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Global Alliance for Improved Nutrition

Wheat Flour

(Iron, Folic Acid, Vitamin B12)

Edible Oil

(Vitamin A & D)

Milk

(Vitamin A & D)

Food Fortification In India

Enriching Foods, Enriching Lives

Deepti Gulati, Head of Programs, GAIN

Nutrition is the Cornerstone that

Defines Health and is Central to Growth and Development

Seventy-two Years Ago ……..

When India became independent, we faced two major problems, with grave nutritional impact:

- ✓ threat of famine and low agricultural production and
- ✓ lack of an appropriate food distribution system

These were compounded by:

- ✓ low dietary intake because of poverty and low purchasing power;
- ✓ high prevalence of infections due to poor access to safe water, sanitation & health care;
- ✓ poor utilization of available facilities due to low literacy and lack of awareness

RESULT: Population suffered from CED and micronutrient malnutrition

Nutrition in Indian Constitution

Access to good nutrition and health is a fundamental human right

Hence, our constitution has made several provisions that reflect our commitment to improve nutrition and health our population

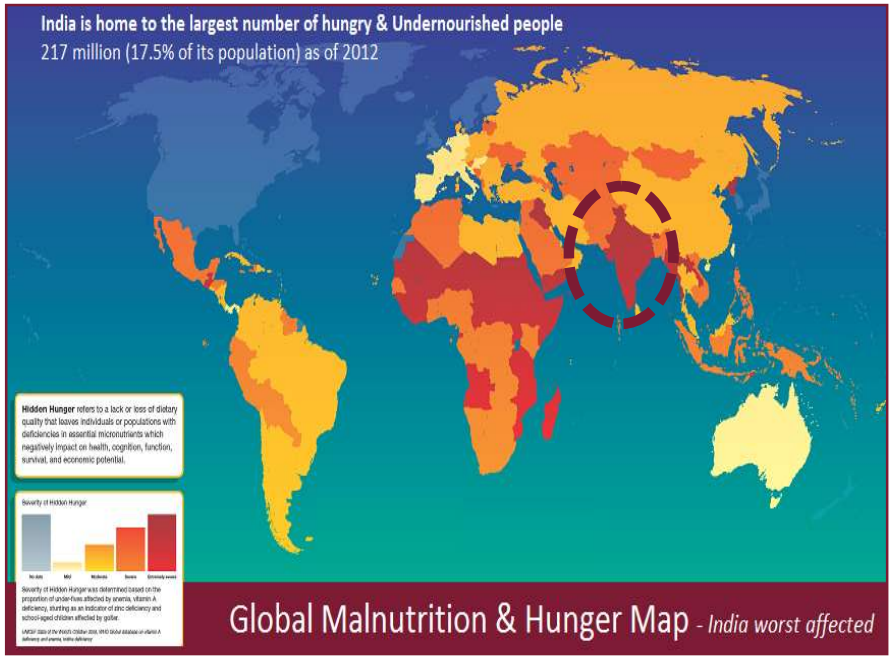
The Indian Constitution recognizes nutrition as a basic human right and a pre-requisite for the attainment of a person's full physical and intellectual potential.

Article 47 of The Indian Constitution states that 'The State shall regard **raising the level of nutrition;** the standard of living of its people; and the **improvement of public health, as among its primary duties** …..'

Lets See How Are We Faring Today……

Despite substantial strides in food grain production,

- About *26% 0f India's population - 268 million* – are considered food-insecure, consuming *less than 80% of minimum energy requirements*
- Malnutrition in Indian children is amongst the highest in the world
- India has 35 % of the world's malnourished children
- Nearly a third of the world's hungry reside in India



India is severely affected

Why Focus on Hunger and Malnutrition ?

Hunger and malnutrition stunt growth - intellectually and physically, thus leading to:

- ✓ *Compromised health and survival:* Lost Human Capital Potential
- ✓ *Life-long susceptibility to illness & disability:* Low Economic Productivity
- ✓ *Poor cognitive and learning abilities:* Poor Educability & Poor School Performance
- ✓ *Low achievement in school:* Low School Retention rates,
- ✓ *Low productivity and low wages:* Poverty

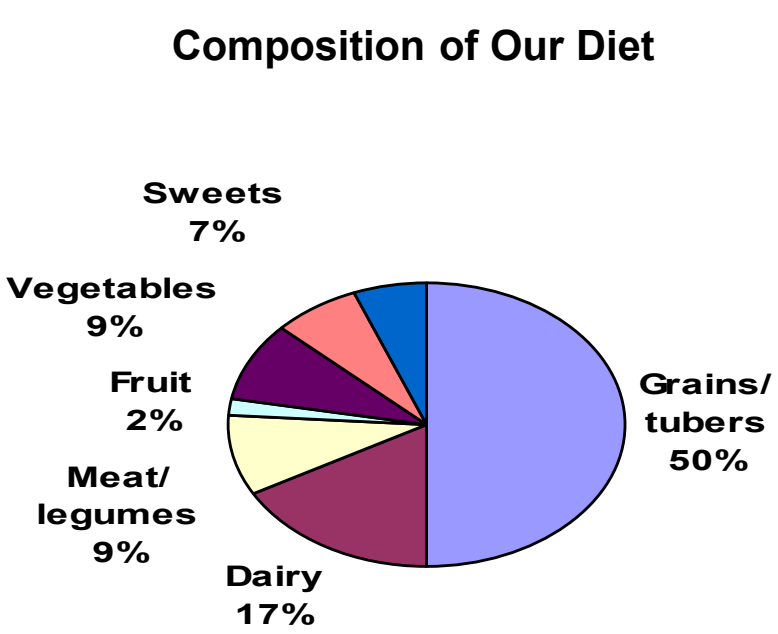
Malnutrition starts early... Right from the Womb

These are Irreversible BUT Preventable !

FOOD THAT WE EAT DEFINES OUR HEALTH

So, let us see what we are eating and how we are faring…

Typical Indian Diet



This type of diet is high on cereals and low on micronutrient rich foods like fruits and vegetables !

Factsheet Data (NFHS-4)

Nutrition & Health Indicators	All India	MP	Raj.	Har.	UP	Bihar	AP	Ker.
CHILDREN								
Children (6-23 months) receiving an adequate diet	**9.6**	6.6	8.4	7.5	5.3	7.5	7.6	21.4
Underweight (< 5 years)	**36**	42.8	37	29	46	43.9	31.9	16.1
Stunted (<5 years)	**38**	42	39	34	40	48.3	31.4	19.7
Under 5 mortality	**50**	65	51	41	78	58	41	7
Children (6-59 months) anaemic	**58.6**	54.6	46.6	55	51.0	58.3	52.9	22.6
ADULTS								
Adults receiving an adequate diet	**60**							
Mothers who consumed IFA for 100 days or more	**30.3**	23.6	17.3	32.5	12.9	9.7	56.1	67.1
Pregnant women (15-49 years) who are anaemic	**50.4**	68.9	60.3	71.7	63.2	63.5	58.6	35.7
All women (15-40 yrs) anaemic	**53.1**	52.5	46.8	62.7	52.4	60.3	60	34.3
Men (15-49 years) anaemic	**22.7**	25.5	17.2	20.9	23.7	32.3	26.9	11.7

Is Nutrition a Poverty Issue?

Parameter (in Percentage) (NFHS-4)	Highest income quintile	Lowest income quintile
Stunting (Height for age <-2SD)		51
Underweight (weight for a	20	49
Thin wor 15-49 (mean body mass index < 18.5)	12	36
Anaemia in children (<11.0 g/dl)		
Anaemia in women (<12.0	46	59
C ds in past 24 ho 6-23 months)	47	42
Consuming Iron-rich foods in past 24 hours (children age 6-23 months)	18	15

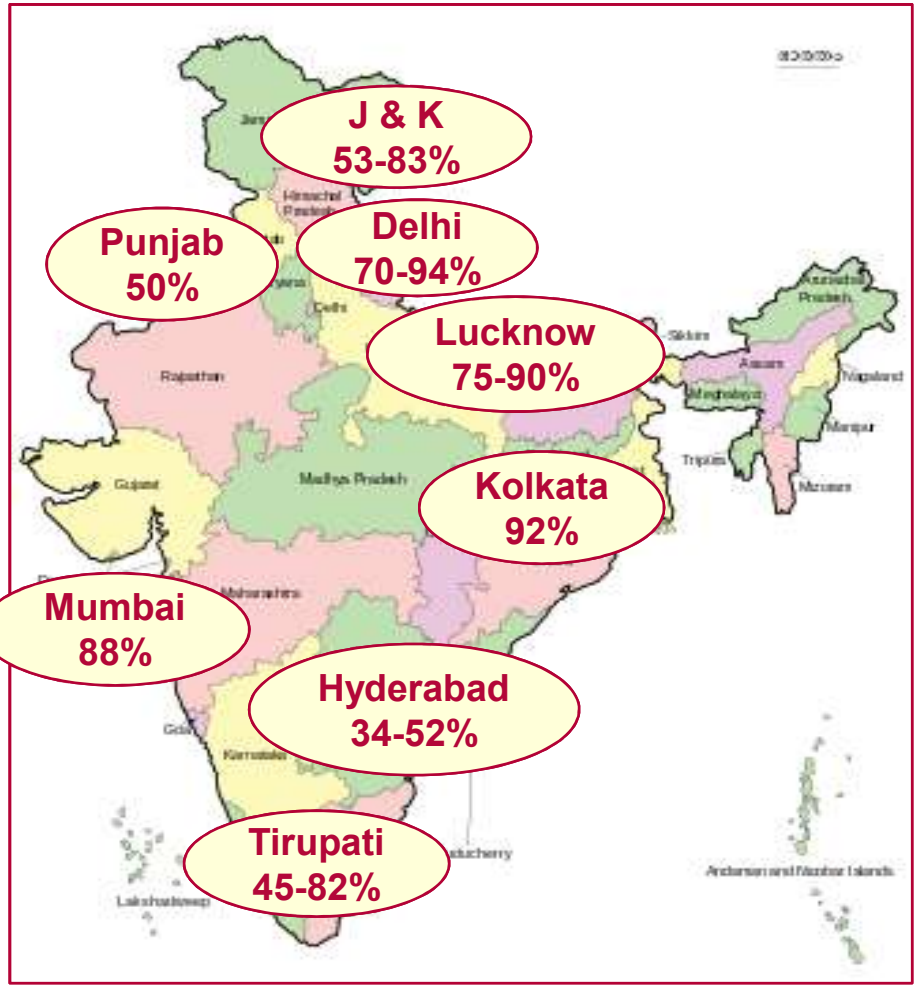
Undernutrition affects poorest the most …

…But poor consumption of micronutrient-rich foods and anaemia affect all !

Source: National Family Health Survey-4, 2015-16

India's 1/3rd population is young, and is considered our Demographic Dividend …But such high levels of micronutrient malnutrition, seriously impair the development of human capital, labour productivity and future social and economic development…This cannot be counted as our Demographic Dividend.

Vitamin A & D Deficiency in India: NIN



States	Vitamin A deficiency at blood level (< 20 μg/dL)	% population eating < 50% of required amount of Vit. A rich foods
Kerala	79.4	91.8
Tamil Nadu	48.8	81.9
Karnataka	52.1	90.4
AP /Telangana	61.5	92.9
Maharashtra	54.7	88.8
MP	88.0	87.4
Orissa	57.7	77.5
West Bengal	61.2	80.6
Pooled	61.8	86.3

India has a very high burden of vitamin A & D deficiencies, impacting all

Micronutrient Malnutrition: 3 Options to Control

Supplementation

- ✓ A safe and efficient strategy to eliminate micronutrient deficiencies
- ✓ Available in capsules and syrups
- ✓ Weekly Iron and Folic Acid tablets are given to school children

GOI programmes reach only about 55% of population. Compliance is also an issue

Dietary Diversification

- ✓ Food prices are spiralling. Hence most diets are only cereals and tubers and are low in vegetables, fruits, lentils and foods from animal sources

Affordability of a diversified diet is a big question

Staple Food Fortification

- ✓ Good option as staple food consumption is high
- ✓ Fortification process is easy.
- ✓ Potential to reach all income groups
- ✓ Does not require changes in eating habits.

Very cost effective (<0.1% of MRP) But only very few foods available in the market are fortified

Fortification is most efficient and low cost & it can yield significant results in a short period of time.

Food Fortification is Not a New Idea

Iodine in Salt	**Switzerland 1923**, **USA 1930** **India 1983/1997**
Vitamin D in Oil & Fats and Milk	**Denmark 1918**, **India 1953 (Vanaspati)** Indonesia 1996, New Zealand 2007 Mexico 2002
Vitamin A in Milk, Sugar and Wheat Flour	**USA, UK 1923**, , **India 1953 (Vanaspati)** Malaysia 1985, Thailand 1993, Mexico 2002, Chile 1997, Mexico , Central America 1974, Philippines 2000, Costa Rica 1991, Puerto Rico, Trinidad and Tobago 1991
Iron, Folic Acid and Vitamin B12 in Wheat Flour	**Canada 1933, USA 1941, Chile 1954** Australia 2009, Costa Rica 1991 Philippines 2001

Over the last 100 years, food fortification has played a major role in improving the health of populations at large in industrialized countries and several nutritional deficiencies have been completely eliminated

Monthly Per Capita Consumption and Expenditure on Staples and Other Foods

Commodity	Monthly per capita consumption, in kg		Monthly per capita expenditure in Rs.	
	Rural	Urban	Rural	Urban
Wheat	4.3	4.0	154	175
Rice	6.0	4.5		
Edible oil	0.67	0.85	60	70
Milk	4.8	5.4	140	184
Vegetables	2.0	3.3	85	132
Fruits	1.0	2.25	41	90
Egg, fish & meat			58	96

Consumption of basic staples is not affected by geographies or socio-economic status . Hence staples lend themselves well for fortification

Source: Household Consumer Expenditure Survey, NSS, 68th Round, June 2014

Benefits of Consuming Fortified Foods

- ✓ Regular consumption of micronutrients-fortified staple foods, **helps to meet 25% - 30% of our daily requirement** of micronutrients.
- ✓ There is a **high acceptability** of fortified foods by the consumers
- ✓ There is a **high bioavailability of micronutrients** through fortified foods
- ✓ Regular consumption of fortified foods has a **rapid impact** on our health and nutritional status
- ✓ Consumption of fortified foods **does not require behavior change**

Strategic Advantages of Fortification

- ✓ Staple foods that are **consumed regularly by all:** wheat flour, oil, milk, rice and salt; are **best suited** for fortification
- ✓ Fortification is a **proven, simple, low cost technology**
- ✓ It is a preventive, ***population-wide approach****, through which the fortified foods can be made available to the entire population, including those served through PDS, ICDS and MDM.*
- ✓ Since staple foods are **centrally processed** and micronutrients are added in very low doses, fortification poses **no risk of excessive intake**
- ✓ Micronutrients added to staple foods have **high stability during cooking and storage.**
- ✓ There is **no change in the colour, taste, texture or quality** of staples due to fortification.

Cost to Fortify

- ✓ Cost of fortificants ranges from **Rs. 20 to Rs.100 per metric ton**, or, **just about 2 - 10 paisa per kg of food**, depending on the type and number of micronutrients added.

Food Commodity	Wheat flour	Milk	Edible Oil
Cost of Fortificants per kg (in Rs)	0.08 - 0.10	0.015	0.10 - 0.15
Cost of fortification, processing, packaging per kg (in Rs)	2.50 - 3.00	0.025	0.10 - 0.15
Cost of fortification per person per year (in Rs.)	6.50 -8.00	2.00-3.00	2.50 – 3.00

- ✓ At the **small chakki level**, the cost of flour fortification is about **40-50 paisa per kg of wheat flour,** as the premix is further diluted to ensure proper blending. Fortificants blending is an issue.

The cost is miniscule on a per-person-per-year basis & benefits enormous !

Food Fortification – It Works

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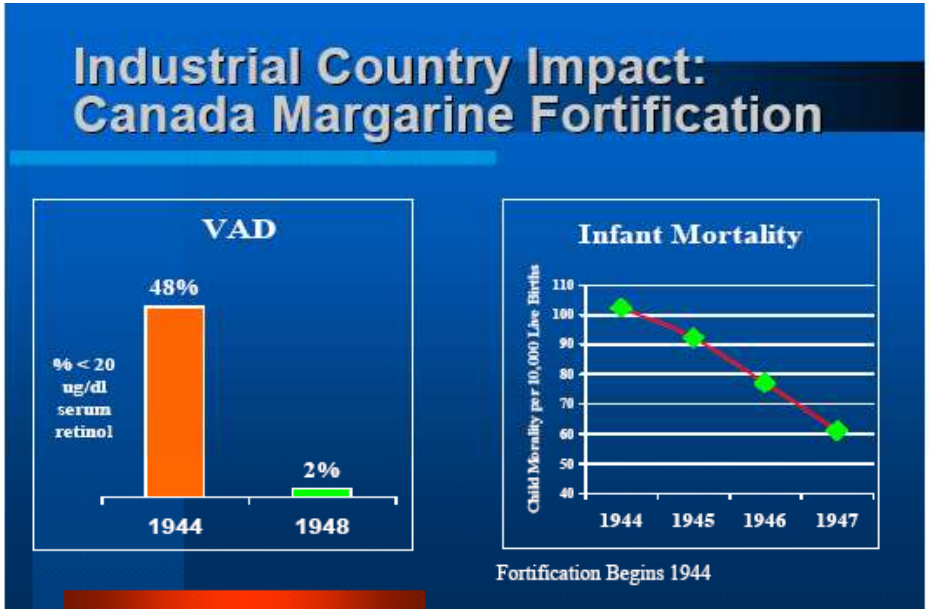
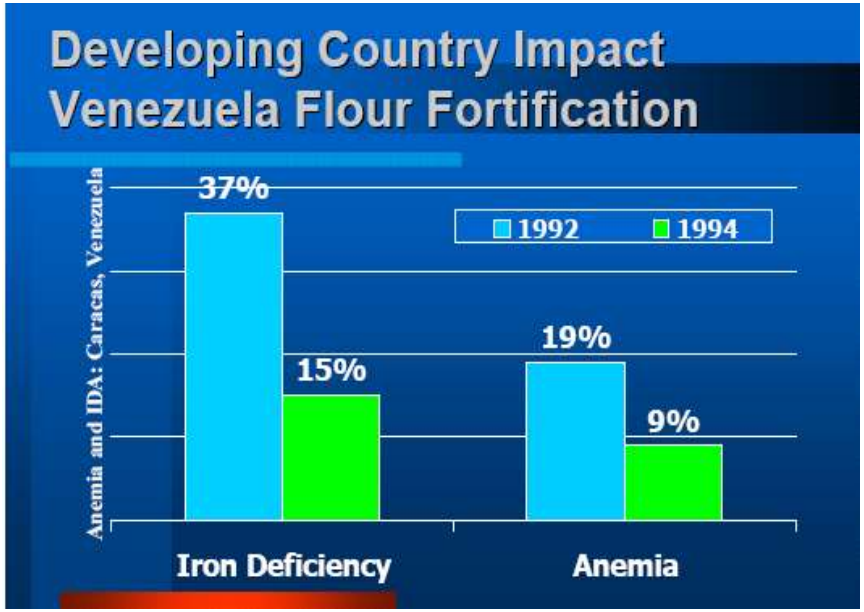
www.gainhealth.org



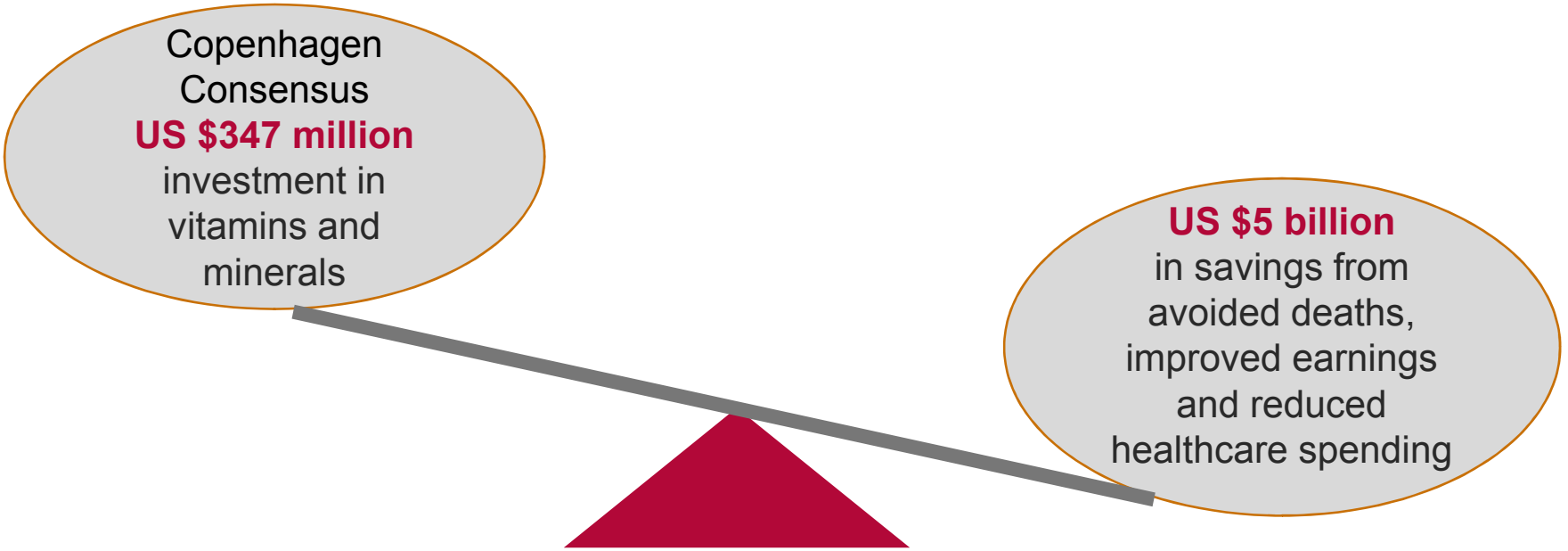
In Canada, **fortification of margarine with vitamin A**, brought down **VAD from 48% to 2%,** and **mortality from 105 to 60 (per 10,000 live births), within 4 yrs.** (1944-1948)

Fortification of wheat flour in Venezuela, reduced **iron deficiency from 37% to 15% and anaemia, from 19% to 9%, within a span of 2 years** (1992-1994)



Food Fortification: Benefits Outweigh Cost

Food Fortification / Enrichment: Addition of one or more essential nutrients to food, **for the purpose of preventing or correcting a demonstrated deficiency** of one or more nutrients at the population level / specific groups



Probably no other technology available today offers as large an opportunity to improve lives & accelerate development at such low cost & in such a short time* * (Source: Enriching Lives, The World Bank)

NFHS-4 for Year 2015-16 and CNNS-2016-17 Factsheet Data

Nutrition & Health Indicators (NFHS-4) in %	All India	Raj	Har.	UP	Bihar	AP	Ker.
Underweight (< 5 years) (NFHS-4)	**36**	**37**	29	46	43.9	31.9	16.1
Stunted (<5 years) (NFHS-4)	**38**	**39**	34	40	48.3	31.4	19.7
Under 5 mortality (NFHS-4)	**50.0**	**51**	41	78	58	41	7
Children (9-59 months) who received at least 1 dose of vit. A (NFHS-4)	60.2	39.6	66.7	39.5	62.3	72.1	74.4
Mothers who consumed IFA for 100 days or more (NFHS-4)	**30.3**	**17.3**	32.5	12.9	9.7	56.1	67.1
Pregnant women (15-49 years) who are anaemic (NFHS-4)	**50.4**	**46.6**	55	51.0	58.3	52.9	22.6
All women (15-40 yrs) anaemic (NFHS-4)	**53.1**	**46.8**	62.7	52.4	60.3	60	34.3
Men (15-49 years) anaemic (NFHS-4)	**22.7**	**17.2**	20.9	23.7	32.3	26.9	11.7
Prevalence of vitamin A deficiency in children 5-9/10-19 years (CNNS)	**21.5 / 15.6**	**1.0 / 1.9**	24.2 / 8.9	28.7 / 18.8	28.3 / 21.9	22.8 / 13.1	26.5 / 13.2

GAIN is supporting fortification of staple foods (wheat flour, edible oil and milk) since 2011.

Introduction of Fortified Wheat Flour in PDS during 2012-14, brought down anaemia levels (NFHS 4 (2015-16) & Fortification of edible oil and milk since 2012, brought down the levels of vitamin A deficiency in children (CNNS 2016-17) in Rajasthan.

Impact of Edible Oil Fortification on Vitamin A Status: Correlating with CNNS Data

Indicators	States covered under BMGF-funded Oil Fortification Project, & Time-lines indicating actual roll-out of fortified edible oil								
	All India*	Rajasthan	Maharashtra	Haryana	Punjab	Andhra Pradesh	Madhya Pradesh	Gujarat	Telangana
		Since 2012	Late 2017	Late 2017	Mid 2018	Mid 2018	Mid 2018	Late 2018	Mid 2019
Children under age 5 years who are stunted (height-for age) (%)	34.7	36.8	34.1	34.9	24.3	31.5	39.5	39.1	29.3
Prevalence of vitamin A deficiency in adolescents aged 10-19 years (%)	**15.6**	**1.9**	**8.1**	**8.9**	**12.8**	**13.1**	**13.2**	**16.8**	**19.7**

* As per Fact-Sheets of Comprehensive National Nutrition Survey (CNNS) Data 2017-18

Regulatory Support and Creating an Enabling Environment for Fortification

Current regulation and supportive environment

The Food Safety and Standards Authority of India (FSSAI) *permits and advocates for fortification of staple foods and has **gazetted standards** for fortification of staple foods (oil, milk, wheat flour, rice and double fortified salt) provided / sold through food safety-net programmes and commercial channels*

India's 10th, 11th ,12th Five Year Plans, **POSHAN Abhiyan (National Nutrition Mission) and Anaemia-Mukt Bharat Mission** *recommend food fortification* as an important strategy to tackle micronutrient malnutrition

Ministry of Food Processing Industry, GOI, ***provides financial assistance*** to the Food Industry for capital equipment and its installation *for undertaking fortification, and value addition and demand creation*

MWCD, GoI and MHRD, GoI, through their communications dated 10 July 2017 and 2 August 2017 respectively, have made it **mandatory to *use fortified oil, fortified wheat flour and double fortified salt in MDM and ICDS programmes***

Letters of Dept. of Food and Public Distribution, Govt. of India, issued on 3 Nov. 2014, 22 Dec, 2016 and 18 Sept. 2018, state that *all states distributing Atta through PDS, **should distribute Fortified Atta** & pass on the cost to the consumers.*

Key Departments / Implementers

Key Government Departments:

- FSSAI / State FDAs
- Department of Women and Child Development
- Department of Mid-Day Meals
- Department of Food and Civil Supplies
- State Food and Civil Supplies Corporations
- State Cooperative Dairy Federations
- DBT Department of Biotechnology Ministry of Science and Technology, Government of India

Key Development Sector Partners: For Technical Support

- GAIN: Global Alliance for Improved Nutrition: Wheat flour, oil and milk
- Tata Trusts: Oil and milk
- Unicef: salt
- UNWFP: World Food Programme: rice and wheat flour
- NI: Nutrition International: salt, rice and wheat flour
- PATH: rice
- FFI: Food Fortification Initiative: wheat flour and rice
- ICCIDD: International Centre for the Control of Iodine Deficiency Disorders: Iodized salt

FORTIFICATION STANDARDS FOR STAPLES

Micronutrient	Atta & Rice (per kg)	Oil (per gram)	Milk (per Litre)
Iron	28-42.5 mg OR 14-21.25 mg		
Vitamin B12	0.75-1.25 ug		
Folic Acid	75-125 ug		
Vitamin A	500-750 ug RE	6.0-9.9 ug RE	270-450 ug RE
Vitamin D		0.11-0.16 ug	5.0-7.5 ug
Thiamine (B1)	1-1.5 mg		
Riboflavin (B2)	1.25-1.75 mg		
Niacin (B3)	12.5-20 mg		
Pyridoxine(B6)	1.5-2.5 mg		
Zinc	10-15 mg		

Vitamin A (retinol): 1 IU= 0.3 µg RE (Retinol Equivalent); Vitamin D (Cholecalciferol or Ergocalciferol), only plant source: 1 IU= 0.025 µg

CHALLENGES AND LESSONS LEARNT

LESSONS LEARNT

1. Staple Food Fortification is
   - *do-able*
   - *very cost-effective and*
   - *an evidence based strategy,*
2. No organoleptic changes
3. Widely acceptable
4. Processing is simple
5. Very low investment on equipment
6. Industry is:
   - responsible
   - ensures appropriate fortification and
   - *takes pride in contributing to nutritional improvement*

OUR CHALLENGES:

- ✓ Prioritizing Food Fortification to address micronutrient malnutrition, with different stakeholders
- ✓ Building consensus and coordination
- ✓ Building capacities to design, implement and monitor interventions
- ✓ Resource allocation to mainstream fortified wheat flour in the Public funded programs
- ✓ Building efficient supply chain as shelf-life of wheat flour is limited
- ✓ Making fortification mandatory (especially oil and milk) to provide key micronutrients

To Sum Up

- ✓ Fortification **"fills the gap"** between
  - ***intake*** *from regular dietary* sources and
  - ***daily needs***.
- ✓ Fortification is the most:
  - **cost-effective** and
  - **preventive** means of reducing micronutrient malnutrition
- ✓ It poses **no risk** for the normal individual as
  - food consumption is **self-limiting** and the
  - **micronutrient absorption falls**, as their stores increase.
  - This prevents excessive micronutrient accumulation.
- ✓ Cost of micronutrients is **negligible** on a per-person-per-year basis.
- ✓ Conditions for successful fortification programmes require:
  - ➢ Industry Support & Commitment
  - ➢ Political Will and Adequate Legislation, and
  - ➢ Consumer Awareness

WHAT NEEDS TO BE DONE

Building Alliance For Improving Nutrition: Engaging With All

Support to Government

Technical Support to Central Government

- Sharing Indian & global experience as well as good practices on food fortification
- Conducting Sensitization workshops & consultations with all stakeholders
- Developing tool kits for the industry and the regulatory body

Technical Support to State Governments

- Sensitization of State FDA on staple food fortification
- Training & capacity building of FSOs
- Providing tool kits & “Spot testing” kits for qualitative testing
- Supporting monitoring & regulatory work

Support to Industry

Technical and Implementation Support to Industry

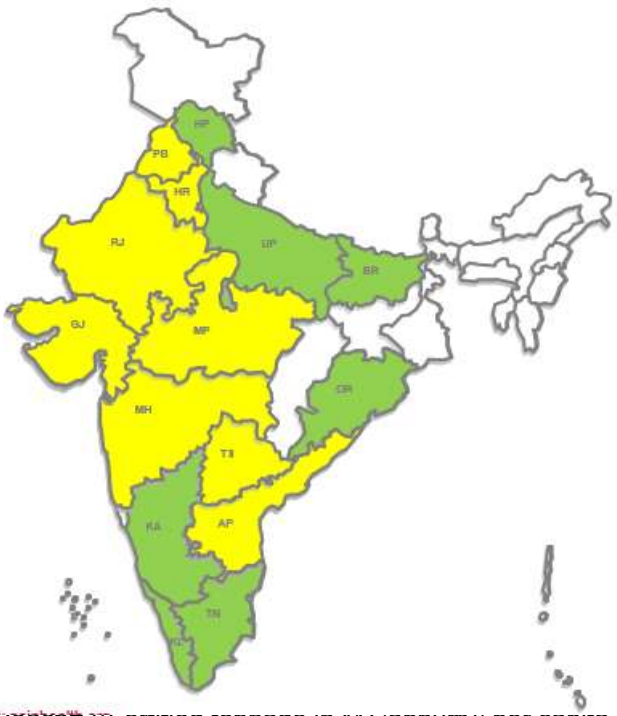
•- Training, capacity building & sharing good practices

•- Linking food industry to accredited / approved premix suppliers & NABL labs for QAQC

•- QA/QC manuals, standard &tool kits & training modules

CIVIL SOCIETY & CONSUMER AWARENESS

GAIN Large-scale Food Fortification (As on January 2020)



S. No.	States	Edible Oil		Milk	
		Total Fortified Tonnage (MT/ annum)	*Persons reached@ consumption level of 25g/ day	Fortified (Litre Per Day)	**Persons reached@ consumption level of 200g/ day
1	Rajasthan	568,222	63,135,778	1,552,795	7,763,975
2	Haryana	59,646	6,627,333	250,626	1,253,130
3	Punjab	152,104	16,900,444	220,256	1,101,280
4	Madhya Pradesh	637,645	70,849,444		-
5	Gujarat	3,135,675	350,436,111		-
6	Maharashtra	1,113,550	123,727,778	420,000	2,100,000
7	Telangana	94,900	10,544,444	340,000	1,700,000
8	Andhra Pradesh	667,536	74,170,667		-
9	Delhi		-	115,000	575,000
10	Uttar Pradesh	526,859	58,539,889	15,666	78,330
11	Bihar	1,370	152,222		-
12	Karnataka	98,800	10,977,778		-
13	Kerala	69,000	7,666,667	10,000	50,00
14	Tamil Nadu	401,000	44,555,556		-
Total		7,526.3	**838,284,111**	2,924,343	**18,621,715**

*Reach= [(Fortified tonnage in MT/annum)/ per capita consumption of edible oil per person per annum]
Per capita consumption of edible oil per person per day = 25 g
Per capita consumption of edible oil per person per annum= 25g*365 days= 9125g or 9.125kg or 0.0091 M

** Reach= [(Fortified tonnage in Litre Per Day)/ per capita consumption of milk per person per day (in Litres)]
Per capita consumption of milk per person per day (in Litres) = 200g/1000 g= 0.2

Fortified wheat flour is reaching about 82 million persons across India through PDS and open market channels

How to Support the State Governments In Scaling-up Staple Food Fortification

1. Provide extensive training to the staple food industry on:
   appropriate fortification method and processes for each staple; and
   enhanced internal quality assurance and external quality control
2. Support and guide on the procurement of quality assured premix for fortification
3. Develop protocols for appropriate handling and storage of micronutrient premix, sampling of the fortified staple foods; and initiating actions in case of over or under fortification;
4. Link the food industries to laboratories accredited by National Accreditation Board Laboratories (NABL) for quality assurance and regulatory activities;
5. Provide “Spot testing” kits for the qualitative testing for the added vitamin A in milk and oil and iron in wheat flour
6. Support the systems for documentation and regular reporting

Way Forward

- ✓ Strengthen regulatory monitoring to ensure the quality and safety of fortified foods
- ✓ Ensure mainstreaming of fortified foods into the public funded programmes like the ICDS, MDM and PDS
- ✓ Make it mandatory to fortify oil and milk with vitamin A and D
- ✓ Promote the +F national logo to indicate that the food is fortified…. just as we promoted red / green dots for vegetarian and non-vegetarian foods
- ✓ Create awareness about the goodness of fortified foods.
- ✓ Coordinate efforts of different sectors: *various Government Departments, Food Industry, Regulators, Civil Society*
- ✓ Nutrition is a *cross-cutting issue* and coordinated efforts of many sectors are required ….. *We need to join hands*

The awareness and aspiration created is now being consolidated

What we need is a strong political will, policy implementation and industry support

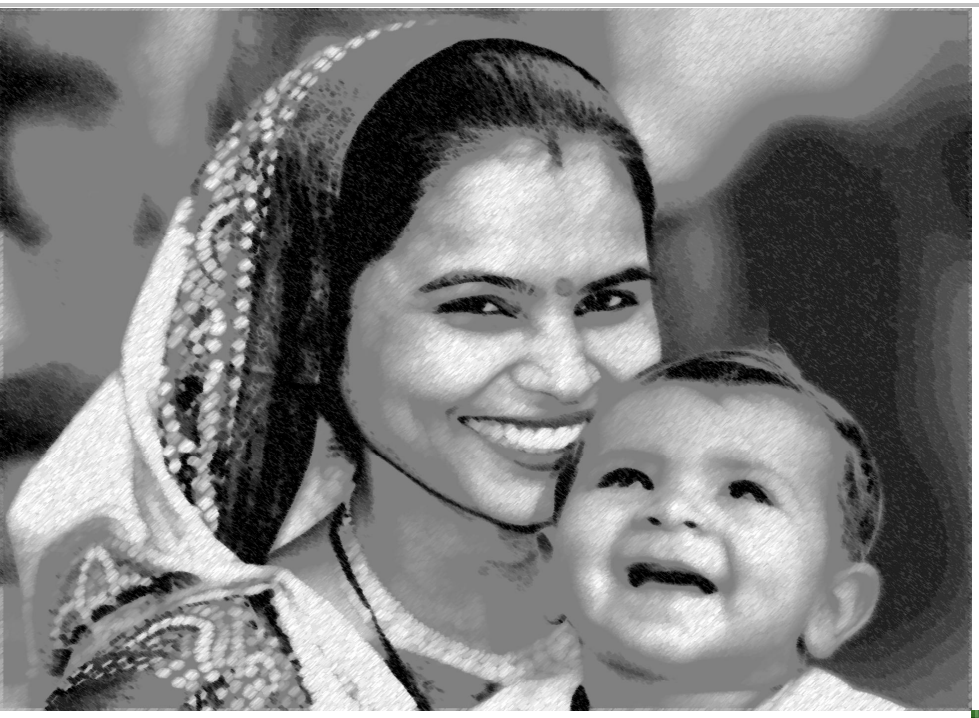
Fortification: Rich Returns on Low Investment

Fortification has a great potential to enrich food and improve the lives of millions of children; by giving them a healthy start to life…..

A basic right, which they rightly deserve.

Let’s not miss out on the opportunity!

FOOD FORTIFICATION IN INDIA:
The Unfinished Agenda



Let's join hands to provide good health & improved quality of life to all !

Let's Eat Right …
Let's Eat Fortified

Thank you !!