

Some points that are crucial for this:

- Right age and optimal weight at the time of pregnancy
- Freedom from anaemia
- Conversant with infant feeding practices
- Equipped with health and hygiene awareness

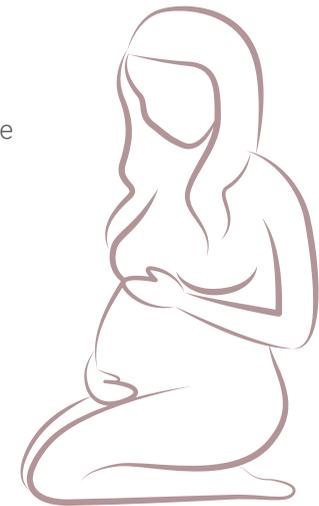


NIN has signed a MoU with ICRISAT to prepare proposals on food-based approach to tackle nutritional anaemia in adolescent girls which comes under the mandate of the Government of India (*Beti bachao, Beti padao*). This collaboration has become a strong foundation to work on gut microbiome and health.

# Foundation for Future

## 1000+ Days Care

Marriage and motherhood is the next stage of life for adolescent girls. Pre-conception care is important for all couples planning pregnancy. Adolescent and illiterate mothers and those living in remote villages are particularly vulnerable and prone to pregnancy related complications and maternal mortality. 1000+ days care covers pre-conception period, pregnancy and lactation and is essential for the health and well-being of the mother and child. It is a golden opportunity to lay a healthy foundation for a prosperous future of the child.



### NIN Recommendations

Iron folate supplementation for pregnant women and preschool children was made as a prophylactic measure based on Dr Gopalan's studies on anaemia and undernutrition. Govt introduced the National Nutritional Anaemia Prophylaxis Programme based on NIN recommendations for pregnant women and young children in 1970.



1000+ days is a critical time period for providing optimal nutrition to ensure normal development and shield the brain against any shortfall in nutrients.

Poorly nourished mothers give birth to small babies with altered body mass composition hence 1000+ days care is emphasized.

### 1000+ days care

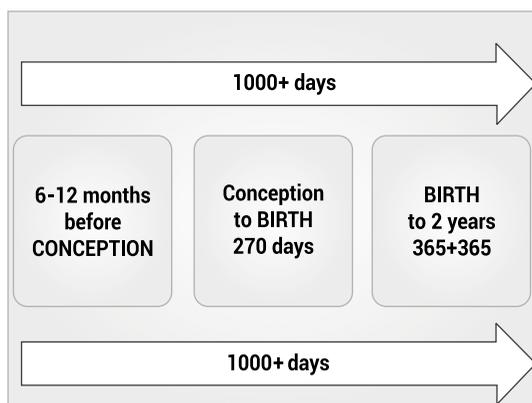
1000+ days period includes pre-conception period, pregnancy and lactation.

- Appropriate growth and development of foetus
- Brain development
- Good birth outcomes with optimal birth weight
- Improves child survival rate
- Ensures linear growth and optimal weight during childhood
- Protects from NCDs such as diabetes, hypertension, heart attack, stroke etc.

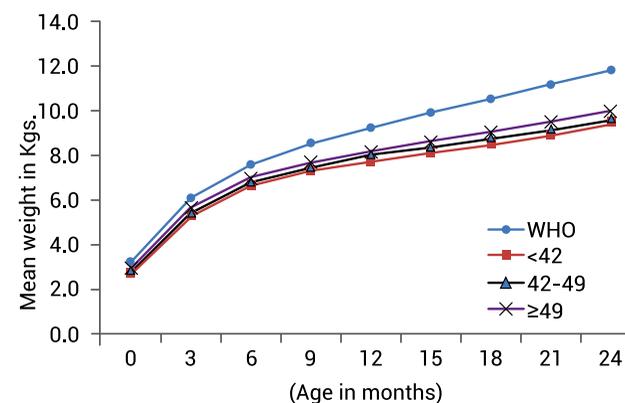
### Pregnancy is a nutritionally demanding physiological state

#### Expecting mothers must

- Consume extra food to meet additional calorie requirement
- Include more whole grains in the diet
- Drink milk
- Take eggs/meat
- Consume plenty of vegetables and fruits
- Avoid superstitions and food taboos



Mean weight of children from birth to 2 years by tertiles of maternal weight compared with WHO growth standards 2006



# Adding to the Mother's Touch



The mother's touch provides physiological and psychological warmth to the baby. Kangaroo care (skin-to-skin contact) given to the baby during this period, along with feeding of colostrum (first milk) immediately after birth improves immunity and provides a safety net against child mortality which tends to be very high between 0-5 years.

Infancy and early childhood are very fast growing periods of one's life. Extra nourishment is required to provide for the continuous increase in size of every body organ and the high energy demand. Infants and toddlers need more energy yielding and body building foods for optimal growth. Improper feeding can lead to malnutrition, slowing of growth rate and in severe cases, wasting.

## Complementary foods

Feeding the baby exclusively with breast milk up to six months is essential followed by introduction of nutritious and safe complementary food at six months along with continuation of breast milk up to two years. NIN developed a micronutrient fortified take-home ration for infants and this is distributed under the ICDS programme. This takes care of the hidden hunger or micronutrient deficiencies that are likely to crop up due to insufficient food and deprive the child of vitality.

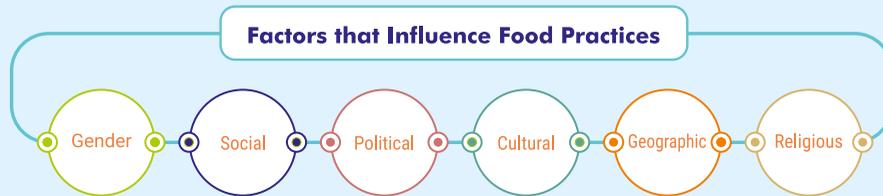
## NIN's contribution to ICDS programme

Launched in 1975 Integrated Child Development Scheme (ICDS) is one of the flagship programmes of the Government of India and represents one of the world's largest and unique programmes for early childhood care and development. NIN research recommended complementary feeding programme to improve nutrition status of children in rural and urban areas. Studies on lactating mothers led to their inclusion in food supplementation programme under ICDS.



## Current Scenario

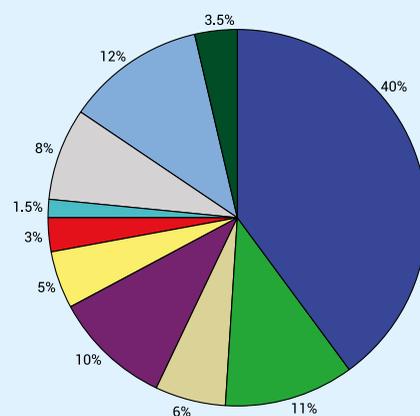
India is going through a period of change due to a spurt in economic growth and this is influencing the food choices of people. Food practices are influenced by several factors like gender, social, cultural, geographic, economic and religious. NIN research shows that what India really eats currently is not entirely wholesome.



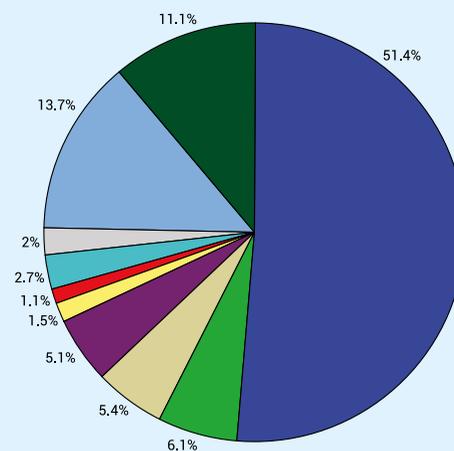
### Faulty Food Patterns

- Cereal based diet with no dietary diversity
- Legumes intake is very low
- Fruits, vegetables, nuts and milk intake is extremely low
- Salt intake is beyond recommended level which is less than 5g/day
- Increased consumption of street food and packaged foods

ICMR - NIN My Plate Recommendations



What India Actually Eats



- Cereals & Millets
- Pulses & Legumes
- Meat, poultry and fish
- Milk & milk products
- Vegetables & GLVs
- Fruits
- Roots and tubers
- Nuts & Oil seeds
- Visible fats & Oils
- Others

Micronutrient intake is distinctly low in children and adult population.

Average percent of energy coming from various food groups in Urban India (pooled) in adults



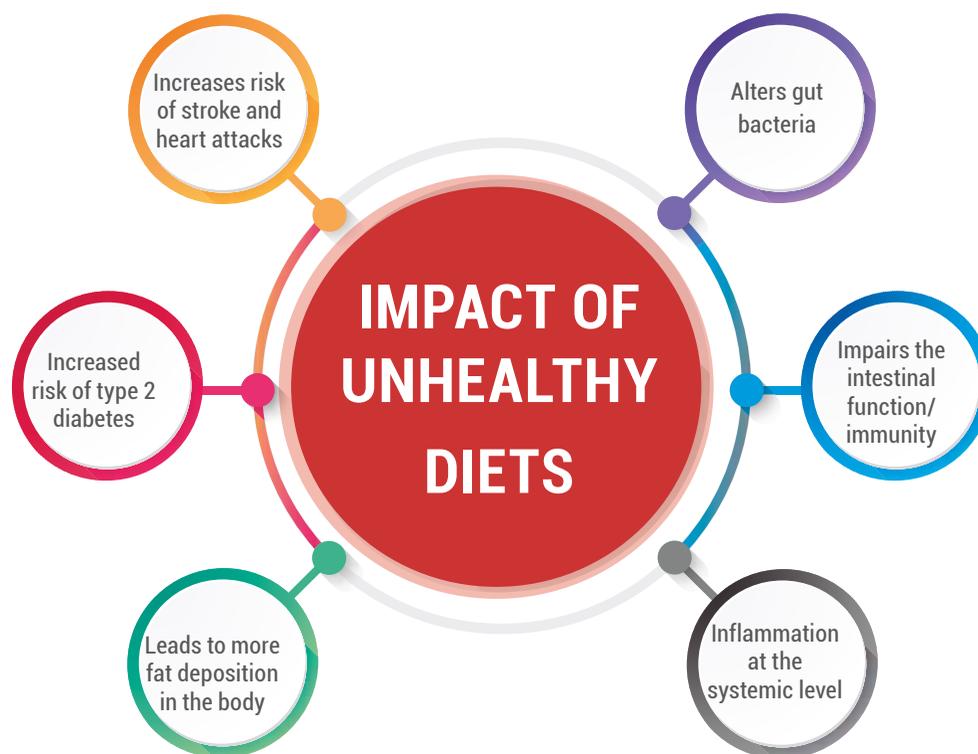
# Cascading Effects of Unhealthy Diets

The food choices we make are determined by several external factors like access, affordability, awareness and cultural norms. Food cravings and habits are wired into our brain and often drive us to make unhealthy choices.

When we are hungry we think of all the mouth-watering foods possible. Temptations for the taste buds are many—*samosas, jalebis, pakoras*, French fries, burgers, pizzas, pastries, rolls and so on. Little do we realise that unhealthy diets play havoc with our body internally and place the organs under pressure.

## Right nutrition during early life reduces risk of NCDs

Unhealthy diets and poor nutrition over a period of time lead to risk of allergy, metabolic disorder, impaired immunity and risk of falling prey to illnesses. It can also lead to unhealthy weight gain and accompanying ailments.

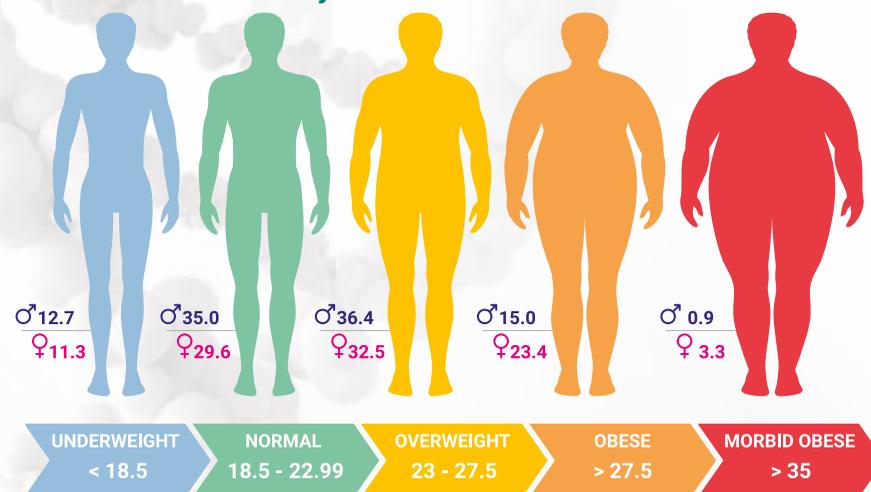


# Against Obesity and NCDs

Post liberalisation India witnessed economic growth, increased purchasing power and entry of multinational food joints leading to a change in food habits at the community level. Also sedentary lifestyles and physical inactivity have further reduced energy expending activities leading to a surge in obesity (BMI>27.5) in the population, even at the school age level. Health consequences of obesity are many. Apart from increasing the risks of devastating non-communicable diseases such as hypertension, heart attack, stroke, diabetes and obesity, it induces other debilitating problems of the muscular, skeletal, metabolic and reproductive systems. The stigma of obesity takes a heavy toll on the psychological health of the individuals and reduces the overall quality of their life. Obesity also sets back communities economically by increasing health care costs and reducing work productivity.

NIN studies showed that high salt intake, physical inactivity and obesity are the leading causes of NCDs.

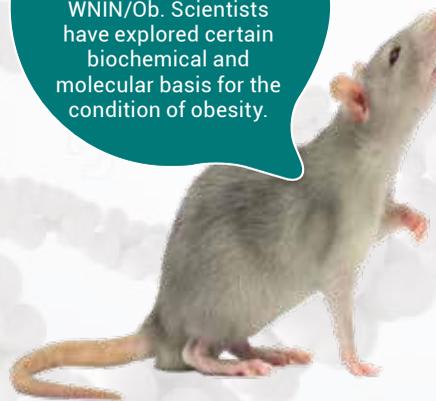
## Asian Body Mass Index Classification



Prevalence of obesity in Indian men and women  
Source: NNMB Urban Survey 2017.

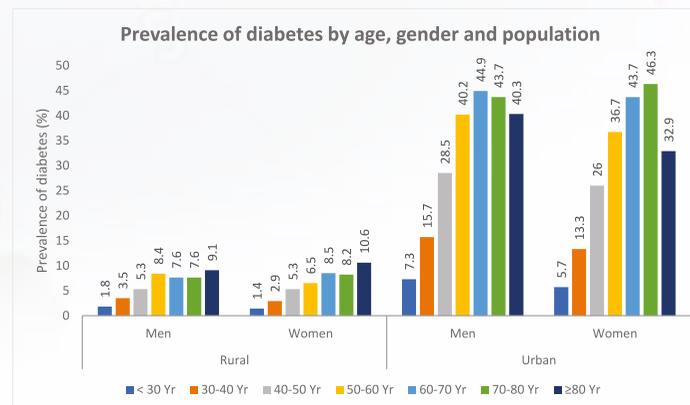
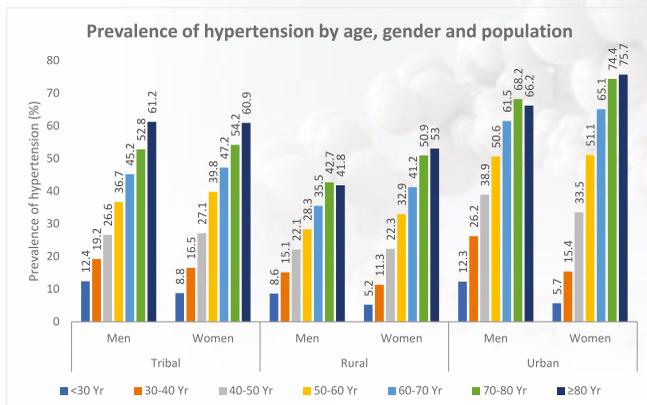
### Genetics of obesity

NIN has developed a rat model for obesity WNIN/Ob. Scientists have explored certain biochemical and molecular basis for the condition of obesity.

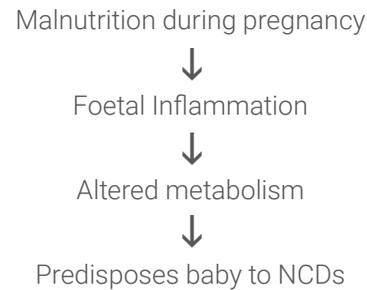


### Causes of Obesity

- Sedentary lifestyle/physical inactivity
- High fat, high sugar, high salt foods (HFSS foods)
- Unhealthy gut micro biota
- Overeating/frequent eating
- Psychological factors
- Medications
- Hormonal disorders



## Malnutrition during pregnancy predisposes the baby to non-communicable diseases



## Overweight and obesity in rural India

Urban agglomeration resulting in modernisation of villages is showing its impact on nutritional status of village populations.

Time trends of National Nutrition Monitoring Bureau surveys reveal a five-fold increase of overweight and obese population in villages over a period of thirty seven years.

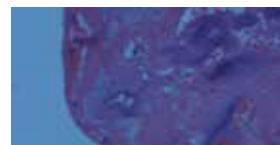
Overweight and obesity in 7 pooled states

Figures in percentage

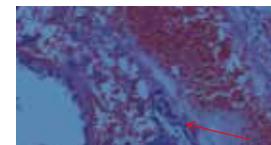
Years	Men	Women
1975-79	2.0	3.2
1996-97	4.1	6.0
2011-12	11.8	15.5

Prevalence of overweight and obesity in urban areas is 52% men and 59% women

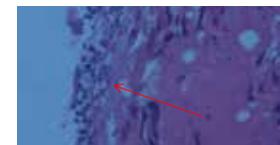
## High fat diet or low protein diet causes inflammation in the chorion layer of placenta



CD chorion layer at 20X



HFD chorion layer at 20X



LPD chorion layer at 40X

## Diet restrictions can control obesity-related retinal degeneration

NIN scientists identified and described neuronal and retinal degeneration in an obese rat model and amelioration of these degenerations by diet restrictions.

## Stem cell therapy eases diabetes management

NIN research showed that injection of stem cells enhances insulin sensitivity and improves the pre-clinical diabetic milieu.

Animal studies with pre-clinical transplantation of stem cells showed restored islet functions, giving hope for diabetes management at the community level.



## Dietary Solutions

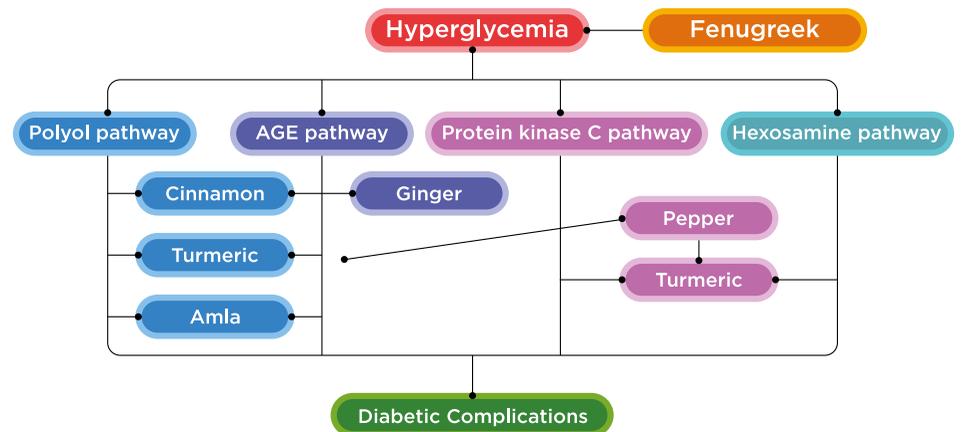
Non-communicable diseases (NCDs) like heart ailments, chronic respiratory disease, cancers and diabetes account for majority of deaths in the world.



The average age for the onset of NCDs in the world is 55 years onwards, but in India, NCDs set in nearly ten years ahead of time, according to scientific reports. This, coupled with the lack of health care access and poor awareness among rural poor amplifies the problem further.

NIN research and outreach on detrimental effects of trans fats led to healthier diets in homes. Many schools rehailed their school canteen food and threw out greasy snacks and junk foods. In an exciting breakthrough, NIN scientists identified dietary sources of novel anti-glycating compounds that prevent diabetic complications including retinopathy and nephropathy in cinnamon, pomegranate, cumin and ginger.

### Biological Mechanisms to Prevent NCDs



**Turmeric:** Research ascertained the cancer combating properties of turmeric. Liberal use is recommended for cancer prevention. Use of turmeric in the range of 0.5-1% of the total diet per day prevents NCDs. Turmeric reduces bacterial mutagenicity, prevents DNA damage, decreases urinary mutagens in humans, reduces incidence of cataract and retinal degeneration.



#### Pomegranate and cumin seeds:

Pomegranate and cumin seeds contain novel anti-glycating compounds that help prevent diabetic complications.



**Cinnamon:** Cancer cells are known to have high proteasome activity which is essential for their growth and survival. Cinnamon extract and its bioactive components inhibited the catalytic activities of the proteasome and led to death of human prostate cancer cells but not normal cells and also decreased expression of anti-apoptotic and angiogenic marker genes in prostate cancer cells. Cinnamon also contains novel anti-glycating compounds.



**Garlic:** Scientists established the anti-mutagenic properties of garlic that arrest the mutation process in damaged genes with a potential to prevent cancer.



**Curry leaves:** Research affirmed that curry leaves are cytotoxic to cancer cells and destroy them.



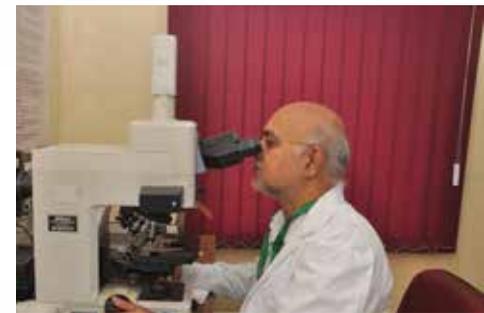
'Spices are rich sources of phytonutrients that reduce the risk of diseases in general and cardiovascular disease (CVDs) in particular.'

Dr Kamala Krishnaswamy

**Ginger:** Studies demonstrated anti-glycating, anti-cancer and anti-mutagenic properties of ginger.



**Fenugreek:** Research showed that fenugreek seeds have the quality to enhance glucose tolerance by improving glucose utilisation at the cellular level.



**Gooseberry:** Scientists identified novel molecules that encourage glucose metabolism and protein glycation for combating diabetic complications. For the first time they discovered beta glucogallin molecule in gooseberry as an aldose reductase inhibitor.



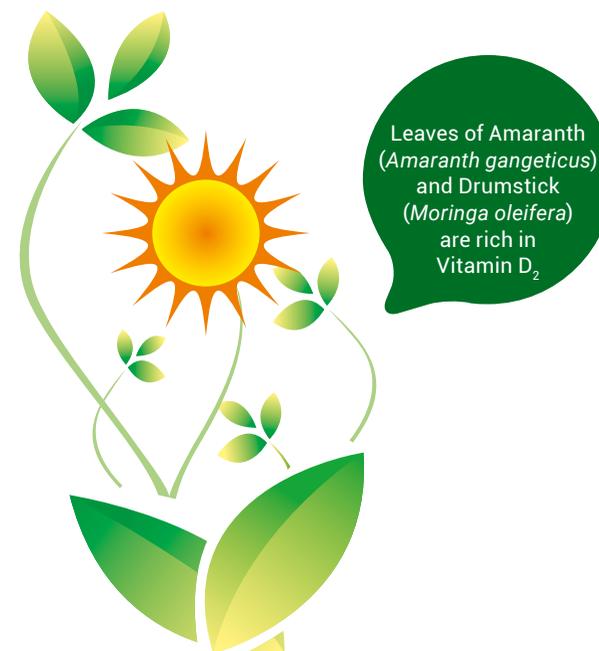
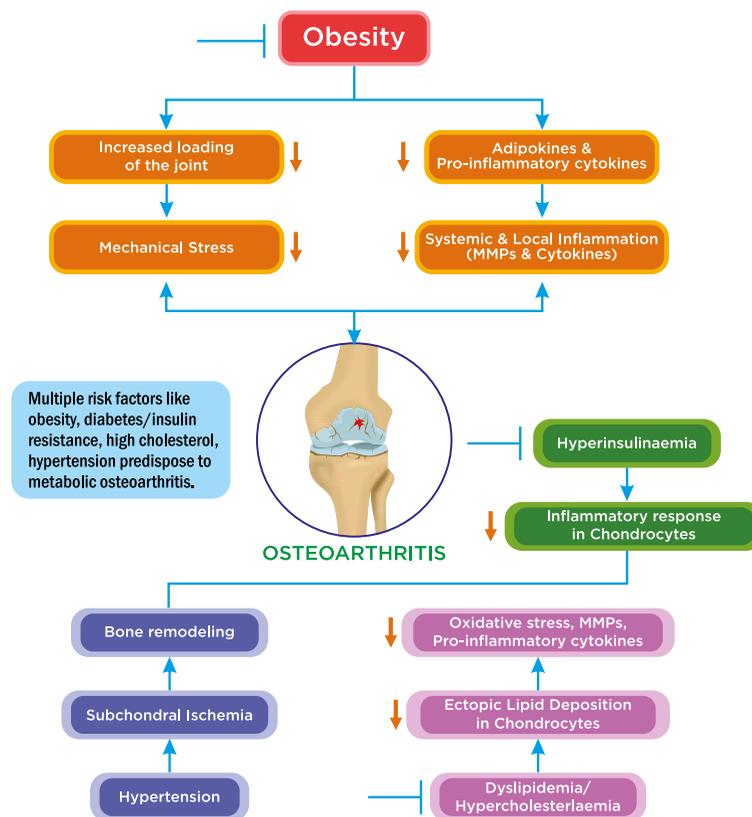
**Gut Immunity:** Scientists highlighted the role of prebiotics and probiotics in gut immunity. Prebiotics are found in fruits and vegetables, whereas probiotics are the beneficial bacteria found in curds and yoghurt. A combination of pre and probiotics help in improving gut immunity by producing short chain fatty acids which protect the gut. Reduces inflammation, improves lipid levels, immunity and reduces risk of heart attack, stroke and diabetes.



# Bone Health and the Sunshine Vitamin

In continuation of NIN efforts in promoting food based approach to meet the requirement of micronutrients, the Institute took up studies on bone health, vitamin D and osteoarthritis.

## Dietary modification decreases the burden of osteoarthritis



Studies in men and women from low socio-economic group highlighted poor bone health, high prevalence of vitamin D deficiency and fractures at an earlier age compared to well-nourished populations, demonstrating the importance of optimal body weight, body composition and calcium intakes as major determinants of bone health.

NIN publication Indian Food Composition Table 2017 (IFCT) for the first time reported the presence of vitamin D<sub>2</sub> in plants (leaves of amaranth and drumstick).

### Vit D deficiency leads to muscle wasting

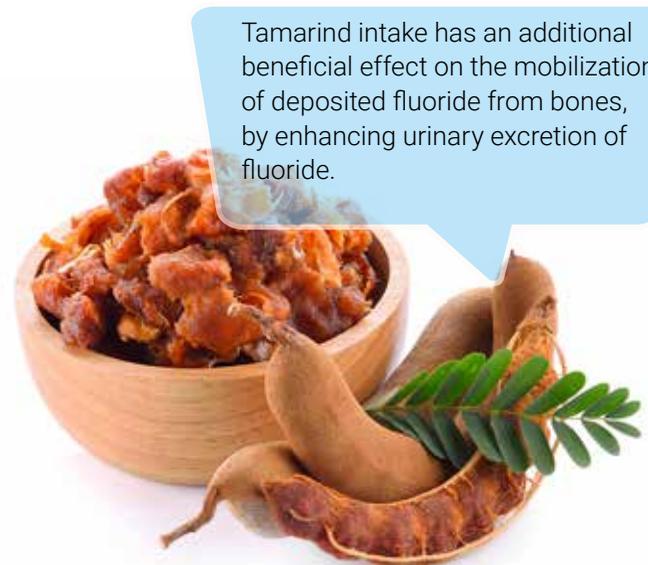
Muscle wasting seen in vitamin D deficiency is due to increased muscle protein breakdown.



# Fight against Fluorosis

Fluorosis is another crippling ailment that is widespread in the country. Dr. Gopalan's research on fluorosis spotlighted this water related disease wherein excess fluorides are present in drinking water. NIN is making all efforts to root it out through food-based approach. There are about 230 fluoride-affected districts in 22 states of India where lakhs of people suffer from the disease. In fluoride-hit villages ground water contains excess fluoride content causing skeletal fluorosis or extreme physical deformity and dental fluorosis as well. About 62 million suffer from dental, skeletal and non-skeletal fluorosis. Of these, six million children below 14 years have deformed legs that bend sideways. Children born with neurological fluorosis are crippled for life.

A National Programme for Prevention and Control of Fluorosis (NPPCF) is being run by the Union Ministry of Health and Family Welfare in 230 districts of the country.



Tamarind intake has an additional beneficial effect on the mobilization of deposited fluoride from bones, by enhancing urinary excretion of fluoride.

**Antidote to fluorosis:** Tamarind, the tangy tropical fruit makes dishes delicious and is an antidote to fluorosis, NIN research has shown. Lab experiments with mice showed that consumption of 10 gms of tamarind daily results in excretion of fluorides from the body and prevents dental and skeletal fluorosis.

## Bone deformities due to skeletal fluorosis



# Mapping India's Nutritional Health

National Nutrition Monitoring Bureau (NNMB) was set up by the Indian Council for Medical Research (ICMR) in 1972 in 10 states under the aegis of NIN and subsequently expanded to 16 states in 2012.

NNMB surveys bring to the fore many insights into the health and nutrition condition of Indians.



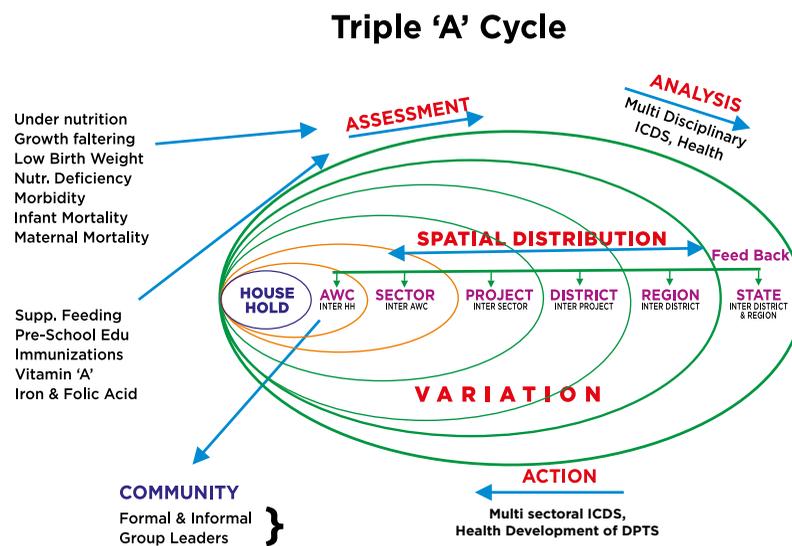
## NNMB Accomplishments

- Complementary nutrition and prophylaxis programmes
- Nutrition surveys and plotting time trends in diet and nutrition status of urban, rural and tribal populations
- Special surveys during droughts in affected areas
- Data for policy planning and implementation
- National Nutrition Surveillance System
- Assessing the bio-effect of Double Fortified Salt (DFS) at community level
- Prevalence of obesity in urban population, their diet and nutrition status
- Diet and nutrition status of tribes in Andaman and Nicobar islands.

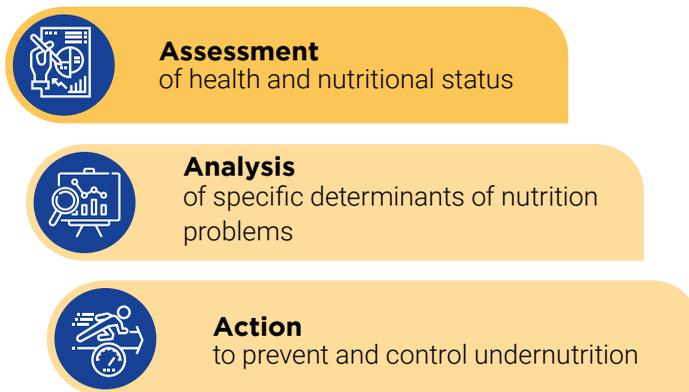


## Triple A Approach

NIN developed a nutritional surveillance system which works on 'AAA' (Triple A) cycle approach of Assessment, Analysis and Action. The system was implemented through the set up of ICDS mechanism from the grassroots level in villages to the supervisory level in states.



**National Nutrition Surveillance System (NSS) is an early warning system for nutritional problems**

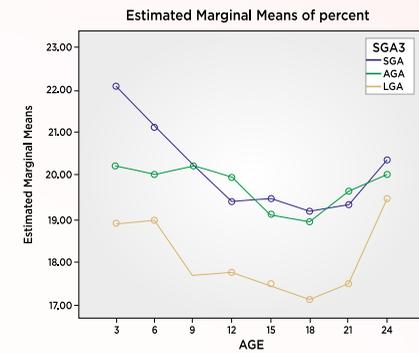


Surveillance is a dynamic process and keeping track of nutrition indicators at the grassroots level is necessary. The data from this enables decision-making at different zonal, regional and national levels. This becomes the basis for intervention programmes.

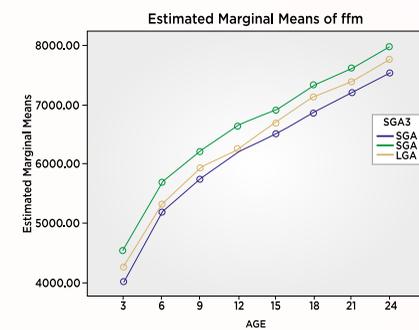
## Hyderabad Nutrition Trial

### Food supplementation at the start of pregnancy reduces CVDs risk in adult life

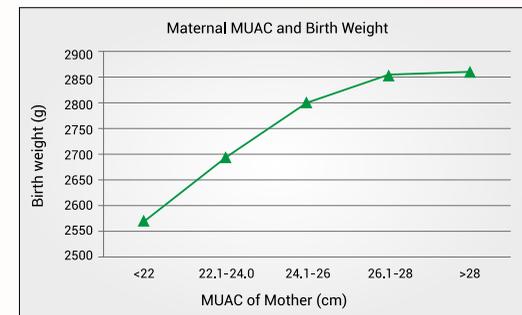
A birth cohort study was conducted by NIN to evaluate the impact of food supplementation during pregnancy on the birth weight and health of the offspring in adult life. The landmark study of Hyderabad Nutrition Trial was initiated in 1987-90 in 29 villages of Ranga Reddy district. Two follow-up studies were carried out in 2003-5 and 2009-11.



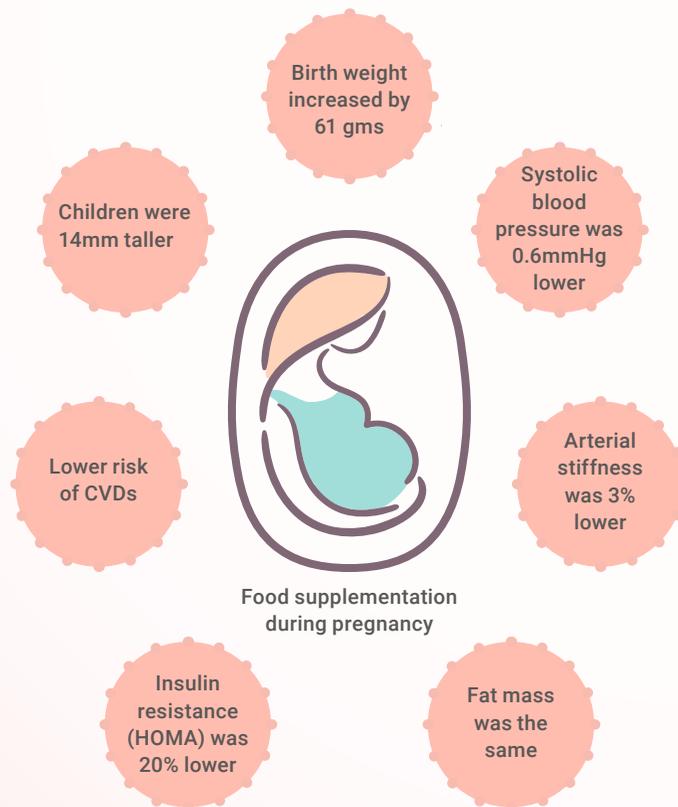
Low birth weight babies have high body fat



Low birth weight babies have lower fat free mass (lean mass)



Mother's Mid Upper Arm Circumference (MUAC) >25 improves birth weight



Salient findings of Hyderabad Nutrition Trial



## MRHRU

### Nutrition support and health research comes to the villages through MRHRU

India lives in its villages as more than 70% of the Indian population can be found in its rural hamlets. Nutrition support and healthcare research are essential to complete the spectrum of health services provision in rural populations. Model Rural Health Research Units have been set up across the country to address rural health issues that need special attention. The tasks of MRHRUs include

- Need-based research addressing regional diseases in rural population to improve diagnosis and therapeutics
- Transfer of technology to the rural areas for improving the quality of health services
- Interface between the new technology developers, health systems operators and the rural communities
- Ensure the much needed geographical spread of health research infrastructure in villages
- Improve health and nutrition awareness among the beneficiaries

### MDRU ( Multi Disciplinary Research Unit)

ICMR had set up Multi Disciplinary Research Units (MDRU) in medical colleges across the country to encourage and strengthen the biomedical research environment. MDRUs at Osmania Medical College and Gandhi Medical College are at the forefront of urban health research with special focus on NCDs. NIN collaborates with MDRUs and plays an advisory role.



## On the Trail of Toxins



### Standards of safety

#### Micronutrients Flush out Pesticide Residues

Studies indicated that micronutrient supplementation increased the excretion rate of pesticide residue in farming community where pesticide exposure is an occupational hazard; hence micronutrient rich foods such as fruits, vegetables and nuts should be consumed adequately.

#### Farm-to-Plate Strategies

NIN studies on food safety and quality of aquatic and meat products to improve food safety standards indicated the importance of Hazard Analysis Critical Control Point (HACCP). Implementation of HACCP in the food industries/establishments improved the food quality and safety of food products from farm to plate.



### Benchmark for heavy metals and lead toxicity

NIN studies on levels of heavy metals (lead, cadmium, chromium, arsenic and mercury) in toy samples, enabled the Bureau of Indian Standards to formulate guidelines for toy manufacturers in Indian markets.

NIN research data on chronic low level exposure to lead (Pb) using biomarkers for haemopoietic and renal system among pregnant women, neonates, children and occupationally exposed adults is used as a benchmark to study subclinical lead toxicity.



**F**ood contamination and safety is a major health concern in our country. The spectre of food adulteration and contamination has haunted us time and again. Every stakeholder including the farmer, supplier, transporter, processor, distributor, marketer, cook and consumer is responsible for safe food.

**NIN conducted timely studies on aflatoxicosis, lathyrism, argemone toxicity, epidemic dropsy, erucic acid toxicity and lead exposure.**

### Safety First

The Food and Drug Toxicology Centre was set up at NIN in 1978 to carry out toxicological analysis of food, drug screening and drug interaction. Whenever there is a food borne disease outbreak, FDTRC swings into action to identify and curtail the cause of the outbreak. Further, the centre is also involved in surveillance and monitoring of food contaminants. The centre brings out publications to educate the community on food safety aspects. FDTRC also trains professionals from foreign countries in analytical quality control practices.



### IUPHAR World Conference on the Pharmacology of Natural Medicine

World Congress on Medicinal Plants and Natural Products explored the possibilities of support from evidence based medicine to help in new drugs discovery. Research is underway to develop drugs out of traditional medicines. Healthy ageing and effects of natural products on molecular aspects of food were deliberated upon. The first Prof. Krishna Prasad Bhargava Oration was presented to Prof. Michael Spedding, Secretary General, IUPHAR in Hyderabad.



### Food Toxicology

- Developed food safety kit to identify food contaminants at the consumer/household level
- Safety norms for food vendors, canteens and caterers formed
- Simple household methods for removal of neurotoxin from *Kesari dal (Lathyrus sativus)* developed
- Recommended use of tamarind in regular household cooking for the removal of fluoride toxicity

### Drug Toxicology

- Scientific studies to validate the efficacy and safety of traditional formulations and medicinal plants in improving health
- Studies on drug interactions with reference to drug metabolism and toxicity
- Research validating anti-cancer benefits of spices and condiments
- Beneficial effects of commonly consumed vegetables in prevention of cancer
- Medicinal plants (*Cocculus hirsutus*, *Cuscuta reflexa* and *Tinospora cordifolia*) as immunomodulatory and anti-inflammatory agents

### Preclinical Toxicology

Safety reports (Regulatory Toxicology) generated through Centre for Advanced Research in Preclinical Toxicology (PCT) on several novel products have become the national guidelines and policy documents for regulatory systems (BIS, FSSAI, DCGI, DBT) in India. This is the first sustainable model of Public-Private Partnership in ICMR.

- Recombinants (DNA vaccine, HPV vaccine, stem cell therapeutics, GCSF, Peg-GCSF)
- GMOs and genetically modified foods (Bt Brinjal, Bt Cotton and *Brassica* species–mustard seeds)
- Biopharmaceuticals and traditional/herbal formulations
- Safety limits of iron filings in tea, phthalate, leaching of heavy metals in glass bottles



# Contribution to National Programmes and Policies

Nutrition research has great value in shaping the policies and programmes of a nation and thereby the health of its population. Ever since its inception NIN has tackled many tough challenges and provided solutions that made a difference to community health.



## Public Health Programmes

Gol implemented various public health programmes at the community level including complementary food and nutrition programmes for vulnerable groups of the population through various community settings based on NIN recommendations.



## National Nutritional Anaemia Prophylaxis Programme

Taking NIN recommendations forward, Gol introduced the National Nutritional Anaemia Prophylaxis Programme in 1970 to prevent and control anaemia at the community level. Iron and folic acid supplementation was prescribed as prophylaxis programme for adolescent girls, pregnant women and preschool children.



## National Prophylaxis Programme against Nutritional Blindness

In the fifties and sixties nutritional blindness due to vitamin A deficiency in children below five years was prevalent. Keratomalacia and Bitot's spots were common. After a study of 2500 children, NIN recommended administration of 200,000 IU of vitamin A drops at six months interval for children between 1-3 years. The Vitamin A Prophylaxis Programme was included in the fourth Five Year Plan in the year 1969.



## Complementary Feeding Programmes

NIN research was the basis for the Government of India in 1975 to launch the ICDS Complementary Feeding Programme providing 300 kcal/day to improve the nutritional status of children in rural areas and urban slums. Recently the nutritional norms of the programme have been changed to 500 kcal/child/day.



### Operational Research

NIN carried out operational research studies on ICDS programme to measure its impact on the nutritional status of children, including process and input evaluation. The study results helped in strengthening the programme and subsequently, it was expanded to all the villages by universalizing ICDS services. Another study assessed the psychosocial development of children, who were beneficiaries and non-beneficiaries of the ICDS for the estimation of ICDS service impact. The study indicated that the outreach of health, nutrition and child care was better in ICDS covered areas compared to that of non-ICDS areas.



### Nutritional and Health Assessment Surveys

NNMB conducts periodical surveys to study the nutritional status of various vulnerable groups in the country. The dynamic database generated by NNMB continues to be utilised by policymakers, programme implementers and different government agencies across the country in order to develop need-based programmes through policy development.



### Prevention of Food and Water Contamination

Food and water safety are high on the agenda of NIN. Following outbreak of epidemic dropsy NIN recommended to Gol to check adulteration of cooking oils. Selective cultivation of yellow mustard, strict enforcement of regulations, punishment of unscrupulous traders was recommended. With regard to *Lathyrus sativus* NIN studies confirm that consumption of less than 60gms dal/day is not harmful. Studies on aflatoxin contamination in rice facilitated policy decisions. Appropriate intervention measures were taken based on NIN recommendations to prevent and control fluorosis. Ground water supply containing mica and silica was replaced by surface water in villages.

# From Labs to Communities

## Outreach Activities

The Institute has adopted several innovative means of communicating and transferring its knowledge from the science labs to kitchens via various groups of communities. Several need-based training programmes are organised by NIN to hone the skills of health functionaries. Many scientific, semi-scientific and popular publications have been brought out and made available to the public to disseminate knowledge related to various aspects of nutrition and health at the community level. Further, nutrition education and communication research has established the usefulness of various media and methods including folk art forms, classroom-based education and computer-aided education for disseminating nutrition messages in different settings.



# Human Resource Development

## Capacity Building



World Health Organization (WHO), Food and Agriculture Organisation (FAO) and UNICEF have recognised NIN as Centre for Excellence in nutrition training. To fulfill its responsibility of capacity building the Institute conducts several educational courses and training programmes.

- Twelve week Post Graduate Certificate course in Nutrition
- Two year MSc programme in Applied Nutrition
- Two year MSc programme in Sports Nutrition

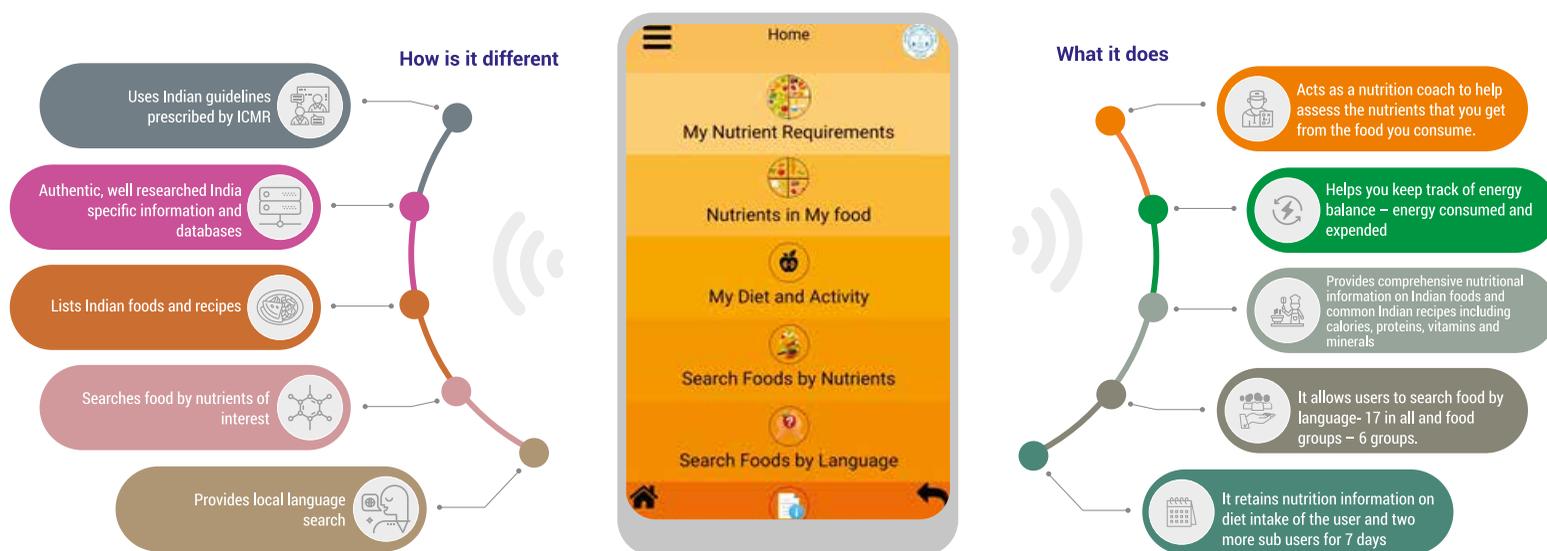
### Training Programmes:

- Orientation in nutrition for medical college faculty and public health personnel
- Need-based training programmes for frontline health workers and professionals
- Orientation programme for Child Development Project Officers on combating malnutrition, knowledge and awareness building at community level
- Food and nutrient data analysis programme for the staff of ICMR-NIRTH, Jabalpur
- Nutrition methods drill for post-graduate medical students
- Train the trainers program for fluorosis prevention and control under NPPCF
- Capacity building for preclinical drug discovery with support from Ministry of Skill Development and Entrepreneurship and UKIER

150 students have acquired their doctorate degrees from NIN.

## Food Coach on your Phone

We live in the age of smartphone apps that are ubiquitous and engaging. They are used mostly by urban populations for accessing the web on-the-go. Smartphone users tend to be aware of global health and food trends and like to follow them. To keep up with the times, NIN developed a mobile app Nutrify India Now. Considering the widespread nature of non-communicable diseases like hypertension, diabetes, obesity, this app will go a long way in helping Indians keep a close watch on what they eat.



Available on Google Playstore and [www.mygov.in](http://www.mygov.in)

## Commemorative postage stamp released to mark NIN centenary

To mark the completion of hundred years of service to the nation Hon'ble Union Minister for Health and Family Welfare Dr Harsh Vardhan released a limited edition commemorative stamp with face value of Rs 5/- in October 2019.



# Up your Nutrition Quotient

## Nutrition Games

Childhood is a crucial formative stage in the life cycle of an individual. Malnutrition during this phase of life could result in the onset of degenerative diseases in a later part of life. Nutrition education is a key element in promoting sustainable healthy eating behaviours and should start from early stages of life.

School-based interventional programs not only increase knowledge about nutrition and health but also lead to significant changes in food choices.

NIN developed interactive games to focus on improving visual literacy and retention of nutrition knowledge pertaining to Identifying healthy foods, functions of foods and concepts of a healthy lifestyle among users.

These games were developed as part of an intramural project of NIN Pictorial Learning and Visual Imagery-Based Activity Methods in Nutrition Education for Primary School Children in India and are adopted by educationists and teachers in their lesson plans.

### Reading with hands



NIN brought out three of its popular publications Dietary Guidelines for Indians, Diet and Diabetes and Diet and Heart Diseases in Braille format for the benefit of the visually challenged. This is part of ICMR's inclusive approach for science and technology dissemination and promoting public health. These books have been distributed to visually challenged individuals and institutions catering to such students across the country free of cost.

**1. Cross Word Puzzle**

Down

1. Name one animal food that is rich in protein (meat?)
2. What nutrient is milk rich in?
3. What drink is very good for your teeth and bones?
4. Which fruit is rich in Vitamin C?
5. Which nutrient is it all about?
6. This is important for an active and healthy life.

Across

1. What do Carbohydrates give us?
2. What nutrient is rich in Vitamin B?
3. Green leafy vegetables are rich in what?
4. Carbohydrates are found mostly in what?

**2. Sorting Foods**

Help Anurag to bring the jumbled broken words together and sort out healthy foods & unhealthy foods and write them in the right column.

Healthy	Unhealthy

Pen cuts Boiled oss Mas Kur foods Car Chi Pul Fizi Pap Sam gi Leafy Street Soya kure egg ze sals Bur rot eye Spr Soft Car ses ps try vegetables bean outs drinks ger Bis

**3. Missing Letters**

Find the missing letters in each word (Hint: Read the sentence beside the word for a clue)

1. R\_ \_ J This is a millet rich in iron and calcium
2. W\_ SA\_ This is one of the cereals (energy giving foods)
3. P\_ TA\_ O This vegetable is rich in starch (Carbohydrate)
4. T\_ BM\_ R\_ C This is a spice known to have anticancer properties
5. E\_ E\_ CL\_ E This keeps you healthy, fit and active
6. S\_ R\_ U\_ B These are rich in vitamins, minerals and protein
7. N\_ T\_ B These are rich in iron
8. G\_ A\_ A This is an inexpensive nutritious fruit
9. C\_ \_ R\_ T This vegetable is rich in Vitamin A
10. L\_ \_ M\_ B These are rich in protein (Body builders)

**9. Food Pyramid**

Write the number of the food item in the right place in the Food Pyramid

**Read the sentence and match it with the picture on the opposite page by writing the number of the sentence in the block next to the picture.**

9. These foods are loaded with vitamins and minerals and protect you from diseases
10. These foods should be avoided as they are not hygienic
11. This is a balanced diet
12. Doing this regularly will keep you fit and healthy
13. These foods are called body building foods
14. These are bad for your bones and teeth if consumed regularly
15. This is caused due to vitamin 'A' deficiency
16. This is required but not more than 5grams iday /person

**5. Match the following by writing the correct number in the boxes**

Energy giving foods

Body building foods

Exercise daily

Balanced diet

Protective foods

**6. Write the HEALTHY PICTURE NO. in the HEALTHY row & UNHEALTHY PICTURE NO. in the UNHEALTHY row**

Healthy	Unhealthy

**7. Read the sentence and match it with the picture on the opposite page by writing the number of the sentence in the block next to the picture.**

1. These foods should be taken sparingly.
2. These foods are rich in Vitamin 'A'
3. These animal foods are rich in Proteins
4. This is important before having your food and after using the toilet
5. These are called Citrus fruits and rich in Vitamin 'C'
6. These are energy giving staple foods
7. These are iron rich foods
8. Only 20-25 gms of these should be consumed iday /person

**10. Word Search Puzzle**

Fill in the blanks with the right words hidden in the puzzle on the opposite page

1. \_\_\_\_\_ is the richest source (40%) of protein
2. Prefer \_\_\_\_\_ over other non-vegetarian foods
3. Green leafy vegetables are rich source of \_\_\_\_\_
4. Goitre is the enlargement of thyroid gland due to \_\_\_\_\_ deficiency
5. \_\_\_\_\_ is essential for formation and maintenance of skeleton and teeth
6. Iron deficiency causes \_\_\_\_\_
7. Always maintain personal \_\_\_\_\_
8. Do not skip \_\_\_\_\_
9. 5 grams of \_\_\_\_\_ is required per person per day
10. 450gm of \_\_\_\_\_ and vegetable are recommended/person/day

A	M	S	O	I	U	D	Y	Z	K	F
I	R	O	N	B	D	C	L	G	I	R
I	H	Y	G	I	E	N	E	F	G	U
O	S	A	C	T	V	R	E	A	E	I
D	B	B	R	E	A	K	F	A	S	T
I	N	E	A	N	E	M	I	A	A	S
N	C	A	L	C	I	U	M	M	L	I
E	M	N	A	F	I	S	H	A	T	N

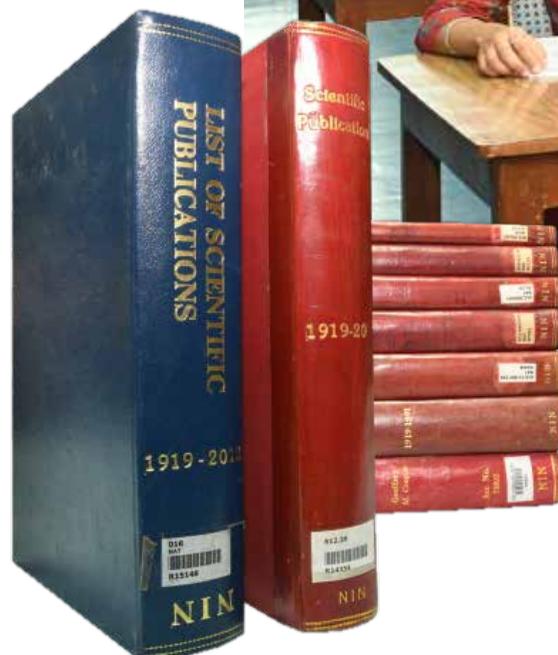
# Repository of Knowledge

The library plays a central role in a research institute. Libraries are the visible form of the scholarly spirit that exists there. The library at NIN is a veritable treasure trove that has grown over the decades. It houses century-old research journals, papers, rare and sought-after reports and chronicles. People from all over the country also visit NIN library for reference work.

#### The library contains:

- Over eighteen thousand books
- More than forty thousand bound volumes of old journals
- More than twenty leading international scientific journals
- Nearly fourteen thousand reports

The unique scientific culture at NIN was developed in the early years during Dr Gopalan's time. Weekly group meetings, seminars and journal club meetings were held to discuss advancements in nutrition and work done at NIN.





A good library adds value to the research, makes for better informed researchers, saves time of researchers, improves research practices, increases the stature of the Institute and raises the quality of research. 'The library at NIN is very good and is accessible round the clock to scholars.'

Dr Mahtab S Bamji



# Looking through the Lens of Science



NIN museum displays the research carried out at various levels while providing a window to the common man to understand the role of NIN in public health. The museum educates the public on the nutrition in everyday food through models, posters and attractive artworks.



The museum is open to all visitors and is especially popular with school students, who are brimming with energy. At NIN, every day is open day for school children. The work of great nutrition scientists ignites a spark in the minds of these young explorers and expands their horizon.

## Overview

Located in a region that qualifies as the city's institutional area, NIN borders the century-old Osmania University campus. It is part of a seven kilometre long science corridor that accommodates many national scientific institutes of Hyderabad. The 30 acre campus is lush green dotted with many old trees. It is one of the oldest and foremost research centres of Indian Council for Medical Research. The Gopalan Block, named after Dr. C. Gopalan, former Director of NIN was declared open in 1978. The iconic wall mural on this building is a timeless work of art which depicts the nutrition and health theme in vivid colours. Divisions of field studies, food and drug toxicology, NNMB are also located in this building.

Administrative block, library, museum, research labs, auditorium, offices of different departments, hostels and residential quarters can be found in the campus.

Interspersed between various buildings are attractive gardens with neatly manicured lawns.

More than 1600 health professionals from 35 countries have been successfully trained at NIN.





Laboratory Animals Information Service Centre (LAISC) was established in 1956 at Cancer Research Institute, Bombay, under the aegis of National Infrastructure Facility for Laboratory Animals. It was later shifted to NIN in 1976. In 1995, these two centres were merged into a single unit and renamed as National Centre for Laboratory Animal Sciences (NCLAS). The centre breeds and supplies genetically and microbiologically defined laboratory animals to working scientists all over the country for research, within the framework of the Institute's Animal Ethics Committee regulations stipulated by GoI. NCLAS has developed three mutant rat models to serve as animal models in drug development for chronic diseases.

In 2017, it was hived off as a full-fledged research institute, National Animal Resource Facility for Biomedical Research (NARF-BR) and relocated to Genome Valley, Shamirpet, Hyderabad.

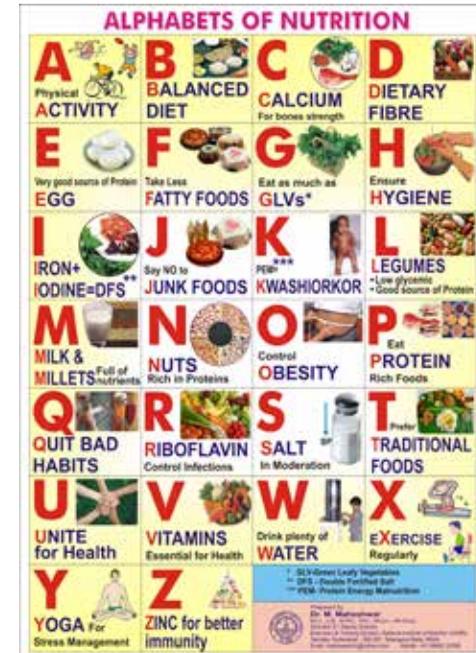
## Our Treasure

Nutrition research outcomes become meaningful when they are transferred to the community. In order to create nutrition awareness among the general public, NIN brings out several books and communication materials from time to time. Over the years NIN has released several books, booklets, pamphlets and folders specially designed to educate the people on the various aspects of food, nutritive values, recommended dietary allowances and therapeutic diets. All these are very reasonably priced and can be purchased from the sales counter at the campus. Dietary Guidelines, Nutritive Values of Indian Foods, Recommended Dietary Allowances, Diet and Diabetes, Diet and Heart Disease are the most popular books.



## Communication Collaterals

NIN brings out pamphlets, flyers and leaflets dealing with specific topics from time to time to spread awareness in the community. The Institute has leveraged traditional folk art forms as an innovative tool to educate the public.



## A Ready Reckoner of Health Indicators

### Online, Virtual, Interactive

ICMR-NIN created the National Nutrition Atlas in 2017. It is India's first ever digital atlas available online. It provides information and data on nutritional status of population groups at national and state levels.

- The dashboard tracks data on undernutrition, over nutrition, overweight, obesity, communicable and non-communicable diseases.
- The portal also includes information on nutrition rich foods and nutri-guide for various nutrients, minerals, essential amino acids, fatty acids, dietary fibers and proteins, along with their biochemical cut-offs, RDA, signs and symptoms and dietary sources.
- It makes use of publicly available data sources like reports of NNMB, NFHS, WHO and other public databases.



### Defining the Nutrition Value Chain of India

In a unique collaboration ICMR-NIN with Tata Trusts launched a first of its kind centralised data repository that throws light on eating habits, patterns, status of malnutrition, prevalence of non-communicable diseases and other factors that define the nutrition value chain of the country.

Data for this storehouse is sourced from government agencies including National Family Health Survey (NFHS), Agriculture Informatics Division of GoI and National Sample Survey, to name a few. The advanced analytics and big data visualisation through a central data repository can be accessed at <https://tatanin.org>.

- Throws light on eating habits, patterns, malnutrition, non-communicable diseases
- Presents a rare collection of databases on nutritional habits
- Provides exact overview of food/nutrition status of states and country
- Aims at augmenting the functioning of Central/State government departments by providing data-driven insights and advice

# e learning Modules

## Self Paced and Effective



The Institute has leveraged technology to develop e-learning modules in association with Ministry of Women and Child Development as part of POSHAN Abhiyaan initiative. Nutritious food, anaemia-free India, sanitation, health and hygiene are the five components of this programme. These modules create and promote awareness on nutrition among general public, particularly adolescents, pregnant and lactating women. One can register for the e-learning modules of various subjects: basics of nutrition, mother's nutrition and health, infant and young child weaning practices, anaemia,



food fortification, WaSH (water, sanitation and hygiene), immunization, non-communicable diseases(NCDs), yoga etc. At the end of the course successful candidates can generate certificates online.

Learners can navigate to these e-learning modules through SWAYAM portal, NIN and Ministry of Women and Child Development websites.

## Down the Decades



**Sir Robert McCarrison**  
1918-1935



**Dr Tulpule**  
1980-1983



**Dr B. Sivakumar**  
2004-2005



**Dr W.R. Aykroyd**  
1935-1945



**Dr B.S. Narsing Rao**  
1983-1988



**Dr B. Sesikeran**  
2006-2012



**Dr Patwardhan**  
1946-1960



**Dr Vinodini Reddy**  
1988-1995



**Dr R. Hemalatha**  
2017-Present



**Dr C. Gopalan**  
1961-1973



**Dr Mohan Ram**  
1995-1996



**Dr Srikantaiah**  
1974-1980



**Dr Kamala Krishnaswamy**  
1997-2002

## Departments



**Mr T. Longvah**



**Mr K. Venkaiah**



**Dr A. Laxmaiah**



**Dr P. Uday Kumar**



**Dr Vijaylakshmi Venkatesan**



**Dr A. L. Khandare**



**Dr B. Dinesh Kumar**



**Dr Y. Venkataramana**



**Dr D. Raghunatha Rao**



**Dr Bhanu Prakash Reddy**



**Dr Bharati Kulkarni**



**Dr Babu Geddam J.J.**



**Dr S. Ahmed Ibrahim**

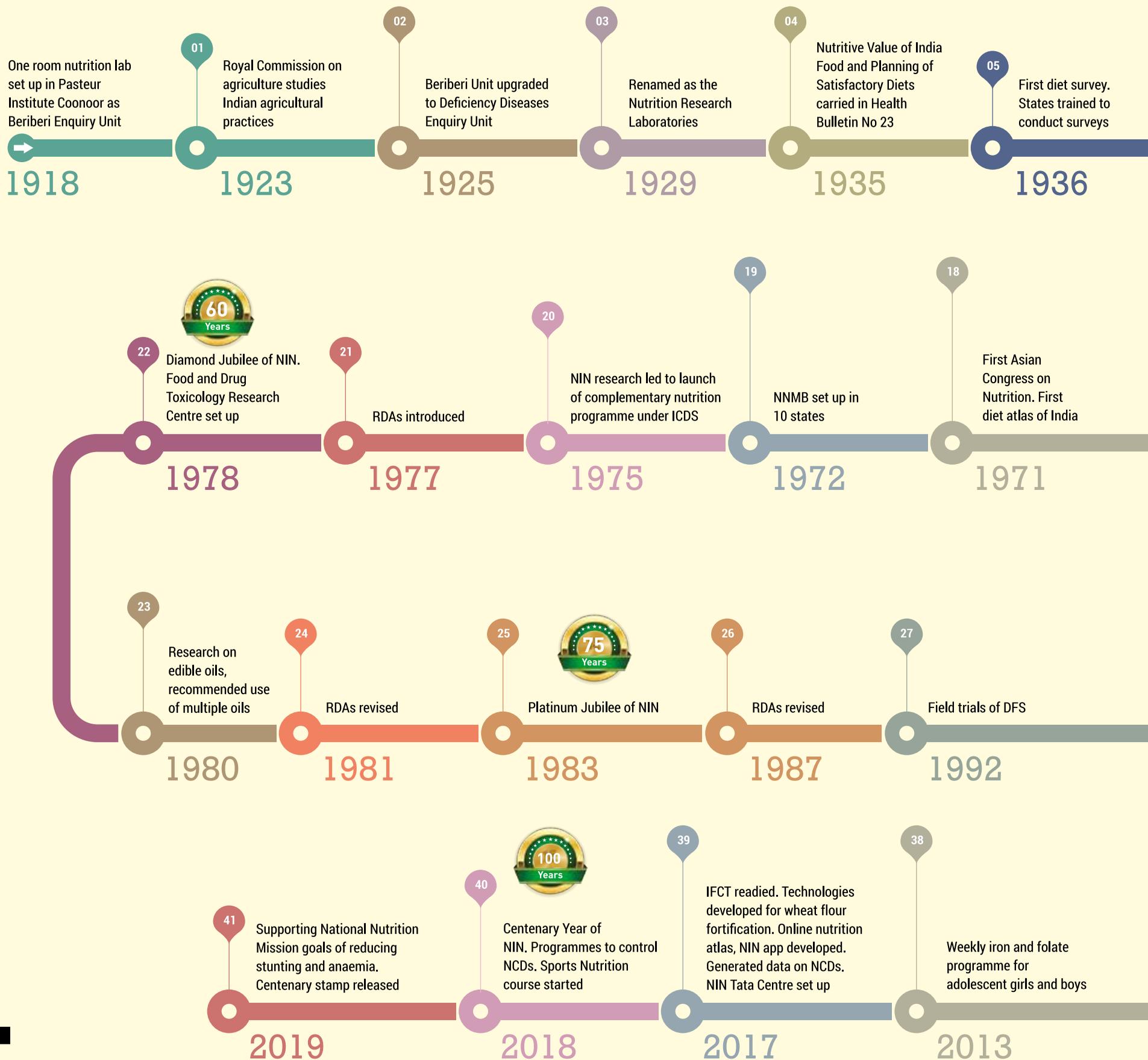


**Dr J. Sudip Ghosh**

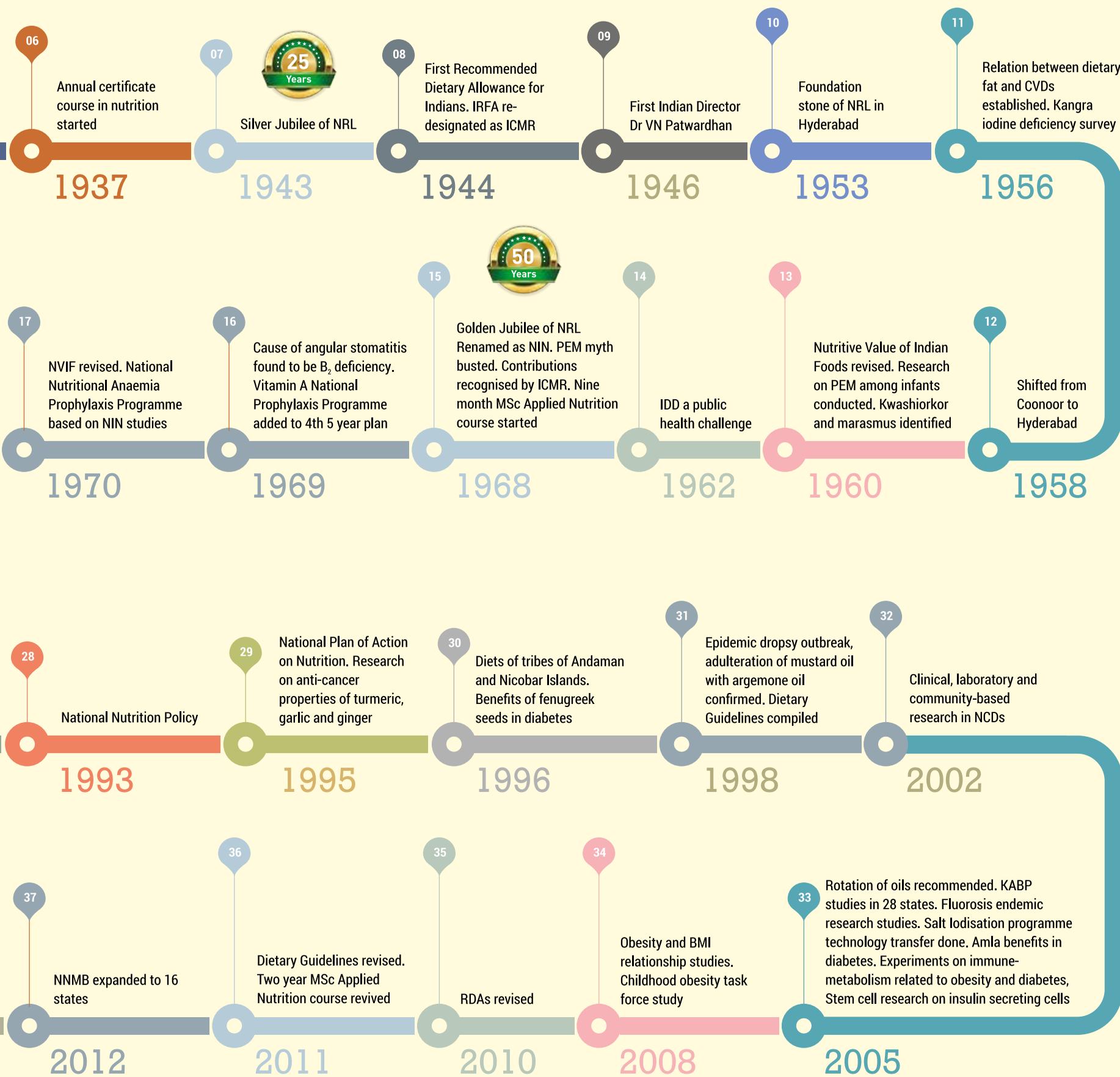


**Dr K. Damayanti**

# A Journey of Achievements



# and Historical Milestones



# Staff of NIN



Dr R. Hemalatha, Director, NIN

## **Sitting (Left to Right)**

P. Amrutha Rao, K. Mangthya, P. Moses Ashok Kumar, R. Raghunadh Babu, Mota Chandrasekhara Rao, R. Radhakrishna Sarma, P. Ajeya Kumar, N. Amulya Rao, K. Srinivasa Rao, B. Narayana, S. Ananda Rao, V. Vikas Rao, M. Satyavani, D. Vijaya Bhaskara Rao, Anil Kumar Dube, M. V. Surekha, J. Sreenivasa Rao, S. M. Jeyakumar, Sanjay Basak, Ayesha Ismail, M. Maheshwar, S. S. Y. H. Qadri, C. Suresh, Sudhip Ghosh, N. Harishankar, J. Padmaja, R. Harikumar, P. Suryanarayana, Bharati Kulkarni, G. Bhanuprakash Reddy, B. Dinesh Kumar, V. Vijayalakshmi, A. Laxmaiah, P. Suresh (I/C Director, NARFBR), R. Hemalatha, Director, T. Longvah, K. Venkaiah, P. Uday Kumar, A. L. Khandare, D. Raghunatha Rao, Y. Venkataramana, J. J. Babu Geddani, M. Shiva Prakash, N. Arlappa, S. N. Sinha, S. Ahamed Ibrahim, N. Balakrishna, S. Vasanthi, I. I. Meshram, G. M. SubbaRao, P. Raghu, K. Damayanthi, M. S. Radhika, K. Rajender Rao, Sylvia Fernandez Rao, G. Venu (SAO), Ch. Madhulatha, Sudha Srinivasan, D. V. Lakshmi Rani, Latha Kumaraswamy, M. Siva, P. Dhanasekharan, R. C. Padmini Mohan, K. Ch. Ramayya Dora, M. Rajagopala Chary, K. Sivarami Reddy, V. Elisha, Alice Mary, B. V. Nancharamma

## **Standing (1st Row-Left to Right)**

K. Venkataramana, Niharika, G. Madhavi, P. Anitha Chauhan, P.S. Prashanthi, B. Tulja, C. Sai Babu, S.P.V. Prasad, P. Madhusudhana Chary, Ch. Ranga Rao, K. Vasudev, M. Seshacharyulu, S.A. Brinda, V. Bhaskar, B. Venkateswara Rao, K. Narasimha Reddy, N. Satyanarayana, B. Ramulu, L. Vijaya Durga, P. Sailaja, K. Sharada, S. Hemalatha, B.R. Annapurna, V. Raju Naik, K. Srinivasu, Ch. Hanumantha Reddy, R. Naveen Kumar, P. Krishnaswamy, Anwar Basha, Dasi Teena, Irfan Ahmad Mir, B. Naveen Kumar, Sudhakar Reddy, B. Santosh Kumar, Paras Sharma, R. Ananthan, P. Sujatha, S. Devindra, A. Rajanna, Raja Sriswan, J. P. Devraj, V. Vakdevi, Ravindranath, B. Rakesh, Malini V. Rao, G. Prashanthi, V. Swayam Prabha, K. Sailaja, G. Mahesh Kumar, G. Durga Prasad, M. Babu, E. Syama Sundari, Shakila Banu, P. Prabhavathi, G. R. Srinivas, Mohd. Ilyas, Shaik Jamaluddin, D. Ramanjaneyulu, M. Jawahar Joshua, M. Raghuram, U. Somayya, A. Venkata Ramana, G. S. Gautami, Mini Pramod, T. Anuradha Jayalaxmi, A. Narsing Rao, A. Satyanarayana Prasad, M. Rekha, K. Santhosham, G. Tulasi Bai, G. Neeraja, Jayamma

# Centenary Year



## **Standing (2nd Row-Left to Right)**

Manmohan Meena, V. Kondaiah, P. Srihari, M. Krishna, YVL Narasimha Rao, Prakash Kulkarni, G. Lalu, P. Satish Babu, M. Sripal Reddy, S. Devendran, M. Shrinath, A. Santosh Kumar, A. Anjaiah, B. Bal Reddy, Purna Chandra Beshra, R. Ramsingh, Hrusikesh Panda, Prathap Reddy, N. Raju, D. Srinivas, M. Sreedhar, B. Nageswar Rao, K. Srinivas, G. Satyanarayana, Mohd. Yaseen, Rama Rao, K. Sreenu, T. Govind, E. Srinivas, Polishetty Naidu, M. Sriramulu Naidu, D. Rakesh Naik, K. Subhash, M. Seenu, P. Nagulu, K. Venkatesh, G. Viswanatham, G. Janardhan, N. Bhaskar, K. Harinarayana, M. Narasimha, Bhujender, Satya Paul, D. Ravindar, I. Poshetty, Iqbal, Parthasarathy, Shyam Sunder, BVS Babu, V. Rajkumar, Md. Shabeer, Kishan, Guruswamy, K. Venkat Reddy, E. Krishna, P. Ravinder, M. Narsingrao, Jangaiah, V. Somaiah, M. Satyamma, Neelamma, C. Siva Leela, Narahari, Mahadev, Mabbu Ramulu, Narasaiah, Punna Reddy, G. Yadagiri, Madhava Reddy, Md. Abdul Satter, P.S. Rama Rao, V. Bhuvaneshwaran, M. Srinivas, Balanarayana, Rajitha, Saritha, Ruspa, G. Bhavani, V. Gowthami, G. Radha, E. Bhavani Eswari, G. Y. Anita, Aruna Reddy, K. Usha Rani, S. Rojamani, Sheela, D. Rani, G. Saraswathi

## **Standing (3rd Row-Left to Right)**

R. Sahadeva, M. Venkataiah, Balarjun, Mukhtar, P. Dasarath, S. Chandraiah, Venkatesh, K. Krishna, Y. Agreepa Raju, N. S. Kumar Reddy, Joseph, Lakshman, Satyanarayana, Asai Thurai, P.V. Sunu, B. Giribabu, A. Kiran Kumar, J. Surender, P. Narendra Kumar, P. Bheem Shankar, Upender, P. Dasarath, G. Upender, Swathandra Rao, G. Suresh, Satya Kumar, Pavan Reddy, Prasad, A. Naresh, Sasi Bhushan, B. Jagdish, G. Tatanand, K. Naveen Kumar, N. Peddi Reddy, Jangaiah, Narasimha, K. Vinod Reddy, B. Srinu, D. Venkatesh, Mohan Rao, M. Krishna, Kasipathi, Md. Chand, J. Nageshwar Rao, Mohd. Habeebuddin, Sammy Reddy, N. Yadagiri, K. Balaji, Mohd. Maqbool, Md. Mahboob, M. Bikshapathi, E. Kondal Reddy, K. Chandran, N. Ramesh Kumar, Manga Narasimha, Md. Moulana, P. V. Poulous, J. Yadagiri, C. Chandramouli, Suresh, Md. Yousuf, Ch. Shankar, V. Somaiah, Michael Fernandez, G P. Narender, K. Srinivasa Raju, S. Mahesh Babu, B. Omprakash, Md. Younus, P. Narasimha, Rajkumar, Narottam Pradhan

Menu For  
**A Golden Future**





**D**otted with several milestones, NIN's journey of a hundred years has been celebrated here.

Many things on the food plate of India have been set right in the past century. Food provides a cultural identity to the people and NIN has rightly restored the national pride through its research and community interventions. Having engaged in meaningful research that is relevant to the changing goalposts of a growing nation, NIN has come to be the go-to-institute for all its nutritional needs. But resting on its laurels is not on the menu for the scientists here. The achievements of a hundred years will serve to renew the commitment and fuel the journey ahead. Going forward NIN is focused on achieving the nutrition targets of the Sustainable Development Goals in India, despite the challenges of climate change and agrarian crisis.

The goal is to end all forms of malnutrition and hunger by 2030 and reach the targets on stunting and wasting in children less than five years of age, while addressing the nutritional needs of adolescent girls, pregnant and lactating women and the elderly. The setting up of the National Nutrition Mission last year with a budget of over Rs. 9000 crores will prove to be a game changer as it has prioritized nutrition in an integrated health agenda. POSHAN *Abhiyaan* has provided a holistic framework for nourishing the nation. Working in alignment with the National Nutrition Mission, NIN is confident of overcoming the challenges and reaching many of its targets in the years to come. There are miles to go, as they say and the milestones will keep coming.









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